

THE SPORTS BOOK



THE GAMES • THE RULES • THE TACTICS • THE TECHNIQUES

“It’s the sports buff’s bible.” –Men’s Fitness

**THE SPORTS
BOOK**



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BOOK



THE GAMES • THE RULES • THE TACTICS • THE TECHNIQUES





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KEY Featured alongside each sport in this book is a series of icons. These either place them in a sporting category (corresponding to the chapter in which they are featured), or provide at-a-glance information about the way the sport is contested and won, how long it lasts, and whether they are contested by individuals, groups, or teams.

SPORTS CATEGORIES



ATHLETICS



GYMNASTICS



TEAMSPORTS



RACKETSPORTS



COMBATSPORTS



WATERSPORTS



WINTERSPORTS



TARGETSPORTS



ANIMALSPORTS



MOTORSPORTS



**SPORTSON
WHEELS**



EXTREMESPORTS



TIMED EVENT

Sports that are contested and decided on the basis of the fastest completion time.



DISTANCE EVENT

Sports that are contested and decided on the basis of the farthest distance gained.



SCORING EVENT

Sports for which the number of points or goals scored decides the outcome.



JUDGED EVENT

Sports in which the performances of competitors are marked by judges.



TIME PERIOD

Provided for sports, such as team games, that take place over a set period.



TEAM AND INDIVIDUAL SPORTS

These icons indicate whether the sport featured is primarily played individually or in teams.

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INTRODUCTION

The sports of “running,” “jumping,” and “throwing” have developed significantly since the Ancient Greeks first established their Games at Olympia. Back then there was only one event, the Stadion race—now there are literally hundreds of sports to choose from. So it’s not surprising that you might not know all the rules to all the sports you come across.


The Sports Book is the answer. Whichever page you land on—basketball or badminton, karate or korfbal (look it up)—you’ll find all the information you need to be completely up-to-date on the rules, the statistics, the gear, and what’s legal and what’s not.

There are more than 200 sports in the book—team sports, racket sports, combat sports, water sports, winter sports, target sports, sports on wheels, motor sports, animal sports, extreme sports—and more than enough information to make you the instant expert on almost any competition you’re likely to encounter.

For each and every sport in the book, there are “Need2know” panels for quick, essential facts and info. Player profiles give an overview of the necessary physical characteristics and skills. Game play panels contain information on key aspects of the game, players, rules, and techniques. Stat central has tables featuring the latest sports statistics, including player records, and results from major championships and the Olympic Games. Sidelines present amusing and fascinating facts and numbers. Background information panels outline the story behind each sport, including news on the sport’s stars and competitions, and insights and anecdotes. It’s all there.

Whether you’re channel-surfing in hi-def on digital TV, have sports-crazy kids who ask you questions you can’t answer, or are training hard and thinking of turning pro, The Sports Book will show you how to play, how to enjoy, and how to win.





OLYMPIC
GAMES

THE OLYMPIC IDEAL

ANCIENT GAMES

By roughly 500 BCE, athletic festivals were being held throughout Greece. The most famous of these was the Olympic Games, which were held every four years at Olympia, in honour of Zeus. Events in these early games included short, middle, and long-distance races, pentathlon, boxing, and wrestling. Most events required athletes—who were male—to compete in the nude.

THE MODERN OLYMPICS

Rome conquered Greece in the 2nd century BCE, and eventually abolished the Olympic Games. But in 1892, Frenchman Pierre de Coubertin—building on the ideas of others—started to campaign for the resurrection of the event. He gave a talk to the Union des Sports Athlétiques in Paris, urging them to support his vision, and emphasizing the potential of the Olympic Games to unite nations around the world under a common cause. He continued his championing of the Olympics at the Congress of Paris—a conference on international sport—in 1894. The result was an emphatic vote in favor of the revival of the Games. The organization of the event was placed in the hands of the International Olympic Committee (IOC). The first president of the IOC was the Greek Demetrius Vikelas, one of de Coubertin's most vocal supporters.

ATHENS



APRIL 6-15, 1896 GAMES OF THE I OLYMPIAD

It was initially intended that the Games be staged in Paris in 1900, in association with the World's Fair. However, it was decided that the first Olympics should be an event in its own right. It was brought forward to 1896 and moved to Athens. The revival of the ancient Games attracted athletes from 14 nations including Greece, Germany, France, and Great Britain.

SPORTING HIGHLIGHTS

- ➔ American James Connolly won the triple jump to become the first Olympic champion in more than 1,500 years.
- ➔ Having already gained three gymnastics titles, German athlete Carl Schumann added a fourth by taking the wrestling championship title.
- ➔ There was no event that the Greek hosts wanted to win more than the marathon race, because of its historical significance, and they got their wish. Spyridon Louis won the race by more than seven minutes.

14 Number of nations 241 Number of athletes
9 Number of sports 43 Number of events

STAR PROFILE ALFRED HAJOS

Alfred Hajos was 13 years old when he felt compelled to become a good swimmer after his father drowned in the River Danube. The first Olympic swimming contests, at the 1896 Athens Games, were held in the Bay of Zea in water with a temperature of only 55°F (13°C). Hajos won the 100 m and the 1,200 m freestyle on the same day. For the longer race, the nine entrants were transported by boat to the open water and left alone to swim back to shore.

PARIS



MAY 15-OCTOBER 28, 1900 GAMES OF THE II OLYMPIAD

24 Number of nations 997 Number of athletes
18 Number of sports 95 Number of events

STAR PROFILE ALVIN KRAENZLEIN

At the 1900 Games American Alvin Kraenzlein won the 60 m dash, 110 m hurdles, 200 m hurdles, and the long jump. His four individual gold medals remain the record for a track-and-field athlete at one Games, and he accomplished the feat over a period of only three days. Although a qualified dentist, Kraenzlein never practiced, preferring to become a track coach.

The 1900 Games were held in Paris as part of the *Exposition Universelle Internationale* or World's Fair. The exhibition organizers spread the events over five months, the length of the Fair, and de-emphasized their Olympic status. Women took part in the Games for the first time, although only in a limited number of events, including golf and tennis.

SPORTING HIGHLIGHTS

- ➔ American Ray Ewry won three gold medals in one day, yet he is almost unknown today because his unprecedented feats were performed in events that are no longer held: the standing high jump, standing long jump, and standing triple jump.
- ➔ Charlotte Cooper of Great Britain was the first female Olympic champion when she won the singles tennis event. She also won the mixed doubles tournament.

ST. LOUIS



013

JULY 1–NOVEMBER 23, 1904 GAMES OF THE III OLYMPIAD

12 Number of nations **651** Number of athletes

17 Number of sports **91** Number of events

STAR PROFILE MARTIN SHERIDAN

Irish-American Martin Sheridan was the world's finest all-around athlete of his time. As well as winning the discus at the 1904 and 1908 Games, he won the Greek-style discus and took bronze for the standing long jump in 1908. He was at his best before world records were officially recognized, but between 1902–11 he set 15 "World Bests" in the discus.

The 1904 St. Louis Olympics organizers repeated all of the mistakes of 1900. The Olympic competitions, spread out over four and a half months, were lost in the chaos of a World's Fair. The general lack of interest was increased by the fact that out of the 94 Olympic events, only 42 included athletes from outside the US.

SPORTING HIGHLIGHTS

- ➔ One of the most remarkable athletes was the American gymnast George Eyser, who won six medals even though his left leg was made of wood.
- ➔ Irishman Thomas Kiely won an early version of the decathlon, completing all 10 events—100 m, 120 m hurdles, 800 m walk, 1,600 m, high jump, long jump, pole vault, shot putt, hammer, and 56 lb weight throw—in a single day.



Above (clockwise from left): champion swimmer Alfred Hajos; Alvin Kraenzlein, winner of four individual gold medals in one Games; shooter Oscar Swahn, who was 60 years old at the time of his first gold medal; and all-around Olympian Martin Sheridan.

LONDON



APRIL 27–OCTOBER 31, 1908 GAMES OF THE IV OLYMPIAD

22 Number of nations **2,008** Number of athletes

22 Number of sports **110** Number of events

STAR PROFILE OSCAR SWAHN

In 1908, Swedish shooter Oscar Swahn was already 60 years old when he won his first Olympic gold medal. He won the running deer single-shot event and took a second gold the next day in the team event. Swahn also earned a bronze medal in the running deer double-shot contest. After World War I, Swahn returned to compete in the Olympics at the age of 72 and won a silver medal.

The 1908 London Games were held in the White City Stadium, which had been constructed for the Franco-British exhibition earlier that year. The stadium was equipped with a running track and a velodrome, as well as having a large swimming pool with an adjustable diving board. Women took part in a limited, but increased, number of sports.

SPORTING HIGHLIGHTS

- ➔ When Italian Dorando Pietri entered the stadium at the end of the marathon he went in the wrong direction and collapsed. Officials helped him to reach the finish line, so he was disqualified, but his plucky effort made him famous.
- ➔ American standing jump specialist Ray Ewry added two more gold medals to take his total Olympic tally to eight, the most individual golds ever won.

STOCKHOLM



MAY 5–JULY 27, 1912 GAMES OF THE V OLYMPIAD

28 Number of nations **2,407** Number of athletes
14 Number of sports **102** Number of events

STAR PROFILE JIM THORPE

Jim Thorpe is often considered the greatest all-around athlete in history. But Thorpe's Olympic medals were taken back after it was revealed he had earlier been paid for playing minor league baseball—only amateur athletes were eligible for the Olympics. It was not until 1982 that the IOC reversed its decision and returned the medals, posthumously, to Thorpe's family.

The organization and sports facilities in Stockholm were both impeccable, making the V Games a model for future Olympic Games. Trailblazing technological innovations at the Stockholm Games included the photo finish for track-and-field events, and the electronic timer to back up the conventional stopwatch.

SPORTING HIGHLIGHTS

- ➔ American Jim Thorpe, of Native American and Irish descent, won the pentathlon and decathlon by huge margins. At the awards ceremony, the King of Sweden told Thorpe, "Sir, you are the greatest athlete in the world."
- ➔ Hannes Kolehmainen of Finland won the 5,000 m, 10,000 m, and the individual cross-country race. He also won a silver medal in the team cross-country race.



Above (clockwise from left): prolific all-arounder Jim Thorpe; tennis great Suzanne Lenglen; medal-winning speed skater Julius Skutnabb; long-distance champion Paavo Nurmi; and Johnny Weissmuller, Olympic swimmer and film star.

ANTWERP



APRIL 20–SEPTEMBER 12, 1920 GAMES OF THE VII OLYMPIAD

29 Number of nations **2,626** Number of athletes
22 Number of sports **154** Number of events

STAR PROFILE SUZANNE LENGLEN

Suzanne Lenglen of France was one of the greatest women tennis players of all time. Between 1919–26, she lost only one match. In the 10 sets it took her to win the 1920 Olympic title, she lost only 4 games. Lenglen teamed with Max Decugis to win another gold medal in mixed doubles and with Elisabeth d'Ayen to win a bronze in the women's doubles.

After much debate about whether or not athletes should be admitted from those countries held responsible for the Great War, the IOC excluded delegates from the Central Powers. Spectators witnessed the last tug-of-war, along with a number of other events that were also discontinued, including weight throwing, the 3,000 m walk, and the 400 m breaststroke.

SPORTING HIGHLIGHTS

- ➔ Hawaii's Duke Kahanamoku won his second consecutive swimming title in the 100 m freestyle, and broke his own world record.
- ➔ Italian fencer Nedo Nadi won the individual foil and sabre titles, and led the Italians to victory in all three team events, collecting a record five fencing gold medals at the same Games.

CHAMONIX



013

JANUARY 25-FEBRUARY 5, 1924 1ST OLYMPIC WINTER GAMES

16 Number of nations **258** Number of athletes

6 Number of sports **16** Number of events

STAR PROFILE JULIUS SKUTNABB

Finnish speed skater Julius Skutnabb competed in his first world championship in 1914. At the first Winter Games, aged 34, he took part in every speed skating event. He won a silver medal in the 5,000 m race and a gold in the 10,000 m, finishing 3 seconds ahead of fellow Finn, Clas Thunberg. Based on his results in the individual races, Skutnabb took a bronze in the combined.

In 1922 a meeting of the French Olympic Committee decided to organize an International Winter Sports Week in Chamonix in 1924. (The IOC did not sanction Winter Games until 1926.) Sadly, the well-organized competitions were beset by poor weather conditions. The Nordic countries demonstrated their dominance in all five disciplines including ice hockey and bobsled.

SPORTING HIGHLIGHTS

- ⇒ American Charles Jewtraw was the first Winter Olympic champion. He won the gold medal in the first event, which was 500 m speed skating.
- ⇒ Finnish speed skater Clas Thunberg won 3 gold medals, a silver, and a bronze. Norway's Thorleif Haug won the 18 km and 50 km cross-country skiing races, and the Nordic combined event.

PARIS



MAY 4-JULY 27, 1924 GAMES OF THE VIII OLYMPIAD

At the 1924 Paris Games, the Olympic motto, "*Citius, Altius, Fortius*," ("Swifter, Higher, Stronger") was introduced, as was the closing ceremony ritual of raising three flags: the flag of the IOC, the flag of the host nation, and the flag of the next host nation. The number of competing nations leapt from 29 to 44, signaling widespread acceptance of the Olympic Games.

SPORTING HIGHLIGHTS

- ⇒ American Johnny Weissmuller won two gold medals in swimming and a bronze in water polo all on the same day.
- ⇒ Finnish athlete Ville Ritola won the 10,000 m, breaking his own world record. He also won gold in the 3,000 m steeplechase, along with two silver medals in the 5,000 m and 10,000 m cross-country races, finishing behind Nurmi.

44 Number of nations **3,089** Number of athletes

17 Number of sports **126** Number of events

STAR PROFILE PAAVO NURMI

At the Paris Games, Finnish athlete Paavo Nurmi performed one of the greatest feats in Olympic history. First he won the 1,500 m, then with just a two-hour break, he won the 5,000 m as well. Two days later, Nurmi won the 10,000 m cross-country, earning a team gold at the same time. The next day, he won another gold in the 3,000 m team race, bringing his total haul to five gold medals.

AMSTERDAM



MAY 17-AUGUST 12, 1928 GAMES OF THE IX OLYMPIAD

46 Number of nations **2,883** Number of athletes

14 Number of sports **109** Number of events

STAR PROFILE JOHNNY WEISSMULLER

At the Amsterdam Games, American swimmer Johnny Weissmuller won the 100 m freestyle, as well as being a member of the winning 200 m relay team. He is rated by many pundits as the greatest swimmer of all time. Later in life, Weissmuller transferred his sporting success to the silver screen, portraying Tarzan in 12 films between 1932-48.

In 1928, female athletes were allowed to compete in the gymnastics and athletics events, resulting in more than double the number of female Olympians than in previous years. The Olympic flame was lit for the first time, and was housed in a tower in the stadium. Athletes from a record 28 different nationalities won gold medals during the Games.

SPORTING HIGHLIGHTS

- ⇒ Australian rower Henry Pearce stopped midway through a quarter-final race to allow a line of ducks to cross in front of his boat. He went on to win the race, and, eventually, the gold medal.
- ⇒ Percy Williams, of Canada, sprinted to victory in both the men's 100 m and 200 m races.

ST. MORITZ

FEBRUARY 11-19, 1928 II OLYMPIC WINTER GAMES

25 Number of nations 464 Number of athletes
4 Number of sports 14 Number of events

STAR PROFILE GILLIS GRAFSTRÖM

Gillis Grafström was one of figure skating's greatest innovators. Among his inventions were the spiral, change sit spin, and flying sit spin. He also won more Olympic medals than any figure skater in history. In 1920, the six judges gave Grafström a unanimous victory. In 1924, he edged Willy Böckl for a second gold medal, and in 1928, another narrow victory over Böckl secured his third.

At St. Moritz, the organizers were fortunate enough to be able to use existing sports facilities in a well-established ski resort. Athletes from 25 nations were full of praise for the organization of the Games. For the first time since World War I, German athletes were allowed to compete. As in Chamonix, Norway were the most successful team, winning six gold medals.

SPORTING HIGHLIGHTS

- ➔ Norwegian Sonja Henie caused a sensation by winning the women's figure skating at the age of 15. Her record as the youngest winner of an individual event stood for 74 years.
- ➔ Canada dominated the ice hockey tournament, winning their three matches 11-0, 14-0, and 13-0.



LAKE PLACID

FEBRUARY 4-15, 1932 III OLYMPIC WINTER GAMES

Despite the worldwide Depression, the third Winter Olympics went ahead. Unfortunately, they turned out to be a financial disaster for the organizers, who faced a huge loss. Only 252 athletes from 17 nations competed for medals and the credibility of the competitions was further undermined by the fact that more than half of these athletes were from the US or Canada.

SPORTING HIGHLIGHTS

- ➔ The French husband and wife team of Pierre and Andrée Brunet retained the pairs figure skating gold they had captured in 1928.
- ➔ Norwegian skier Johan Grøttumsbraaten became Olympic champion in the Nordic combined and successfully defended his 1928 St. Moritz title.
- ➔ Only four teams competed in the ice hockey competition, so the teams played each other twice to decide the competition. Canada beat the US team 2-1, and then drew 2-2 to secure overall victory.

17 Number of nations 252 Number of athletes
4 Number of sports 14 Number of events

STAR PROFILE EDDIE EAGAN

American Eddie Eagan holds a special place in Olympic history: he is the only person to win gold medals in both summer and winter sports. In 1920, Eagan defeated Sverre Sørsdal of Norway to win the light-heavyweight boxing at the Antwerp Olympics. Twelve years after his victory at the Summer Games, Eagan reappeared at the 1932 Lake Placid Winter Olympics as a member of the victorious four-man bobsled team.

LOS ANGELES

JULY 30-AUGUST 14, 1932 GAMES OF THE X OLYMPIAD

37 Number of nations 1,332 Number of athletes
14 Number of sports 117 Number of events

STAR PROFILE BOB VAN OSDEL

Duncan McNaughton and Bob Van Osdel were good friends and fellow high jumpers. At the 1932 Los Angeles Olympics, Van Osdel represented the US and McNaughton represented Canada. In the Olympic final, the battle for gold came down to a duel between the two friends. McNaughton cleared the bar at 6 ft 5½ in (1.97 m) to take gold, while Van Osdel missed, taking the silver medal.

Because the 1932 Olympics were held in the middle of the Great Depression and in the comparatively remote city of Los Angeles, half as many athletes took part as had in 1928. Nevertheless, the level of competition was extremely high and 18 world records were either broken or equaled. The 1932 Olympics were the first to last 16 days.

SPORTING HIGHLIGHTS

- ➔ American athlete "Babe" Didrikson won the javelin throw and the 80 m hurdles, and took silver in the high jump. She could have won more medals but women were restricted to competing in only three individual track-and-field events.
- ➔ American swimmer Helene Madison won the 100 m and 400 m freestyle and helped smash the world record in the 4x100 m freestyle team relay.



GARMISCH-PARTENKIRCHEN



FEBRUARY 6-16, 1936 IV OLYMPIC WINTER GAMES

28 Number of nations 646 Number of athletes
4 Number of sports 17 Number of events

STAR PROFILE SONJA HENIE

Figure skater Sonja Henie made her Olympic debut at the first Olympic Winter Games in Chamonix in 1924 at the age of 11. Henie won gold medals at both the 1928 and 1932 Olympics. At the 1936 Winter Games, aged 23, she won her third gold medal. A week later, she won her tenth straight world championship, setting a record that still has not been broken.

The 1936 Winter Games were held in the twin Bavarian towns of Garmisch and Partenkirchen. Alpine skiing events were included for the first time, and this led to a major controversy. The IOC declared that ski instructors could not take part in the Olympics because they were professionals. Incensed, the Austrian and Swiss skiers boycotted the events.

SPORTING HIGHLIGHTS

- ➔ Norwegian ski jumper Birger Ruud attempted an unusual double, competing in both the Alpine and ski jumping events. After missing a gate in the slalom he ended up in fourth place, but a week later he won his second consecutive gold medal in the large hill event.
- ➔ Norwegian speed skater Ivar Ballangrud won three gold medals and one silver. This was his seventh medal in three Olympics.



Above (clockwise from top-left): Eddie Egan, the only man to win gold medals in summer and winter sports; triple gold medalist Sonja Henie; multiple world-record breaker Jesse Owens; Gillis Grafström, one of figure skating's greatest innovators; and medal-winning high jumper Bob Van Osdel.

BERLIN



AUGUST 1-16, 1936 GAMES OF THE XI OLYMPIAD

49 Number of nations 3,963 Number of athletes
19 Number of sports 129 Number of events

STAR PROFILE JESSE OWENS

Jesse Owens assured himself a place in sporting history on May 25, 1935, when he broke five world records and equaled a sixth in the space of 45 minutes. One of these world records, 26 ft 8¼ in (8.13 m) in the long jump, would last for 25 years. His four gold medals at the 1936 Olympics—in 100 m, long jump, 200 m, and 4x100 m relay—set a world record that would last for 20 years.

The 1936 Berlin Olympics are best remembered for Adolf Hitler's failed attempt to prove his theories of Aryan racial superiority. The most popular hero of the Games was the African-American sprinter and long jumper Jesse Owens, who won four gold medals. The torch relay was introduced, in which a lighted torch is carried from Olympia to the site of the Games.

SPORTING HIGHLIGHTS

- ➔ Rower Jack Beresford of Great Britain set a record by winning his fifth Olympic medal.
- ➔ Thirteen-year-old American diver Marjorie Gestring took gold in the springboard event, becoming the youngest female gold medalist in the history of the Summer Olympics.

ST. MORITZ



JANUARY 30-FEBRUARY 8, 1948 V OLYMPIC WINTER GAMES

28 Number of nations
669 Number of athletes (592 men /77 women)
4 Number of sports **22** Number of events

STAR PROFILE BARBARA ANN SCOTT

Barbara Ann Scott was only 11 years old when she won her first national junior title. From 1945–48, she won the North American Figure Skating Championships each year. In 1948, at the Winter Games, she became the first Canadian to win the figure skating gold medal, and was inducted into the Canadian Olympic Hall of Fame. She was awarded the Lou Marsh Trophy as Canada's top athlete of the year in 1945, 1947, and 1948, and was made an Officer of the Order of Canada in 1991.



Did you know that... After a 12-year break, these Winter Games were named the "Games of Renewal." >>> Alpine skiing made its Olympic debut. A few combined events had taken place in 1936, but now there were 3 events for men as well as women.

The 1940 Winter Olympics were scheduled for Sapporo, Japan, but war with China forced the Japanese to announce, in July 1938, that they would be unable to host the Games. Organizational disagreements led the Swiss to withdraw as well, so the Germans volunteered Garmisch-Partenkirchen in July 1939, but four months later the outbreak of World War II forced the cancellation of the Olympics. The first postwar Games were held in St. Moritz in 1948, but Germany and Japan were barred from competing. As Switzerland had been neutral during the war, its facilities and infrastructure remained undamaged. However, a shortage of hard currency, combined with restrictions on foreign travel for some nations, meant that many visitors stayed away.

SPORTING HIGHLIGHTS

- ➔ Competing in the slalom, American skier Gretchen Fraser recorded the fastest time in the first round. Despite a 17-minute delay, she skied fast enough to win the gold medal: the first ever by an American skier.
- ➔ Henri Oreiller won two Olympic skiing titles—the Downhill and the Combined—becoming the first Frenchman to win a Winter Olympic title.
- ➔ Canadian figure skater Barbara Ann Scott, 19, succeeded Norway's Sonja Henie, winner at the previous three Winter Games, as the women's figure skating gold medalist.

LONDON

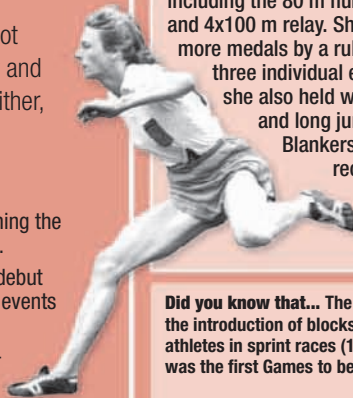


JULY 29-AUGUST 14, 1948 GAMES OF THE XIV OLYMPIAD

London was a likely option for the first postwar Summer Olympics because its existing facilities had remained largely intact through the war. In front of King George VI, and more than 80,000 spectators, the XIV Games were opened at the Empire Stadium in Wembley, northwest London. Before the Games, the organizers dropped the idea of building an Olympic village because of the anticipated costs. Britain was, after all, almost bankrupt in the years following World War II. Instead, the athletes stayed in military barracks and colleges around the capital, while rationing meant that many teams had to bring their own food along with them. Not surprisingly, the Games took place without teams from Germany and Japan, while athletes from the Soviet Union did not participate either, since the USSR was not affiliated with the IOC.

SPORTING HIGHLIGHTS

- ➔ The 17-year-old American Bob Mathias won the decathlon, becoming the youngest athlete in Olympic history to win a men's athletics event.
- ➔ Fanny Blankers-Koen of the Netherlands, who made her Olympic debut in 1936, was a 30-year-old mother and world record holder in six events when she became the star of the London games.
- ➔ Hungarian Karoly Takacs' (see p19) right hand—his pistol hand—was shattered by a grenade. After learning to shoot with his left hand, he won an Olympic gold medal in the rapid-fire pistol event.



59 Number of nations
4,104 Number of athletes (3,714 men/390 women)
17 Number of sports **136** Number of events

STAR PROFILE FRANCIKA BLANKERS-KOEN

Francina "Fanny" Blankers-Koen was an outstanding all-around athlete. At the 1948 London Games, she won four gold medals including the 80 m hurdles, 100 m sprint, and 4x100 m relay. She was deprived of more medals by a rule limiting women to three individual events, at a time when she also held worlds in the high jump and long jump. In her career, Blankers-Koen set 16 world records at 8 different events, and won 5 European titles from 1946–50.

Did you know that... The 1948 London Games saw the introduction of blocks to facilitate the start for athletes in sprint races (100 m to 400 m). >>> This was the first Games to be shown on television.

OSLO



019

FEBRUARY 14-25, 1952 VI OLYMPIC WINTER GAMES

30 Number of nations
694 Number of athletes (585 men/109 women)
4 Number of sports **22** Number of events

STAR PROFILE HJALMAR ANDERSEN

Hjalmar Andersen of Norway was the first man to win three speed skating gold medals at one Olympic Winter Games when, in 1952, he won the three long races (1,500 m, 5,000 m, and 10,000 m) in his native Oslo. His winning margin in the 5,000 m was an astounding 11 seconds. He retired after the 1952 Games, but returned to competition in 1954 to win his fourth Norwegian title, having already won the World, European, and Norwegian all-around titles in 1950–52.



Did you know that... The Olympic flame was lit for the first time at the Olympic Winter Games. >>> American Richard "Dick" Button became the first figure skater to perform a triple jump and double Axel jump.

For the first time, the Winter Olympics were held in a Scandinavian country. The Norwegians received the event with great enthusiasm, and a record number of spectators attended the Games. Before these Games began, the organizers were concerned about Oslo's ability to stage the event; the city did not really have sports facilities that met Olympic standards.

However, existing facilities were refurbished and new ones were built, well before the opening ceremony. The facilities, as well as the courses, met the high expectations of athletes and officials alike. For the first time since the end of World War II, the German and Japanese teams were allowed to compete. Attracting 150,000 spectators, the ski jump event drew a record crowd attendance that remains unbeaten.

SPORTING HIGHLIGHTS

- ⇒ American Dick Button chose to attempt a triple loop, even though no skater had ever performed it in competition. He landed his innovative jump perfectly and the judges were unanimous in voting him the winner.
- ⇒ Norwegian Stein Eriksen became the first skier from outside the Alps to win an Olympic men's Alpine gold medal.
- ⇒ Despite being the oldest competitor, 31-year-old Lydia Wideman of Finland won the 10 k cross-country pursuit.

HELSINKI



JULY 19-AUGUST 3, 1952 GAMES OF THE XV OLYMPIAD

There was a wonderful atmosphere at the XV Olympics where, to the delight of the crowd, the final torchbearers were heroes Paavo Nurmi and Hannes Kolehmainen. For the first time since 1912, athletes from Russia, who were now representing a communist Soviet Union, took part in an Olympic Games. However, problems arose before the Games when the Soviet team refused to be accommodated alongside athletes from capitalist countries in the Olympic village at Kapyla. Unfortunately Helsinki was overshadowed by the polarization of the two systems; team officials considered every win achieved by "their" athletes as proof of the superiority of their own social system. This was also the first time since the World War II that a German Olympic team participated in a Summer Games. However, Germany failed to assemble a united team due to disagreements over selection criteria.

SPORTING HIGHLIGHTS

- ⇒ The great Czech athlete Emil Zatopek won the 5,000 m, successfully defended his 10,000 m title, and then took his third gold medal in his first-ever marathon.
- ⇒ One of the first women allowed to compete against men in the equestrian competition was Lis Hartel of Denmark. Despite being paralyzed below the knees after an attack of polio, Hartel won a silver medal.
- ⇒ American athlete Bob Mathias was the first person to win two successive Olympic decathlon titles.

69 Number of competing nations
4,955 Number of athletes (4,436 men/519 women)
17 Number of sports **149** Number of events

STAR PROFILE KAROLY TAKACS



Karoly Takacs was a member of the Hungarian pistol shooting team in 1938 when, while serving in the army, a faulty grenade exploded in his right hand. Takacs taught himself to shoot with his left hand and returned to the competition, with great success. In 1952, Takacs defended his Olympic title to become the first repeat winner of the rapid-fire pistol event.

Did you know that... Israel came to the Olympic Games for the first time. >>> The first commemorative coin of the modern Olympic Games was made in 1951–52. >>> Mixed events took place in the equestrian competitions for the first time.

CORTINA d'AMPREZZO



JANUARY 26-FEBRUARY 5, 1956 VII OLYMPIC WINTER GAMES

32 Number of nations
821 Number of athletes (687 men/134 women)
4 Number of sports **24** Number of events

STAR PROFILE TONI SAILER

Toni Sailer of Austria was the first Alpine skier to win three gold medals. He began by winning the giant slalom by 6.2 seconds, which is still the largest margin of victory in the history of Olympic Alpine skiing. Days later he won the slalom by 4 seconds. The last Alpine race was the downhill. Less than 15 minutes before the start, Sailer tightened the straps between his boots and skis—and one of the straps broke. Fortunately, the trainer of the Italian team removed his own strap and lent it to the Austrian. Sailer went on to win the race by 3.5 seconds.

Did you know that... The Cortina Games were the last Games where the figure skating competitions took place outdoors. >>> For the first time in the history of the Games, the Olympic Oath was sworn by a female athlete—skier Giuliana Chenal Minuzzo.



The northern Italian town of Cortina d'Ampezzo had been earmarked for the 1944 Winter Games, but World War II forced this plan to be abandoned. It was finally given the chance to host the Games in 1956, but a lack of snow cast a shadow over the competition. Such was the concern that a few days before the start, snow had to be transported down the valley from higher snow fields. However, heavy snow fell on the day of the opening ceremony and much of the imported snow had to be removed. The Games saw the Olympic debut of a pan-German team of 75 athletes. The Soviet team also made their Winter Olympics debut, winning 16 medals and becoming the most successful nation. Live television coverage allowed audiences in Central Europe to follow the Games.

SPORTING HIGHLIGHTS

- ⇒ American figure skater Teenley Albright took a fall just before the Games, suffering a major injury. Her left skate cut through her right boot, slashed a vein, and severely scraped the bone. However, she still skated well enough at the Games to earn first-place votes from most of the judges.
- ⇒ The Soviet speed skater Yevgeni Grishin was Olympic champion over 500 m and tied for first-place in the 1500 m, sharing gold with his compatriot Yuri Mikhailov.
- ⇒ Toni Sailer was the first Alpine skier to win all three gold medals.

Below: Soviet gymnast Larisa Latynina was the first female athlete to win nine gold medals (four at Melbourne) and still holds the record for winning the most Olympic medals (18).



MELBOURNE



021

NOVEMBER 22-DECEMBER 8, 1956 GAMES OF THE XVI OLYMPIAD

72 Number of nations

3,314 Number of athletes (2,938 men/376 women)

17 Number of sports 145 Number of events

STAR PROFILE DAWN FRASER

Swimmer Dawn Fraser is an iconic figure in Australian sporting history. An exceptional sportswoman, she won eight Olympic and eight Commonwealth medals. Aged 19, she entered the 1956 Olympic Games and won a gold medal in the 100 m freestyle, setting a new World and Olympic Games record.



Did you know that... The IOC brought together the two Germanys (East and West) in a combined team. >>> To avoid the problem of quarantine for horses entering Australia, the equestrian competitions of the Games took place in Stockholm, Sweden.

The first Olympic Games to be held south of the equator posed a particular set of problems. Many athletes from the northern hemisphere did not have sufficient funds to spend a period of time acclimatizing before the Games, and the later timing of the competition meant that athletes had to retain their peak fitness over a longer period than usual. Because of the high cost of traveling, fewer athletes participated in the Games. The already low number was decreased further when China pulled out (because of Taiwan's participation), and Egypt and Lebanon did not attend because of the Suez crisis. Liechtenstein, the Netherlands, Spain, and Switzerland also withdrew, to protest the Soviet invasion of Hungary. The competitions themselves also suffered from the effects of political crises. A water polo match between the USSR and Hungary was abandoned due to the misconduct of some players.

SPORTING HIGHLIGHTS

- ⇒ With four gold, one silver, and one bronze medal, the Soviet gymnast Larisa Latynina was the Games' most successful competitor.
- ⇒ Upon his return to Dundee, ecstatic fans held aloft British boxing gold medalist Dick McTaggart. Not only did he return with the lightweight gold medal, he also won the Val Barker Cup for the Games' most stylish boxer.
- ⇒ Soviet long-distance runner Vladimir Kuts became a double champion over 5,000 m and 10,000 m, setting a new Olympic record in the latter event.

SQUAW VALLEY



FEBRUARY 18-28, 1960 VIII OLYMPIC WINTER GAMES

When the decision was made in 1955 on the venue for the 1960 Games, the area around Lake Tahoe was completely undeveloped as a winter sports center. Within four years, however, Squaw Valley was ready with sports facilities and accommodation for participants, as well as infrastructure for more than two million visitors. This came about thanks to the organizing committee and financial backing from the states of California and Nevada, together with subsidies from the federal government. Despite the financial backing the Games received, they still did not have enough time to build a bobsled run, with the result that the International Olympic Committee (IOC) had to call off all the bobsled competitions. This was the first and last time that this has happened. The opening and closing ceremonies were stage-managed by Walt Disney.

SPORTING HIGHLIGHTS

- ⇒ Four years after earning two gold medals, Soviet speed skater Yevgeny Grishin again won gold over 500 m, and again matched his own world record. Then, in the 1,500 m, he finished in another tie for first place with Norwegian Roald Aas.
- ⇒ Veikko Hakulinen, a Finnish cross-country skier, had already won two gold medals, but his greatest Olympic moment was yet to come. As the anchor of the Finnish relay team, he took off 20 seconds after Norway's Håkon Brusveen; 328 ft (100 m) from the finish line, he took over the lead to win by 3 ft (1 m).

30 Number of competing nations

665 Number of athletes (521 men/144 women)

4 Number of sports 27 Number of events

STAR PROFILE YEVGENY GRISHIN



At the 1956 Winter Games, Yevgeny Grishin won the gold medal in 500 m speed skating, equaling his own world record. Two days later, in the 1,500 m, he set another joint world record, tying for first place with Yuri Mikhailov. At the Squaw Valley Olympics, Grishin again won the gold medal in the 500 m and finished in a tie in the 1,500 m. In 1964, he returned to the Olympics, winning silver, and made a final Olympic appearance in 1968.

Did you know that... The winner of the Downhill race wore metal rather than wooden skis. It was the first Olympic medal to be won on metal skis. >>> When Alexander Cushing put forward Squaw Valley's bid to the IOC in 1955, he was the Valley's only inhabitant.

ROME



AUGUST 25 - SEPTEMBER 11 1960 GAMES OF THE XVII OLYMPIAD

83 Number of nations

5,338 Number of athletes (4,727 men/611 women)

17 Number of sports **150** Number of events

STAR PROFILE ALADAR GEREVICH

Aladar Gerevich is the only person to win the same Olympic event six times. Indeed, he is the only athlete to earn gold medals at six different Olympics. A specialist in sabre fencing, Gerevich's record might have been even more amazing if World War II had not forced two Olympics to be cancelled. At the age of 50 he made his final Olympic appearance at the 1960 Games.



Did you know that... These were the last Games in which South Africa was allowed to participate—until 1992—because of international outrage at their apartheid policy (racial segregation). >>> The Games were broadcast by more than 100 television stations.

Rome had been chosen to stage the 1908 Games, but the eruption of Mount Vesuvius in southern Italy had intervened. It was some 52 years later that the Games finally arrived in the Italian capital. The Rome games were broadcast by television to all European countries and were watched by millions. Sadly, the competitions themselves were overshadowed by the rivalry between the USA and the USSR. In the final medal table the Soviet Union, with a total of 43 gold medals, finished ahead of the USA, which won 34.

SPORTING HIGHLIGHTS

- ➔ Running barefoot in the x,000m, Ethiopian athlete Abebe Bikila (see p.23) did not go unnoticed when he entered the marathon. He refused to be daunted by the condescending remarks and left all his opponents behind to cross the finishing line victorious, near Constantine's triumphal arch.
- ➔ Aged 20, Wilma Rudolph became the first American woman to win three gold athletics medals in one Olympiad: in the 100m, 200m and 4x100m relay. She achieved this extraordinary feat after recovering from several major illnesses during her childhood.
- ➔ Cassius Marcellus Clay, later known as Muhammad Ali, first gained international prominence by winning the light-heavyweight gold medal. He would later turn professional and embark on a phenomenal career.

INNSBRUCK



JANUARY 29 - FEBRUARY 9 1964 IX OLYMPIC WINTER GAMES

Although the organizers had made all the preparations for the Games that they could, they were unable to influence the weather. Innsbruck's mildest February for 58 years meant that Austrian troops had to transport more than 25,000 tons of snow from higher snow fields to the River Inn Valley so the slopes would be ready for the Alpine skiing competitions. The cross-country skiers, competing further down the valley, found conditions ideal. The schedule included luge tobogganing, where competitors descended an ice run lying face upward on the toboggan—in 1928 and 1948 there had been skeleton sledding competitions, in which the athletes lay face down—and the bobsled competitions returned after their enforced break in Squaw Valley. Meanwhile, in the ski jump competition, new rules were put in place.

SPORTING HIGHLIGHTS

- ➔ Russian speed skater Lidiya Skoblikova became the first woman to win all four speed skating events in the same Games.
- ➔ The 18-year-old French Alpine skier Marielle Goitschel finished in second place in the Olympic slalom. She was beaten by her older sister.
- ➔ Eugenio Monti, from the Italian bobsled team, helped Tony Nash and Robin Dixon (GBR) win gold medals when he lent them an axle bolt to replace one that was broken. Monti was given the first De Coubertin Medal for sportsmanship.



36 Number of nations

1,091 Number of athletes (892 men/199 women)

6 Number of sports **34** Number of events

STAR PROFILE KNUT JOHANNESSEN

Long-distance skater Knut Johannesen first competed in the 1956 Olympics, winning a silver medal in the 10,000m. At the 1964 Games, fellow Norwegian Per Ivar Moe recorded an excellent time of 7:38.6 for the 5,000m. Johannesen fell 3 seconds behind Moe, but gradually closed the gap. When he crossed the finish line, the clock read "7:38.7", but it was wrong. His official time of 7:38.4 earned him a gold medal.

Did you know that... For the first time in the Winter Games, the flame was lit in Olympia. Since then, it has always been lit there. >>> Britain won its first Winter Olympics (check) gold medal for 12 years by winning the 2-man bobsled event.



Above: Despite suffering from polio as a child, US athlete Wilma Rudolph overcame her disability to win three track golds in Tokyo.

TOKYO



OCTOBER 10 - 24 1964 GAMES OF THE XVIII OLYMPIAD

For the first time, the Olympic Games went to Asia. The hosts invested heavily in the most modern sports facilities as well as in improving the infrastructure of a city containing over 10 million people. The extraordinary architectural design of the swimming stadium led to it being described as a "cathedral of sports." Other outstanding new buildings included the judo hall, which was modeled on the style of traditional Japanese temples. The opening ceremony offered a glimpse into how record-breaking the competition would be, when teams from 93 nations (10 more than participated in Rome in 1960) paraded into the Meiji Stadium. However, the high standards set by athletes at the Tokyo Games led some critics to warn about exaggerated expectations for the future development of the Olympic disciplines.

SPORTING HIGHLIGHTS

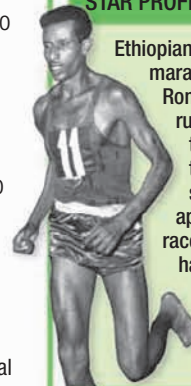
- ☞ Australian swimmer Dawn Fraser (see p.21) won her third successive gold medal in the 100m freestyle. She was the first woman swimmer to win a total of eight medals (four gold and four silver) in three Olympics.
- ☞ Soviet gymnast Larisa Latynina (see p.20) added six new medals to her Olympic haul. Over three Olympics she won nine gold, five silver, and four bronze medals.
- ☞ Deszo Gyarmati won gold with the Hungarian water polo team, thus achieving the unique feat of winning medals at five successive Olympic Games.

93 Number of nations

5,151 Number of athletes (4,473 men/678 women)

19 Number of sports **163** Number of events

STAR PROFILE ABEBE BIKILA



Ethiopian Abebe Bikila's first Olympic marathon was at the 1960 Games in Rome, where he won a gold medal running barefoot. Bikila returned to the Games in 1964, and this time he ran with shoes and socks. Despite having had an appendectomy 40 days before the race, Bikila took a clear lead by the halfway mark and steadily pulled away to win by more than four minutes. His time, 2 hours 12 minutes 11.2 seconds, was a world best for the marathon.

Did you know that... Judo and volleyball were introduced for the first time. >>> American Al Oerter won the discus for the third time despite having to wear a neck harness. >>> Larisa Latynina became one of only four athletes to win nine gold medals.



Above: In 1968, American swimmer Debbie Meyer won the 200 m, 400 m, and 800 m freestyle events.

GRENOBLE



FEBRUARY 6-18, 1968 X OLYMPIC WINTER GAMES

Before the industrial city of Grenoble was able to become a suitable venue for the Winter Games, large amounts of money needed to be invested in the construction of new sports facilities and an improved infrastructure. Even though this money was spent, Grenoble itself still did not have sufficient sports facilities, so competitions took place in the surrounding region, and athletes were accommodated in seven Olympic villages. French hero Jean-Claude Killy swept the men's Alpine events, equaling Toni Sailer's achievement, but only after the greatest controversy in the history of the Winter Olympics. This was the first time at a Winter Games that two separate German teams paraded into the stadium. Although united by one flag and a joint anthem, relationships between the two teams soured during the course of the competition.

SPORTING HIGHLIGHTS

- ☞ There was controversy in the women's luge when the three East German entrants, who had finished first, second, and fourth, were disqualified for heating their runners.
- ☞ American figure skater Peggy Fleming easily won the first-place votes of all nine judges. She was the only American winner at the Games.
- ☞ Swedish cross-country skier Toini Gustafsson won both the 5 km and 10 km races along with a silver medal in the relay.

37 Number of nations
1,158 Number of athletes (947 men/211 women)
6 Number of sports **35** Number of events

STAR PROFILE JEAN-CLAUDE KILLY

French fans hoped that Jean-Claude Killy would sweep all three Alpine skiing events at Grenoble. He began by winning the downhill and giant slalom. Next, came the slalom. Killy's rival, Austrian? Karl Schranz, claimed that a mysterious man in black crossed his path during this race, causing him to skid to a halt. Given a restart, Schranz beat Killy's time, but a Jury of Appeal later awarded the victory to Killy.



Did you know that... The IOC's Medical Commission introduced sex tests for women—where female athletes were tested for excess quantities of testosterone (a male hormone). >>> Grenoble was the first Winter Olympics to be broadcast in color.

MEXICO CITY



OCTOBER 12-22, 1968 GAMES OF THE XIX OLYMPIAD

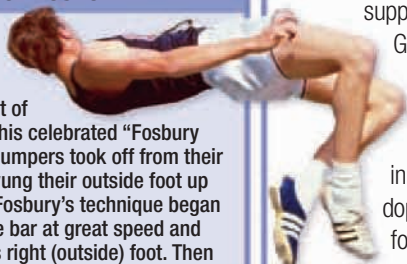
112 Number of nations:

5,516 Number of athletes (4,735 men/781 women)

20 Number of sports **172** Number of events:

STAR PROFILE DICK FOSBURY

The 1968 Mexico City Olympics marked the international debut of Dick Fosbury and his celebrated "Fosbury flop." At the time, jumpers took off from their inside foot and swung their outside foot up and over the bar. Fosbury's technique began by racing up to the bar at great speed and taking off from his right (outside) foot. Then he twisted his body so that he went over the bar head first with his back to the bar. Fosbury achieved a personal record of 7 ft 4¼ in (2.24 m) to win the gold medal.



Did you know that... It was the first Games to use the synthetic Tartan track surface in athletics. >>> Electronic rather than manual timing was used for athletics, cycling, rowing, canoe, swimming, and equestrian competitions.

Mexico City's high altitude—almost 7,350 ft (2,240 m) above sea level—had dominated much of the pre-Games discussion: the consensus being that athletes from lowland countries would be at a disadvantage. However, several weeks of high-altitude training for many of these athletes increased oxygen supply to their muscles and enhanced performances. Before the

Games, complaints about the exorbitant amounts of money being invested in facilities in contrast to Mexico's own social problems culminated in violent riots. Controversy also arose over South Africa's participation at these Games—the IOC eventually gave in to the pressure and withdrew its invitation. The IOC introduced doping controls for the first time and disqualified a Swedish athlete for having too much alcohol in his bloodstream.

SPORTING HIGHLIGHTS

- ⇒ American Bob Beamon was a favorite in the long jump but he exceeded expectations. His jump of 29 ft 2½ in (8.9 m) beat the world record by 21¾ in (0.55 m).
- ⇒ Czech gymnast Vera Caslavská won four gold and two silver medals. These victories were given added spice by beating the Soviet gymnasts shortly after Soviet tanks had invaded her homeland.
- ⇒ American swimmer Debbie Meyer became the first female swimmer to win three individual gold medals at one Olympic Games.

SAPPORO



FEBRUARY 3-13, 1972 XI OLYMPIC WINTER GAMES

The 1972 Sapporo Games in Japan were the first Winter Games to be held outside Europe or the US. The Japanese government regarded these Games as a prestigious event and invested enormous sums of money in the construction of new sports facilities. As a result, the Games turned out to be the most extravagant and expensive so far, but this was offset by selling the television rights. The subject of amateurism stirred controversy when skier Karl Schranz was banned for receiving payment from ski product manufacturers, but full-time ice hockey players from communist nations were allowed to compete.

SPORTING HIGHLIGHTS

- ⇒ In front of his home crowd, Yukio Kasaya produced the best jump of each of the two rounds to earn the gold medal in the normal hill ski-jumping event. His teammates Konno and Aochi completed the Japanese sweep with silver and bronze.
- ⇒ The biggest surprise of the Games was the victory of 21-year-old "Paquito" Fernandez Ochoa of Spain, who won the slalom by a full second. His gold medal was the first ever won by a Spanish athlete in the Winter Olympics.
- ⇒ Galina Kulakova of the Soviet Union entered all three cross-country races and finished first in all of them, winning the 5 km and 10 km individual events and anchoring the relay team to victory.



35 Number of nations

1,006 Number of athletes (801 men/205 women)

6 Number of sports **35** Number of events

STAR PROFILE ARD SCHENK

In 1968, Ard Schenk won a silver medal in the 1,500 m speed skating event. By the 1972 Sapporo Games, Schenk held the world record for three of the four Olympic distances. Racing during a snowstorm, Schenk won the 5,000 m by 4.57 seconds. In the 500 m, he fell after four steps and finished 34th. Schenk came back to win the 1,500 m and the 10,000 m. Weeks later he became the first skater in 60 years to win all four events at the world championships.

Did you know that... Canada did not send a team to Sapporo in protest against the covert professionalism rife in the USSR and Eastern Europe. >>> The Japanese Olympic team won their first Winter Olympic Games gold medal.

MUNICH

AUGUST 26-SEPTEMBER 11, 1972 GAMES OF THE XX OLYMPIAD



121 Number of nations
7,134 Number of athletes (1,059 women/6,075 men)
23 Number of sports **195** Number of events

STAR PROFILE MARK SPITZ

American Swimmer Mark Spitz predicted he would win six gold medals at the 1968 Olympics, but actually only won two. At the 1972 Munich Olympics, Spitz tried again! Over a period of eight days, he entered seven events, won all seven, and set a world record in every one. Spitz is the only person to win seven gold medals at one Olympics and he is one of only four athletes to earn nine career golds.



Did you know that... Archery was reintroduced to the Olympic program after a 52-year absence, and handball after a 36-year absence. >>> The officials took the Olympic Oath for the first time.

The 1972 Munich Games were the largest yet, setting records in all categories, with 195 events and 7,134 athletes from 121 nations. They were supposed to celebrate peace and, for the first 10 days, all did indeed go well. But in the early morning of September 5th, eight Palestinian terrorists broke into the Olympic village, killed two members of the Israeli team, and took nine more hostage. In an ensuing battle, all nine Israeli hostages were killed, as were five of the terrorists and one policeman. The Olympics were suspended and a memorial service was held in the main stadium. In defiance of the terrorists, the International Olympic Committee ordered the competitions to resume after a pause of 34 hours. All other details about the Munich Games paled in significance, but it did have its highlights.

SPORTING HIGHLIGHTS

- ➔ Distance runner Lasse Viren of Finland fell halfway through the 10,000 m final, but still set a world record to win the first of his four career gold medals.
- ➔ The media star of the Munich Games was the tiny Soviet gymnast Olga Korbut, whose three gold medals helped establish Soviet dominance in the female gymnastics events and captured the attention of fans worldwide.
- ➔ West German Liselott Linsenhoff, competing in the dressage event, became the first female equestrian to win a gold medal in an individual event.

INNSBRUCK

FEBRUARY 4-FEBRUARY 15, 1976 XII OLYMPIC WINTER GAMES



The 1976 Winter Olympics were awarded to the city of Denver, but the people of the state of Colorado voted to prohibit public funds from being used to support the Games. Innsbruck stepped in and hosted the Games only 12 years after it had hosted its last Olympics. The organizers decided to conduct the medal ceremonies in the ice rink at the end of each evening, rather than after the competition, as the spectators preferred to see the medal ceremonies held "on-the-spot." Arguably the most memorable image of the Games was skier Franz Klammer flying wildly down the downhill course, barely keeping control, on his way to a gold medal.

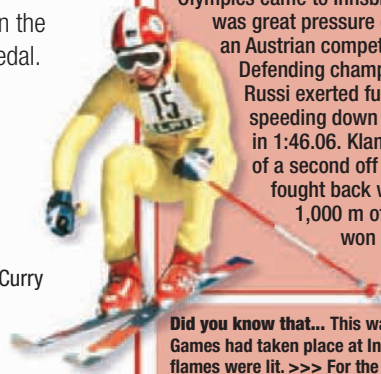
SPORTING HIGHLIGHTS

- ➔ The first major downhill competition that Rosi Mittermaier of Germany won resulted in a gold medal. Three days later she won the slalom event. She almost achieved success in all three Alpine events, but missed the gold by 12-hundredths of a second in the giant slalom.
- ➔ Certain judges did not approve of the style used by Britain's John Curry in the figure skating. He emphasized grace and artistic expression over athleticism. In the course of the Games, he supplemented his natural elegance with dynamic jumps. The judges awarded him the highest points total in the history of men's figure skating.
- ➔ The East German luge team won every medal at these Games, and competitors from other countries had to be content with silver or bronze medals.

37 Number of nations
1,123 Number of athletes (231 women/892 men)
6 Number of sports **37** Number of events

STAR PROFILE FRANZ KLAMMER

In 1975, Franz Klammer won eight of nine World Cup downhill races. When the Olympics came to Innsbruck in 1976, there was great pressure on Klammer as an Austrian competing in Austria. Defending champion Bernhard Russi exerted further pressure by speeding down the Olympic hill in 1:46.06. Klammer fell one-fifth of a second off Russi's pace, but fought back wildly over the last 1,000 m of the course and won by one-third of a second.



Did you know that... This was the second time the Games had taken place at Innsbruck, so two Olympic flames were lit. >>> For the first time in the history of figure skating, a skater (Terry Kubicka of the US) successfully attempted a dangerous back flip.

MONTREAL



JULY 17-AUGUST 1, 1976 GAMES OF THE XXI OLYMPIAD

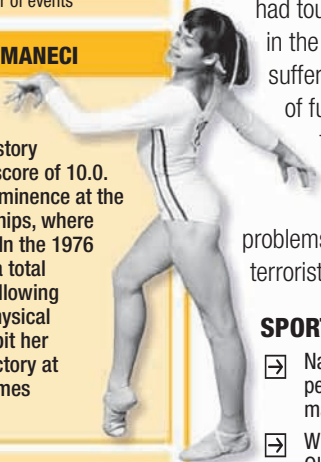
92 Number of nations

6,084 Number of athletes (1,260 women/4,824 men)

21 Number of sports **198** Number of events

STAR PROFILE NADIA COMANECI

In 1976, Romania's Nadia Comaneci became the first gymnast in Olympic history to be awarded the perfect score of 10.0. Comaneci first came to prominence at the 1975 European Championships, where she won four gold medals. In the 1976 and 1980 Games she won a total of nine Olympic medals. Following the 1980 Games, natural physical development began to inhibit her performance and after a victory at the 1981 World Student Games she retired.



Did you know that... Hockey was played on an artificial field for the first time at the Montreal Games. >>> The city of Montreal is still repaying debts that were accrued during the 1976 Olympic Games.

The 1976 Montreal Games were marred by the boycott of 22 African nations protesting the fact that the national rugby team of New Zealand had toured South Africa, and New Zealand was scheduled to compete in the Olympics. To further compound the situation, the host nation suffered an unusually long winter, industrial disputes, and a lack of funds, which made it impossible to finish work on the Olympic facilities in time for the opening ceremony. The difficulties were overcome, however, and the performances of the athletes did not suffer from the political and national disputes. Despite the problems, the Games were perfectly organized and, in light of the 1972 terrorist attack in Munich, security was tight.

SPORTING HIGHLIGHTS

- ➔ Nadia Comaneci was the star of the Games. She achieved her first perfect 10 on the uneven parallel bars and the judges awarded her the maximum mark seven times.
- ➔ With his victory in platform diving, Italian Klaus Dibiasi became the first Olympic diver to win three successive gold medals, and to be awarded medals in four Olympic Games.
- ➔ The US and East Germany dominated the swimming events. Only Great Britain's David Wilkie and the Soviet Union's Marina Koshevaya (both winning their 200 m finals in record time) upset the monopoly.

Below: American athlete Edwin Moses burst onto the scene in 1976, winning the 400m hurdles by a record eight meters. 12 years later in Seoul he won bronze.



LAKE PLACID

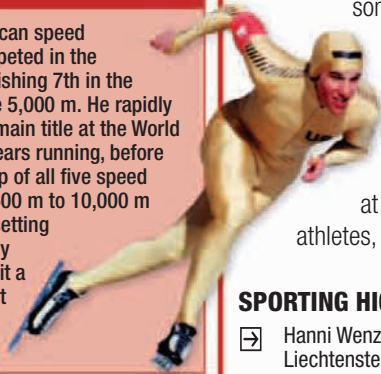


FEBRUARY 13-24, 1980 XIII OLYMPIC WINTER GAMES

37 Number of nations
1,072 Number of athletes (232 women/840 men)
6 Number of sports **38** Number of events

STAR PROFILE ERIC HEIDEN

As a 17-year-old, American speed skater Eric Heiden competed in the 1976 Winter Games, finishing 7th in the 1,500 m and 19th in the 5,000 m. He rapidly improved, winning the main title at the World Championships three years running, before achieving a clean sweep of all five speed skating events—from 500 m to 10,000 m—at the 1980 Games, setting Olympic records in every one. In the 1,500 m he hit a rut in the ice and almost fell, but recovered to win by 0.37 seconds.



Did you know that... Artificial snow made its Olympic debut at the Lake Placid Games. >>> President Jimmy Carter threatened a United States boycott of the Summer Olympics due to be held in Moscow later that year.

In 1974 the IOC awarded the XIII Winter Games to Lake Placid for the second time. Lake Placid first hosted the Games back in 1932. The organizers had to cope with a lack of snow and with moving enormous crowds to and from a small town of 3,000 inhabitants. People were sometimes forced to wait hours for shuttle buses to take them to venues. Many athletes considered the Olympic village too confined; after the Games it would actually be used as a prison for young offenders. The sports facilities, on the other hand, received high praise despite being some distance apart. Artificial snow was used for the first time, at a cost of \$5 million. This was extremely demanding on the athletes, especially when mixed with the newly fallen snow.

SPORTING HIGHLIGHTS

- ☞ Hanni Wenzel won the giant slalom and the slalom and her nation, Liechtenstein, became the smallest country to produce an Olympic champion.
- ☞ In the biathlon relay, Soviet athlete Aleksandr Tikhonov earned his fourth straight gold medal. His compatriot Nikolay Zimyatov earned three gold medals in cross-country skiing.
- ☞ The US ice hockey team beat the Soviet team, which had previously won gold at every Games since 1964.

Below: The 4-3 "Miracle on Ice" victory over the Soviet Union by a rookie American team is still the best-remembered international ice hockey game in the US today.



MOSCOW



JULY 19-AUGUST 3, 1980 GAMES OF THE XXII OLYMPIAD

80 Number of nations
5,179 Number of athletes (1,115 women/4,064 men)
21 Number of sports **203** Number of events

STAR PROFILE ALEKSANDR DITYATIN

Aleksandr Dityatin first appeared at the Olympics in 1976, winning a silver medal in the gymnastics team event. Competing before a home crowd in Moscow, he led the Soviet Union to the team championship and then won the individual all-around title. He also qualified for all six apparatus finals. Dityatin won six medals in one day and is the only athlete in Olympic history to win eight medals at one Games. He was also the first male gymnast to be awarded a perfect score of 10 in an Olympic competition.



Did you know that... The United States-led boycott was largely in protest to the Soviet invasion of Afghanistan. >>> In the men's coxless pairs rowing event both the gold and silver medal-winning teams were identical twins.

Only 80 countries were represented at the Moscow Games. Notable absentees included Japan, West Germany, and the team from the US.

Western countries have frequently referred to the Moscow Games as being of a low standard, and have raised doubts about the sporting value of the results and medals. Nonetheless, although not of the highest caliber, the Moscow Games were hardly substandard: 36 world records, 39 European records, and 73 Olympic records were testimony to the high level of talent and competition on display.

SPORTING HIGHLIGHTS

- ⇒ Vladimir Salnikov of the USSR won three gold medals, in the 400 m freestyle, 4×200 m relay and 1,500 m. This was the first time any swimmer had swum the 1,500 m in fewer than 15 minutes.
- ⇒ British runners Steve Ovett and Sebastian Coe faced each other in two memorable duels. In the 800 m, Ovett won the gold medal ahead of his compatriot. Six days later, a determined Coe redeemed himself in the 1,500 m. He took the gold, while Ovett managed only a bronze.
- ⇒ By winning the decathlon, Britain's Daley Thompson became "king of the athletes," and disappointed the home crowd by beating Soviet athlete Yuri Kutsenko into second place.

SARAJEVO



FEBRUARY 8-19, 1984 XIV OLYMPIC WINTER GAMES

In 1984, the Winter Games was held in the Balkans for the first time and in a socialist country for the first and only time. The people of Sarajevo gained high marks for their hospitality, and there was no indication of the tragic war that would engulf the city only a few years later. For the first time, the International Olympic Committee agreed to pay the expenses of one male and one female member of each team. The number of participating nations was up, from the 37 at Lake Placid, to 49 although Egypt, the Virgin Islands, Mexico, Monaco, Puerto Rico, and Senegal were represented by only one competitor each.

SPORTING HIGHLIGHTS

- ⇒ Cross-country skier Marja-Liisa Kirvesmiemi-Hämäläinen of Finland, the only woman to have competed in six Winter Olympics (1976-1994), won all three events for women. She also added a bronze medal in the 4x7.5 km relay.
- ⇒ In the giant slalom, Jure Franko of Yugoslavia won the only medal for the organizing country.
- ⇒ Canadian speed skater Gaétan Boucher earned a bronze medal in the 500 m and then beat Sergei Khlebnikov in the 1,000 m to gain his first gold medal. Two days later, he won again in the 1,500 m.
- ⇒ East Germany's Katarina Witt won her first Olympic figure skating gold medal.



49 Number of competing nations
1,272 Number of athletes (274 women/998 men)
6 Number of sports **39** Number of events

STAR PROFILE JAYNE TORVILL AND CHRISTOPHER DEAN

The 1984 Sarajevo Winter Games was one of the few times that the Olympic ice dancing competition was not won by a Soviet or Russian couple. Jayne Torvill and Christopher Dean of Great Britain mesmerized the audience with their interpretation of Ravel's "Bolero." The judges awarded them 12 scores of 6.0, including across-the-board perfect scores for artistic impression, to take the gold medal.

Did you know that... These were the first Games under the presidency of Juan Antonio Samaranch. >>> The amount charged for television rights was increased greatly to help pay for the Games. >>> The 20 km race was added to the women's Nordic skiing.

LOS ANGELES



JULY 28-AUGUST 12, 1984 GAMES OF THE XXIII OLYMPIAD

140 Number of nations
6,829 Number of athletes (1,566 women/5,263 men)
23 Number of sports **221** Number of events

STAR PROFILE CARL LEWIS

American Carl Lewis is one of only four Olympic athletes to win nine gold medals and one of only three to win the same individual event four times. In 1984, Lewis matched Jesse Owens' feat of winning four gold medals with victories in the 100 m, the 200 m, the long jump, and the 4x100 m relay. At the Atlanta Games, 12 years after his triumphs in Los Angeles (or, as Lewis put it, "fourteen hairstyles" later), Carl Lewis was still the Olympic long jump champion.

Did you know that... Only 14 nations boycotted the Games but they accounted for 58% of the gold medals at the 1976 Olympics! >>> Rhythmic gymnastics and synchronized swimming made their first appearance at these Games.



Although a revenge boycott led by the Soviet Union depleted the field in certain sports, a record 140 nations took part in the first privately funded tournament in Olympic history. More than 30 sponsors together contributed more than \$500 million, while other companies funded the building of new sports facilities, in a deal that allowed them to advertise on the admission tickets. The ABC television network paid \$225 million for the exclusive television rights, thereby ensuring that most events started in the evenings during prime television time in the US. With these vast amounts of money involved, many critics held the view that what had once been a festival of amateur sport was now a purely commercial spectacle.

SPORTING HIGHLIGHTS

- ➔ The American diver Greg Louganis remained unbeaten from the 3 m springboard as well as from the 10 m highboard.
- ➔ Sebastian Coe became the first repeat winner of the men's 1,500 m.
- ➔ In the women's 400 m hurdles final, Nawal El Moutawakel ran the race of her life, leading from start to finish. She was the first woman from an Islamic nation to win an Olympic medal, and the first Moroccan athlete to win a gold medal.

CALGARY

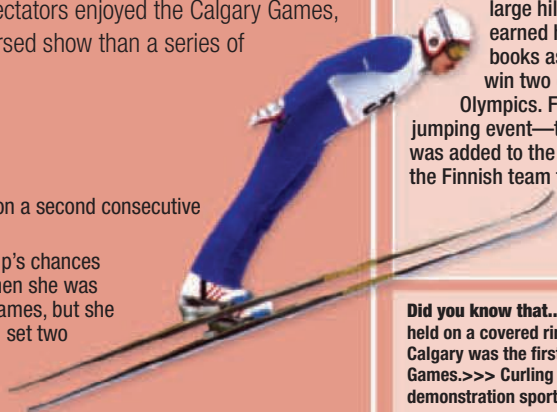


FEBRUARY 13-28, 1988 XV OLYMPIC WINTER GAMES

Funds for the Calgary Games originated from three sources. Half of the budget was put up by the Canadian government; sponsors, official suppliers, and licensees contributed another \$90 million; and the American television network ABC paid \$309 million for the broadcasting rights. ABC benefited from the decision to extend the Games to 16 days, including 3 weekends. The consequence for the competitors was that start times for many events were chosen not for sporting reasons, but to meet the demands of television advertisers in the US. Although the spectators enjoyed the Calgary Games, many saw them more as a well-rehearsed show than a series of competitive sporting competitions.

SPORTING HIGHLIGHTS

- ➔ German figure skater Katarina Witt won a second consecutive Olympic title.
- ➔ Dutch speed skater Yvonne van Gennip's chances for Olympic victory seemed ruined when she was hospitalized two months before the Games, but she went on to win three gold medals and set two world records.
- ➔ Skier Gunde Svan of Sweden took his career gold medal total to four.



57 Number of nations
1,423 Number of athletes (301 women/1,122 men)
6 Number of sports **46** Number of events

STAR PROFILE MATTI NYKÄNEN

At the 1988 Calgary Games, Matti Nykänen of Finland won the normal hill event by a decisive 17 points, and then won the large hill by 16.5 points. This earned him a place in the record books as the first ski jumper to win two gold medals at the same Olympics. For the first time, a third jumping event—the large hill team event—was added to the program. Nykänen led the Finnish team to victory and brought his career total to four gold medals and one silver medal.

Did you know that... The speed skating events were held on a covered rink for the first time.>>> Calgary was the first "smoke-free" Olympic Games.>>> Curling appeared on the program as a demonstration sport.



Above: American diver Greg Louganis was arguably one of the greatest ever; he won two golds in 1988 despite cracking his head open on the springboard.

SEOUL



SEPTEMBER 17-OCTOBER 2, 1988 GAMES OF THE XXIV OLYMPIAD

Happily, the large-scale boycotts of Moscow and Los Angeles did not recur at Seoul. For the first time in 12 years, all leading Olympic nations, except Cuba and Ethiopia, took part in the Olympic Games. Although the drug disqualification of sprinter Ben Johnson became the biggest story of the 1988 Olympics, the Seoul Games were highlighted by numerous exceptional performances, and 27 new world records. Once again the Soviet Union (55 gold medals) and East Germany (37) demonstrated their superiority over the Western nations by finishing first and second in the medal table.

SPORTING HIGHLIGHTS

- ➔ American swimmer Matt Biondi won seven medals, including five gold. His gold medals came in the 50 m freestyle, 100 m freestyle, and all three relays.
- ➔ Soviet record holder and world champion Serguei Bubka dreamed of an Olympic title. He won the gold medal, but only just, vaulting 5.90 m at the third attempt. This was his last time on an Olympic podium.
- ➔ East German cyclist and speed skater Christa Luding-Rothenburger made Olympic history after becoming the first person to win Summer and Winter Olympic medals in the same year. After winning gold and silver in the speed skating at Calgary, she won silver in the 1,000 m sprint cycling.

159 Number of nations

8,391 Number of athletes (2,194 women/6,197 men)

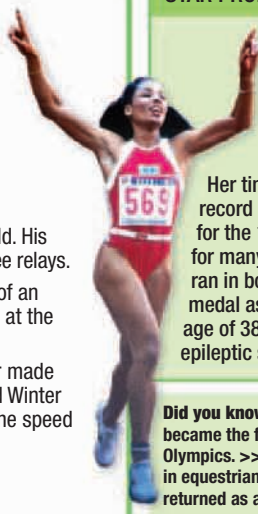
25 Number of sports 237 Number of events

STAR PROFILE "FLO JO"

At the 1988 Olympic Trials, American Florence Griffith Joyner ("Flo Jo") ran the 100 m in a stunning 10.49 seconds—beating the previous record by more than a quarter of a second.

Her time was faster than the men's record in many countries. Her records for the 100 m and 200 m look set to last for many years. At the Seoul Games, she ran in both relays, winning a third gold medal as well as a silver. In 1998, at the age of 38, she died in her sleep from an epileptic seizure.

Did you know that... Fencer Kerstin Palm (SWE) became the first woman to take part in seven Olympics. >>> For the first time, all three medalists in equestrian dressage were women.>>> Tennis returned as a medal sport after a break of 64 years.



ALBERTVILLE



FEBRUARY 8-23, 1992 XVI OLYMPIC WINTER GAMES

Albertville's successful bid to stage the Winter Olympics had been inspired by the French triple Olympic skiing champion of 1968, Jean-Claude Killy, who was chairman of the organizing committee. Killy wanted to stimulate the economic development of the Savoy region, an area where the winter sports and tourism had been largely untapped. The results of political change in Eastern and Central Europe were clearly noticeable during the nations' parade. Lithuania competed under its own flag for the first time since 1928; likewise, Estonia and Latvia for the first time since 1936. In addition, competitors from other parts of the former Soviet Union formed the Unified Team. For the first time in 28 years, athletes from all over Germany were reunited in one team for the Winter Olympics.

SPORTING HIGHLIGHTS

- ➔ Freestyle skiing made its debut at the Olympics. The winner of the moguls event was the popular French freestyle skier Edgar Grospron, who recorded the fastest time and the second best scores for turns and air.
- ➔ Half of her home village in Italy (population 160) traveled to support Stefania Belmondo. She struck gold in the 18.6 mile (30 km), the final women's cross-country event.
- ➔ Vegard Ulvang of Norway took gold in the men's 18.6 mile (30 km). In the 6.2 mile (10 km) race, for the first time in his career, he competed without wax on his skis. He won again.

64 Number of nations

1,801 Number of athletes (488 women/1,313 men)

7 Number of sports **57** Number of events

STAR PROFILE ALBERTO TOMBA

At the 1992 Albertville Games, charismatic Alberto Tomba finished first in the giant slalom to become the first Alpine skier in Olympic history to win the same event twice. He also gained the silver medal in the slalom. Tomba was the first Alpine skier to win medals in three different Olympics and he is the first male Alpine skier to earn five career Olympic medals. In April 2000, Alberto Tomba received the Olympic Order.



Did you know that... Speed skiing, curling, ballet, and freestyle aerial skiing were demonstration sports at these Games. >>> Croatia and Slovenia participated for the first time as independent nations, definitively from the 1996 Atlanta Games onward.

BARCELONA



JULY 25-AUGUST 9, 1992 GAMES OF THE XXIII OLYMPIAD

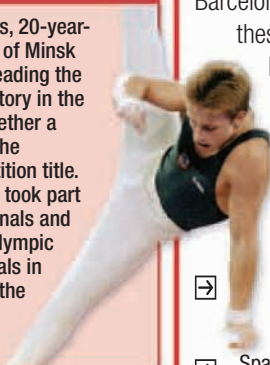
169 Number of nations

9,356 Number of athletes (2,704 women/6,652 men)

28 Number of sports **257** Number of events

STAR PROFILE VITALY SHCHERBO

At the 1992 Barcelona Games, 20-year-old gymnast Vitaly Shcherbo of Minsk made history. He began by leading the ex-Soviet Union squad to victory in the team event. Next, he put together a superb performance to win the individual all-around competition title. Then, on August 2, Shcherbo took part in the individual apparatus finals and became the first person in Olympic history to win four gold medals in one day. Shcherbo was also the first gymnast to win six gold medals at one Olympics.



Did you know that... Yugoslavia was banned from team sports, but individual athletes were allowed to compete independently. >>> In the women's 100 m sprint Merlene Ottey finished only 6-hundredths of a second behind the winner, yet ended up in 5th place.

These turned out to be the Olympic Games of the Spanish OOC president, Juan Antonio Samaranch, who had managed to bring the Games to his home region of Catalonia. Being an advocate of the commercialization of sport, he expressed his gratitude to the Games' sponsors at the end of the Barcelona celebration. The IOC registered millions of dollars in revenue from these Olympics, partly through the sale of television broadcasting rights.

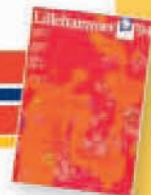
However, many athletes complained that the start times of several events were arranged to suit the TV and advertising industries.

The 1992 Games marked the emergence, or re-emergence, of a number of teams onto the world sporting stage; South Africa was welcomed back and a pan-German team was represented.

SPORTING HIGHLIGHTS

- ➔ Men's basketball was open to professionals for the first time, allowing the creation of the US "Dream Team," which included Magic Johnson, Michael Jordan, Larry Bird, and Charles Barkley.
- ➔ Spaniard Fermin Cacho Ruiz was not one of the favorites in the 1,500 m. However, the final was run at an unusually slow pace. Cacho took advantage of this and, with the crowd screaming his name, won the race over the final sprint.
- ➔ Britain's Linford Christie won the men's 100 m final ahead of Namibia's Frankie Fredericks and the American Dennis Mitchell. The oldest man to win this sprint title, Christie added the world championship to his collection the following year.

LILLEHAMMER



FEBRUARY 12-27, 1994 XVII OLYMPIC WINTER GAMES

In 1986, the IOC voted to change the schedule of the Olympic Games so that the Summer and Winter Games would be held in different years. This was partly because the television companies could not attract the amount of advertising needed in order to pay for Olympic television broadcasting rights twice a year. From now on, the Winter Games would fall in the same year as soccer's World Cup finals. To adjust to this new schedule, the Lillehammer Games were held in 1994, the only time that two Games have been staged two years apart. Lillehammer was a town of 21,000 inhabitants, but within 4 years the organizers turned it into a first-rate Olympic site.

SPORTING HIGHLIGHTS

- ➔ Norwegian speed skater Johan Olav Koss won three gold medals, and broke the world record each time, in front of a home crowd.
- ➔ At her fourth Olympics, Bonnie Blair of the US made history by becoming the first woman speed skater to win three consecutive titles in the 500 m.
- ➔ After the first run of the slalom, Switzerland's Vreni Schneider was in fifth place. She then achieved such a fantastic second run that she won the gold medal. Schneider went on to earn a silver medal in the combined event and a bronze in the giant slalom.

67 Number of nations
1,737 Number of athletes (1,215 men/522 women)
6 Number of sports **61** Number of events

STAR PROFILE BJÖRN DÆHLIE



Cross-country skier Björn Dæhlie holds several all-time Winter Olympics records. Competing in the 1990s, he is still the only winter athlete to win eight gold medals, the only one to win 12 medals in total, and the only one to earn nine medals in individual events. He is also the only man to win six gold medals in individual events. At the 1994 Lillehammer Olympics, Dæhlie earned the gold medal in the 10 km and took silver in the 30 km.

Did you know that... The Bosnia and Herzegovina 4-man bob team was made up of 2 Bosnians, a Croatian, and a Serbian: a great example of the Olympic spirit.>>>Due to respect for the environment, Lillehammer was named the "White-Green Games."

ATLANTA

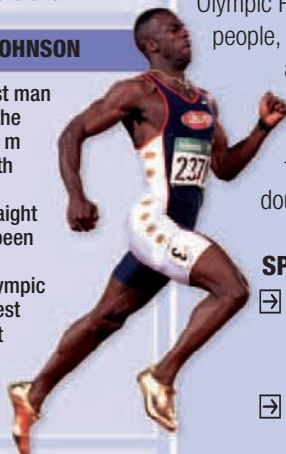


JULY 19-AUGUST 4, 1996 GAMES OF THE XXVI OLYMPIAD

197 Number of nations
10,318 Number of athletes (3,512 women/6,806 men)
26 Number of sports **271** Number of events

STAR PROFILE MICHAEL JOHNSON

Michael Johnson was the first man to be ranked number one in the world at both 200 m and 400 m and he began dominating both events in 1990. By the 1996 Olympics, he had won 54 straight finals at 400 m and had not been beaten at that distance in 7 years. Johnson won the Olympic final by 33 ft (10 m): the largest margin of victory in the event in 100 years. He also ran a phenomenal 19.32 to win the gold for the 200 m.



Did you know that... Each team that qualified for the soccer tournament was allowed to include three professionals, regardless of age or experience.
>>> For the first time, all 197 recognized National Olympic Committees were represented at the Games.

The 1996 Games were given a dramatic start when the cauldron was lit by Muhammad Ali. On July 27, during a concert held in the Centennial Olympic Park, a terrorist bomb killed one person and injured another 110 people, but the Atlanta Games are best remembered for their sporting achievements. A record-setting 79 nations won medals and 53 won gold. Initially, there were murmurs of discontent when the IOC decided to alter the sequence of events on the track so that the US's Michael Johnson could attempt a 200 and 400 m double, something no man had ever successfully achieved before.

SPORTING HIGHLIGHTS

- ➔ French runner Marie-José Pérec won the 200 m and then broke the 400 m Olympic record, thus achieving the best performance for 10 years. She became the most successful French female athlete of all time.
- ➔ Russian swimmer Aleksandr Popov won two gold and two silver medals. A very experienced competitor and a magnificent glider, he created the impression that swimming required no effort.
- ➔ Naim Suleymanoglu of Turkey became the first weightlifter in history to win three consecutive Olympic titles.
- ➔ Michael Johnson's double success over 200 m and 400 m was the first for a man in Olympic history.

NAGANO



FEBRUARY 7-22, 1998 XVIII OLYMPIC WINTER GAMES

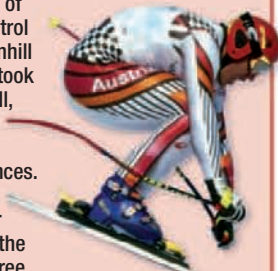
72 Number of nations

2,176 Number of athletes (787 women/1,389 men)

7 Number of sports **68** Number of events

STAR PROFILE HERMANN MAIER

Hermann Maier of Austria lost control during the downhill at Nagano and took a frightening fall, flying through the air to crash through two fences. Incredibly, three days later he won gold in the super-G, and three days after that he earned a second gold in the giant slalom.



Did you know that... For the first time, professional players from the US National Hockey League participated. >>> A 50% discount on all Olympic tickets was offered to schoolchildren. >>> Official staff uniforms were made from recyclable materials.

The Japanese city of Nagano, 90 minutes by train from Tokyo, was host to the final Winter Olympics of the 20th century, with 68 events in 7 winter sports being held over period of 16 days. A criticism of past Winter Games was that the competition sites were too far from central areas. The Nagano organizers ensured this was not the case in 1998. The competition sites were divided into six areas, all of them within a 25-mile radius of Nagano City. As host nation, Japan rode on the wave of enthusiasm from faithful fans to win more gold medals at Nagano than it had won in the previous 70 years of Winter Games. At the Games (the biggest yet), Germany topped the medal table, followed by Norway and then Russia.

SPORTING HIGHLIGHTS

- ➔ Norwegian cross-country skier Björn Dæhlie, the most successful male nordic skier in Olympic history, won the 10 km classical and the 50 km races, anchored the Norwegian team to victory in the relay, and won silver in the combined pursuit event.
- ➔ Japanese ski jumper Kazuyoshi Funaki won the silver medal in the normal hill event. On the large hill he obtained perfect style points from all five judges and won the gold medal.
- ➔ Italian Deborah Compagnoni repeated her 1994 giant slalom victory and just missed out on golf in the slalom by 0.06 seconds, becoming the first alpine skier to win gold medals in three different Olympics.

SYDNEY



SEPTEMBER 15-OCTOBER 1, 2000 GAMES OF THE XXVII OLYMPIAD

The Sydney Games were the largest yet, with 10,651 athletes competing in 300 events. Despite their size, the Games were well organized, renewing faith in the Olympic Movement. Athletes from North and South Korea marched together under the same flag, while four athletes from East Timor (it only became a sovereign state in 2002) were allowed to participate under the Olympic flag as individual athletes. Cathy Freeman, an indigenous Australian, was given the honor of lighting the Olympic flame in the opening ceremony, and repaid the compliment by winning the 400 m final in front of an ecstatic home crowd.

- ➔ After being kept away from competitions for over a year by serious shoulder and back problems, French judo champion David Douillet won his second consecutive Olympic gold by beating Shinichi Shinohara of Japan in an exciting final.
- ➔ 17-year-old Australian swimming sensation Ian Thorpe won his first gold medal in the 400 m freestyle by breaking his own world record. He then swam the anchor leg in the 4x100 m freestyle to win again. A third gold came from the 4x20 m freestyle, and he added a silver medal in the 200 m freestyle.
- ➔ German canoeist Birgit Fischer (see p.35) won two golds in the K-2 and K-4 500 m to become the first female Olympian to win medals 20 years apart.

199 Number of nations

10,651 Number of athletes (6,582 men/4,069 women)

28 Number of sports **300** Number of events

STAR PROFILE STEVEN REDGRAVE

Steven Redgrave of Great Britain is the only rower to win five consecutive Olympic gold medals. In the Atlanta Games, Redgrave and partner Matthew Pinsent successfully defended their title to win the coxless pairs in their 100th race together. Redgrave won his fifth gold medal in the Sydney Games, at the age of 38, as a member of the coxless fours.



Did you know that... The first Sri Lankan woman to win a medal, Susanthika Jayasinghe, won bronze in the 200 m. >>> Vietnam won its first medal since it first began competing in 1952, in women's taekwondo.

SALT LAKE CITY



FEBRUARY 8-24, 2002 XIX OLYMPIC WINTER GAMES

The Salt Lake City Games saw the expansion of the winter program to 78 events, including the skeleton (for the first time since 1948) and women's bobsleigh. A record 18 nations won gold medals, including China and Australia for the first time. Highlights included Norwegian Ole Einar Bjorndalen winning quadruple gold across all biathlon events, Finn Sampa Lajunen winning triple gold across all Nordic combined events, and the 20-year-old Swiss Simon Ammann winning both ski jump events. Canada won the men's and women's ice hockey tournaments, with the men's victory over the US being their first gold for 50 years. By winning silver in the single luge, German Georg Hackl became the first Olympian to win a medal in the same event in five consecutive games.

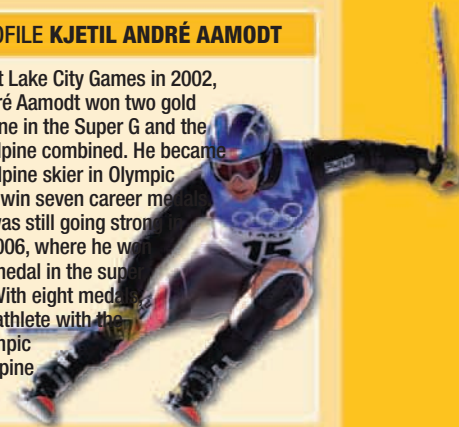
SPORTING HIGHLIGHTS

- ➔ After knee surgery and a long rehabilitation, Alpine skier Janica Kostelic of Croatia made Olympic history. She started by taking the combined title followed by golds in the slalom and giant slalom, as well as silver in the super-G.
- ➔ With a gold medal in the combined, Kjetil Andre Aamodt of Norway became the most decorated Alpine skiing Olympian in history.
- ➔ Competing in the women's bobsled, Vonetta Flowers became the first black athlete to win a gold medal at a Winter Games.

77 Number of nations
2,399 Number of athletes (886 women/1,513 men)
7 Number of sports **78** Number of events

STAR PROFILE KJETIL ANDRÉ AAMODT

At the Salt Lake City Games in 2002, Kjetil André Aamodt won two gold medals: one in the Super G and the other in Alpine combined. He became the first Alpine skier in Olympic history to win seven career medals. Aamodt was still going strong in Turin in 2006, where he won the gold medal in the super-G event. With eight medals, he is the athlete with the most Olympic titles in Alpine skiing.



Did you know that... These games saw the introduction of instant video replay in figure skating. >>> Two golds were awarded in pairs figure skating instead of gold and silver. >>> China and Australia won their first gold medals in Winter Games history.

ATHENS



AUGUST 13-29, 2004 GAMES OF THE XXVIII OLYMPIAD

In 2004, the Olympic Games returned to Greece, the home of both the ancient Olympics and the first modern Olympics. For the first time ever, a record 201 National Olympic Committees (NOCs) participated in the Olympic Games. The overall tally for events in the games was 301 (one more than in Sydney 2000). The popularity of the Games soared to new heights as 3.9 billion people had access to the television coverage compared to 3.6 billion for Sydney 2000.

SPORTING HIGHLIGHTS

- ➔ Moroccan Hicham El Guerrouj became the first runner since Paavo Nurmi in 1924 to win both the 1,500 m and the 5,000 m. In the 1,500 m, he was passed by Bernard Lagat in the home stretch, but came back to win. In the 5,000 m, he came from behind to defeat 10,000 m champion Kenenisa Bekele.
- ➔ Turkish weightlifter Nurcan Taylan won the gold medal in the women's 48 kg category. She was the first Turkish woman in any sport to win an Olympic championship.
- ➔ Argentina's men's basketball team put an end to the domination of the US's professionals, defeating them 89–81 in the semi-finals. The Argentinians went on to beat Italy 84–69 in the final.
- ➔ German canoeist Birgit Fischer became the youngest and oldest Olympic canoeing gold medallist, winning her gold medals—in K-1 and K-4 500 m—24 years apart, and the first female athlete to win gold in six different Olympics.

201 Number of nations
11,099 Number of athletes (6,458 men/4,551 women)
28 Number of sports **301** Number of events

STAR PROFILE MICHAEL PHELPS



US Swimmer Michael Phelps won six gold and two bronze medals at Athens. He went on to top that achievement in Beijing, winning a record eight events. Phelps has the perfect physique for a swimmer, with a long torso and arms, short legs, and large, flexible feet. During his training regime, he eats up to 10,000 calories a day—five times a normal adult's intake of food.

Did you know that... Kenya's runners swept the medals in the 3,000 m steeplechase taking gold, silver, and bronze. >>> The marathon races followed the same route as in 1896, beginning in Marathon and ending in Athens' Panathenaic Stadium.

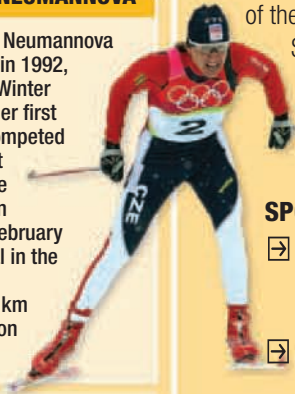
TURIN

FEBRUARY 10-26, 2006 XX OLYMPIC WINTER GAMES

80 Number of nations
2,508 Number of athletes (960 women/1,548 men)
7 Number of sports **84** Number of events

STAR PROFILE KATERINA NEUMANOVA

Cross-country skier Katerina Neumannova first competed in the Games in 1992, but it was not until her third Winter Games that she finally won her first medals. Because she also competed in the mountain bike event at the 1996 Summer Games, the Turin Games were the sixth in which she participated. On February 12, she earned a silver medal in the pursuit. On February 24, Neumannova skied in the 30 km race and, at the age of 33, won her first gold medal.



Did you know that... For the first time, live video coverage of the Olympic Games was available on mobile phones. >>> With a population of more than 900,000, Turin became the largest city ever to host the Winter Olympic Games.

A record 2,508 athletes from 80 nations competed at the Turin Winter Games with a record 26 countries taking home medals. The Austrians dominated the Alpine skiing, winning 14 of the 30 medals. South Korea displayed similar success in the short track speed skating, winning 10 of the 24 medals. During the cross-country team sprint, Canadian Sara Renner broke one of her poles. Seeing her struggle, the Norwegian head coach Bjørnar Håkenmoen gave her one of his, which allowed Renner to help her team win silver, and dropped Norway out of the medals.

SPORTING HIGHLIGHTS

- ➔ Philipp Schoch was the favorite to defend his Olympic championship in the snowboarding parallel giant slalom event, but he faced a tough challenger: his older brother, Simon. They both qualified for the two-man final, with Philipp getting the victory.
- ➔ The men's ice hockey tournament saw the first all-Scandinavian final: Finland against Sweden. In the final, Nicklas Lidstrom scored 10 seconds into the final period to give Sweden the lead, and they held on to seal the victory.
- ➔ Local favorite Enrico Fabris won bronze in the 5,000 m speed-skating event, becoming the first Italian to win a medal in this event.



BEIJING

AUGUST 08-24, 2008 GAMES OF THE XXIX OLYMPIAD

The 29th Olympiad officially started at eight minutes past eight in the evening on August 8, 2008. Eight is a lucky number in China, and luck certainly held with the weather, as the heavily polluted Chinese capital enjoyed its cleanest air for 10 years. The huge building program for the Olympics included the construction of 12 new venues and a doubling of the capacity of the Beijing underground. The centerpiece was the spectacular 90,000-seater National Stadium, dubbed the "Bird's Nest." Nine new events were held, including BMX cycling, marathon open-water swimming, and the women's 3,000 m steeplechase. The medals table was topped by the host country, which won 51 gold medals.

SPORTING HIGHLIGHTS

- ➔ Usain Bolt's outstretched arms as he turned to the crowd in the final stages of the 100 m final provide the abiding image of the games. Bolt (21) destroyed the field in both the 100 and 200 meters. (see box).
- ➔ Michael Phelps won all eight of the swimming events he entered, breaking Mark Spitz's 36-year-old record for the most gold medals in a single games. He broke the world record in four of his five individual events.
- ➔ Chris Hoy led the way in the velodrome as a dominant British team took seven of the 10 indoor cycling gold medals. Hoy, also a seven-time world champion, bagged three golds, the first British athlete to do so since 1908.

204 Number of nations
11,196 Number of athletes (6,450 men/4,746 women)
28 Number of sports **302** Number of events

STAR PROFILE USAIN BOLT



Jamaican sprinter Usain Bolt broke the world record in three events at Beijing. He won the 100 m with a time of 9.69 seconds, and could have run even faster had he not begun celebrating victory 15 m from the finish line. Four days later, he took the 200 m in 19.30 seconds, breaking Michael Johnson's 12-year-old record. He completed a sprinting clean sweep in the 4x100 m relay. Bolt was the first man since fellow-Jamaican Don Quarrie to hold the world record for both the 100 and 200 meters.

A team of 70,000 helped keep the Beijing Games running smoothly. >>> Cuba's Angel Valodia Matos saved his best move until after his taekwondo bout had ended. Angry at his disqualification, Valodia Matos landed a kick right in the referee's face.



VANCOUVER



FEBRUARY 12-28, 2010 XXI OLYMPIC WINTER GAMES

The Winter Games continued to grow at Vancouver 2010, with a record number of athletes, events, and nations—including first-timers the Cayman Islands, Colombia, Ghana, Montenegro, Pakistan, and Peru. The opening ceremony was dedicated to 21-year-old Georgian luger Nodar Kumaritashvili, who had died just hours earlier following a crash during training. Chastened by tragedy, public and competitors alike made Vancouver 2010 an explosive, joyous celebration in his memory. Canada put its failure to win a single gold medal in two previous Games as host well and truly behind it, setting a record for host-nation success by topping the medals table with 14 golds. Meanwhile, Slovakia and Belarus also won their first golds at a Winter Games.

SPORTING HIGHLIGHTS

- ➔ Norwegian Marit Bjorgen confirmed her status as the most successful female cross-country skier of the modern era. She topped the medals table with three golds, a silver, and a bronze, taking her overall Olympic medal tally to seven.
- ➔ Team Canada capped a record-breaking Winter Games for a host nation by beating neighbours USA in the men's ice hockey. The final gold medal of the Games was won in overtime with a goal from star player Sidney Crosby.
- ➔ Slovenian Petra Majdic won bronze in the cross-country sprint despite breaking five ribs and damaging a lung after falling into a gully. She said of her medal: "Today, this is not a bronze. This is a gold with little diamonds on it."

82 Number of nations
2,536 Number of athletes (1,503 men/1,033 women)
7 Number of sports **86** Number of events

STAR PROFILE KIM YU-NA

19-year-old South Korean figure skater Kim Yu-Na won her gold medal in breathtaking fashion, scoring a world record 150.86 points for her free skate. Her combined total of 228.56 points was also a new record, beating silver-medal winner Mao Asada of Japan by a massive 23 points. Her routine was acclaimed as "destined to be remembered for as long as Torvill and Dean's famous Bolero in 1984."



Did you know that... With a total of 2.3 million inhabitants, Vancouver became the largest city to host the Winter Games. >>> Environmental measures included real-time tracking and publication of the energy consumption of each Olympic venue.

037

Below: British track cyclist Chris Hoy became the most successful male Olympic cyclist of all time by winning gold in the sprint, team sprint, and keirin at Beijing 2008.



THE PARALYMPIC GAMES

038

The Paralympics Games, an Olympiad for competitors with disabilities, was first contested in Rome in 1960. Initially conceived by Sir Ludwig Guttman in 1948 as a sports event for World War II veterans with spinal cord injuries (known as the Stoke Mandeville Games), the event later assumed global proportions. The first Winter Paralympics were held in Sweden in 1976.

The Summer Paralympics comprises many of the same events as the Olympic Games—judo, rowing, swimming, table tennis, etc.—while also having several disability-specific events such as wheelchair rugby. The Winter Paralympics is a smaller spectacle and comprises six core events—alpine skiing, ice sledge hockey, Nordic skiing, biathlon, cross-country skiing, and wheelchair curling.

Because disability can take several forms, Olympians compete in six different categories—amputee, cerebral palsy, wheelchair, vision impairment, intellectual disability, and others (including competitors with a mobility impairment or other loss of physical function that does not fall strictly under one of the other four categories).

Below: Tanni Grey-Thompson storms over the line to win the first of her two gold medals at the Summer Paralympics in Athens, in September 2004, determination etched on her face. It is a determination that saw her break 20 world records in a 20-year career at the pinnacle of disabled sport.





Above: Norway's Ragnhild Myklebust heads to victory in the cross-country middle distance (5 km) event at the 2002 Winter Paralympics in Utah.

Above right: Wheelchair curling is one of six core events that make up the Winter Paralympics. Here, Canadian Chris Daw sends a rock down the ice.

THE GREATEST PARALYMPIAN

OCTOBER 1988—MAY 2007 THE CAREER OF A CHAMPION

STAR PROFILE DAME TANNI GREY-THOMPSON

Britain's Dame Tanni Grey-Thompson, who retired from competitive sport in May 2007, is one of the world's greatest Paralympians. Born in 1969 with spina bifida, she was confined to a wheelchair from the age of seven, but this did not hinder her athletic career. She first tried wheelchair racing at the age of 13 and has been a pioneer for disabled athletics ever since. During a glittering career, she competed in the widest possible range of disciplines—from 100 m to the marathon—achieving great success in all. She held 30 world records, won the London Marathon six times between 1997 and 2002, and in the course of five Paralympics won 16 medals, including 11 golds. She was made a Dame of the British Empire in 2005 in recognition of her achievements in disabled sport and in 2006 she was appointed a member of the Laureus World Sports Academy.

TANNI'S PARALYMPIC ROLL OF HONOR

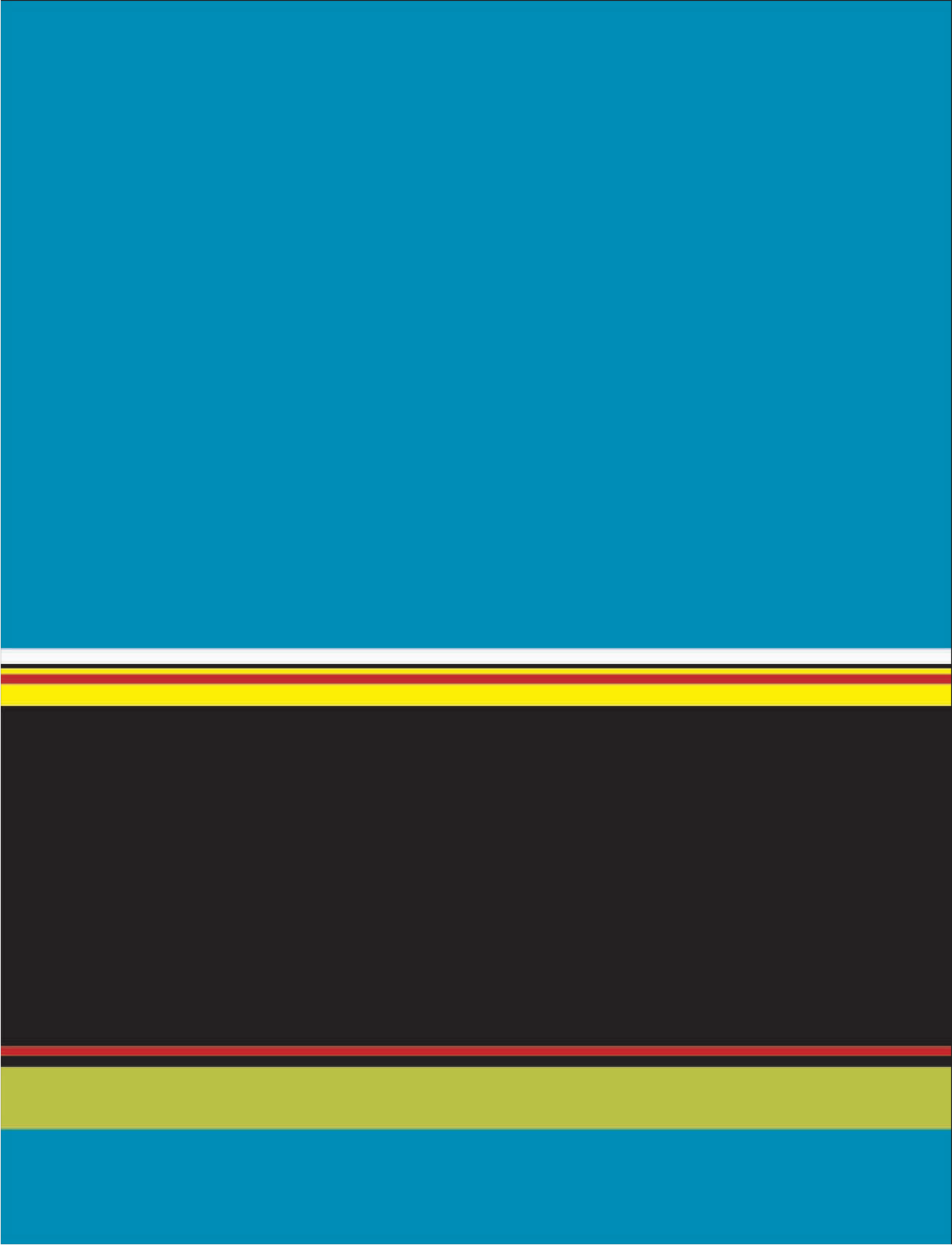
YEAR	HOST COUNTRY	MEDALS
2004	ATHENS	2 GOLD
2000	SYDNEY	4 GOLD
1996	ATLANTA	1 GOLD AND 3 SILVER
1992	BARCELONA	4 GOLD AND 1 SILVER
1988	SEOUL	1 BRONZE

OTHER ACHIEVEMENTS

- FIRST WOMAN TO BREAK ONE-MINUTE BARRIER FOR 400 M
- WINNER OF 13 WORLD CHAMPIONSHIP MEDALS
- FIRST WOMAN TO BREAK TWO-HOUR BARRIER FOR MARATHON

Below: Some sights of sporting achievement at the 2004 Paralympics in Athens. Amputee athletes work hard on building muscles in their remaining limb for events like the high jump and long jump (below and center); in swimming (below right), most of the rules are the same as for able-bodied competitions.







**THE
SPORTS**

The image features a bold, graphic design. A large, stylized letter 'L' shape is formed by a thick blue line that curves from the top left towards the bottom right. This blue line is bordered by a thin, bright yellow line. The background is split into three main color zones: a large orange area on the right, a red area at the bottom, and a red area on the left that is partially obscured by the blue and yellow lines. The word 'ATHLETICS' is centered in the orange area in a bold, black, sans-serif font.

ATHLETICS

01



TRACK AND FIELD

SPORT OVERVIEW

Track and field consists of three types of events: track events (running or walking), field events (jumping or throwing), and combined events, such as the pentathlon, which are a combination of both track and field events. Track and field is at the core of the Olympic movement and was featured at the first games at Olympia in 776 BCE. The popularity of track and field events wavered during Roman times, but athletics again dominated the first modern Games.

INDOORS AND OUTDOORS

Track and field events are held either indoors (during the winter) or outdoors (in the spring and summer). The majority of events are held at both indoor and outdoor meets, although there are exceptions. Limited space at indoor venues means that throws such as the javelin, hammer, and discus are only contested during the outdoor season. A smaller indoor track also means that the 100 m is replaced by the 60 m sprint.

MEASURE FOR MEASURE

Accurately measuring time and distance is a crucial part of track and field events. For track events, athletes are timed using sensors linked to cameras, and measured using Fully Automatic Time. For the long jump, triple jump, and throwing events, distances are measured using a certified steel measuring tape.

KEEPING SCORE

Movable electronic scoreboards are placed around the track, enabling athletes, officials, and spectators to see how much time has elapsed since the start of a race.



PHOTO FINISH

A digital line-scan camera (trained on the finish line and linked to a computerized timing sensor) determines competitor placings. It is accurate to thousandths of a second.



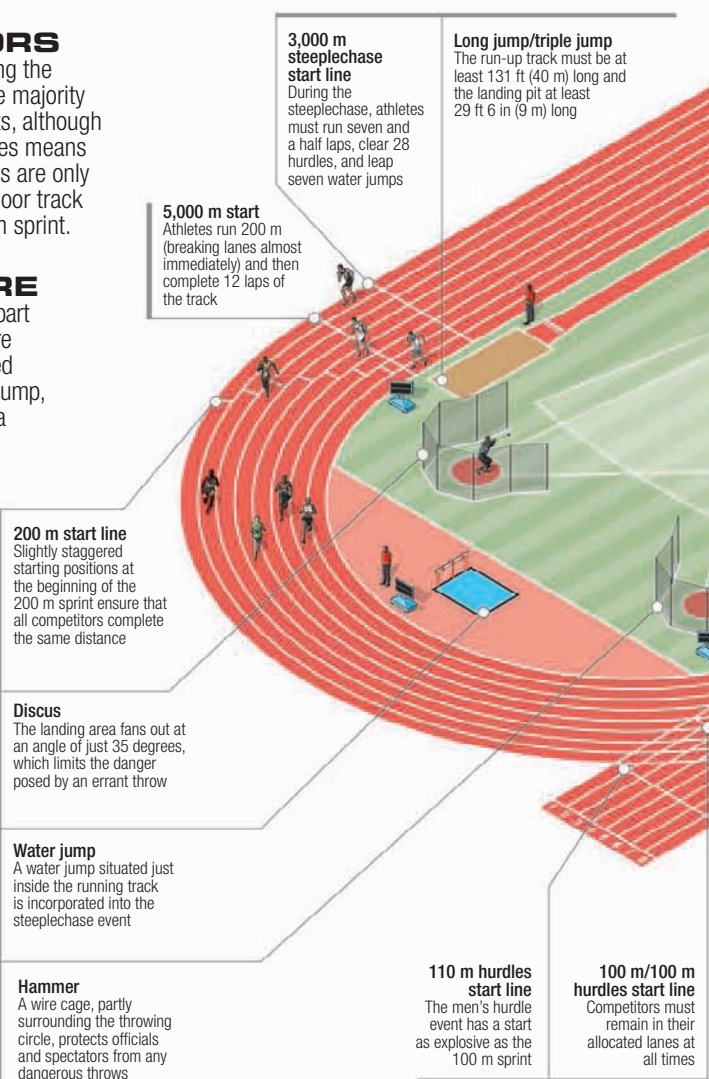
STARTER PISTOL

Track and field events are started by the firing of a starting pistol. The sound of the gun, which contains blank shells, is a signal to the athletes to begin. The gun automatically starts the timers.



NEED2KNOW

- ➔ The word "athlete" comes from the Greek word "athlos," meaning a contest or competition.
- ➔ The first athletics event at the first ancient Olympiad was the "stade" race—a sprint along the full length of the stadium (a distance of approximately 210 yd/192 m).
- ➔ The order in which track and field events are competed at an official meet is determined by a random draw.





TRACK AND FIELD ARENA

A full-size track usually measures 400 m in circumference, has six or eight lanes, and encircles a sports field that contains specific areas for each field sport. Most tracks have a synthetic rubber or polyurethane surface for year-round use. Indoor tracks are usually only 200 m in circumference, have four or six lanes, and have banked turns to accommodate bends that are far tighter than on an outdoor track. Whether competing indoors or outdoors, athletes always race around the track in an counterclockwise direction. Due to space constraints, indoor field events consist of only the jumps and the shot put.

1,500 m start line

Runners, who can break lanes for the shortest running line almost immediately, must complete $3\frac{3}{4}$ circuits of the track

High jump

High jumpers have an approach run of about 40 ft (12 m), which can be made from almost any direction to the front of the bar

Javelin

A white strip marks the end of the run-up track, which is made of the same material as the running track

Shot put

The shot-put throwing circle is 7 ft (2.14 m) in diameter; the landing area fans out at an angle of 35 degrees

400 m start

The 400 m start is more staggered than the 200 m start as there are more curves to negotiate

Finish Line

All races finish at this line, regardless of their starting position

10,000 m start

Long-distance runners begin 25 laps of the track from here

Pole vault

A wedge-shaped "pole box" at the end of the track is sunk to a depth of 8 in (20 cm)

DRUG TESTING

The use of performance-enhancing drugs—especially in athletics—never fails to make headline news. In a constant battle to promote fair play, the International Association of Athletics Federations runs a stringent doping control program to detect improper use of drugs such as anabolic steroids. In 1999, an independent foundation called the World Anti-Doping Agency (WADA) was also set up by the International Olympic Committee.

INSIDE STORY

As well as being fundamental to the Olympic movement, athletics is a glamorous sport that can earn top athletes literally millions of dollars. The IAAF Golden League—an annual event run by the sport's governing body—has a \$1 million prize fund up for grabs, with the jackpot being shared between the athletes who win their event at all six meets during the season (although the award structure varies from season to season). During the 2000/2001 league, the prize money was even replaced by gold bars weighing in at 110 lb (50 kg).

STAT CENTRAL

OLYMPIC TRACK EVENTS

EVENT	GENDER
100 M	M & W
200 M	M & W
400 M	M & W
100 M HURDLES	W
110 M HURDLES	M
400 M HURDLES	M & W
4 X 100 M RELAY	M & W
4 X 400 M RELAY	M & W
800 M	M & W
1,500 M	M & W
3,000 M STEEPLECHASE	M & W
5,000 M	M & W
10,000 M	M & W
MARATHON	M & W
20 KM WALK	M & W
50 KM WALK	M

OLYMPIC FIELD EVENTS

EVENT	GENDER
DISCUS	M & W
JAVELIN	M & W
HAMMER THROW	M & W
SHOT PUT	M & W
POLE VAULT	M & W
HIGH JUMP	M & W
LONG JUMP	M & W
TRIPLE JUMP	M & W

OLYMPIC COMBINED EVENTS

EVENT	GENDER
DECATHLON	M
HEPTATHLON	W

A STELLA PERFORMANCE

POLISH-BORN ATHLETE STANISLAWA WALASIEWICZ (ALSO KNOWN AS STELLA WALSH) WON GOLD IN THE WOMEN'S 100 M AT THE 1932 OLYMPICS IN LOS ANGELES. SHE WENT ON TO SECURE SILVER FOUR YEARS LATER AT THE GAMES IN BERLIN. HOWEVER, AN AUTOPSY CARRIED OUT ON HER BODY—AFTER SHE WAS TRAGICALLY KILLED BY A STRAY BULLET DURING AN ARMED ROBBERY IN A SHOPPING MALL IN 1980—SHOWED THAT SHE POSSESSED MALE GENITALIA AND BOTH MALE AND FEMALE CHROMOSOMES. DESPITE THESE REVELATIONS, STELLA WALSH'S RECORDS STILL STAND.

NEED2KNOW

- Sprints are generally staged as part of larger athletics events, including the Olympic Games and the World Championships.
- The first Olympic Games (776BC) probably only featured one event—a sprint over 600 ft (182.88 m).
- Carl Lewis is the most successful 100 m runner ever, with five World or Olympic titles (1983–1991).

046



SPRINTS

EVENT OVERVIEW

At athletics events it is usually the sprints—which are run over 60, 100, 200, and 400 meters—that most firmly grip the spectators' imagination. And it is as if the world stops for the Olympic 100 m men's final: there is something mesmerizing—almost primeval—about the competitors exploding out of the blocks, sprinting as fast as is humanly possible, and then streaking across the finishing line a mere 10 seconds or so later.



Body position

To maintain maximum speed, the upper body should be still, upright, and relaxed

Born fast

Sprinters usually have more "fast-twitch" muscle fibers than the average person. This type of muscle fiber provides short bursts of power but fatigues rapidly

No socks

Since the foot should have very little room to move inside the shoe, many athletes do not wear socks

Good grip

Lightweight shoes with spikes provide maximum traction

1996 FINAL

THE 1996 ATLANTA OLYMPICS MEN'S 100 M FINAL IS CONSIDERED ONE OF THE GREATEST SPRINTS EVER. THE FAVORITE, DONOVAN BAILEY, RECOVERED FROM A POOR START TO WIN THE RACE AND SET A WORLD RECORD OF 9.84 SECONDS.

RUNNING IN LANES

For all the sprints, runners must remain in their starting lane for the duration of the race. At the start of the events that involve rounding one or more bends (the 200 m and the 400 m), the competitors are "staggered" to ensure that each runner travels exactly the same distance.

Dressed for speed

Close-fitting, streamlined Lycra body suits reduce wind resistance and allow excellent freedom of movement

ATHLETE PROFILE

Sprinters' leg muscles are highly developed to provide explosive power. The upper body is similarly muscular because according to the laws of biomechanics, the forces created by the striding legs and the swinging arms must be equal (and opposite). Also, a quick response to the starter's gun requires sharp reflexes.

SIDELINES

20

The number of years Jesse Owens of the United States held the 100 m world record with his time of 10.3 seconds at the 1936 Olympic Games. Owens is considered one of the finest athletes ever and once defeated a racehorse over 100 yd (91 m).

53

The number of times Maurice Greene (United States) legally ran the 100 m in less than 10 seconds.

33

British athlete Linford Christie's age when he won the 100 m at the 1993 World Championships.

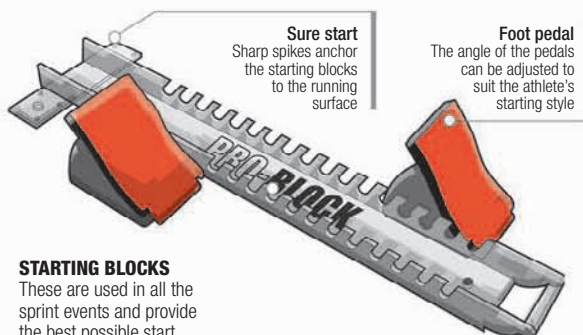
0.33

The winning margin, in seconds, achieved by Michael Johnson of the United States in the 200 m at the 1991 and the 1995 World Championships. This was the largest difference at this level since Jesse Owen's winning margin of 0.4 in the 200 m at the 1936 Olympic Games.



EQUIPMENT

Sprinters wear an aerodynamically efficient Lycra body suit and very light shoes that feature spikes up to $\frac{3}{8}$ in (9 mm) long and a thin sole, which improves the competitor's feel for the track. Starting blocks allow athletes to drive forward powerfully at the starter's gun and to begin the race in the best position to achieve maximum acceleration.



STARTING BLOCKS

These are used in all the sprint events and provide the best possible start.

THE SPRINT DISTANCES

There are four sprint distances. The 60 m, which is usually run indoors, favors runners with electrifying speed but not necessarily high endurance. Unofficially defining the "Fastest Person on Earth," the 100 m rewards sprinters who can quickly achieve and then maintain maximum speed. This demands tremendous muscular power and finely honed technique. 200 m runners have all the skills of an 100m runner, with the additional ability to manage centrifugal forces when rounding the bend. They must start strongly yet have sufficient energy to finish well. Described as an endurance sprint, the 400 m is the most grueling of all the sprints. Careful pacing of this race is vital because after about 30 seconds of running at near maximum effort, lactic acid builds up in the muscles, making it more difficult and more painful to maintain speed.

FACTORS AFFECTING PERFORMANCE

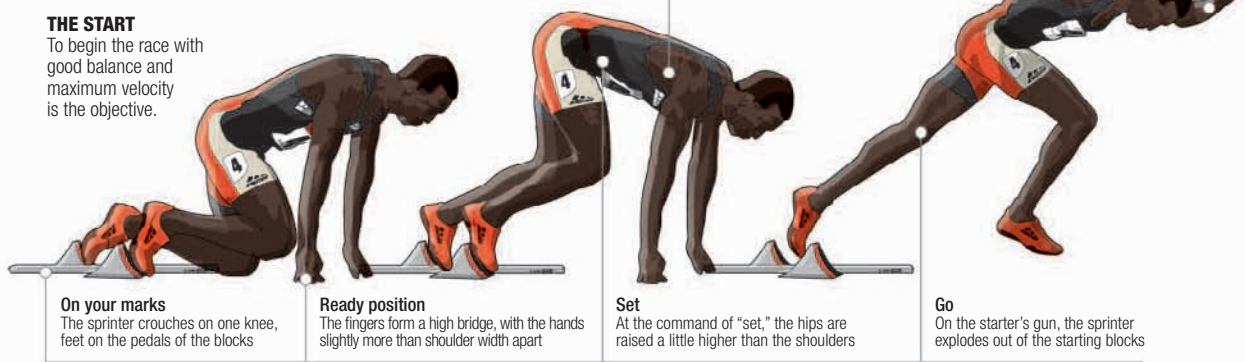
A sprinter recording fast times will have talent, a powerful physique, good tactical awareness, will have trained hard, and will be in good form—physically and mentally. Other factors that may influence performance include the track type (harder surfaces produce faster times) and climatic conditions, particularly wind speed and direction.

RACE PHASES

A sprint can be divided into four phases: the start (see below), acceleration (the body leans forward, so that the legs can provide maximum acceleration), stride (full speed has been achieved and is maintained via a relaxed technique, with the body now upright), and finish (the arms are pulled back so that the head and shoulders dip toward the finish line).

THE START

To begin the race with good balance and maximum velocity is the objective.



On your marks

The sprinter crouches on one knee, feet on the pedals of the blocks

Ready position

The fingers form a high bridge, with the hands slightly more than shoulder width apart

Set

At the command of "set," the hips are raised a little higher than the shoulders

Go

On the starter's gun, the sprinter explodes out of the starting blocks

Shoulders forward

The shoulders are directly above or a little in front of the hands

Pumping arms

The arms drive hard to propel the athlete forward quickly

Head down

Watching the track helps the sprinter maintain a low position

STAT CENTRAL

MEN'S 100 M: FASTEST TIMES

TIME	ATHLETE (COUNTRY)
9.58	USAIN BOLT (JAM)
9.77	ASafa POWELL (JAM)
9.77	JUSTIN GATLIN (US)
9.79	MAURICE GREENE (US)
9.84	DONOVAN BAILEY (CAN)

MEN'S 200 M: FASTEST TIMES

TIME	ATHLETE (COUNTRY)
19.19	USAIN BOLT (JAM)
19.32	MICHAEL JOHNSON (US)
19.62	TYSON GAY (US)
19.63	XAVIER CARTER (US)
19.65	WALLACE SPEARMON (US)

MEN'S 400 M: FASTEST TIMES

TIME	ATHLETE (COUNTRY)
43.18	MICHAEL JOHNSON (US)
43.29	HARRY (BUTCH) REYNOLDS (US)
43.45	JEREMY WARINER (US)
43.50	QUINCY WATTS (US)
43.75	LASHAWN MERRITT (US)

WOMEN'S 100 M: FASTEST TIMES

TIME	ATHLETE (COUNTRY)
10.49	FLORENCE GRIFFITH-JOYNER (US)
10.65	MARION JONES (US)
10.73	CHRISTINE AFFRON (FRA)
10.74	MERLENE OTTEY (JAM)
10.76	EVELYN ASHFORD (US)

WOMEN'S 200 M: FASTEST TIMES

TIME	ATHLETE (COUNTRY)
21.34	FLORENCE GRIFFITH-JOYNER (US)
21.62	MARION JONES (US)
21.64	MERLENE OTTEY (JAM)
21.71	MARITA KOCH (GER)
21.71	HEIKE DRECHSLER (GER)

WOMEN'S 400 M: FASTEST TIMES

TIME	ATHLETE (COUNTRY)
47.60	MARITA KOCH (GER)
47.99	JARMILA KRATOCHVÍLOVÁ (CZE)
48.25	MARIE-JOSÉ PÉREC (FRA)
48.27	OLGA VLADYKINA-BRYZGINA (RUS)
48.59	TAEÁNA KOCEMBOVÁ (CZE)

RELAYS



048

- The relay is a highly tactical race, and teams pay close attention to the order in which the runners race. Usually, the fastest runner (the anchor) is the last to run.
- The 4x400 m became a men's Olympic sport in 1908 (the women's competition followed in 1972). The 4x100 m relay first appeared at the Stockholm Games in 1912 (the women's event followed in 1928).
- The first relay races were held in the US by firemen who ran for charity, passing on a red pennant instead of a baton.

NO TURNING BACK

IN THE 4x400 M AT THE 1997 WORLD CHAMPIONSHIPS, THE US TEAM CAME TO GRIEF WHEN TIM MONTGOMERY SET OFF TOO EARLY ON THE SECOND LEG. REALIZING HIS MISTAKE, HE TURNED AROUND AND CRASHED INTO ONCOMING TEAMMATE BRIAN LEWIS.

EVENT OVERVIEW

The relay race boasts the competitiveness of a sprint race and the drama of the baton changeovers. Each of the four athletes race one section, or leg, of the race, handing over a baton to the next member of the team within a marked hand-off zone. The most common relays are the 4x100 m and the 4x400 m, in both men's and women's disciplines. The men's 4x400 m is traditionally the last event of any track meet. Less common events are the 4x200 m, 4x800 m, and 4x1,600 m races.

RUNNING TRACK

Relay races are run on regular running tracks. Due to the difference in the distance run by racers on the inside lane to those in the outer lanes, the racers start at staggered points in both 4x100 m and 4x400 m competitions. The runner in the inside lane starts on the finish line in both races, while the other runners start from progressively forward positions; the positions are more staggered in the 4x400 m. The three hand-off zones are clearly indicated on the surface of the track.

STAYING COOL

Due to the high speeds involved and the close proximity of other teams, good timing and concentration are required to pass the baton smoothly. This is especially true in the 4x100 m which is shown here.

Passing the baton

The incoming runner prepares to pass the baton to the receiver

Steady hands

It's crucial not to drop the baton; in Olympic events the team will be disqualified



Baton received

After taking the baton from his teammate, the receiver sets off as fast as possible on his leg of the race

Keep in lane

Runners risk disqualification if they pass the baton outside the hand-off zone, or stray from their own lane

Taking the baton

The receiver gets up to speed and puts his hand back, ready for the passer to plant the baton

COMPETITOR PROFILE

4x100 m relay runners need to have explosive pace, just as sprinters do. Runners in all distances must be able to time runs efficiently in order to achieve successful changeovers. 4x400 m runners must also have the stamina to run the extra distance.

THE BATON

The baton is a hollow aluminium tube 12 in (30 cm) long, 1½ in (4 cm) in diameter, and weighing 1¼ oz (50 g) or more. It is the time of the baton around the track that is measured, not the time of the athlete who carries it.



Smooth surface

The baton is entirely smooth, so must be handled carefully

Tubular build

The baton is made from a tube of metal, usually aluminum. The hollow construction makes it particularly lightweight



LANE DISCIPLINE

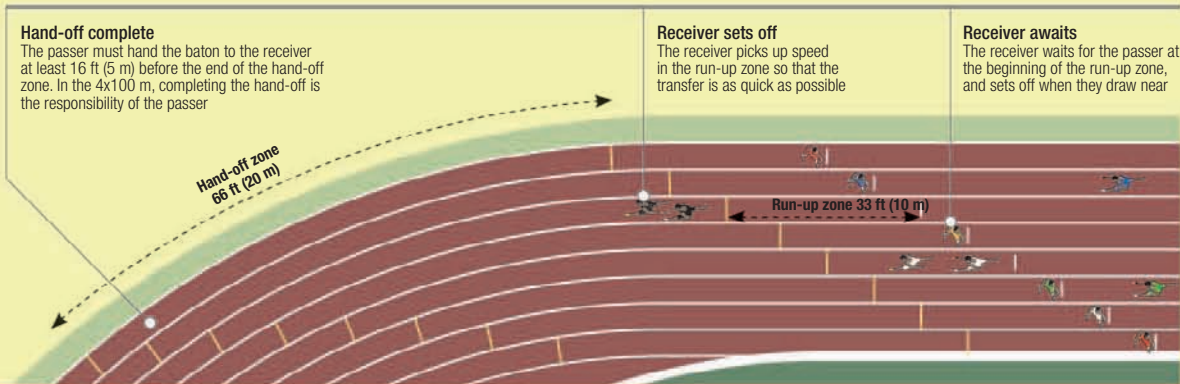
Athletes in the 4x100 m remain in their lanes from start to finish, so the hand-off takes place in the relevant lane. In the 4x400 m, runners start in separate lanes but may join the inside lane after the first 100 m of the second leg. In the final two hand-offs, race organizers place the receivers across the finish line according to their teams' placings at the time, with the leading team in the inside lane.

HIGH-SPEED HAND-OFF

Unlike the 4x400 m hand-off, where the length of each leg means that the passers are running relatively slowly, the 4x100 m hand-off (see below) is an action-packed phase when passer and receiver are running at high speed. The three run-up and hand-off zones are staggered around the bends of the track, so that the length of each leg is the same for every team.

STAYING IN THE BOX

The hand-off zone is 20 m in length. The baton must be handed over while both runners are fully inside it and no less than 5 m from its end. Second-, third-, and fourth-leg runners begin running in the run-up zone, 10 m before the hand-off zone, in order to pick up speed before the transfer. As a result, in 4x100 m relays, the first athlete runs 105 m, the second and third 125 m each, and the anchor 120 m.



CHANGING TIMES

The transfer of the baton is the crucial moment in a relay race, and must be handled delicately. In the 4x100 m relay the transfer is known as a "blind hand-off," since the receiver does not maintain visual contact. The receiver starts to run when the passer reaches a certain point on the track, and the baton-carrier then shouts "stick!" to tell the receiver to hold out a hand. In the 4x400 m relay, the receiver jogs forward while looking back at the passer, and holds out a hand for the baton.

UPSWEEP HAND-OFF

The baton is passed in an upward movement, a popular method in the 4x100 m relay. The receiver must adjust his grip before the next changeover.



DOWNSWEEP HAND-OFF

The passer hands the baton to the receiver in a downward movement. This method is popular in the 4x400 m relay, and is less risky than the alternative.



SIDELINES

300

The length, in meters (984 ft), of each leg of the earliest recorded relay races, held informally between teams of firemen in the United States in the late 19th century. The batons were red flags. The first official relay race was run in Philadelphia in 1893.

24

The number of Olympic gold medals held by the US athletic team in both men's and women's 4x100 m and 4x400 m events, the most of any nation. The US also boasts 12 world titles.

5.2

The number of seconds that have been knocked off the men's 4x100 m world record since 1912.

STAT CENTRAL

MEN'S 4X100 M OLYMPIC GOLD

YEAR	COUNTRY
2008	JAMAICA
2004	GREAT BRITAIN
2000	UNITED STATES
1996	CANADA

WOMEN'S 4X100 M OLYMPIC GOLD

YEAR	COUNTRY
2008	RUSSIA
2004	JAMAICA
2000	BAHAMAS
1996	UNITED STATES

MEN'S 4X400 M OLYMPIC GOLD

YEAR	COUNTRY
2008	UNITED STATES
2004	UNITED STATES
2000	NIGERIA
1996	UNITED STATES

WOMEN'S 4X400 M OLYMPIC GOLD

YEAR	COUNTRY
2008	UNITED STATES
2004	UNITED STATES
2000	UNITED STATES
1996	UNITED STATES

NEED2KNOW

- Hurdles events are divided into sprint races (110 m for men and 100 m for women), and the 400 m, which is run separately by men and women.
- Indoor hurdles are held over shorter distances—typically 60 m and 300 m. In such events, the distance between the hurdles remains the same as in the outdoor events; there are just fewer of them.

050

SIDELINES

10 The number of hurdles in a hurdles race, which remains the same regardless of the distance run.

15 The time, in seconds, of the first 110 m hurdles world record, set in 1908. The 13-second barrier was broken in 1981.

19 The number of times in the first 24 modern Olympic Games that gold in the men's 110 m hurdles was won by an athlete from the US. This overwhelming dominance was challenged in the first two Olympiads of the 21st century.

122 The number of consecutive 400 m hurdles races won by Edwin "Ed" Moses between 1977 and 1987.

Arms race

The arms play a critical role in counterbalancing the forces that are applied to the torso by the legs as they swing in to and out of the jumps over the hurdles

Low trajectory

It is important that the trailing leg is kept as low as possible. It is better to hit the hurdle with the knee than to lose speed by making an unnecessarily high clearance



HURDLES

EVENT OVERVIEW

Always big crowd-pullers, hurdling events are among the most exciting at any athletics meet. The object of a hurdles race is to jump over a series of gatelike obstacles and reach the finish line first. There are four main outdoor events: 100 m for women and 110 m for men (both sprint hurdles), and 400 m races for both men and women.

SPRINT HURDLES

In both the 100 m and 110 m hurdles, the competitors start out of the blocks and run along a straight course, jumping over 10 hurdles along the way. In the men's event, the first hurdle is 45 ft (13.7 m) from the starting line, and the distance between each hurdle is 30 ft (9.1 m). After the final hurdle, the runners sprint the remaining 47 ft 3 in (14.4 m) to the finish line. The first hurdle in the women's event is 42 ft 8 in (13 m) from the blocks. The hurdles are 29 ft 6 in (8.5 m) apart, and the last is positioned 34 ft 6 in (10.5 m) from the finish line.

ONE-LAP HURDLES

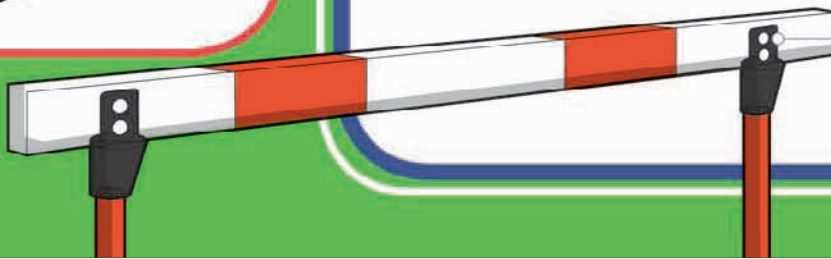
In the 400 m hurdles, racers start from the blocks and must leap over 10 hurdles, just like the sprint-distance hurdlers. Racers start from staggered points on the track, according to their lane position. The hurdles are slightly lower in height than their sprint-distance equivalents. The first hurdle is positioned 147 ft 7 in (45 m) from the start, and the distance between each of the following hurdles is 114 ft 10 in (35 m). The last hurdle is 131 ft 3 in (40 m) from the finish line.

ATHLETE PROFILE

Like any other race runners, hurdlers need speed, power, and stamina. Above all, they need to develop quick reflex actions that will help to propel them over a rapid succession of obstacles without a time-wasting loss of rhythm. Hurdlers also need to be flexible (they pay particular attention to hip exercises).

Getting a grip
A plate of small spikes on the sole of the hurdler's shoe provides traction

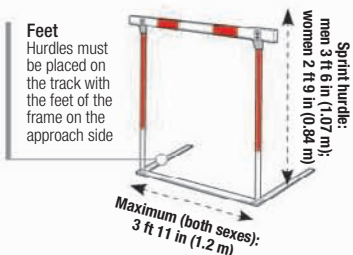
Material difference
The uprights and bases of the hurdles are made of metal, but the crossbar is wooden





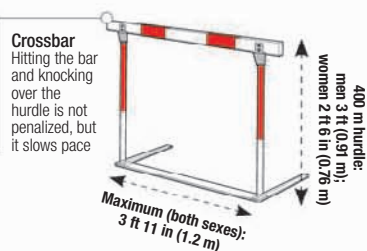
APPARATUS

The height of the hurdles varies from event to event. The sprint events are known as “high” hurdles. Long hurdle races use slightly lower heights. Hurdles must all be L-shaped, and designed to fall over forward when hit. Adjustable hurdles, in which the height of the crossbar from the ground can be altered, are sometimes used for training.



WHOLLY MOSES

EDWIN “ED” MOSES WON THE 400 M HURDLES AT THE 1976 AND 1984 OLYMPICS. AFTER RETIRING FROM THE TRACK, HE TOOK UP BOBSLEDDING, AND WAS A MEMBER OF THE TEAM THAT TOOK BRONZE FOR THE UNITED STATES AT THE 1990 WORLD CUP.



STAT CENTRAL

MEN'S 110 M HURDLES OLYMPIC GOLD

YEAR	ATHLETE (COUNTRY)
2008	DAYRON ROBLES (CUB)
2004	JLIU XIANG (CHN)
2000	AÑER GARCIA (CUB)
1996	ALLEN JOHNSON (USA)
1992	MARK MCCOY (CAN)
1988	ROGER KINGDOM (USA)

WOMEN'S 100 M HURDLES OLYMPIC GOLD

YEAR	ATHLETE (COUNTRY)
2008	DAWN HARPER (USA)
2004	JOANNA HAYES (USA)
2000	OLGA SHISHIGINA (KAZ)
1996	LUDMILA ENQUIST (SWE)
1992	VOULA PATOULIDOU (GRE)
1988	YORDANKA DONKOVA (BUL)

MEN'S 400 M HURDLES OLYMPIC GOLD

YEAR	ATHLETE (COUNTRY)
2008	ANGELO TAYLOR (USA)
2004	FELIX SANCHEZ (DMA)
2000	ANGELO TAYLOR (USA)
1996	DERRICK ADKINS (USA)
1992	KEVIN YOUNG (USA)
1988	ANDRÉ PHILLIPS (USA)

WOMEN'S 400 M HURDLES OLYMPIC GOLD

YEAR	ATHLETE (COUNTRY)
2008	MELANIE WALKER (JAM)
2004	FANI HALKIA (GRE)
2000	IRINA PRIVALOVA (RUS)
1996	DEON HEMMINGS (JAM)
1992	SALLY GUNNELL (GBR)
1988	DEBBIE FLINTOFF-KING (AUS)

“HIGH” HURDLES

The highest hurdles (for each sex) are used in the sprint events: the 110 m race for men and the 100 m for women.

INTERMEDIATE HURDLES

Slightly lower hurdles, height-adjusted according to sex, are used in the longer distance events: the men's and women's 400 m races.

TAKE IT IN STRIDE

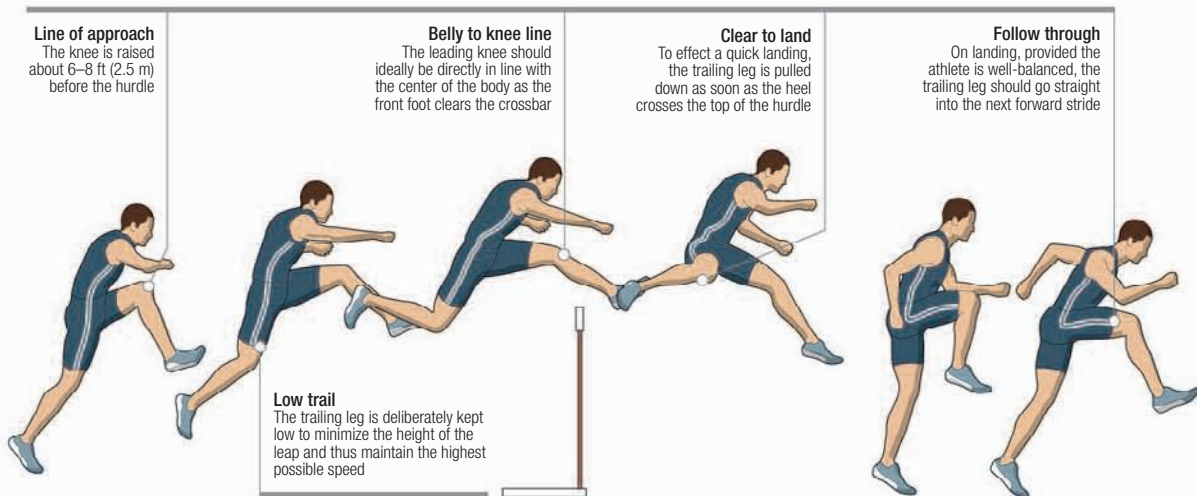
Hurdlers do not try to maximize the length of their stride. Their main focus is on the approach to each hurdle, and maintaining a smooth, uninterrupted flow throughout the race: they should never break step for an upcoming hurdle. The other key to success is efficient and economical jumping. To achieve this, competitors “run through” the hurdles—in other words, they simply lift their legs, rather than jump in the conventional sense of the word, and try to stay as close to the track as possible throughout the race. They generally lead with the same leg over every hurdle.

ARMED FOR ACTION

The best hurdlers make full use of their arms to balance their bodies. As they attack the hurdle, they stretch forward, reaching for their lead leg with their opposite hand. This action—which is sometimes referred to as “checking the time” because the runner seems to be looking at the top of his or her wrist—brings the forehead close to the leading knee. The other arm swings backward in a normal sprint racing action.

CLEARING THE HURDLE

Sprint hurdlers lean their bodies farther forward than 400 m hurdlers because they need to minimize the height they jump and get their feet back down on the track faster.



MIDDLE-DISTANCE

052



EVENT OVERVIEW

The most common middle-distance events are the 800 m and the 1,500 m, with steeplechasing also regularly included. Many athletes compete in both the 800 m and the 1,500 m, as the training and physical requirements are similar. Tactics play a part in these races, which are often won or lost in the last few feet. Middle-distance races have always been among the core events of the Olympics and all athletic championships.

ATHLETE PROFILE

Middle-distance athletes need physical and mental staying power. The distances are too long for sprinting, but speed is required for the finish. Tactics are also important.

NEED2KNOW

- The women's Olympic 800 m was first run in 1928, but shock at competitors' exhaustion meant it did not appear again until 1960.
- Women were finally allowed to run in the 1,500 m at the Munich Olympics in 1972.
- Steeplechasing, of varied lengths, has been a men's Olympic event since 1900. It first appeared as a major women's race in the 2005 Helsinki World Championships.

STAYING BEHIND—A GOOD TACTIC?

STAYING AT THE BACK IS NOT RECOMMENDED, BUT IN THE 1936 OLYMPICS, JOHN WOODRUFF WAS BOXED IN EARLY IN THE 800 M. SLOWING ALMOST TO A STOP, HE LET THE RUNNERS PASS, AND STILL WON. IN 2004, KELLY HOLMES HAD SUCCESS USING A SIMILAR TACTIC.



Hanging back

While trailing behind can work tactically, there is a risk of being unable to catch up at the end and of being boxed in

In the field

Staying behind the leader allows a runner to choose an acceleration point and pace themselves more easily

Leader

The leader takes the full brunt of the wind resistance and cannot easily tell what is happening behind them

THE MAIN EVENTS

In the 800 m, runners complete two laps around a standard 400 m track. They start from staggered positions along the track and have to stay in their starting lane until the end of the first curve (about 100 m). The 800 m requires speed and endurance so competitors plan their race and use carefully considered and practiced tactics. The 1,500 m event consists of three and three-quarter laps around the standard outdoor track and is often called "the metric mile." With an increasingly scientific approach to performance and training, runners have been able to make this race an extended sprint. However, like the 800 m, the 1,500 m remains very mentally taxing.

BREAKING TO THE INSIDE

Leaving the starting lane after the first curve, called breaking to the inside, allows runners to compete against each other more effectively. Breaking lanes must be done without deliberately obstructing or barging another competitor, although elbow clashing is almost unavoidable.

RUNNING GEAR

As for all athletics events, the gear a middle-distance runner wears is chosen with great care. There is an emphasis on lightweight, technical modern materials with little wind resistance and advanced wicking properties. A close, flexible, and comfortable fit are essentials in both the shoes and the clothes.

THE FOOTWEAR

Key features of middle-distance shoes are their aerodynamic shape, light weight, and spiked sole.



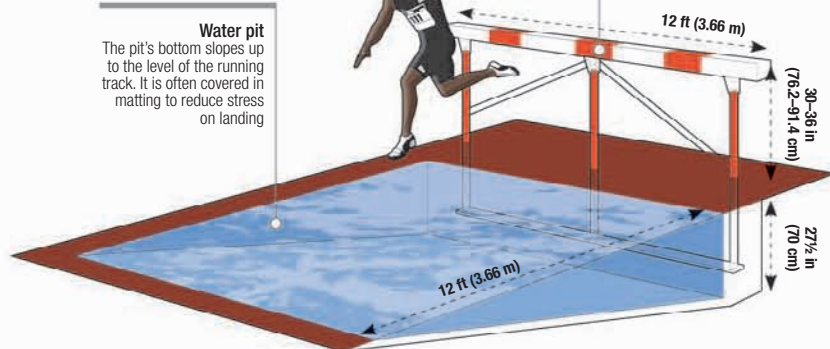


STEEPLECHASE

Usually 3,000 m, the steeplechase includes 35 jumps, seven of which are water jumps. Normally, four barriers are placed around the track, with the water jump—the fifth barrier—at the top of the second turn, either to the inside of lane one or to the outside of the outermost lane. Barriers, which do not fall over if hit, are placed 256 ft (78 m) apart; runners start jumping them after the first half lap. They must be cleared cleanly by jumping, stepping on and over, or vaulting.

THE WATER JUMP

The water jump combines a barrier and a sloping pool of water. Runners attempt to land as far from the barrier as possible as this is where the water is shallower. Water resistance slows runners down and splashing inhibits freedom of movement and vision.



Water pit

The pit's bottom slopes up to the level of the running track. It is often covered in matting to reduce stress on landing.

Solid barrier

The solidity of the steeplechasing barriers, both water and track, adds a psychological element to the race.

THE FOOTWEAR

Steeplechasing shoes are streamlined and lightweight, usually with $\frac{1}{4}$ – $\frac{3}{4}$ in (6–8 mm) pyramid spikes on the sole. Spikes provide extra traction for negotiating the barriers and staying on the track. High-tech midsole and ankle cushioning is also provided.



Rubber sole

Flexible, solid rubber outer soles are fitted with nylon spike plates.

RUNNING TECHNIQUES

Posture and balance are important in a middle-distance runner. These enable acceleration and maintenance of high speeds. The athlete concentrates on relaxing into the stride, with their arms held close to the body but hanging loosely from the shoulders, allowing them to swing with the body in a down and back movement. In the 800 m race, runners aim to complete both laps in more or less the same time. The 1,500 m is also run at a steady pace throughout.

TRAINING

Middle-distance runners need both fast and slow twitch muscles, the first for speed, the second for endurance. Interval training, in which fast work is interspersed with short recovery periods, is used to build these, and to increase aerobic and anaerobic fitness. Running at race speeds as well as slower endurance runs are included in training.

STARTING POSITIONS

Runners start without blocks. They stand on the toes of the back foot and the ball of the front foot, opposite arms back and forward respectively.

Body position

To accelerate at the start, runners lean forward, but they soon straighten their body to run.

Feet position

On "go," the back foot drives forward onto the power foot. The arms swing to aid acceleration.



STAT CENTRAL

MEN'S 800 M WORLD RECORDS

TIME	ATHLETE (YEAR)
1:41.01	DAVID RUDISHA (2010)
1:41.11	WILSON KIPKETER (1997)
1:41.73	SEBASTIAN COE (1981)
1:41.77	JOAQUIM CRUZ (1984)
1:42.28	SAMMY KOSKEI (1984)

WOMEN'S 800 M WORLD RECORDS

TIME	ATHLETE (YEAR)
1:53.28	JARMILA KRATOCHVÍLOVÁ (1983)
1:53.43	NADEZHDA OLIZARENKO (1980)
1:54.01	PAMELA JELIMO (2008)
1:54.44	ANA FIDELIA QUIROT (1989)
1:54.81	OLGA MINEYEVA (1980)

MEN'S 1,500 M WORLD RECORDS

TIME	ATHLETE (YEAR)
3:26.00	HICHAM EL GUERROUJ (1998)
3:26.34	BERNARD LAGAT (2001)
3:27.37	NOUREDDINE MORCELI (1995)
3:28.12	NOAH NGENY (2000)
3:28.95	FERMÍN CACHO (1997)
3:28.98	MEHDI BAALA (2003)

WOMEN'S 1,500 M WORLD RECORDS

TIME	ATHLETE (YEAR)
3:50.46	YUNXIA QU (1993)
3:50.98	BO JIANG (1997)
3:51.34	YINGLAI LANG (1997)
3:51.92	JUNXIA WANG (1993)
3:52.47	TATYANA KAZANKINA (1980)
3:53.91	LILI YIN (1997)

SIDELINES

27 The number of times Moroccan Hicham El Guerrouj has done the 1,500 m in under 3:30. He also holds the most world titles—four. Briton Steve Cram was first to finish in under 3:30 in 1985.

24 The age of Moses Kiptanui of Kenya when he had already won three steeplechasing world titles (1991, 1993, 1995) and had been the first to finish in under 8 minutes—his record is 7:59.18.

1,000,000 The amount in US dollars won by 800 m runner Maria Mutola, in 2003. She was the first athlete to win the IAAF Golden League Jackpot outright.

LONG-DISTANCE RUNNING



→ While the men's 5,000 m and 10,000 m events have featured in the Olympics since 1912, the women's 10,000 m and 5,000 m runs only debuted in 1988 and 1996, respectively.

→ The length of the marathon commemorates the Greek soldier who, in 490 BCE, ran from Marathon to Athens with news of the Greek victory over the Persians.

→ Marathons in London, New York, Chicago, Hong Kong, and Honolulu each attract more than 30,000 runners.

EVENT OVERVIEW

Long-distance running events include 5,000 m and 10,000 m races, cross-country running, and marathons. The 5,000 m and 10,000 m runs and the marathon are Olympic events. The runs take place on a stadium track, while the marathon route is staged around the streets of the host city. Some 5,000 m and 10,000 m races are held off-road, in which case they are usually known as 5 km and 10 km runs.



Shoes

Lightweight running shoes help absorb the impact of each stride

Lightweight shorts

The runners wear lightweight shorts in a breathable fabric

Cool to run

Runners wear loose-fitting, lightweight, sleeveless tank tops to keep as cool as possible

THE OVAL TRACK

In 5,000 m and 10,000 m races, the competitors start off on a slightly curved line across the track, but soon move to the inside lane to minimize the total distance they have to run. One lap around the track equals 400 m. Consequently, in a 5,000 m event, the athletes must run 200 m (the start line is near the 200 m start) and then 12 complete laps. In the 10,000 m event, the competitors run 25 times around the track. Both races finish at the same line.

ATHLETE PROFILE

Long-distance runners are lighter, more slightly built, and more wiry than the more muscular powerhouse sprinters. Stamina and endurance are essential, as is aerobic strength: it's vital that the heart pumps blood around the body as efficiently as possible to allow more oxygen to reach tired muscles. Success in long-distance running comes not only through peak physical fitness but also through mental endurance and tactical thinking. Competitors are pushed to their physical and mental limits, and being able to pace yourself to conserve energy, or knowing when to hang back or push forward, is vital.

HIGH FLYERS

OFTEN DUBBED "THE RUNNING TRIBE," THE KALENJIN PEOPLE OF THE GREAT RIFT VALLEY IN WESTERN KENYA ARE RENOWNED FOR THEIR PROWESS AT LONG-DISTANCE RUNNING. ONE POSSIBLE REASON FOR THEIR CONTINUED INTERNATIONAL SUCCESS IS THE HIGH ALTITUDE AT WHICH THEY LIVE. WITH LESS OXYGEN IN THE ATMOSPHERE AT HIGH ALTITUDES, THE BODY MUST PRODUCE MORE OXYGEN-CARRYING RED BLOOD CELLS. WHEN COMPETING AT SEA LEVEL, THESE EXTRA CELLS PROVIDE A HUGE ADVANTAGE AS THE HEART DOESN'T HAVE TO BEAT AS FAST TO CARRY AN EQUIVALENT AMOUNT OF OXYGEN AROUND THE BODY.

SIDELINES

6,255 The number of runners to cross the finish line at the first ever London Marathon. The ever-popular annual event was first staged in the city in 1981.

21.1 The length, in kilometers (13 miles), of a half marathon. Moses Tanui was the first athlete to complete the event in under 60 minutes, setting the record in 1993 in Milan.

8 The number of records broken in a single women's 10,000 m race at the 2002 Asian games in Busan. Chinese runner Sun Yingjie won the race, and the first four finishers produced the 3rd, 4th, 5th, and 6th best times ever.

20 Haile Gebrselassie's age when he won his first World Championship gold in the 10,000 m. He went on to win another three titles and is one of the most celebrated long-distance runners of all time.



EQUIPMENT

Whether running a cross-country race, a marathon on city streets, or a long-distance track event, athletes face similar physical and mental challenges but need somewhat different equipment. Staying adequately hydrated for the duration of the course is an absolute necessity. It is also crucial to provide as much comfort as possible for the feet, since blisters or other skin discomfort can cause a runner to retire from a race.

Cushioned heel

A cushioned layer in the heel and sole helps absorb shocks from hard road surfaces



ROAD SHOE

Marathons are generally raced on roads, often through cities. Marathon runners wear flat running shoes specially designed to absorb the shock of the foot repeatedly striking a hard surface.

Outer sole

Rubber cleats on the outer sole provide extra grip on rough ground



OFF-ROAD SHOE

Cross-country runners race on routes that may go through all types of natural terrain. Runners wear shoes with rubber cleats to give them grip on muddy and grassy routes. They are usually less-cushioned than road shoes.

CROSS COUNTRY

Cross-country runs take place off-road, over all sorts of terrain, including grass, mud, and even water. There is no fixed length for cross-country running; women's races are generally between 1¼ and 5 miles (2 and 8 km); men's events may be between 3 and 9 miles (5 and 15 km). Cross-country running was an Olympic sport until 1924, but was then dropped as it was deemed unsuitable as a summer event. The IAAF organizes the annual World Cross-Country Championships, which is considered the most important competition in the discipline.

TEAM EVENTS

Cross-country running is unusual in that it involves athletes competing both as an individual and as part of a team. Usually it is the first five runners in a team who have their scores put forward to determine the finishing order.

SETTING THE PACE

One of the most important tactics in long-distance running is the ability to judge pace-setting. Often following a dedicated pacemaker, athletes need to pace themselves exactly. If they run relatively slowly to conserve energy, they may not be able to put on a sufficient burst of speed to overtake the front-runners. However, if they run relatively quickly, perhaps assuming an early lead, they may not be able to sustain their advantage, ultimately running out of steam well before the finish line. The most skillful runners can force their opponents to make tactical errors.

MARATHON

Marathons are run on roads over a course 26 miles 385 yd (42.2 km) long. At the Olympic Games, the race ends in the stadium. The men's marathon is traditionally the last event of the athletics calendar and is sometimes incorporated into the closing ceremony. The marathon was held at the first modern Olympics in Athens in 1896, where the course was only 24.85 miles (40 km) long. The length of subsequent Olympic marathons varied slightly (depending on the established route for each venue) but was set at today's distance during the 1924 Games.

PUBLIC APPEAL

Marathons are also popular participation sports, with top athletes competing alongside hundreds or thousands of amateurs. Notable events take place annually in cities including London, New York, Paris, Tokyo, and Boston.

STAT CENTRAL

MEN'S 5,000 M OLYMPIC CHAMPIONS

YEAR	GOLD MEDALLIST
2008	KENENISA BEKELE
2004	HICHAM EL GUERROUJ
2000	MILLON WOLDE
1996	VENUSTE NIYONGABO
1992	DIETER BAUMANN
1988	JOHN NGUGI
1984	SAID AOUITA

WOMEN'S 5,000 M OLYMPIC CHAMPIONS

YEAR	GOLD MEDALLIST
2008	TIRUNESH DIBABA
2004	MESERET DEFAR
2000	GABRIELA SZABO

MEN'S 10,000 M OLYMPIC CHAMPIONS

YEAR	GOLD MEDALLIST
2008	KENENISA BEKELE
2004	KENENISA BEKELE
2000	HAILE GEBRESELASSIE
1996	HAILE GEBRESELASSIE
1992	KHALID SKAH

WOMEN'S 10,000 M OLYMPIC CHAMPIONS

YEAR	GOLD MEDALLIST
2008	TIRUNESH DIBABA
2004	HUINA XING
2000	DERARTU TULU
1996	FERNANDA RIBEIRO
1992	DERARTU TULU

MEN'S MARATHON OLYMPIC CHAMPIONS

YEAR	GOLD MEDALLIST
2008	SAMMY WANJIRU
2004	STEFANO BALDINI
2000	GEZAHEGNE ABERA
1996	JOSIA THUGWANE
1992	HWANG YOUNG-CHO
1988	GELINDO BORDIN
1984	CARLOS LOPES

WOMEN'S MARATHON OLYMPIC CHAMPIONS

YEAR	GOLD MEDALLIST
2008	CONSTANTINA TOMESCU
2004	MIZUKI NOGUCHI
2000	NAOKO TAKAHASHI
1996	FATUMA ROBA
1992	VALENTINA YEGOROVA
1988	ROSA MOTA
1984	JOAN BENOIT



LONG JUMP

056

EVENT OVERVIEW

The long jump—formerly known as the broad jump—is one of the oldest track-and-field events for men and women. Athletes compete in this technically demanding event to see which of them can leap the greatest distance through the air from a running start. There are five main elements to the long jump: the run up, the last two steps before reaching the take-off board, the take-off itself, technique through the air, and the landing. Over the history of athletics, long jump records have been few and far between. Bob Beamon's long jump world record, set at the 1968 Mexico Olympics, stood for almost 23 years.

Center of gravity

For most of the flight phase, long jumpers push their weight backward to produce upward thrust; then, as they land, they lean forward to avoid falling back into the pit

Running vest

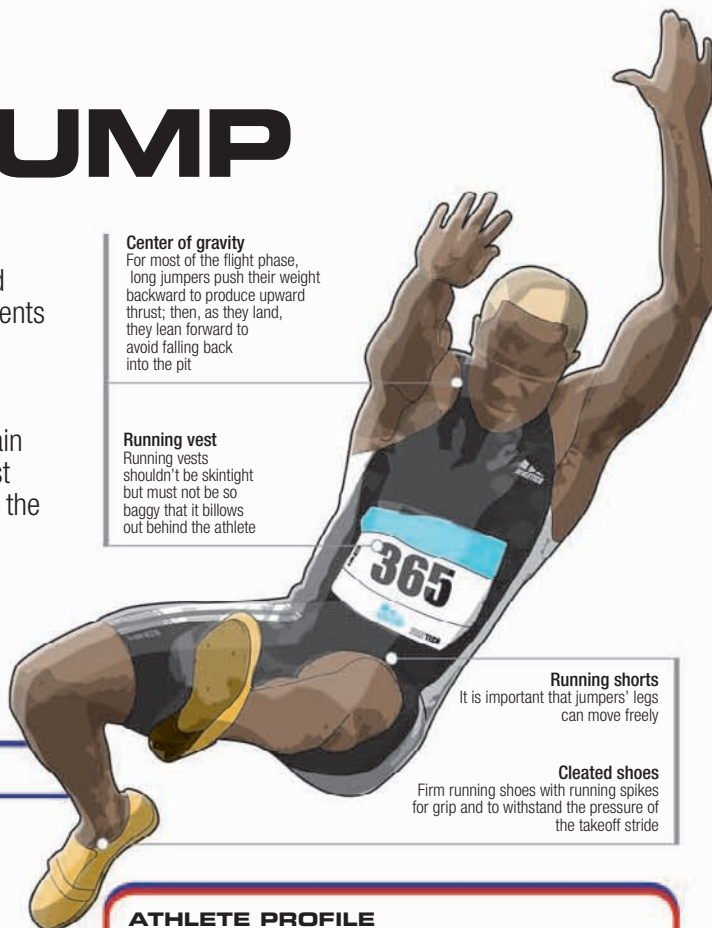
Running vests shouldn't be skintight but must not be so baggy that it billows out behind the athlete

Running shorts

It is important that jumpers' legs can move freely

Cleated shoes

Firm running shoes with running spikes for grip and to withstand the pressure of the takeoff stride



NEED2KNOW

- ➔ The long jump was included in the first track and field competitions at Exeter College at Oxford University, England, in 1850.
- ➔ The long jump is one of track and field's core events and has been part of every modern Olympic Games.
- ➔ Previously a men-only event, in 1948 the long jump became an Olympic sport for women as well.

ONE GIANT LEAP FOR MANKIND

IN MOST SPORTS, WORLD RECORDS CREEP UP—A QUARTER OF AN INCH HERE, 0.01 OF A SECOND LESS THERE. UNTIL 1968, NO ATHLETE HAD JUMPED MORE THAN 28 FT (8.5 M). BUT AT THAT YEAR'S OLYMPIC GAMES IN MEXICO CITY, AMERICAN BOB BEAMON CLEARED A MASSIVE 29 FT (8.9 M), ALMOST 2 FT (60 CM) FURTHER THAN THE PREVIOUS BEST. BEAMON'S RECORD STOOD FOR 23 YEARS, 216 DAYS BEFORE FALLING TO ANOTHER US ATHLETE, MIKE POWELL.

ATHLETE PROFILE

One of the keys to success in the long jump is a fast run-up, and it is no coincidence that the brightest stars in the event are often outstanding 100 m and 200 m sprinters. Height, though not essential, is also an advantage as the further an athlete can reach, the greater jump distance they will achieve. Most of the leading male long jumpers are 6 ft 1 in (1.85 m) or taller; women tend to be over 5 ft 8 in (1.72 m).

LONG JUMP PIT

The approach runway, made of cinders or synthetic material, should be no less than 131 ft (40 m) long and is often 147½ ft (45 m). The landing area is a sand-filled pit at least 29½ ft (9 m) long and 9 ft (2.75 m) wide. Between the two is a 8 in (20 cm) wide takeoff board. To the front of it, judges may place a strip of plasticine, soft earth, or sand, that will show if the jumper's foot was on the ground beyond the takeoff limit.

SIDELINES

2 Feet per second: the maximum permitted tail wind for a record long jump to be deemed valid. That is the equivalent of 4.47 mph (7.2 kph).

4 The number of consecutive Olympic gold medals won by the US athlete Carl Lewis between 1984 and 1996.

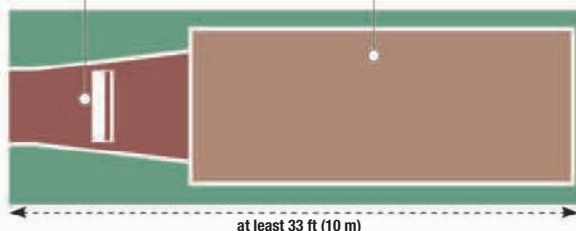
22 The average number of run-up strides taken by a top-class male long jumper.

Takeoff board

This is set back at least ¾ ft (1 m) from the front of the pit so that judges can tell more easily if the jumper's feet went beyond the forward edge before takeoff

Landing pit

The pit is filled with sand, then moistened. After every jump the surface is smoothed over with a rake to the same level as the runway





RULES AND ATTEMPTS

When attempting a jump, competitors may tread on the takeoff board but they must not allow any part of their feet to go over its farthest edge, called the scratch line. If they overstep the scratch line, the jump is invalid. A legal jump is indicated by an official who holds up a white flag; foul jumps are signaled by a red flag. Each contestant has three attempts (known as trials), unless there are fewer than eight competitors, in which case they may each have six jumps. At high level events, athletes must participate in two preliminary knockout rounds; the top eight of whom contest a final. The winner is the athlete with the longest valid jump in the final round; in the event of a tie, the second-best trials are taken into consideration.

FIVE STEPS TO HEAVEN

Five elements of a long jump are crucial: a fast approach, a well measured last two strides, an explosive takeoff, a long flight, and a well-balanced landing. Since speed in the approach is so important, it is not surprising that many competitive sprinters are also top-level long jumpers. There are three main long jumping techniques: the hitchkick, the hang, and the sail. There is no "right" or "wrong" technique, and athletes choose the one that suits them best.

HITCHKICK

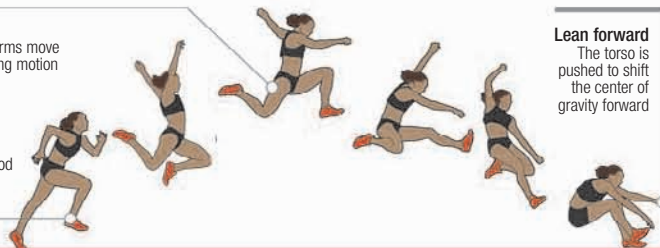
This technique is the hardest to master, but it is the method most frequently employed by elite jumpers. Also known as "running in the air," the hitchkick in fact relies on a cycling action to maintain an upright body position. On landing, hitchkickers touch down feet first and then push their torso forward to prevent losing distance by falling backward into the pit.

Cycling legs

The legs and arms move in a rapid cycling motion

Explosive takeoff

As with all techniques, good lift is crucial at takeoff



Lean forward

The torso is pushed to shift the center of gravity forward

SAIL

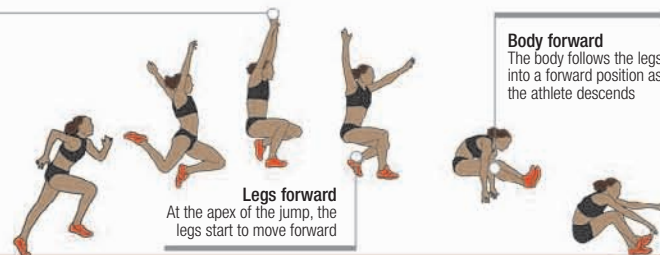
The sail is the most basic long jump technique. Once airborne, it is important to help force the body through the air by circling the arms. They should first go downward, then backward, upward and finally forward. On landing, they must attempt to push their body forward so their feet and arms are forced in front of them as far as possible.

Arms up

The arms are stretched as high as possible at takeoff

Legs forward

At the apex of the jump, the legs start to move forward



Body forward

The body follows the legs into a forward position as the athlete descends

HANG

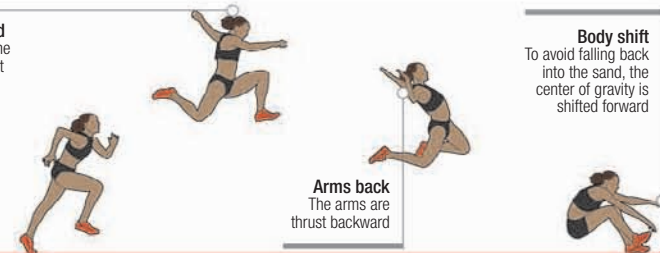
Both the arms and the legs are extended upward to reach a maximum distance from the hips. The limbs are kept "long" until after the jumper has reached the top of the jump, at which point they push the legs forward in readiness for landing. The hang technique is the easiest way to achieve a forward-falling finish, which prevents the jumper falling backward and losing distance.

Head forward

After takeoff, the head is brought in front of the arms

Arms back

The arms are thrust backward



Body shift

To avoid falling back into the sand, the center of gravity is shifted forward

MEASUREMENTS

No matter where on the runway the athlete takes off, each valid jump is measured from the front edge of the takeoff board to the nearest mark made in the sand by any part of the competitor's body. (That is why the sand in the long jump pit must be completely smoothed after every trial.) Distances are recorded to the nearest quarter of an inch below the actual distance jumped if the distance was not a whole inch.

THE FINAL STEP

The takeoff board is set into the runway and may have a small hollow beneath to add springiness. The telltale strip in front of the board should be replaced every time it is stepped on.

Overstepping the mark
If toe prints are imprinted on the putty-like strip in front of the board, the jump is illegal



STAT CENTRAL

WORLD RECORDS (MEN)

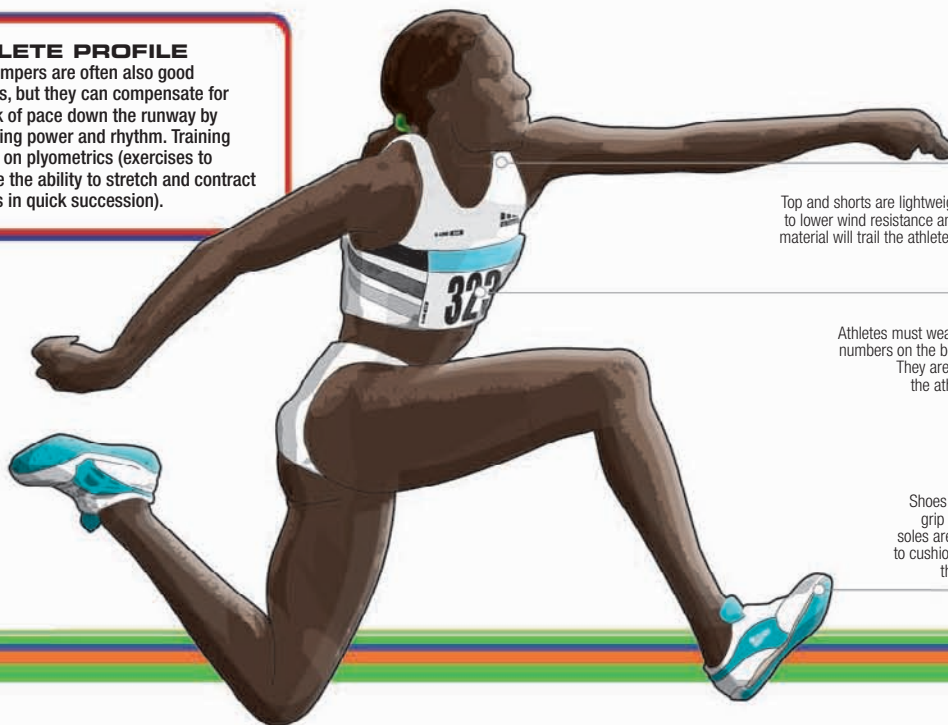
ATHLETE	DISTANCE	YEAR
MIKE POWELL (USA)	29 FT 3 IN (8.95 M)	1991
BOB BEAMON (USA)	29 FT 2½ IN (8.90 M)	1968
RALPH BOSTON (USA)	27 FT 4¾ IN (8.35 M)	1965
RALPH BOSTON (USA)	27 FT 4¼ IN (8.34 M)	1964
IGOR TER-OVANESYAN (URS)	27 FT 3¼ IN (8.31 M)	1962

WORLD RECORDS (WOMEN)

ATHLETE	DISTANCE	YEAR
GALINA CHISTYAKOVA (USR)	24 FT 6¾ IN (7.52 M)	1998
JACKIE JOYNER-KERSEE (USA)	24 FT 5¾ IN (7.49 M)	1994
HEIKE DRECHSLER (GDR)	24 FT ½ IN (7.48 M)	1988
HEIKE DRECHSLER (GDR)	24 FT 4¾ IN (7.45 M)	1986
HEIKE DRECHSLER (GDR)	24 FT 4 IN (7.44 M)	1985

ATHLETE PROFILE

Triple jumpers are often also good sprinters, but they can compensate for any lack of pace down the runway by developing power and rhythm. Training focuses on plyometrics (exercises to increase the ability to stretch and contract muscles in quick succession).

**Close fit**

Top and shorts are lightweight and close-fitting to lower wind resistance and to ensure that no material will trail the athlete and mark the sand.

Athlete ID

Athletes must wear race identification numbers on the both sides of the top. They are usually attached to the athletes' top with pins.

Jumping spikes

Shoes have spikes to help grip on any surface. The soles are specially designed to cushion the impact during the run-up and leaps.

TRIPLE JUMP



EVENT OVERVIEW

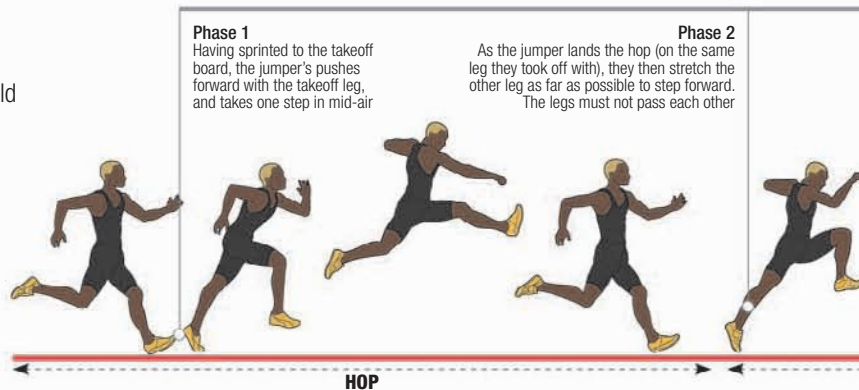
This track-and-field event is also informally known as the hop, step, and jump—a description that defines the movements of the athletes who compete in this thrilling contest. Each athlete runs down a track that is often the same as the one used for the long jump (see pp.56–57). On reaching the takeoff board (at full speed), the athlete jumps forward, lands on the takeoff foot, then takes a step on to the other foot, and finally jumps into a sand-filled pit. The competitor who covers the greatest overall distance is declared the winner.

TECHNIQUES

A top-level triple jumper usually takes a run-up of around 130 ft (40 m). The approach, which will be at full speed, should be so well judged that the jumper has no need to look down at the board during takeoff—to do so would compromise the length of the jump. Athletes begin and end the hop on the same foot; as soon as they have landed they launch the other foot into the step, stretching to cover as much ground as possible. For the final jump, the athlete uses the extension, hitch-kick, or sail technique (see pp.56–57) to bring the legs forward for the landing.

NEED2KNOW

- ➔ The Men's triple jump was a medal event at the first modern Olympics in 1896; there was no women's equivalent for exactly 100 years.
- ➔ Any athlete who walks back through the landing pit after they have made their jump will be disqualified from the competition with immediate effect.
- ➔ Proportionally, the largest phase of the triple jump is the hop stage (first phase)—about 37%; phase two is about 33%, while the final phase accounts for 30% of the total leap.
- ➔ Elite triple jumpers cover about twice the distance of elite long jumpers. The current long jump record held by Mike Powell is 29 ft (8.95 m) and the current triple jump record held by Jonathan Edwards is 60 ft (18.29 m).

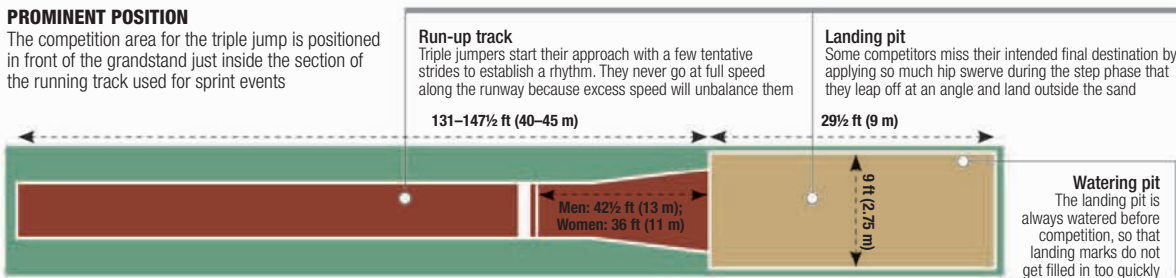


FIELD OF PLAY

The takeoff board for the triple jump is set much farther back than that of the long jump. The adjustment is made so that the athletes can perform the hop and step phases on the cinder or synthetic track, before launching the final jump into the landing pit. A strip of modeling clay, soft clay, or similar material is usually placed along the leading edge of the takeoff board. This leaves a tell-tale impression of the athlete's shoe, so that the officials can detect foul jumps that they may not have noticed with the naked eye. The sand in the landing pit must be level with the track and should be raked completely smooth after every jump is measured. This is so the officials can be sure that any mark made in the sand was left by the athlete who had just made the jump.

PROMINENT POSITION

The competition area for the triple jump is positioned in front of the grandstand just inside the section of the running track used for sprint events



EDWARDS: THE UNSURPASSABLE?

JONATHAN EDWARDS WAS THE FIRST ATHLETE TO BREAK THE 59 FT (18 M) BARRIER, SETTING A NEW WORLD RECORD OF 60 FT (18.29 M) IN THE PROCESS. IT WAS THE EQUIVALENT OF JUMPING A LITTLE UNDER THE LENGTH OF TWO DOUBLE-DECKER BUSES.

RULES & REGULATIONS

At larger competitions athletes have to progress through qualifying rounds before being able to compete in the final round, with the possibility of winning a medal of any color. The athletes have at least three attempts (trials) at a jump. Each jump is measured from the leading edge of the takeoff board to the nearest mark in the sand made by any part of the competitor's body. The jump is recorded to the nearest centimeter below the distance cleared. If an athlete is confident that their jump will get them into the next round, or win a medal, they don't have to complete all three trials.



Soft strip
Modeling clay, sand, or clay will show illegal impressions

THUS FAR AND NO FARTHER

One of the most important skills for triple jumpers to master is to judge the approach run-up so that the leading foot lands as close as possible to the edge of the takeoff board without overstepping the mark and making the jump invalid.

FOUL JUMPS

The officials signal a foul jump by waving a red flag. Most foul jumps occur when the athlete oversteps the takeoff board and makes an indent in the soft strip on the takeoff board. Sometimes, the jumper will miss the landing pit altogether. A foul may be called if the athlete takes more than the agreed length of time (usually a minute and a half) to complete a jump. Foul jumps may also be called if the jumper lands the hop on the incorrect foot, or if they jump off two feet instead of just one.

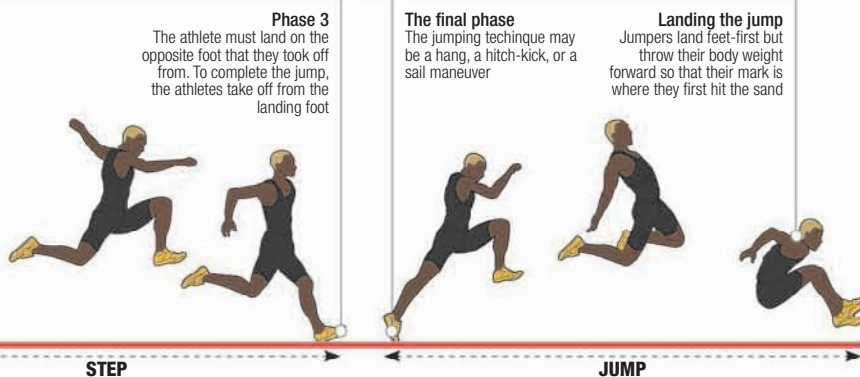
STAT CENTRAL

LONGEST TRIPLE JUMPS (MEN)

MARK	ATHLETE (YEAR)
18.29 M	JONATHAN EDWARDS (1995)
18.09 M	KENNY HARRISON (1996)
18.01 M	JONATHAN EDWARDS (1998)
18.00 M	JONATHAN EDWARDS (1995)
17.99 M	JONATHAN EDWARDS (1998)
17.98 M	JONATHAN EDWARDS (1995)
17.97 M	WILLIE BANKS (1985)
17.93 M	KENNY HARRISON (1990)
17.92 M	KHRISTO MARKOV (1987)
17.92 M	JAMES BECKFORD (1995)
17.92 M	JONATHAN EDWARDS (2001)
17.90 M	VLADIMIR INOZEMTSEV (1990)
17.89 M	JOÃO CARLOS DE OLIVEIRA (1975)

LONGEST TRIPLE JUMPS (WOMEN)

MARK	ATHLETE (YEAR)
15.50 M	INESSA KRAVETS (1995)
15.39 M	F. MBANGO ETONE (2008)
15.34 M	TATYANA LEBEDEVA (2004)
15.33 M	INESSA KRAVETS (1996)
15.33 M	TATYANA LEBEDEVA (2004)
15.32 M	TATYANA LEBEDEVA (2000)
15.32 M	HRYSOPIYÍ DEVETZÍ (2004)
15.30 M	F. MBANGO ETONE (2004)
15.29 M	YAMILÉ ALDAMA (2003)
15.28 M	YAMILÉ ALDAMA (2004)
15.28 M	YARGELIS SAVIGNE (2007)
15.27 M	YAMILÉ ALDAMA (2003)
15.25 M	TATYANA LEBEDEVA (2001)



HIGH JUMP



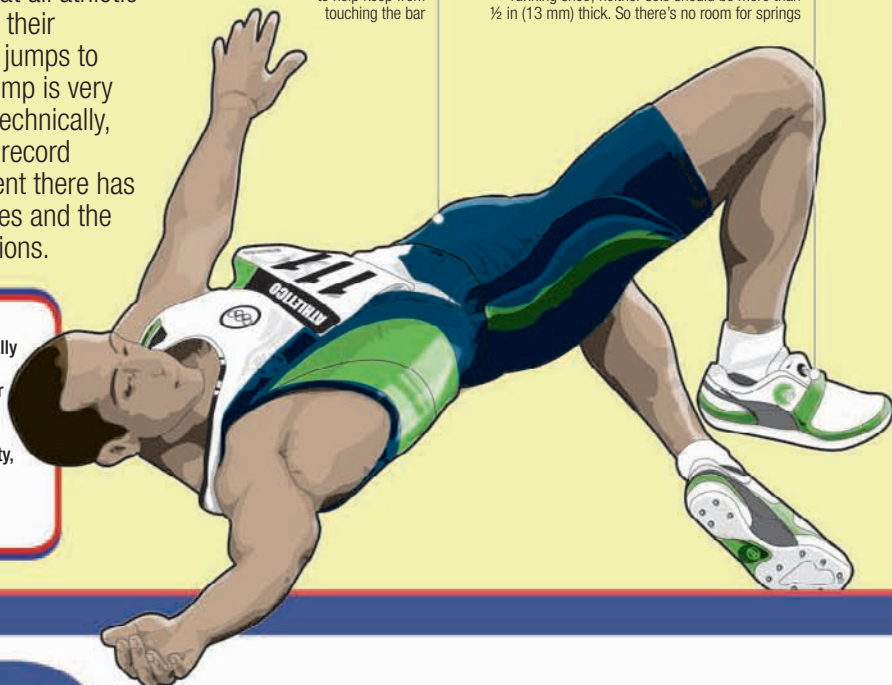
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EVENT OVERVIEW

The high jump is one of the standard track and field events that takes place at all athletic meets. Using only the strength of their bodies, competitors take running jumps to clear a horizontal bar. The high jump is very demanding, both physically and technically, and the progression of the world record shows just how much improvement there has been in the conditioning of athletes and the development of technical innovations.

ATHLETE PROFILE

Both male and female high jumpers are usually above average height: most men are at least 6 ft 1 in (1.85 m) tall; women are usually over 5 ft 10 in (1.75 m). They nearly all have a lean, slim build but have well-developed quadriceps and calf muscles. Speed, flexibility, and good coordination are also important. Jumpers often work out on the trampoline to accustom themselves to “controlled” falling.



Close-fitting clothes

Tank top and shorts or leotards are close-fitting to help keep from touching the bar

Odd shoes

Jumpers may wear odd shoes: the jump-off foot has a cleated sole, but the other is a smooth-soled running shoe; neither sole should be more than ½ in (13 mm) thick. So there's no room for springs

NEED2KNOW

- The high jump has been an Olympic event since the 1896 Olympics in Athens.
- The high jump was revolutionized in the 1960s by the introduction of soft mats that enabled athletes to land on their backs without serious injury.
- Almost all modern jumpers use a technique called the Fosbury Flop, after 1968 Olympic champion Dick Fosbury.

SIDELINES

1.94 The height in meters, (6 ft 4 in) of **Blanka Vlasic**, the tallest world-class woman high jumper. Vlasic, the Croatian record-holder, won silver at the 2009 World Indoor Championships.

400 The height in meters (1,312 feet!) that an adult human would need to jump to emulate the high-jump world record of the common flea.

EQUIPMENT SET-UP

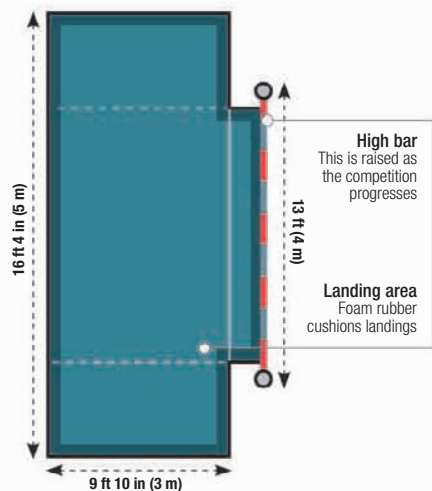
The modern high-jump bar is made of glass-reinforced plastic or aluminum. The bar is approximately 13 ft (4 m) long with a round, triangular, or square cross-section for most of its length, and a square resting point at each end. It is placed at a measured height on two uprights. Directly behind the bar is a soft foam mat that provides a safe landing area.

CUSHIONED LANDING

The landing area is normally made of plastic-covered layers of foam rubber, usually at least 3 ft 3 in (1 m) thick. Old-style sandpits are still sometimes used in school and other junior events, making techniques such as the Fosbury Flop impossible.

COMPACT AREA

The high jump takes up less room than most athletic events. The run-up area—made of asphalt, like a running track—allows for approach runs of about 40 ft (12 m) from almost any direction. Right-angled approaches to the bar are rare—most jumpers come in from an acute angle.





THE COMPETITION

High jumping has few rules. Competitors can leap off only one foot and cannot knock the bar off its supports. Touching the bar is fine, as long as it does not fall—and as long as the jumper doesn't use any part of her body to hold it up.

In competitions, athletes choose the height of their opening jump, which is usually relatively low. As the competition goes on, the bar is raised by increments—usually 1 in or 2 in, but $\frac{1}{2}$ in toward the conclusion of the event.

Once a height has been cleared, competitors may not attempt a lower height. They may choose to pass at any height, even if they have tried but failed to clear the bar already, but as soon as they record three consecutive misses, they are out of the competition. The competitor who clears the highest jump is the winner. Ties are decided by the lowest number of failed attempts.

DOING THE FLOP

TRADITIONALISTS WERE AGHAST WHEN US ATHLETE DICK FOSBURY WON GOLD AT THE 1968 MEXICO OLYMPICS WITH HIS NEW TECHNIQUE. US OLYMPIC COACH PAYTON JORDAN SAID: "KIDS IMITATE CHAMPIONS. IF THEY TRY TO IMITATE FOSBURY, HE WILL WIPE OUT AN ENTIRE GENERATION OF HIGH JUMPERS BECAUSE THEY WILL ALL HAVE BROKEN NECKS."

STAT ATTACK

MEN'S WORLD RECORD		WOMEN'S WORLD RECORD	
HEIGHT	ATHLETE (YEAR)	HEIGHT	ATHLETE (YEAR)
2.45 M	JAVIER SOTOMAYOR (1993)	2.09 M	STEFKA KOSTADINOVA (1987)
2.42 M	PATRIK SJOBERG (1987)	2.07 M	LYUDMILA ANDONOVA (1984)
2.41 M	IGOR PAKLIN (1985)	2.05 M	TAMARA BYKOVA (1984)
2.40 M	RUDOLF POVARNITSYN (1985)	2.03 M	ULRIKE MEYFARTH (1983)
2.39 M	ZHU JIANHUA (1984)	2.01 M	SARA SIMENONI (1978)
2.35 M	JACEK WSZOLA (1980)	2.00 M	ROSEMARIE ACKERMANN (1977)
2.34 M	VLADIMIR JASHTSHENKO (1978)	1.9 M	IOLANDA BALAS (1961)
2.28 M	VALERIY BRUMEL (1963)	1.77 M	CHENG FENG-JUNG (1957)
2.22 M	JOHN THOMAS (1960)	1.72 M	SHEILA LERWILL (1951)
2.15 M	CHARLES DUMAS (1956)	1.71 M	FANNY BLANKERS-KOEN (1943)
2.11 M	LESTER STEERS (1941)	1.65 M	DOROTHY ADAMS (1939)
2.06 M	WALTER MARTY (1934)	1.55 M	PHYLLIS GREEN (1926)
2.00 M	GEORGE HORINE (1912)	1.45 M	NANCY VOORHEES (1922)

EVOLVING TECHNIQUE

Until the late 1960s, the most popular high-jump techniques were the scissor and the Western roll. Using the scissor method, the jumper approached the bar from an angle and threw first their inside leg and then their outside leg over the bar in a scissoring motion, landing on his or her feet. For the Western roll, the jumper again approached the bar on a diagonal, but used the inner leg for the takeoff, while the outer leg was thrust up to lead the body sideways over the bar. The Fosbury Flop, named after American jumper Dick Fosbury who used it to win Olympic gold, is now almost universal. The last world record breaker not to use Fosbury's method was Vladimir Jashtshenko in 1978.

HIGHER AND HIGHER

Since the end of the 19th century, high jump techniques have evolved rapidly. First sideways, then forward, then, eventually, backward, jumpers have been hurling themselves ever higher. In less than 100 years (1895–1993), the men's high jump world record rose by nearly 25 percent (see above).

SCISSOR JUMP

The scissor jump was first used by American Michael F. Sweeney, who took the world record in 1895 with a height of 6ft $5\frac{1}{2}$ in (1.97 m). The scissor was a popular technique until the late 1960s.



One leg at a time

The leading leg is raised over the bar first, immediately followed by the other leg

WESTERN ROLL

As they reach the high point of their leaps, jumpers rotate their torsos to cross the bar face down. George Horne used the technique to clear 6 ft $6\frac{3}{4}$ in (2 m) in 1912.

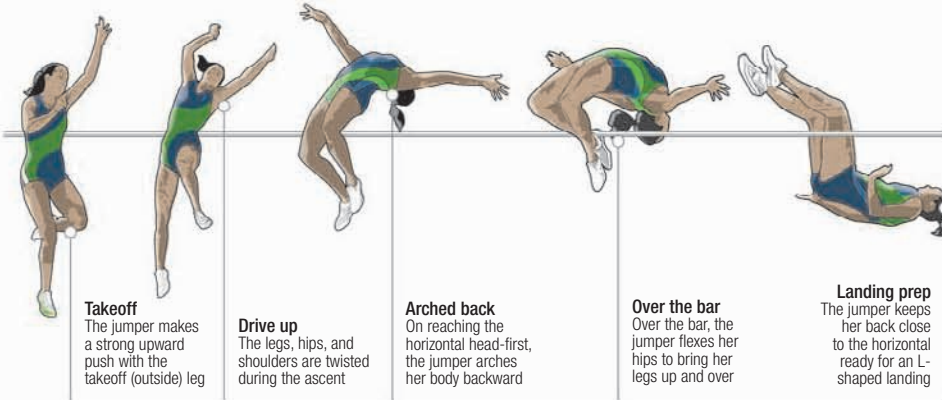


Face down

The jumper must rotate the body as he or she goes over the bar

THE "FOSBURY FLOP"

A "flopper" takes a curved running approach, then launches herself off the outside foot, head and shoulders first, into a modified scissor jump with her back arching backward over the bar. By the time the hips pass over the bar, the whole upper body is in descent.



Takeoff

The jumper makes a strong upward push with the takeoff (outside) leg

Drive up

The legs, hips, and shoulders are twisted during the ascent

Arched back

On reaching the horizontal head-first, the jumper arches her body backward

Over the bar

Over the bar, the jumper flexes her hips to bring her legs up and over

Landing prep

The jumper keeps her back close to the horizontal ready for an L-shaped landing

POLE VAULT



062

NEED2KNOW

- ➔ Vaulting with poles was originally a practical method of crossing natural obstacles such as ditches and marshes.
- ➔ The first recorded pole vault competition was held in England in 1812.
- ➔ Broad jumping—a closely related sport in which athletes use a pole to gain distance rather than height—is widely practiced but has never become an established event at top-class competitive levels.
- ➔ The men's pole vault has been a medal event at every modern Olympics; the first women's competition was held in Sydney in 2000.

EVENT OVERVIEW

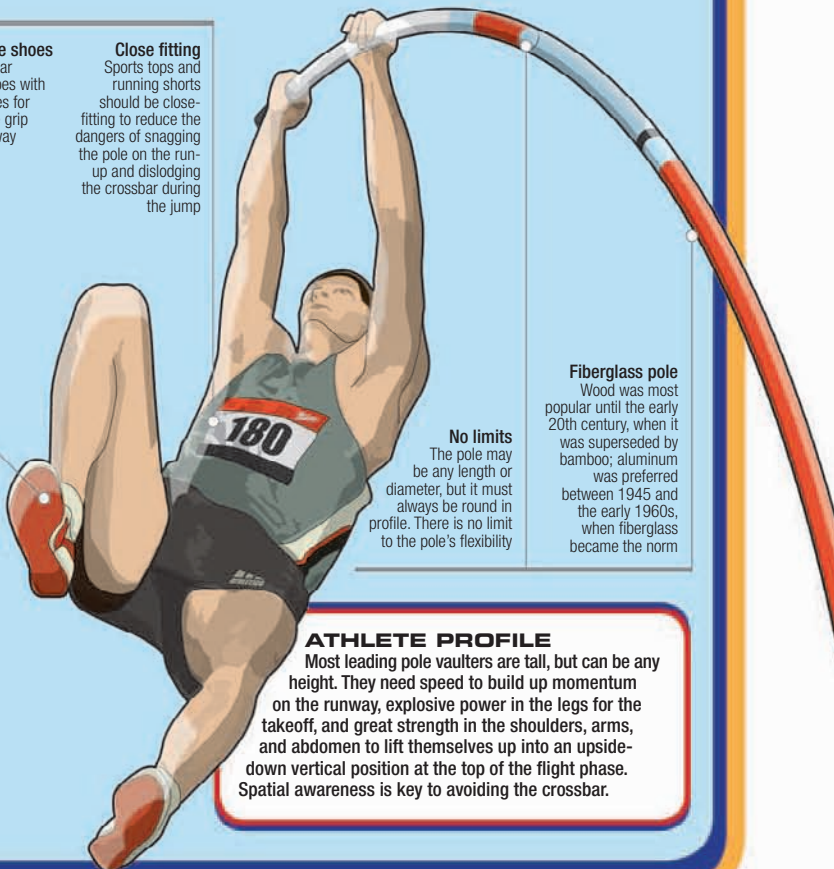
The pole vault is a field event for men and women. Competitors sprint along a runway carrying a long, flexible pole that they plant in a box and use to lever themselves over a crossbar suspended several meters above the ground between two uprights. The height of the crossbar is raised after every round and athletes are eliminated from the competition if they fail three consecutive jump attempts.

Supportive shoes

Vaulters wear running shoes with cleated soles for dependable grip on the runway

Close fitting

Sports tops and running shorts should be close-fitting to reduce the dangers of snagging the pole on the run-up and dislodging the crossbar during the jump



Fiberglass pole

Wood was most popular until the early 20th century, when it was superseded by bamboo; aluminum was preferred between 1945 and the early 1960s, when fiberglass became the norm

No limits

The pole may be any length or diameter, but it must always be round in profile. There is no limit to the pole's flexibility

ATHLETE PROFILE

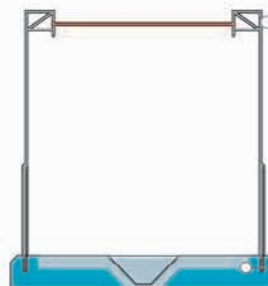
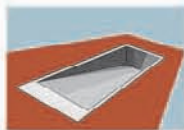
Most leading pole vaulters are tall, but can be any height. They need speed to build up momentum on the runway, explosive power in the legs for the takeoff, and great strength in the shoulders, arms, and abdomen to lift themselves up into an upside-down vertical position at the top of the flight phase. Spatial awareness is key to avoiding the crossbar.

EQUIPMENT AND SETUP

The pole vault event requires a runway of 131–147½ ft (40–45 m), a pole box, two uprights with pegs, a crossbar, landing mats, and, of course, an athlete with a very long, flexible pole. Officials are on hand to oversee the contest and adjust the height of the crossbar.

IN THE BOX

At the end of the runway is a pole box, into which the vaulter thrusts one end of the pole to gain leverage for the jump. Wedge-shaped and open at the approach end, the box is 3 ft 3 in (1 m) long. It deepens to 8 in (20 cm) and narrows to 6 in (15 cm).

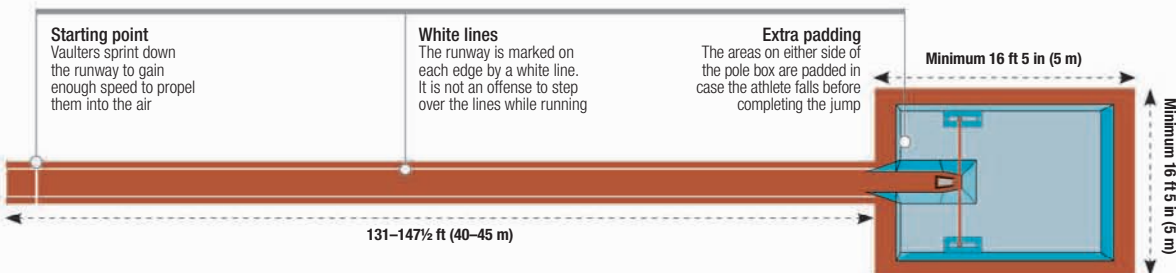


Adjustable height

Pegs, positioned on the supports inside the uprights, allow the crossbar to be raised as the competition progresses. The crossbar is 14 ft 9 in (4.5 m) long

Landing mat

Foam rubber no less than 3–5 ft (1–1.5 m) thick



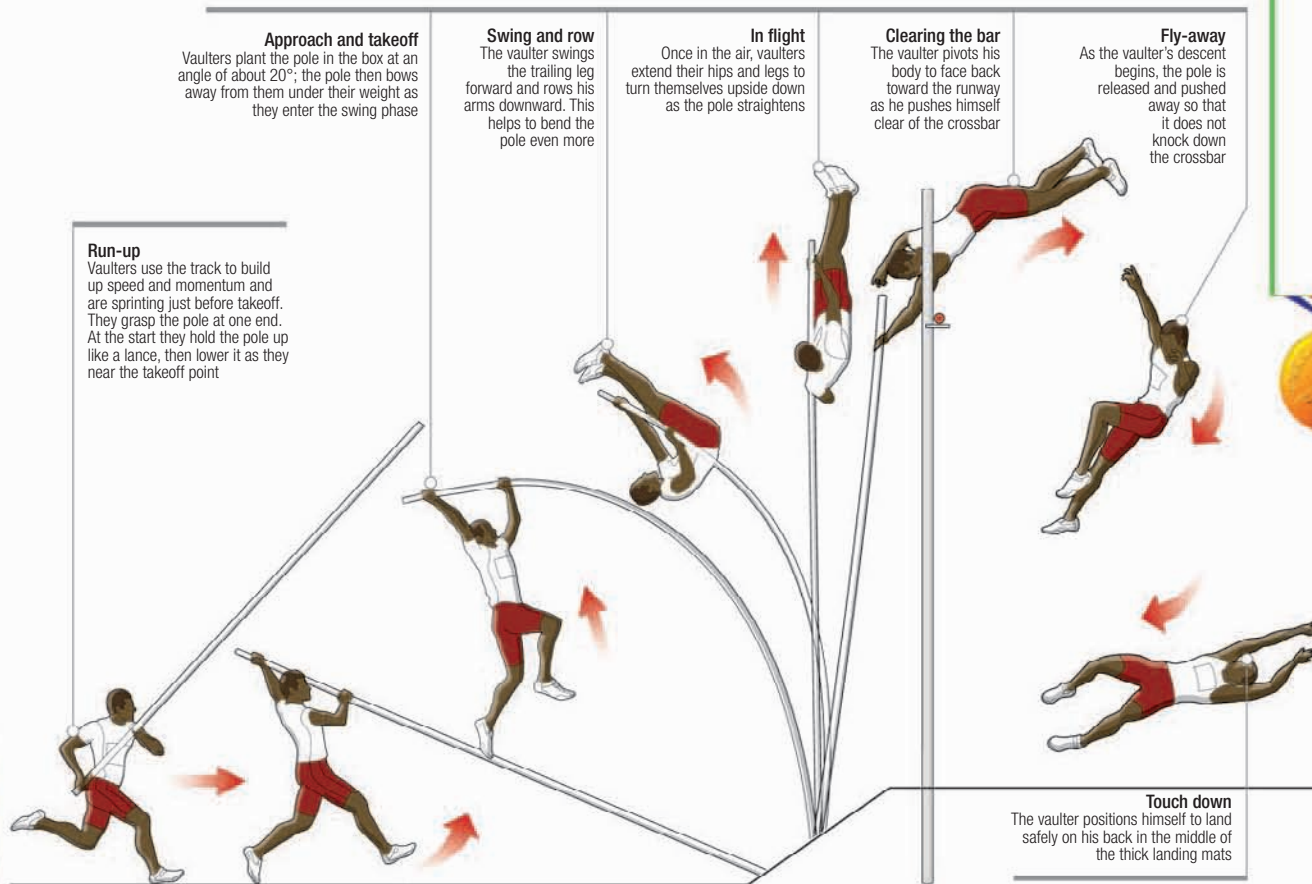


RULES OF THE BAR

An opening bar height and a sequence of incremental heights is decided by an official, and vaulters choose the height at which they wish to enter the competition. Athletes take turns vaulting. If two or more of them have cleared the bar, the height is increased by the agreed distance, typically 2 in (5 cm) or 6 in (15 cm). Vaulters may decline to jump at a certain height and wait to try at a higher one. If at the end of the competition there is a tie, the number of failures is taken into consideration. If two or more vaulters have the same number of misses, there may be a sudden-death jump off.

LEARNING TO FLY

Pole vault is a series of phases that, performed perfectly, can produce jumps of over 19 ft 8 in (6 m)—although only 16 male pole vaulters have ever achieved this. A higher grip on the pole allows more leverage into the swing phase, while whipping the takeoff leg through to the vertical position keeps energy in the flight phase, giving the vaulter more height over the crossbar. It doesn't matter if the competitor touches the crossbar during the jump, as long as it stays in position and does not fall. Each phase of the vaulting sequence is crucial to executing a successful jump.



STAT ATTACK

MEN'S WORLD RECORD		WOMEN'S WORLD RECORD	
HEIGHT	ATHLETE (YEAR)	HEIGHT	ATHLETE (YEAR)
6.14 M	SERGEI BUBKA (1994)	5.06 M	YELENA ISINBAYEVA (2009)
5.83 M	THIERRY VIGNERON (1983)	5.01 M	YELENA ISINBAYEVA (2005)
5.82 M	PIERRE QUINON (1983)	4.88 M	SVETLANA FEOFANOVA (2004)
5.81 M	VLADIMIR POLYAKOV (1981)	4.87 M	YELENA ISINBAYEVA (2004)
5.80 M	THIERRY VIGNERON (1981)	4.85 M	SVETLANA FEOFANOVA (2004)
5.78 M	WLADYSLAW KOZAKIEWICZ (1980)	4.82 M	YELENA ISINBAYEVA (2003)
5.70 M	DAVE ROBERTS (1976)	4.81 M	STACY DRAGILA (2001)
5.67 M	EARL BELL (1976)	4.60 M	EMMA GEORGE (1999)
5.65 M	DAVE ROBERTS (1975)	4.23 M	SUN CAIYUN (1995)
5.63 M	BOB SEAGREN (1972)	4.22 M	DANIELA BARTOVÁ (1995)

THE KING OF POLE VAULT

UKRAINIAN SERGEI BUBKA IS INDISPUTEDLY THE GREATEST POLE VAULTER OF ALL TIME. HE BROKE 35 WORLD RECORDS DURING HIS CAREER—17 OUTDOOR AND 18 INDOOR—AND WON SIX CONSECUTIVE WORLD CHAMPIONSHIPS BETWEEN 1983 AND 1997. HE WAS THE FIRST MAN TO CLEAR THE ELUSIVE 6 M MARK, A FEAT HE ACHIEVED IN 44 COMPETITIONS, AND REMAINS THE ONLY POLE VAULTER TO HAVE CLEARED OVER 6.10 M. OLYMPIC GOLD MEDALS WERE HARDER TO COME BY, HOWEVER; HE WON ONLY ONE IN THE 1988 OLYMPIC GAMES IN SEOUL.

NEED2KNOW

- ➔ The discus became an Olympic medal event for women at the 1928 Games.
- ➔ The first man to break the 200 ft (60.96 m) mark was American Al Oerter in 1962.
- ➔ The first woman to throw the discus over 229½ ft (70 m) was Faina Melnik of Russia in 1976.

064

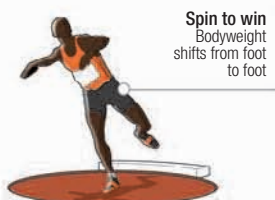


TERMS OF PLAY

Throwers have three attempts, which are called trials. They must release the discus within the circle and remain there until it has landed; they may leave only from the back half of the circle. The discus must hit the ground within the marked landing sector for the trial to be valid. The length of the throw is measured from the front of the circle to the point where the discus first lands. Distances are rounded down to the nearest half-inch (or centimeter) below the length of the throw.



Warm up
The throwing arm is taken as far back as possible



Spin to win
Bodyweight shifts from foot to foot



Long reach
The throwing arm is extended behind the thrower



Foot fault
The feet must remain in the circle for the throw to be good

PRELIMINARY SWING

The thrower makes two or three swings by rotating the torso. This sets the body into its throwing rhythm and prepares it for the turn.

TURNING CIRCLE

The thrower turns in quick spinning jumps from the back of the circle to the front. This move winds up the momentum for the release.

RELEASE

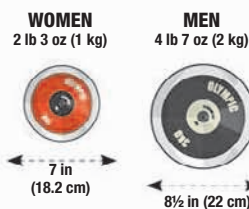
The power in the release comes from an explosion of energy in the body and legs. The discus spins as it is released from the hand.

FOLLOW THROUGH

After releasing the discus, the thrower continues to turn, taking the left leg through almost 360° to avoid overstepping the boundary.

EQUIPMENT

The discus is plate-shaped. It is made mainly of rubber but also has a metallic or wooden rim and core to make up the required weights. The maximum central thickness is about 1¾ in (44–46 mm). The weight and dimensions shown here are for adult competitions; both may be reduced for junior events.



BRUTE FORCE AND BALLET

The thrower takes up position at the back of the circle. He or she rests the discus in the throwing hand, then makes one and a half quick, powerful turns on the balls of the feet, like uncoiling a spring, to produce the force to release the discus at shoulder level. As the discus is released off the index or middle finger, it spins clockwise (for a right-handed thrower). Discus throwers welcome a headwind because it helps increase the amount of lift, therefore lengthening the throw.

DISCUS

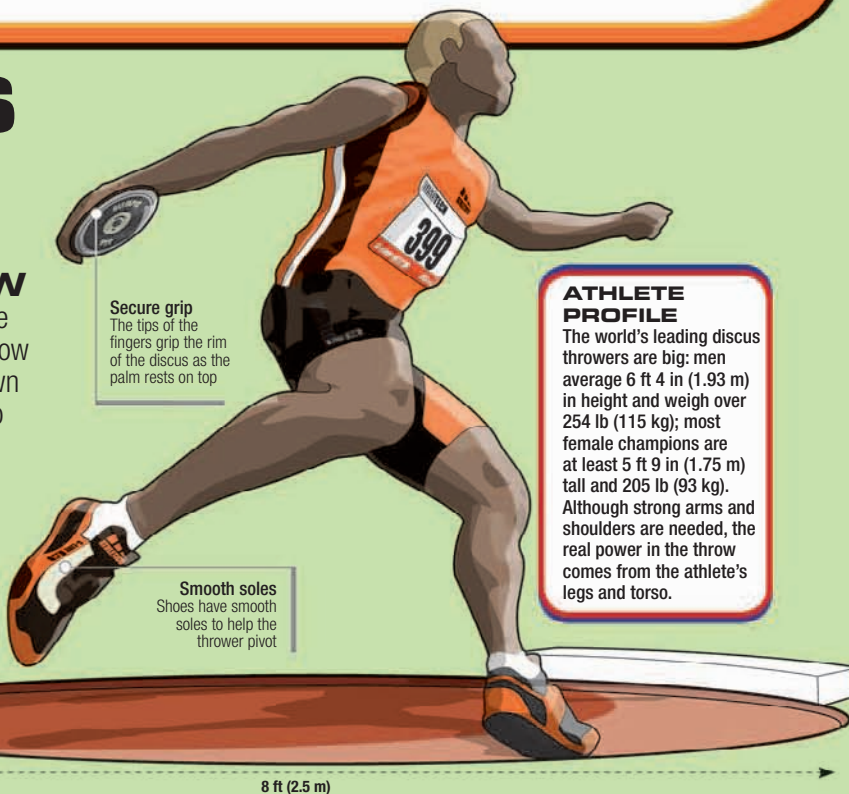


EVENT OVERVIEW

Originally part of the pentathlon in the ancient Olympics, the discus throw now stands alone as a field event in its own right. The aim of the competition is to throw the discus as far as possible.

FIELD OF PLAY

The discus is thrown from a circle 8 ft (2.5 m) in diameter. The landing sector is an area fanning out at 35° from the center of the throwing circle. For safety, a U-shaped cage surrounds the throwing circle. The mouth of the cage is 19 ft 8 in (6 m) wide and sits 23 ft (7 m) in front of the throwing circle.



Secure grip
The tips of the fingers grip the rim of the discus as the palm rests on top

Smooth soles
Shoes have smooth soles to help the thrower pivot

ATHLETE PROFILE

The world's leading discus throwers are big: men average 6 ft 4 in (1.93 m) in height and weigh over 254 lb (115 kg); most female champions are at least 5 ft 9 in (1.75 m) tall and 205 lb (93 kg). Although strong arms and shoulders are needed, the real power in the throw comes from the athlete's legs and torso.

Sound surface
The surface of the throwing circle must be smooth but not slippery

8 ft (2.5 m)



SHOT PUT

EVENT OVERVIEW

The shot put is a field event for men and women. Athletes compete to see which of them can throw (put) a heavy metal ball (shot) the farthest into the landing sector. Men's shot put has been included in the Olympics since its inception in 1896, women's since 1948.

NEED2KNOW

- ➔ The sport is believed to have originated from the practice of throwing heavy stones.
- ➔ Codified in the late 19th century, shot putting was one of the men's events at the first modern Olympics in 1896. Olympic women's shot putting first became a medal event at the 1948 Games in London, England.

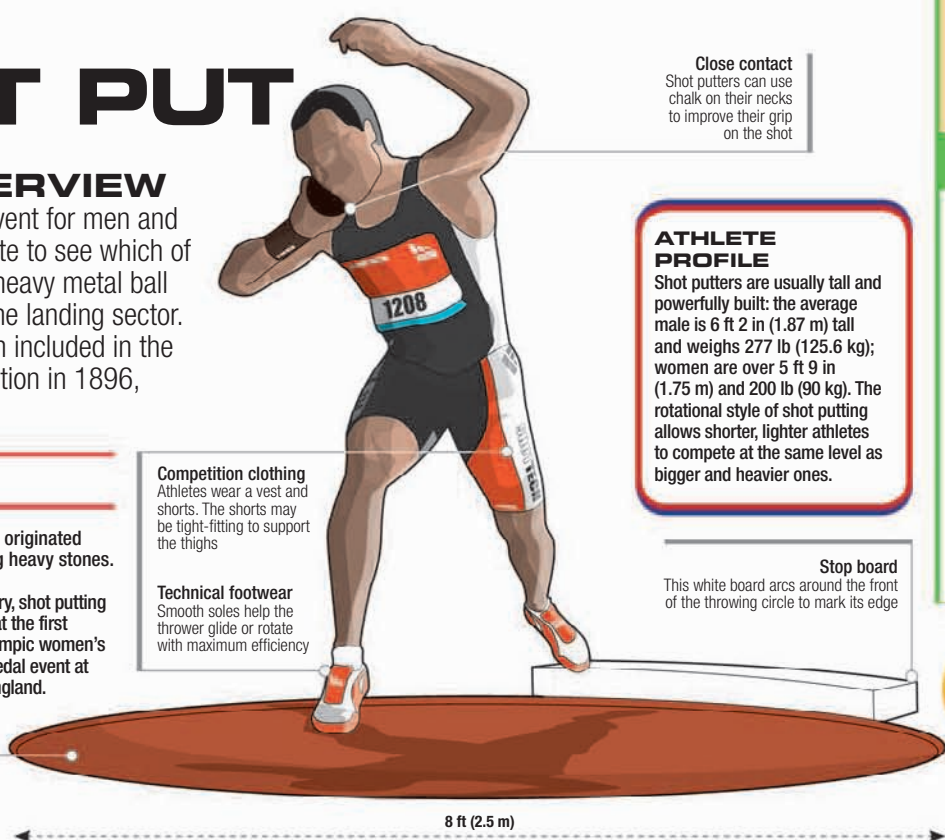
Competition clothing
Athletes wear a vest and shorts. The shorts may be tight-fitting to support the thighs

Technical footwear
Smooth soles help the thrower glide or rotate with maximum efficiency

ATHLETE PROFILE

Shot putters are usually tall and powerfully built: the average male is 6 ft 2 in (1.87 m) tall and weighs 277 lb (125.6 kg); women are over 5 ft 9 in (1.75 m) and 200 lb (90 kg). The rotational style of shot putting allows shorter, lighter athletes to compete at the same level as bigger and heavier ones.

Stop board
This white board arcs around the front of the throwing circle to mark its edge



Throwing circle
Set about 1 in (2 cm) below ground level, the circle has a non-slippery cement surface

GLIDE OR ROTATE?

The two main styles of shot put delivery are the glide technique, which is a linear technique, or the rotational technique, which is similar in many respects to the spinning delivery used by discus throwers. In both techniques, explosive power and core strength are essential to gain medal-winning results.

THE O'BRIEN GLIDE

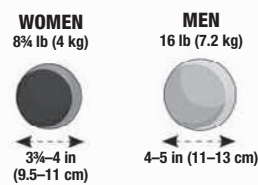
In this method, named after 1950s' US champion Parry O'Brien, the athlete begins on one foot in a crouching position at the back of the circle, getting all their weight behind the shot. He or she then thrusts up and forward to the front of the circle, powerfully launching the shot.

THE BARYSHNIKOV ROTATION

This technique was originated in the 1970s by Soviet athlete Aleksandr Baryshnikov. It borrows heavily from the discus thrower's spin, and makes it easier to maximize the launch speed of the put. Controversial at first, the Baryshnikov Rotation is the style most used by shot putters today.

HEAVY METAL

The shot is usually made of iron or brass, must have a smooth surface, and must not be modified in any way.



SHOT PUT LAW

For each of the three shots, the competitor may touch the inside of but not overstep the stop board at the front of the circle. The length of the shot is measured from the front of the circle to the shot's first landing point and recorded to the nearest half-inch or centimeter below the actual length of the throw.

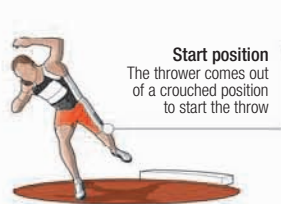
THE CIRCLE

The landing area is a sector that fans out at 35° from the center of the throwing circle; its sides are usually no more than 98 ft 6 in (30 m) long.

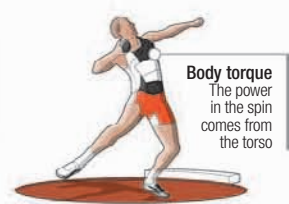
SIDELINES

11 The number Olympic medals out of a possible 12 won by American male shot putters in the four Summer Games held between 1948 and 1960.

116 The number of consecutive shot put competitions won by Parry O'Brien in the 1950s. He also competed in four Olympic games, winning gold in two of them.



PUSH OFF
The thrower faces away from the direction of throw with the shot tucked between the neck and shoulder.



SPIN
The athlete makes one and a half revolutions across the circle.



THRUST
The final step is timed to coincide with the release of the shot.

NEED2KNOW

- ➔ Finns are particularly successful javelin throwers, tallying a total of 23 Olympic medals, nine of them gold.
- ➔ Despite its long history, javelin throwing was not originally included at the modern Olympics. It made its debut only at the fourth Games in 1908, when it was a men-only event; women's javelin was introduced in Los Angeles in 1932.
- ➔ For safety reasons, the javelin was redesigned (men's in 1986; women's in 1999) to reduce the distance it could travel to around 295 ft (90 m) for men.

066



Sharp tip

The head measures 10 in (25 cm). It is made completely from metal and must be smooth

Sporting spear grip

This is usually metal, with cord grip wrapped around midpoint

Back support

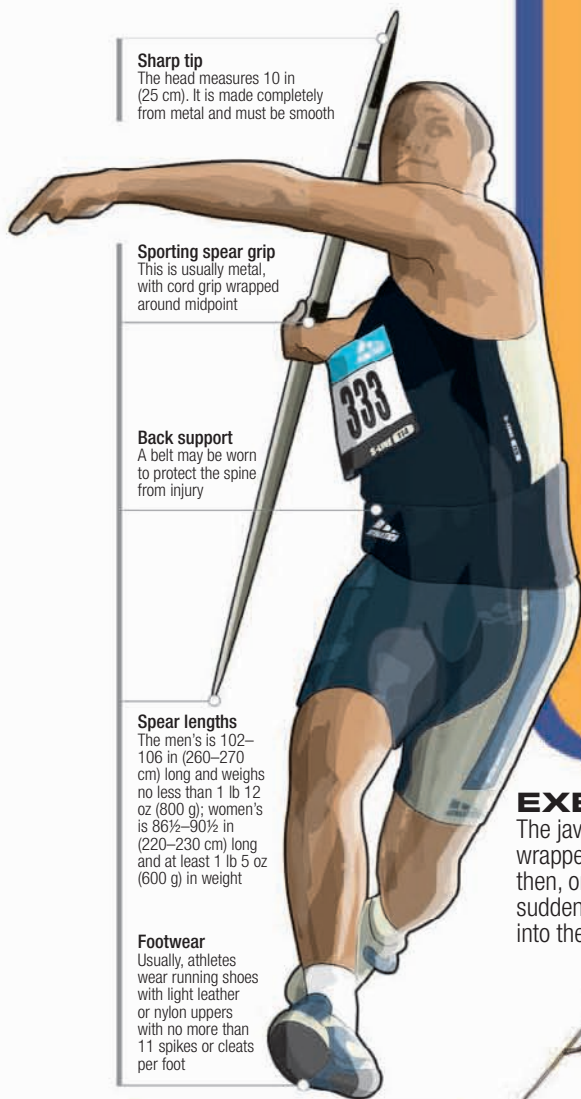
A belt may be worn to protect the spine from injury

Spear lengths

The men's is 102–106 in (260–270 cm) long and weighs no less than 1 lb 12 oz (800 g); women's is 86½–90½ in (220–230 cm) long and at least 1 lb 5 oz (600 g) in weight

Footwear

Usually, athletes wear running shoes with light leather or nylon uppers with no more than 11 spikes or cleats per foot



JAVELIN

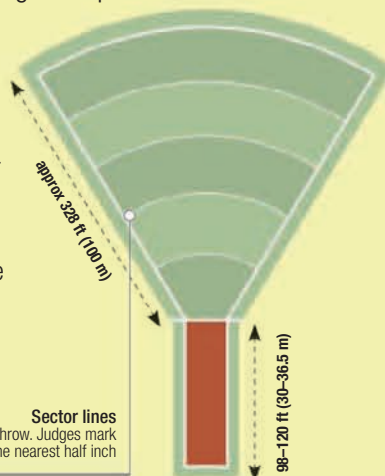


EVENT OVERVIEW

Javelin throwing is a field event for men and women. Athletes compete to see which of them can throw a spear-like projectile over the greatest distance. Despite its popularity, javelin may be omitted from track meetings at smaller venues because of the potential danger to spectators.

TARGET AREA

Athletes run up to the stop board (throwing line) along a synthetic track that may extend across the track. Beyond the line, the landing area is a sector that fans out at 29° for about 328 ft (100 m)—the exact size is partly determined by the space available and partly at the judges' discretion.



Mark the distance of the throw. Judges mark the distance to the nearest half inch

PERFECT THROW

Athletes get three throws each, unless there are fewer than eight competitors, in which case they throw six times. For the throw to be legal, the javelin must be released before the stop board and come down point-first within the landing sector. Throws are measured from the stop board to the javelin's first contact with the ground and rounded down to the nearest ½ in (1 cm). In the event of a tie, the winner is the athlete with the longest second-best throw.

EXECUTING THE THROW

The javelin must be held over the shoulder and is always gripped by the cord that is wrapped around the fulcrum of the shaft. The athlete accelerates down the runway, then, on entering the last seven strides, prepares to throw. He or she combines a sudden stop with an explosion of power to propel the javelin as far as possible into the landing sector without touching or crossing the stop board.



LEG CROSSOVER

Near the end of the run-up, athletes cross their legs in preparation for getting maximum torque on the throw.

DRAW

As the legs untwist, they pull back the throwing arm and push the other arm forward to help with aim and the follow-through.

LAUNCH

Throwers keep the javelin behind their shoulders for as long as possible before it is released.

RELEASE

The athlete suddenly stops running and thrusts the throwing arm forward to achieve the greatest possible speed of throw.

ATHLETE PROFILE

Strong hips, shoulders, and elbows are key for success, as is speed along the runway. Strength and speed produce the power to throw the javelin long distances.



HAMMER



EVENT OVERVIEW

The aim of this track and field event is to throw the hammer as far as possible from a circle into a marked target area. Although the projectile used is known as a hammer, the term is misleading: it is in fact a heavy metal ball attached by a wire to a handle.

Strong core

The torso stays erect to maintain balance and speed as the athlete and ball rotate as a single unit

Ball and wire

The ball is made of solid iron or a similar dense metal, or lead covered with a thin layer of other metal; the wire is at least $\frac{1}{16}$ in (3 mm) in diameter

Hand in glove

Hammer throwers often wear one leather glove with thick open-tipped fingers to help them grip the handle

Dress code

Throwers wear a vest and shorts or leggings; alternatively a tight-fitting one-piece; sometimes a belt for extra support

Track shoes

The shoes have no studs or cleats in order to maximize the sole area in contact with the launch pad



7 ft (2.13 m)

HAPPY HAMMERING

In most competitions, competitors have three attempts at throwing the hammer, each of which must be completed within 90 seconds of entering the throwing circle. In larger events, there may then be a second round from which all but the eight best performers are eliminated. The finalists get a further three throws each. If two or more athletes tie, the winner is the one with the second-longest throw. For a throw to be valid the competitor must stay within the throwing circle until the hammer has landed in the landing sector. Top male competitors throw the hammer about 276 ft (85 m); women throw the hammer around 244 ft (75 m).

NEED2KNOW

- ➔ The hammer began to take its current form in the late 19th century. The sport became an Olympic medal event for men at the 1900 Games; women followed 100 years later.
- ➔ In the Middle Ages in England, villages held blacksmith's hammer throwing competitions. Scotland's Highland Games still feature a version of this traditional sport using a metal ball attached to a wooden handle.

PLAYER PROFILE

Hammer throwers are powerfully built, especially in the arms, shoulders, and torso, which they develop working out with weights and barbells. The outstanding men in the sport weigh about 243 lb (110 kg) on average; the leading women are about 176 lb (79 kg). Throwers need not be tall, but those who are have a natural advantage.

HEAVY HAMMER

The hammer used in men's events is composed of a ball $4\frac{1}{3}$ –5 in (11–13 cm) in diameter, a steel wire measuring 4 ft (1.2 m) in length, and a roughly triangular-shaped handle measuring 5 in (13 cm) and 4 in (10 cm) at its widest and longest points respectively. The maximum combined weight is 16 lb (7.26 kg).

The women's hammer ball is smaller and lighter. It is $3\frac{1}{2}$ – $4\frac{1}{3}$ in (9.5–11 cm) across and weighs 8 lb 13 oz (4 kg). The wire and handle have similar dimensions to the men's hammer.

SPIN TO WIN

The classic throw consists of four phases. At the start, the athlete takes up a stationary position with his or her back to the landing area, then swings the hammer back and forth in a pendulum movement. Having gained momentum, the hammer is raised above the head and whirled in what is known as the windmill sequence. This lasts for two or three rotations before the hammer is released.

CAGED CIRCLE

The throwing area is a concrete circle with a 7 ft (2.135 m) diameter. In front of the circle, the landing sector fans out at 40° and has sides 262–328 ft (80–100 m) long. The exact dimensions of the sector are determined by the space available.

HAMMER CAGE

For safety reasons the cage is made of netting capable of stopping a hammer traveling at speed.

Cage
Surrounds throwing area on three sides

Circle
Area from which the hammer is thrown





DECATHLON AND HEPTATHLON

EVENT OVERVIEW

Often seen as the jacks of all trades of athletics, decathletes and heptathletes specialize in being great all-around athletes. Their sports comprise 10 (decathlon) or seven (heptathlon) track and field disciplines that are contested over two consecutive days. Men compete in decathlon while women compete in heptathlon. The competitions are a test of endurance and concentration to last the distance, as well as speed, strength, and skill to win the individual events. Decathlon has appeared in the summer Olympic Games since 1912 and heptathlon since 1984.

NEED2KNOW

- Decathlon consists of ten track and field events; heptathlon of seven. Male athletes contest decathlon, while female athletes contest heptathlon.
- Both events have developed from the ancient Greek pentathlon, which featured in the ancient Olympics from around 700 BCE.
- The sequence of events in decathlon has remained unchanged since 1914.

SIDELINES

14 The number years Jackie Joyner-Kersey held the world heptathlon record of 7,291 points (1988–2002). It is the longest standing heptathlon record, and she is the heptathlete who has gained 7,000 points most often.

9,026 The record number of points scored in a decathlon competition. Czech athlete Roman Sebrle attained this feat in 2001, when he became the first athlete to score more than 9,000 points, at Getzsis in Austria.

17 The age of athlete Bob Mathias when he won Olympic gold in the decathlon at the 1948 Games in London. Despite never having competed in the event prior to 1948, he still holds the record as the youngest Olympic champion in the discipline.

DECATHLON DISCIPLINES

100 M
LONG JUMP
SHOT PUT
HIGH JUMP
400 M
110 M HURDLES
DISCUS THROW
POLE VAULT
JAVELIN THROW
1500 M RUN

DECATHLON

This two-day competition comprises 10 disciplines: 100 m, long jump, shot put, high jump, and 400 m on day one; 110 m hurdles, discus throw, pole vault, javelin throw, and 1500 m on day two. Competitors' speed and strength are challenged in the first day's events, while the second day tests their endurance and technical skills.

Athletes must compete in all disciplines in order to be included in the final classification.

HEPTATHLON DISCIPLINES

200 M
LONG JUMP
SHOT PUT
HIGH JUMP
100 M HURDLES
JAVELIN
800 M

HEPTATHLON

The women's seven-discipline competition comprises 100 m hurdles, high jump, shot put, and 200 m on the first day, and long jump, javelin throw, and 800 m on the second day. Originally, female athletes competed in the five-discipline pentathlon, but the javelin throw and 800 m race were added in 1981 after the 1980 Olympics in Moscow to create the modern event.

COMPETITOR PROFILE

Decathletes and heptathletes need to be great all-arounders. Which not only requires speed and mobility, but also strength and explosive power. They tend to have lean, athletic physiques, rather than the specific adaptations developed by specialists.

DOUBLE DALEY

WIDELY REGARDED AS THE WORLD'S BEST-EVER ALL-AROUND ATHLETE, DALEY THOMPSON HOLDS THE RECORD AS THE FIRST PERSON TO WIN OLYMPIC GOLD FOR DECATHLON TWICE, FIRST IN 1980 AND AGAIN IN 1984. HE RETIRED FROM COMPETITION IN 1992, DUE TO INJURY, BUT THAT WAS NOT THE END OF THOMPSON'S CAREER. IN THE 1990s HE BECAME A PROFESSIONAL SOCCER PLAYER, PLAYING FOR MANSFIELD TOWN, THEN A FITNESS COACH.



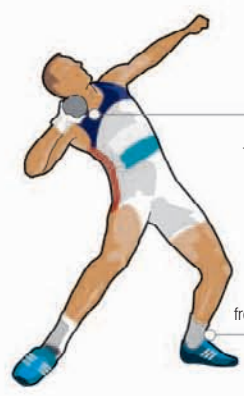
Pumping arms
A high, pumping arm movement allows the athlete to push himself more quickly to the finish line

Long stride
Sprinters aim for maximum stride length, which requires more ballistic strength

Sail technique
In this method, jumpers arch backward then throw their arms and legs forward before landing



Long limbs
Athletes stretch their arms and legs as far forward as possible to ensure maximum distance from their jump



Shot position
The shot must be held between the neck and shoulder before it is released

Glide technique
The competitor hops from the back of the throwing circle to the front to release the shot

SPRINTS

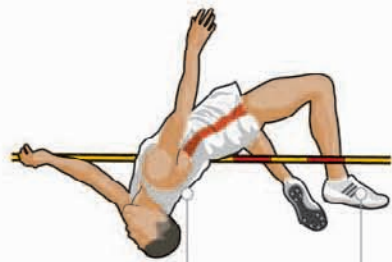
Decathletes and heptathletes compete over different sprint distances. The men have two sprint events, the 100 m and 400 m, while the women race only over 200 m. The maximum points on offer for 100 m is 1,223.

LONG JUMP

The second event for men and the fifth for women, the long jump relies on speed in the run-up, good flight through the air, and a forward landing to attain the greatest distance in the pit.

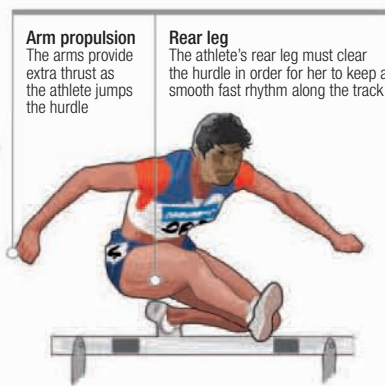
SHOT PUT

Athletes have three trials each to score the maximum points on offer: 1,350 for a 23.99 m put for men, and 1,500 for a 24.40 m throw for women. The shots used are the same as those for the individual competition.



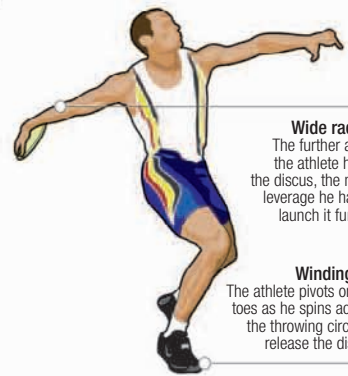
Head and shoulders
The athlete initiates the back arch over the bar with his head and shoulders

Active feet
The athlete must kick his feet up at the end of the jump to ensure they clear the bar



Arm propulsion
The arms provide extra thrust as the athlete jumps the hurdle

Rear leg
The athlete's rear leg must clear the hurdle in order for her to keep a smooth fast rhythm along the track



Wide radius
The further away the athlete holds the discus, the more leverage he has to launch it further

Winding up
The athlete pivots on his toes as he spins across the throwing circle to release the discus

HIGH JUMP

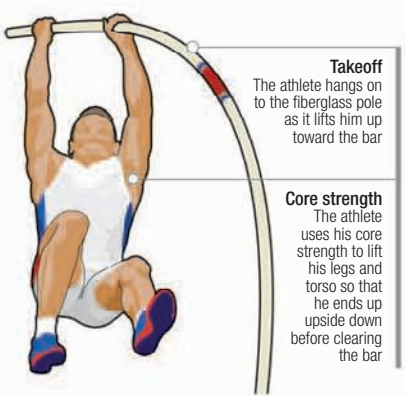
This vertical jump appears on the first day of both the decathlon and heptathlon competitions. The decathletes are chasing a maximum score of 1,392 points, while the women are competing for 1,498 points.

HURDLES

Raced on the first day over 110 m in the men's decathlon and 100 m in the women's heptathlon, the hurdles race carries a maximum score of 1,223 points for men and 1,361 for women.

DISCUS THROW

The second of the throwing events is contested only in the decathlon competition. There is a maximum of 1,500 points available, but athletes must throw 79.41 m to be awarded them.



Takeoff
The athlete hangs on to the fiberglass pole as it lifts him up toward the bar

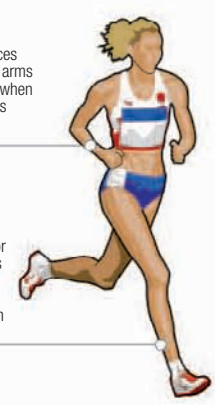
Core strength
The athlete uses his core strength to lift his legs and torso so that he ends up upside down before clearing the bar



Throwing arm
The athlete keeps her throwing arm behind her as long as possible along the runway

Maximum torque
The athlete crosses her legs as she prepares to release the javelin. This increases the torque in her body

Relaxed stance
Over longer distances athletes keep their arms more relaxed than when sprinting. This helps conserve energy



Long stride
Athletes still aim for a long stride at this distance, keeping contact with the track to a minimum

POLE VAULT

The second event competed only by decathletes, the pole vault appears on the second day of the competition. Athletes aim to jump heights of 6.49 m in order to be awarded the maximum score of 1,396 points.

JAVELIN THROW

The final throwing event, the javelin throw features in both men's and women's combined events. Throws of 102.85 m for men and 82.63 m for women will win the competitors maximum points.

MIDDLE DISTANCE

The last event of both competitions is the 800 m for women and 1500 m for men. Final race positions matter less than who beats whom for the last available points; a maximum of 1,250 for both heptathletes and decathletes.

COMPETITOR PROFILE

Most walkers are tall and lean. In training they work on back, abdominal, and thigh muscles to meet the demands of the walking action. Their feet must be in good condition, and they need a lot of stamina.



Walking gear
Athletes wear loose-fitting vests, which may be in team colors

Baggy trousers
Shorts tend to be loose to avoid chafing the legs and groin

Silver lining
Socks are not essential with well-fitting shoes, but are sometimes worn to reduce rubbing

Sole control
Shoes have lightweight uppers with thin soles; the heels should be well padded. Shoes wear out quickly and need to be replaced regularly between races

COURSES

Most walking races are held on roads. There are judges along the course to ensure that competitors walk in accordance with the rules. Often, walkers do several laps of a circuit so that officials get the chance to observe them several times during the race.

RACE RULES

One foot must be in contact with the ground at all times, and the supporting leg must be straight, not bent at the knee, from the moment the foot touches the ground until the supporting leg passes below the body. Walkers are penalized for illegal techniques, such as "lifting"—having both feet off the ground. Officials report offenses to three judges who may show the offender a yellow warning paddle; further violations lead to a red paddle; three red paddles mean disqualification.

REGULATED WALKING

Race walking is much more demanding than regular walking. Enthusiasts claim that it is even harder than running: it takes a greater toll on the body because the action is less efficient. Walkers swivel and tilt their hips to lengthen their strides and get up as high as possible on the toes of the trailing foot before placing the heel of the leading foot on the ground.



Front foot
Toes raised at about 45° so that heel hits the ground first

Quick step
Trailing leg is raised, but knee kept low for speed

Short stride
Small, quick steps are efficient

Bent knee
The knee is bent once the leg is past vertical position

CALM ON TOP
The torso is relaxed and upright for balance; the work is done by the arms and legs.

ONE AT A TIME
The lead foot must be grounded before the back foot is lifted: both feet off the ground is running.

WEIGHT AHEAD
In the middle of each stride, the upper body rocks forward over the front leg.

SWING ALONG
Walkers must swing the arms vigorously to propel themselves forward.

NEED2KNOW

- ➔ World-class race walkers can cover 1 mile (1.6 km) in under six minutes—a speed of about 10 mph (16 kph).
- ➔ At major race-walking events, men compete over two distances—50 km and 20 km—while women walk 20 km only.
- ➔ A race-walking World Cup is held biannually in even-numbered years.

SO NEAR AND YET...

AT THE 2000 SYDNEY OLYMPICS, AUSTRALIAN JANE SAVILLE WAS DISQUALIFIED FOR LIFTING JUST 492 YD (150 M) FROM THE FINISH AS SHE LED THE 20 KM RACE. SHE BURST INTO TEARS AND, WHEN ASKED IF THERE WAS ANYTHING SHE NEEDED, REPLIED: "A GUN TO SHOOT MYSELF."

EVENT OVERVIEW

Race walking bears little relation to what most people know as "ordinary" walking. Athletes look more as if they are trying to stop themselves from running. The technique, requiring short, rapid steps, is difficult to master. Races are a test of the walker's concentration and endurance.

**RACE WALKING**

ORIENTEERING



EVENT OVERVIEW

Orienteering is a cross-country race in which participants use a map and compass to navigate between checkpoints, or controls, on an unfamiliar route. The winner is the first individual, or team, to reach the finish or, in timed events, whoever has reached the greatest number of checkpoints at the end of an allotted period.



Paperwork
The high-grade map is typically to a scale of 1:15000

Hands free
Some compasses are designed to be worn on the thumb

Outdoor wear
Clothing must be waterproof and lightweight; many competitors wear purpose-made lycra or nylon suits

Ankle anchors
Gaiters may be worn to protect the legs on rough terrain

Dry feet
The running shoes must be light and waterproof with rubber and/or metal cleats

Course markers
Brightly colored indicators are located at all control points

ELEMENT OF SURPRISE

Competitors must not preplan a route. They are given a map of the course only when they arrive at a rallying point, which is usually some distance from the starting line. They may all start at the same time or at intervals of one or two minutes.

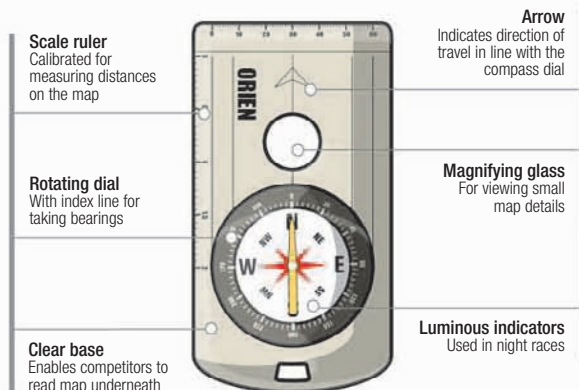
STAYING ON COURSE

Certain points are marked on an orienteering map, but not the course between them. A triangle marks the start, a double circle marks the finish. Single circles show the control points that competitors must visit. These are marked by red and white or orange and white flags.

Sprint orienteering may take place in city parks and other urban settings. In events held at night, control markers should have cat's eyes or other reflective surfaces, and competitors may wear flashlights on their heads to help them see.

EQUIPMENT

A map and a compass are essential equipment. Competitors normally sign in at control points, but electronic log-in devices called dibbers are sometimes worn on the fingers. At night, racers carry a whistle to attract attention in emergencies.



LIE OF THE LAND

A straight line is the shortest distance between two points, but it is not necessarily the quickest route. Race organizers often ensure that there are obstacles, such as gulleys and streams, between control points that runners must circumnavigate. Orienteers read the map to assess the landscape and choose a course between points. They use their compass to establish their position and the right direction, perhaps by taking bearings from easily identifiable landmarks.

COMPETITOR PROFILE

Successful orienteers have the stamina and speed of long-distance runners. They need to be able to read a map and compass while on the move and be expert navigators. Orienteers must be ready to use their initiative when confronted with a range of terrains that could include steep, rocky ground or marshes, as well as roads and tracks.

NEED2KNOW

- ➔ At the annual world championships there are four timed events: long (90–100 mins for men; 70–80 mins for women); middle (30–35 mins); and relay (10–12 mins).
- ➔ Most contests are on foot, but some involve the use of mountain bikes or skis.

RACE FORMAT

Most professional triathletes compete in Olympic or Ironman races. The Olympic event consists of a 1,640 yd (1,500 m) swim, a 25 mile (40 km) cycle, and a 6¼ mile (10 km) run. The Ironman is the ultimate test of endurance. The race consists of a 2½ mile (3.8 km) swim, 112 mile (180 km) cycle, and ends with a full marathon (26¼ miles or 42.2 km).



SWIM

The swim takes place in a lake, river, or the ocean. Swimmers may set off in a large bunch or smaller groups a few seconds apart. Any stroke can be used, but the crawl is the most popular. Wetsuits are required in cold water.

RUN

The run may be a road race or cross country, and the course may be relatively flat or up and down a hilly terrain. Regular aid stations provide water and energy drinks to sustain the athletes.

BIKE

The cycling phase is a road race that starts and finishes at the transition area. In Olympic races, the pros may cycle in a group and draft in the slipstream of riders ahead. In Ironman events, triathletes must cycle alone.

TRANSITIONS

To keep transitions smooth and efficient, competitors check out the transition area before the race and practice removing wetsuits while running and mounting the bike with cycle shoes attached to the pedals.

Swimming cap

This is worn mainly for identification, but in very cold water an athlete may wear a neoprene cap and bodysuit to reduce heat loss

Carbon cycle

Pro triathletes use aerodynamic time trial bikes with strong, ultra lightweight carbon fiber frames

ATHLETE PROFILE

Stamina, speed, physical and mental strength, technical ability, and the ability to switch effortlessly from one discipline to the next are all vital. Training typically takes up to around 30 hours a week for a professional Ironman triathlete. Pros usually hit peak performances in their late 20s and early 30s.



One-piece suit

Athletes can wear a one-piece suit or a short top and shorts.

This outfit can be worn for all three disciplines, thus eliminating the need to change

Timing tags

An electronic chip attached to the ankle enables the accurate timing of all triathletes

RULES OF THE RACE

RACE REFEREES HAND OUT TIME PENALTIES FOR MINOR OFFENSES SUCH AS CYCLING IN THE TRANSITION ZONE. DISQUALIFICATION RESULTS FROM SERIOUS OFFENSES SUCH AS RECEIVING OUTSIDE ASSISTANCE.

NEED2KNOW

- ➔ The International Triathlon Union (ITU) organizes a series of world championship events annually.
- ➔ The triathlon was first introduced to Olympic competition at Sydney in 2000; there are both men's and women's events.
- ➔ The London Triathlon is the world's biggest event, with more than 8,000 triathletes swimming, cycling, and running the course in Docklands in east London.
- ➔ The World Triathlon Corporation organizes the Ironman Triathlon World Championship. Ironman events in countries around the world offer qualification slots for the big race—Ironman Hawaii.



TRIATHLON

EVENT OVERVIEW

The triathlon is an endurance event that combines three sports in one race—swimming, followed by cycling and then running. A triathlon is timed from the start of the swim to the end of the run, and the competitors seamlessly switch from one sport to the next in transition zones. Smooth transitions reduce race times, so triathletes often treat the two transitions as a fourth discipline. The standard distance for international triathletes is the Olympic triathlon, but formats vary from short sprints to long-distance Ironman events. Held annually since 1978, Ironman Hawaii is the most prestigious event in the triathlon calendar.



EVENT OVERVIEW

Modern pentathlon is a combination of five events in a day—shooting, fencing, swimming, riding, and running. The sport was the brainchild of Pierre de Coubertin, the founder of the modern Olympics, who believed it to be a measure of the “complete athlete.” Men and women are awarded points for their performances in each of the first four events. The points then translate into a time advantage on the run. The overall winner is therefore the first to cross the finish line on the run.

MODERN PENTATHLON



POINTS FOR PRIZES

Generally, the rules governing each event are the same as when they are competed as individual sports. In the show jumping contest, however, the pentathletes draw lots for their horse and have only 20 minutes and up to five trial jumps to get to know their animal. Further, there is a staggered start for the cross-country run.

ATHLETE PROFILE

Contestants need a very wide range of skills. Older competitors tend to do better in the more technical events of shooting, fencing, and riding. Younger athletes generally excel in swimming and running. Top pentathletes are usually more than 28 years old.

SWIMMING

The swimming competition takes place in a standard Olympic pool. Pentathletes race against the clock—not each other—in a 200 m freestyle race. For men, a time of 2 minutes 30 seconds translates into 1,000 competition points, and the equivalent time for women is 2 minutes 40 seconds.



Fast lane
A good standard of swimming is often considered a precondition of participation in a pentathlon

Speed points
Ten points are added to an athlete's total for each second below the benchmark time

SHOOTING

The shooting takes place on a 33 ft (10 m) range. Contestants fire 20 shots with a 4.5 mm air pistol at a target that is 6 in (15.5 cm) in diameter with nine rings and a center circle, which counts the highest. Points are awarded according to how near to the target's center the contestant's 20 shots hit.

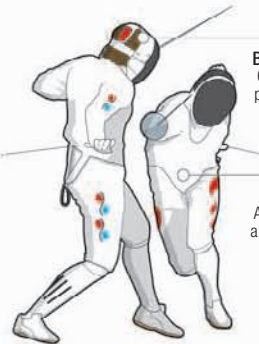


One arm only
Under no circumstances may the second arm be used to support the shooting arm

Eyewear
Shooting glasses offer eye protection when on the range

FENCING

The fencing competition is held on a standard piste. Competitors fence each other athlete in turn, and bouts last for one minute. The first to land a hit with his or her épée wins the bout. If neither fencer strikes a winning blow, they both lose. Athletes who win 70 percent of their bouts are awarded 1,000 points.

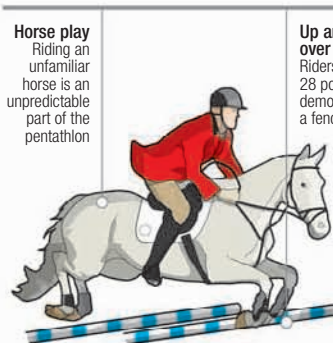


Body protection
Competitors wear protective gear on the head and body

First strike
A win results from a strike to any part of the body

RIDING

The showjumping course is between 383–437 yd (350–400 m) long, with obstacles up to 4 ft (1.2 m) in height. Contestants have 20 minutes to get used to their horse before jumping a 12-obstacle course within a specific time limit. Starting with 1,200 points, riders lose points for faults and slow times.



Horse play
Riding an unfamiliar horse is an unpredictable part of the pentathlon

Up and over
Riders lose 28 points for demolishing a fence

RUNNING

The run takes place on a 3,280 yd (3,000 m) cross-country course or a road track. The maximum climb of the course is 164 ft (50 m). The overall leader after the previous event—the riding—starts first, with the others behind in order of their placing. The winner of the running becomes the overall winner.



Running climax
A staggered start provides a nail-biting end to the competition

Points deductions
If an athlete starts before his or her allotted time in the handicap, 40 points are deducted

GYMNASTICS

02

GYMNASTICS



076

SPORT OVERVIEW

Gymnastics is a multidiscipline sport in which men and women compete as individuals or in teams. Individuals can compete in single disciplines or as all-arounders. The sport is split into three main sections: artistic gymnastics, rhythmic gymnastics, and trampoline. Rhythmic gymnastics is a discipline for women only. Men's artistic gymnastics consists of six disciplines: floor exercises, pommel, rings, vault, parallel bars, and high bar. Women's artistic gymnastics consists of four disciplines: vault, asymmetric bars, balance beam, and floor exercises.

CODE OF POINTS

The official scoring system (the "code of points") was overhauled in 2006 following accusations of inconsistent judging at the 2004 Olympics. However, critics claim the new code rewards technical difficulty at the expense of artistry, and the coveted "perfect ten" is now impossible to attain.

Raised platform

The apparatus and floor mats are all placed on a raised platform. Only competing gymnasts are permitted on the podium during competitions.

Pommel horse

Both the surface of the horse and the surface of the pommels must allow the gymnast to glide over them but must not be slippery.

High bar

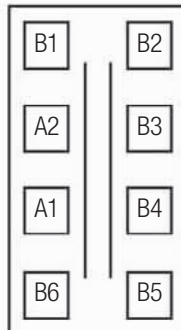
The 7 ft 10½ in (2.4 m) long horizontal high bar is erected 9 ft 2 in (2.8 m) above the floor.

Asymmetric bars

Featured in women's artistic gymnastics, the asymmetric bars are placed 63 in (160 cm) apart and have a height difference of 31 in (80 cm).

JUDGE AND JURY

Top level gymnastics competitions are presided over by an apparatus jury. The jury is divided into an A-jury and a B-jury. The A-jury consists of two judges and the B-jury is made up of six judges. Some disciplines require other officials, such as line judges, for example, for the floor exercises. The A-judges sit in front of the apparatus, where they have a clear view of the gymnast's performance. The B-judges are positioned clockwise around the apparatus from the left of the A-jury.



ON BALANCE

SOVIET GYMNAST OLGA KORBUT SHOT TO FAME AT THE 1972 MUNICH OLYMPICS, BRINGING HER SPORT WITH HER. SHE WAS THE FIRST PERSON TO PERFORM A BACKWARD SOMERSAULT ON A BALANCE BEAM, AND HER EXPLOSIVE, TECHNICAL STYLE REVOLUTIONIZED THE SPORT.

Apparatus scoreboard

This scoreboard gives the marks for the current competitor in that event.

Floor exercises

The area for floor exercises and acrobatic gymnastics measures 39 ft 4 in x 39 ft 4 in (12 m x 12 m).

Vault runway

Competitors accelerate along the 82 ft (25 m) vault runway, which is 39 in (1 m) wide.

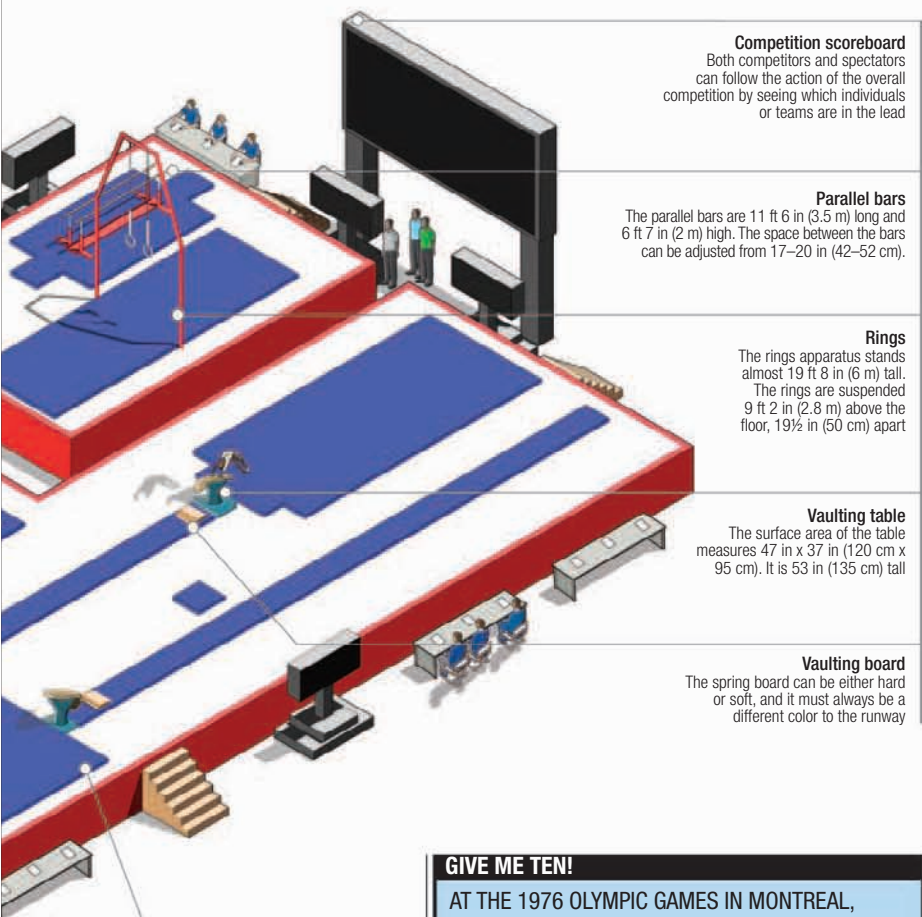
COMPETITOR PROFILE

Male and female gymnasts come in a variety of shapes and sizes, depending on their area, or areas, of expertise. The men's rings event, for example, requires extraordinary upper-body strength, while women's rhythmic gymnastics relies on flexibility and precise muscle control. Common attributes of all gymnasts are their incredible balance and power—especially remarkable considering the diminutive stature of many top level competitors.



THE GYMNASTICS ARENA

The gymnastics competition arena, also known as the podium, is arranged to allow different competitions to be run at the same time. For example, the men's bars events can run at the same time as the women's balance beam, as they occupy opposite ends of the arena. At large events, the competitions may be staged on different days, as was the case at the 2004 Olympics in Athens (where the rhythmic gymnastics competition was run in a different venue entirely).



Competition scoreboard

Both competitors and spectators can follow the action of the overall competition by seeing which individuals or teams are in the lead

Parallel bars

The parallel bars are 11 ft 6 in (3.5 m) long and 6 ft 7 in (2 m) high. The space between the bars can be adjusted from 17–20 in (42–52 cm).

Rings

The rings apparatus stands almost 19 ft 8 in (6 m) tall. The rings are suspended 9 ft 2 in (2.8 m) above the floor, 19½ in (50 cm) apart

Vaulting table

The surface area of the table measures 47 in x 37 in (120 cm x 95 cm). It is 53 in (135 cm) tall

Vaulting board

The spring board can be either hard or soft, and it must always be a different color to the runway

Floor mats

Padded floor mats, which are 4 in (10 cm) thick, are a key safety feature. The mats around the pommel horse, asymmetric bars, horizontal bars, and rings are 8 in (20 cm) for additional protection

GIVE ME TEN!

AT THE 1976 OLYMPIC GAMES IN MONTREAL, ROMANIAN GYMNAST NADIA COMANECI BECAME THE FIRST PERSON TO ACHIEVE A PERFECT SCORE OF TEN—AT THE TENDER AGE OF 14. NOT CONTENT WITH SECURING THE RECORD AS THE YOUNGEST GYMNAST EVER TO DO SO, SHE WENT ON TO WIN FIVE OLYMPIC GOLD MEDALS.

INSIDE STORY

Both as a method of keeping fit and as a form of competition, gymnastics has a long history. The ancient Greeks used to perform the exercises naked. However, the use of clothing and special equipment for each event dates from the 18th century, when Germans developed gymnastics in military training. It soon caught on among civilians, too, and spread to other countries.

GYMNASTICS GOVERNING BODY

A European gymnastics federation was founded in 1881; it became the Fédération Internationale de Gymnastique (FIG) in 1921, when non-European countries were admitted. Gymnastics competitions were featured at the first modern Olympic Games in 1896, and women first competed in 1928.

STAT CENTRAL

MOST OLYMPIC MEDALS

INDIVIDUAL ALL-AROUND MEN

COUNTRY	NUMBER
SOVIET UNION	15
JAPAN	13
FRANCE	8
SWITZERLAND	6
ITALY	5

MEN'S TEAM COMPETITION

COUNTRY	NUMBER
JAPAN	11
SOVIET UNION	9
UNITED STATES	7
FINLAND	6
ITALY	5

INDIVIDUAL ALL-AROUND WOMEN

COUNTRY	NUMBER
SOVIET UNION	18
ROMANIA	11
UNITED STATES	5
CZECHOSLOVAKIA	2
EAST GERMANY	2

WOMEN'S TEAM COMPETITION

COUNTRY	NUMBER
ROMANIA	11
SOVIET UNION	9
CZECHOSLOVAKIA	6
UNITED STATES	5
HUNGARY	5

GROUP RHYTHMIC GYMNASTICS

COUNTRY	NUMBER
RUSSIA	4
BULGARIA	2
SPAIN	2
BELARUS	1
ITALY	1

INDIVIDUAL RHYTHMIC GYMNASTICS

COUNTRY	NUMBER
RUSSIA	5
UKRAINE	4
EUN	2
URS	2
CANADA	1

NEED2KNOW

- Of all the disciplines in artistic gymnastics, the floor exercises are considered to offer the best opportunity for the gymnast's personal expression and individuality, particularly in the women's event where dance skills are a core element.
- Gymnastics has been part of the Olympics since 1896. Floor exercises first appeared in the men's competition in 1936, and in the women's competition in 1952.
- Some national teams hire choreographers as well as coaches to help gymnasts with their routines.

THE FLOOR

Gymnasts perform floor exercises on a square floor mat measuring 40 ft x 40 ft (12 m x 12 m). This area is surrounded on all four sides by a clearly marked boundary line. On most floors, the padded area extends for at least 3 ft 3 in (1 m) beyond the perimeter markings to help prevent injuries. Point penalties are incurred if the gymnast steps or falls outside the boundary line.

Panel of judges

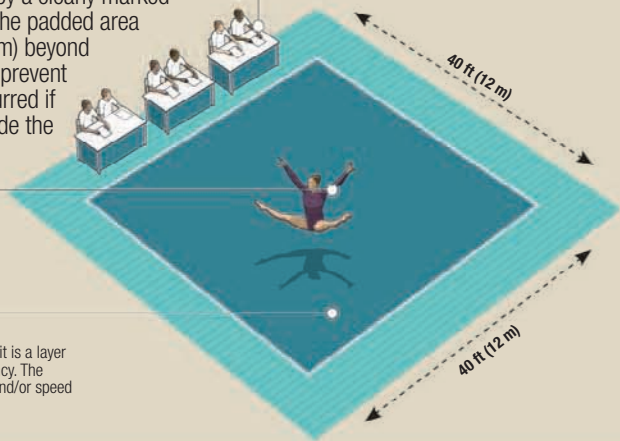
Six judges mark the execution of the routine. There are also two technique judges, and one jury resident overseeing all the judges

The focus of attention

The gymnast performs a solo routine full of tumbling runs, turns, and rolls that he or she has choreographed

Soft and bouncy surface

The mat is made of foam rubber; beneath it is a layer of plywood, which makes the surface bouncy. The gymnast uses the "spring" to give height and/or speed to his or her tumbling runs



FLOOR EXERCISES



EVENT OVERVIEW

Floor exercises make up one of the four disciplines in women's artistic gymnastics, and one of the six disciplines in men's artistic gymnastics. They are among the most popular gymnastics events, giving spectators an action-packed display of skill and strength. Individual competitors perform choreographed routines on a square floor mat and are scored for both their acrobatic accomplishment and their artistic inventiveness. Competitors are expected to use the whole area of the mat during their routines, and tumbling runs are often performed from one corner of the floor to the opposite corner.

MEN VERSUS WOMEN

The men's and women's routines are broadly similar, but differ in some important details. Women are expected to demonstrate tumbles, jumps, turns, and dance movements. Men are also expected to show tumbling and jumping skills, but in male competitions there is greater emphasis on strength. In order to display their physical power, male routines normally include presses such as the V-sit position, where the gymnast takes and holds his whole weight on his hands (see right).

V-SIT POSITION

This gymnast is performing the V-sit, a move where the joined legs are raised off the floor and the body is supported by the hands.

Points of symmetry

In poses such as this, gymnasts must keep their feet together and their toes pointed

Strong head

The position of the head is essential in maintaining balance in nearly all gymnastic moves

Muscular strength

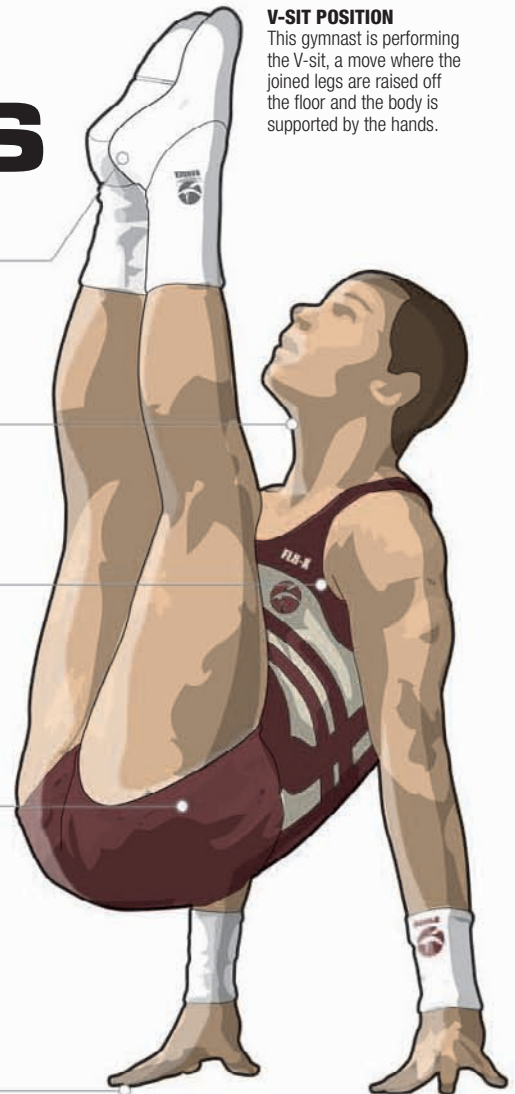
Gymnasts must be very strong as well as supple

Short work

Male gymnasts wear shorts for freedom of movement, to stay cool, and so that the judges can see their leg movements

White handedness

Gymnasts often apply chalk to their hands before performing to give them better grip on the floor





TAKING THE FLOOR

Women gymnasts perform floor exercises for a maximum of 90 seconds to musical accompaniment (the music must be instrumental only). Male gymnasts' routines can last for a maximum of 70 seconds, and are performed without music. Gymnasts must use the whole floor mat, but are penalized for stepping over the boundary marking. Three or four tumbling runs must be performed in the routine, and competitors have to show both acrobatic and dance skills.

SCORING

Floor exercise routines are scored out of 10; obtaining the "perfect 10" is rare. There are two groups of judges: one group scores a routine on its difficulty, the other awards marks for the proficiency of its execution. Each floor exercise routine must feature certain required elements (such as the reverse salto, or backward somersault), and is assigned a start value. This varies, but is generally about 9.4. Every acrobatic and dance element carries a set value, ranging from A (the easiest) to G. Bonus points may be awarded to competitors who successfully perform all the required elements, at whatever level. However, any slight loss of balance or incorrect body line spotted by the judges will lose marks.

SIDELINES

3 The highest number of successive Olympic gold medals in the floor exercises. The winner was Larisa Latynina in 1956, 1960, and 1964.

5 The length, in years, of the ban received in 2002 by Romanian Olympic double gold medallist Lavinia Milosovici for posing topless in a Japanese fashion magazine.

15 The highest number of medals (seven gold, five silver, three bronze) ever won by a single competitor at the Olympics. The gymnast in question is Russian Nikolay Andrianov. Floor exercises brought him two of his golds (at Munich in 1972, and Montreal in 1976), and a bronze in 1980 at the Moscow Games.

WAYS TO GLOW

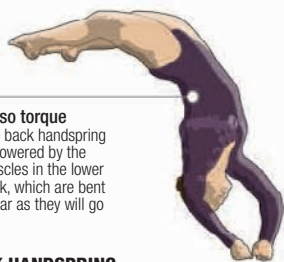
A high-scoring floor routine will feature dazzling acrobatic skills, particularly in the tumbling, which includes dynamic combinations of turns, leaps, springs, and somersaults all linked together in a fluid sequence. Acrobatics must be combined with expressive dance movements. The required elements of floor exercises include a turn of 560 degrees, front and back tumbling, and a double salto (somersault). Female gymnasts can end their tumbles in lunge position (with one foot in front of the other); male gymnasts must land in the stuck position (both feet firmly together).

COSMOPOLITAN RED STAR

SOVIET GYMNAST NELLIE KIM, FLOOR EXERCISE GOLD MEDALLIST AT THE 1976 OLYMPICS, WAS USUALLY DESCRIBED IN THE WEST AS "RUSSIAN." IN FACT SHE WAS HALF KOREAN AND HALF TATAR, BORN IN TAJIKISTAN, AND TRAINED IN KAZAKHSTAN.

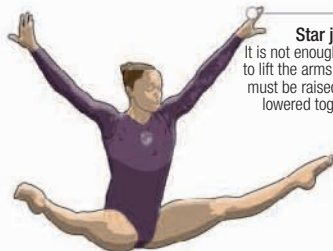
Torso torque

The back handspring is powered by the muscles in the lower back, which are bent as far as they will go



BACK HANDSPRING

In this move, the gymnast starts from a standing position and leaps backward onto her hands and then springs off her hands to land upright again. This move is sometimes known as a flic-flac or a flip-flop and is often seen in tumbling routines.



Star jump

It is not enough just to lift the arms: they must be raised and lowered together

Angle pose

The lower body and legs appear to be driving down, while the arms stretch upward and outward



SPLIT LEAP

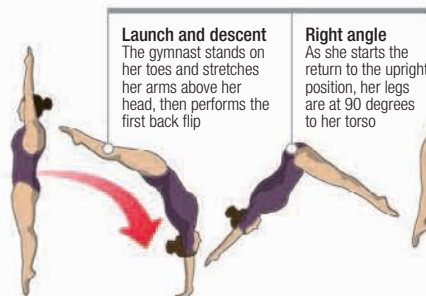
The gymnast aims to do the splits in midair, with both legs parallel to the floor; extra points are awarded if the arms are also parallel. The landing should be delicate, and segue seamlessly into the next part of the routine.

HOLD THAT POSE!

While the main object of any floor exercise is a fluent and aesthetically pleasing sequence of moves, there should be moments when the gymnasts strike poses. Even though these last for only an instant, they are scored according to the beauty of their execution.

REVERSE DOUBLE SALTO

A double salto (double somersault) is one of the required elements in the floor exercises. This gymnast is performing her salto in the pike position, with the legs held close to the torso.



Launch and descent

The gymnast stands on her toes and stretches her arms above her head, then performs the first back flip

Right angle

As she starts the return to the upright position, her legs are at 90 degrees to her torso

Higher aim

As she launches into the first back somersault, the gymnast goes for maximum elevation

Hands down

As she flips again, the gymnast brings her arms down parallel

Tuck up

Hands clasped behind the knees, the gymnast brings her body around again

Final approach

The hands come down to the outside of the thighs in preparation for the landing

Sharper angle

At the apex of the second flip, the gymnast brings her legs up tight to her trunk

Stuck landing

The gymnast completes the move by standing stock still (no steps allowed), and raising both hands above her head

NEED2KNOW

080

→ After 50 years of Eastern European domination, modern Olympic bar champions are just as likely to come from the West. At the 2004 Games, Émilie Lepennec of France took gold in the uneven bar, and Italy's Igor Cassina won the high bar event.

→ The outstanding nation at the 2006 world artistic gymnastics championships was China.

HAND GRIPS

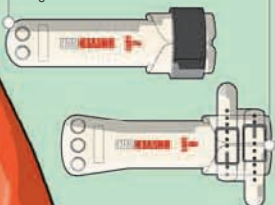
The latest alternative to bandages, these grips are strapped to the wrists. The upper sections are made of leather, which flexes into the palms of the gymnasts' hands and up through the top of their fingers. This prevents blisters and slippage on the apparatus.

Fingerhole grips

Hand protectors normally have two or three finger sockets

Wrist straps

The devices are secured around the wrists



Non-slip

Men's leggings always have footstraps or sewn-in feet to prevent them riding up during routines. They have strong elastic at the waist for the same reason

Body wear

Men wear armless vests to maximize the maneuverability of the shoulders; in the uneven bar event, women wear leotards

Firm grip

Gymnasts may tape their hands with bandages, wear leather grips, or chalk them to prevent sweat, which might make them lose their grip

BAR EVENTS



EVENT OVERVIEW

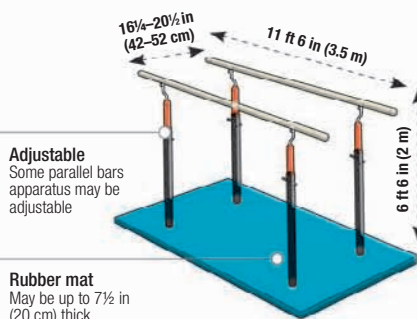
The three bar disciplines—uneven bars, parallel bars, and high bar—require different skills, but all place huge physical demands on gymnasts' ability to move seamlessly and gracefully while at times supporting their swinging body weight with only one arm. The uneven bars are exclusively for women, and only men compete on the high and parallel bars.

RAISING THE BAR

In all three events, the height of the bar or bars is measured from the ground, rather than from the surface of the rubber mat, which may be up to 7½ in (20 cm) thick to ensure soft landings and provide a cushion in case of a fall.

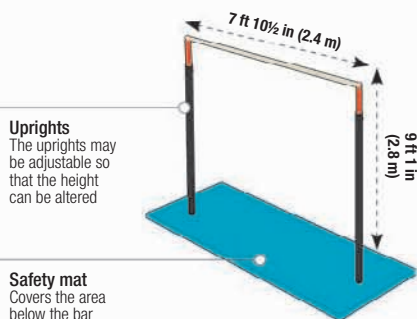
PARALLEL BARS

The parallel bars are made of laminated wood or plastic or a combination of both; they should be hygroscopic (absorb moisture) so that they do not become slippery. The uprights may be made of any weight-bearing material, but are normally iron or steel. The height and width are adjustable for junior events.



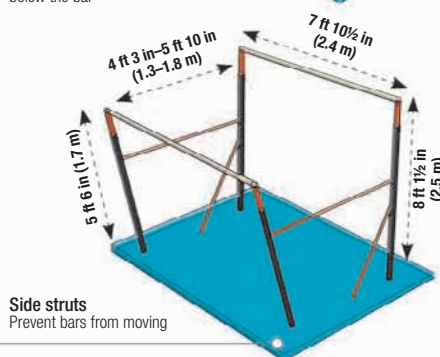
HIGH BAR

The apparatus is made of high-tensile steel, and mounted on floor plates to displace the force of the gymnasts' movement. It may also be held upright by four tension cables anchored to the floor. The two uprights are usually of equal thickness. The bar is 1 in (2.4 cm) in diameter. It may be any color.



UNEVEN BARS

The uneven or asymmetric bars are made of wood, plastic, or composite materials. Whatever their composition, they should be absorbent and must not be treated with lacquer or polish that would make them slippery. The frame is of metal or steel. The uprights may be secured with floor-mounted guys.





SWINGOMETRY

High-bar routines involve various held positions linked by spectacular swings and turns. Horizontal bar exercises feature at least 11 skills, including giant swings with a variety of holds and turns, and releases and regrasps.

On the uneven bars, gymnasts must show skills from five element groups, including a release and regrasp, and transition moves where they pass from bar to bar. Gymnasts are expected to swing "fluidly" and to "hold" their handstands.

HIGH BAR

Gymnasts must not touch the bar with their bodies. Routines should include forward and backward swings using continuous movement—over and under the bar—with multiple changes of grip. The bar should be frequently released and regrasped throughout.

Toes up

Held positions such as this must be symmetrical

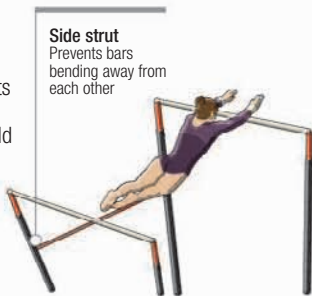


UNEVEN BARS

After a few preliminary swings to build up momentum, gymnasts perform sequences of movements in both directions above and below the bars. All routines should feature twists and somersaults that can only be executed with alterations of grip. Flight movements between the bars should be as high and as spectacular as possible.

Side strut

Prevents bars bending away from each other

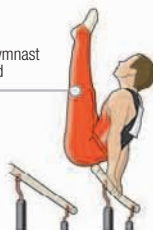


PARALLEL BARS

On this equipment, gymnasts must combine swinging movements with held positions that display their strength. They must use the whole length of the bars, and move above and below them. Bonus points can be gained by performing somersaults and other particularly difficult moves.

Flailing legs

Legs should be together; this gymnast will be penalized



TAKING PART IN EVENTS

Bar routines are a compulsory part of artistic gymnastic competitions (see pp. 76–77), and in international events are performed in a particular order. Men must compete in both the parallel bars and high bar events, following a floor routine, pommel horse, rings, and vault. For women, the bar routine is part of a four-discipline competition that follows the order of: vault, uneven bars, balance beam, and floor exercises. Gymnasts compete both as team members and as individuals.

A MOVE TOO RADICAL

AT THE 1972 OLYMPICS, SOVIET STAR OLGA KORBUS WOWED THE JUDGES BY STANDING ON THE HIGHER UNEVEN BAR, DOING A BACK FLIP, AND CATCHING THE BAR AGAIN. THE SPORT'S WORLD GOVERNING BODY DECIDED THAT THE MOVE WAS TOO DIFFICULT FOR MERE MORTALS, AND PROMPTLY OUTLAWED IT.

DISMOUNT WITH FLOURISH

When gymnasts come to the end of a high bar routine, they often dismount with an aerial flourish that involves spectacular flips or twists during the final descent to the mat. Dismounts from the parallel and uneven bars necessarily have less chance of being spectacular, because they are from lower heights. But, no matter which apparatus, it still takes immense skill to achieve the "stuck" landing on both feet and with no steps to maintain balance.

SWINGOMETRY

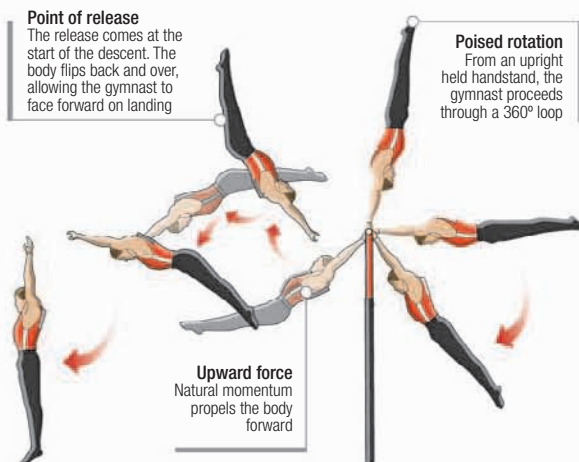
On all bar events, judges award marks in four categories: difficulty, form, technique, and composition. They deduct marks for execution errors, poor body shape, falls, pauses, and "empty" swings that break the sequence of an exercise. The dismount is often crucial: a good one can turn a competent performance into a medal winner; a stumble on landing can ruin everything.

Point of release

The release comes at the start of the descent. The body flips back and over, allowing the gymnast to face forward on landing

Poised rotation

From an upright held handstand, the gymnast proceeds through a 360° loop



PEOPLE POWER

WHEN ALEXEI NEMOV OF RUSSIA SCORED A MODEST 9.725 ON A HIGH BAR ROUTINE AT THE 2004 OLYMPICS IN ATHENS, THE CROWD ERUPTED IN NOISY PROTESTS, FORCING THE JUDGES TO RECONFER. EVENTUALLY THEY UPPED THE MARK TO 9.762, BUT THE UPROAR CONTINUED AND IT TOOK APPEALS FOR CALM FROM NEMOV HIMSELF BEFORE THE EVENT COULD PROCEED.

SIDELINES

1.65 The height in meters (5 ft 5 in) of Russian Svetlana Khorkina, who was told that she was too tall to make it as a gymnast.

6 The number of moves in the official Code of Points named after Svetlana Khorkina, asymmetric bars gold medal winner at the 1996 and 2000 Olympics; no other gymnast has ever had so many.

4 The number of artistic gymnastics medals won by Alfred Flatow at the first modern Olympics in 1896. He took gold in the parallel bars, silver in the horizontal bar, and shared another two gold medals with fellow members of the German team that triumphed in the parallel bars and horizontal bar events. No other gymnast has since matched Flatow's amazing achievement.

16.200 The points score of the Chinese gymnast Zou Kai when he took the gold medal in the high bar event at the 2008 Olympics in Beijing.

0.100 The difference, in points scored, between the gold-medal winner He Kexin of China and fourth-place Beth Tweddle of Great Britain in the uneven bars final at the 2008 Olympics.



POMMEL HORSE

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EVENT OVERVIEW

Gymnasts on the pommel horse perform a fluid sequence of circular and pendulum leg swings without any pauses. They touch the horse and the pommels (handles) only with their hands, which go through complex changes of position. Athletes have to perfect the artistry and technical composition of their routines.

POMMEL PARAMETERS

The performer must use of every part of the top of the horse, but can touch it only with his hands, "walking" back and forth along it. At least one part of a routine must be performed while holding only one of the handles. Although there is no rule about whether movements should be clockwise or counterclockwise, most gymnasts show moves in both directions. Among the optional elements, the most common are spindles (180 degree turns) and flares, or swinging straddles with legs on either side of the horse.

MARKING CRITERIA

The precise scoring criteria for the horse are altered regularly by the world governing body, the FIG. Whatever the specifics, every competitor starts his routine with a combined score made up of the degree of difficulty (the D-score), which in theory is unlimited, and a score of 10.0 for execution, artistry, and technique (the E-score). The judges deduct marks from the E-score if any part of the apparatus is favored excessively or omitted altogether. The absence of scissor movements is particularly heavily penalized.

Nice legs

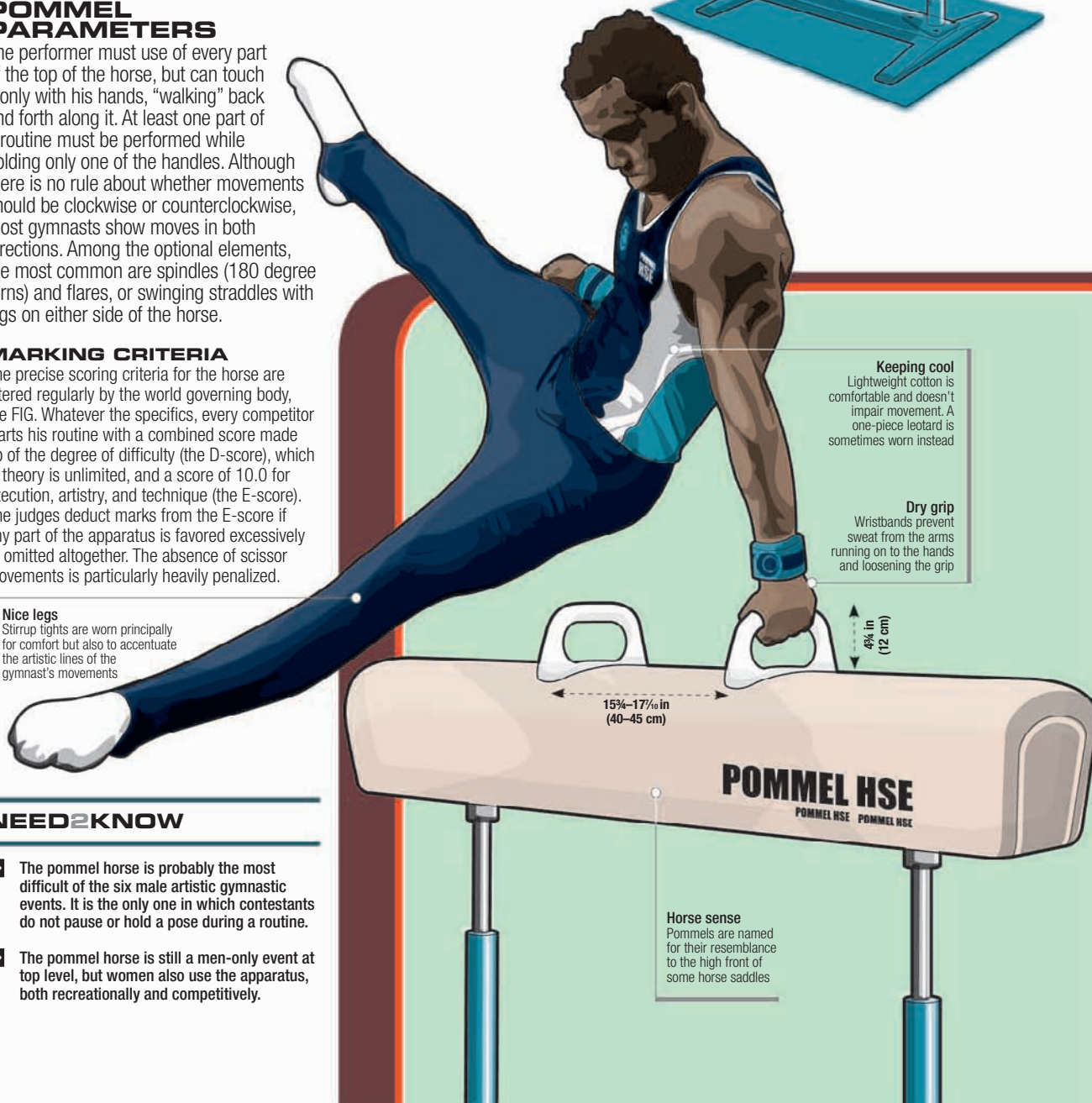
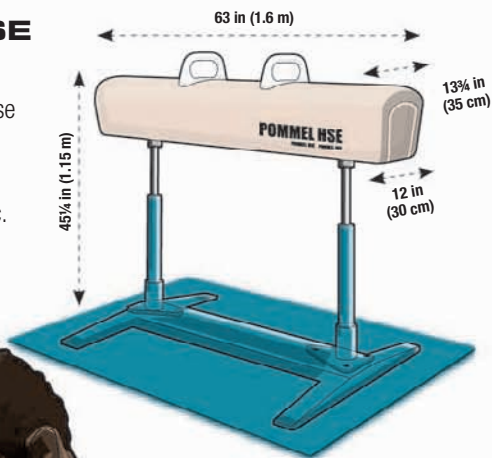
Stirrup tights are worn principally for comfort but also to accentuate the artistic lines of the gymnast's movements

NEED2KNOW

- ➔ The pommel horse is probably the most difficult of the six male artistic gymnastic events. It is the only one in which contestants do not pause or hold a pose during a routine.
- ➔ The pommel horse is still a men-only event at top level, but women also use the apparatus, both recreationally and competitively.

PLASTIC HORSE

Originally a metal frame with a wooden body and a leather cover, the modern pommel horse is typically made of plastic and covered with non-slip synthetic material. The handles may be metal but are commonly plastic. The landing mat on which the pommel horse stands is about 9½ in (20 cm) thick.



Keeping cool
Lightweight cotton is comfortable and doesn't impair movement. A one-piece leotard is sometimes worn instead

Dry grip
Wristbands prevent sweat from the arms running on to the hands and loosening the grip

15 1/4 - 17 1/8 in
(40 - 45 cm)

4 3/4 in
(12 cm)

Horse sense
Pommels are named for their resemblance to the high front of some horse saddles



RINGS

NEED2KNOW

- ➔ The rings are one of the male-only gymnastics events.
- ➔ Ring exercises usually last around 90 seconds: they are so demanding that few gymnasts could support themselves for longer.
- ➔ The event used to be referred to as the Roman rings, suggesting origins in Italy, but the first recorded use was in 19th century Germany.

EVENT OVERVIEW

The rings, or still rings, are one of the most varied gymnastic events, taking the gymnast from gravity-defying holds and swings to spectacular aerial dismounts in which momentum spins him far above the height of the apparatus before he lands. Judges look for a technically difficult and varied program that is well executed by the gymnast.



Supporting cable
Plastic-covered steel cables provide strength and flexibility

Hand grips
Comprising a strip of leather with finger holes and a wrist strap, hand grips used with chalk give a better grip.

Tank top
A light cotton vest is worn

Tight leggings
Leggings nearly always have footstraps

Reinforcements
Wrist guards of cotton or foam padding are worn under grips to absorb sweat running down from the arms on to the hands

IN SUSPENSE

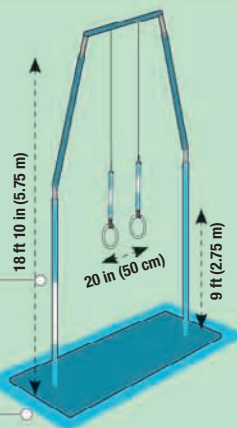
Judges look for a combination of swings and held positions including at least two handstands. One is entered forwards from a position with the arms held at 45 degrees before straightening out, the other exactly the same, but entered backward. The legs may be held either together or wide apart. There must be at least one front lever hold, with the legs held out at 90 degrees in front of the torso.

SCORING

Judges deduct points for technical mistakes, but also for whatever strikes them as "unaesthetic," such as too much ring and rope movement. Even falling off the rings is not necessarily disastrous as the gymnast can remount the apparatus, and loses only 0.5 of the 10 points on offer.

HANGING RINGS

Two moisture absorbent rings, 7 in (18 cm) in diameter and 1 in (2.8 cm) thick, are suspended on ropes or cables from either the ceiling or a free-standing frame. Safety stewards check that they are secure between each round of every competition. A rubber mat about 8 in (20 cm) thick is placed directly beneath the rings.



Ring tower
A simple steel frame supports the rings

Landing mat
Soft, thick, and wide enough to cushion even the most flamboyant landing

A QUESTION OF TENSION

Success on the rings requires maximum tension be kept on the cables at all times. This stops them from swinging and keeps the rings as still as possible to offer a solid support for the gymnast. Forward and backward swings are performed quickly, to limit the time when there is no pressure on the rings.



INVERTED CROSS
The legs are held together, with the arms starting close together and pushing slowly apart. The movement requires great control and strength.



FLAT OUT
A horizontal position should be held for at least two seconds but not disrupt the flow of a routine. The rings and ropes should remain as still as possible.



HANDSTAND PLANCHE MALTESE
After performing a handstand, the legs and body are lowered so they are horizontal to the floor; the arms are held at 45 degrees.

NEED2KNOW



BEAM

→ The balance beam is traditionally for women only. It is widely believed that men do not compete because of the danger it poses to their genitals, but in fact the distinction is only by tradition.

→ Some of the stunning feats practised on this apparatus are all the more amazing in the light of the fact that they are carried out on a surface only 4 in (10 cm) wide.

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Dry skin

Chalk may be applied to hands and feet to reduce risk of sweat causing gymnasts to slip on the beam

Close crop

Hair must be short or tied up tightly; points may be deducted for flopping locks

Color combinations

Leotards may be of any color, but are commonly in team or national strip

Barefoot balance

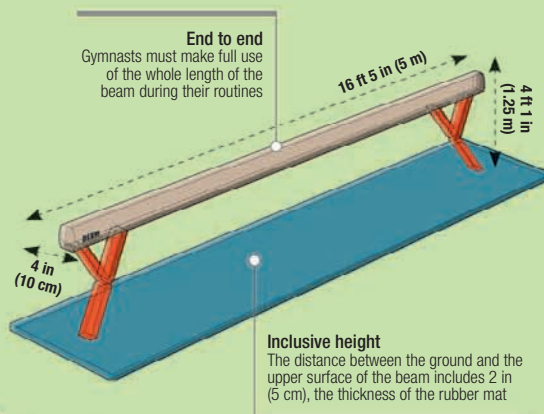
Competitors do not wear any kind of shoes, which would affect the sensitive contact with the beam required for complete control

EVENT OVERVIEW

The beam demands a supreme display of balance. On a perilously narrow bar, gymnasts perform leaps, turns, and flips that most people would find impossible, even on the ground. There is a panel of judges who look for technical and artistic skills, dance elements, leaps, and held poses.

EQUIPMENT SET-UP

Balance beams were traditionally made of polished wood. They still are wooden, but today they are sprung, and covered in suede to make contact softer. The rubber mats beneath the beams should extend as far as possible for safe landings.



KEY MOVES

The compulsory elements of the 90 second routine include a 360° turn, and a leap with a 180° leg split. There must also be an acrobatic sequence with at least two flight sections, during which the gymnast must leave the bar and then return to it in a smooth movement without stumbling or groping to maintain balance.

Head up

Wobbling costs points

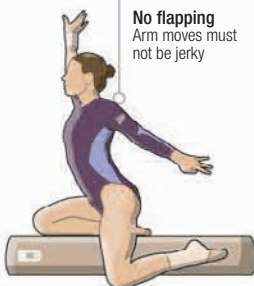


DOUBLE LEG LIFT

In this strength element that also requires perfect balance, the gymnast puts her weight on palms and wrists, and brings her knees up to her face.

No flapping

Arm moves must not be jerky



WORK OF ART

Balance elements must be adopted smoothly, and maintained steadily; the pose itself must be shapely and aesthetically pleasing.

Confidence

To somersault on the beam requires lots of confidence

Off beam

The beam exercise often ends with a somersault.

SOMERSAULT

Routines may include a step-over somersault during which the gymnast must keep her head perpendicular to the beam to maintain balance.

STRIKE A BALANCE

Competitors must perform a mixture of compulsory and optional moves. These include acrobatic elements, in which they leave the beam altogether, strength elements such as the double leg lift, gymnastic elements (turns, leaps, steps, runs), balance elements (holding sitting, standing or lying positions), and dance steps.

Judges look for elegance, flexibility, rhythm, balance, tempo, and self-control. Points are lost for not doing required elements, supporting a leg against the side of the beam or pausing more than three times.



VAULT

EVENT OVERVIEW

Vaulters take a fast run-up of up to 82 ft (about 25 m) before leaping off a springboard onto their hands on the vault table. They use their momentum to perform different mid-air moves, before landing squarely on both feet. From takeoff, a vault takes no more than about two seconds.

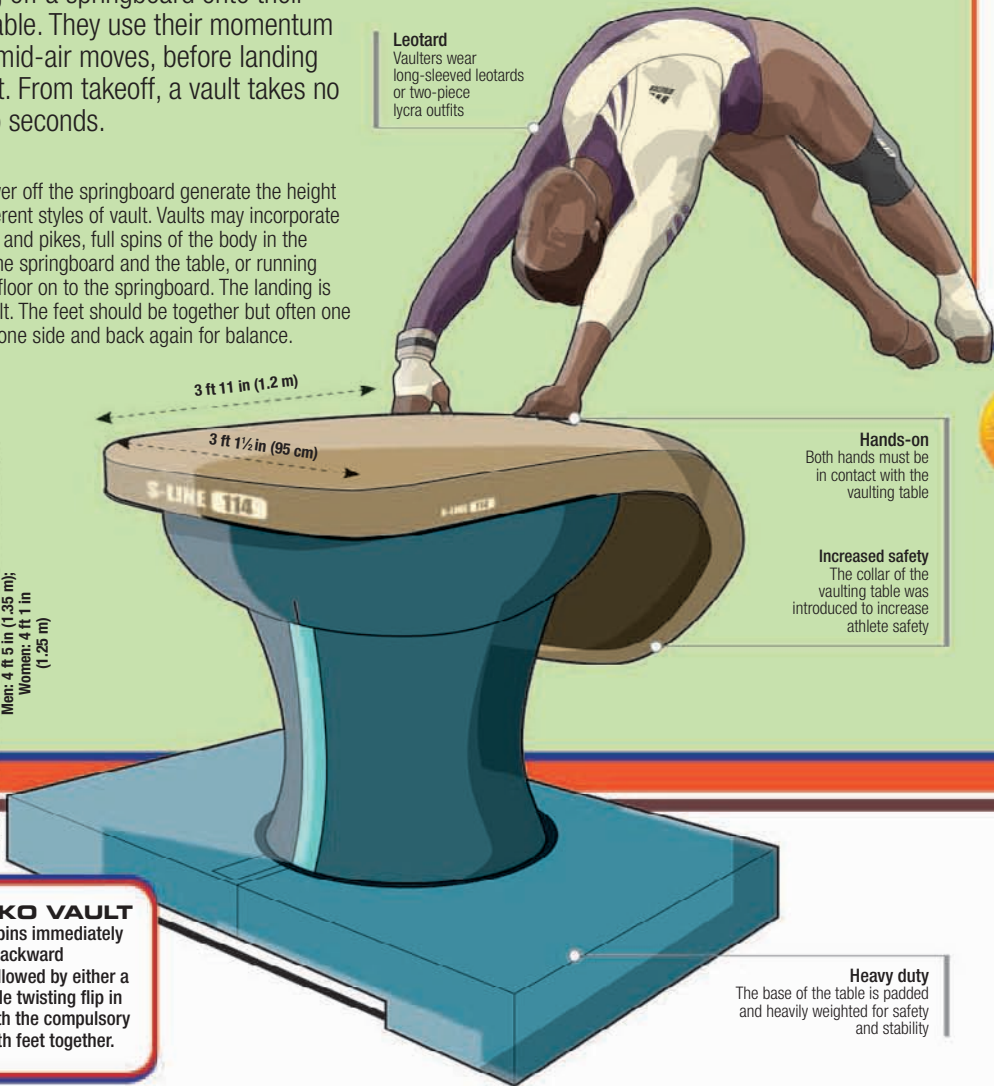
FLIGHT PLAN

Speed of approach and power off the springboard generate the height and rotation to perform different styles of vault. Vaults may incorporate moves such as somersaults and pikes, full spins of the body in the air, quarter-turns between the springboard and the table, or running handstands to flip from the floor on to the springboard. The landing is an important part of the vault. The feet should be together but often one foot is moved forward or to one side and back again for balance.

SCORE

Gymnasts usually take two vaults, one after the other. Two panels of judges mark each vault in two categories: the D-score, for degree of difficulty, and the E-score, for technique, execution, and landing. Judges look for clean take-offs and landings, height through the air, and precise movements at each stage.

Men: 4 ft 5 in (1.35 m);
Women: 4 ft 1 in
(1.25 m)



3 ft 11 in (1.2 m)

3 ft 1½ in (95 cm)

Leotard

Vaulters wear long-sleeved leotards or two-piece lycra outfits

Hands-on

Both hands must be in contact with the vaulting table

Increased safety

The collar of the vaulting table was introduced to increase athlete safety

Heavy duty

The base of the table is padded and heavily weighted for safety and stability

THE YURCHENKO VAULT

In this vault the gymnast spins immediately after takeoff, then does a backward handspring off the table followed by either a tuck or a spectacular double twisting flip in mid-air. The move ends with the compulsory landing: stock-still with both feet together.

SIDELINES

0.031

The number of points by which Spaniard Gervasio Deferr beat his nearest rival, Evgeni Saponenko of Latvia, to the gold medal at the 2004 Olympics in Athens, Greece. Deferr scored a total of 9.737 out of a maximum possible 10 points.

4

The number of vaulters who have won gold at consecutive Olympics: Nikolai Adrianov (Soviet Union; 1976 and 1980), Yun Lou (China; 1984 and 1988), Gervasio Deferr (Spain; 2000 and 2004), and Vera Caslavskia (Czechoslovakia; 1964 and 1968).

THE LAST STRAW FOR THE HORSE

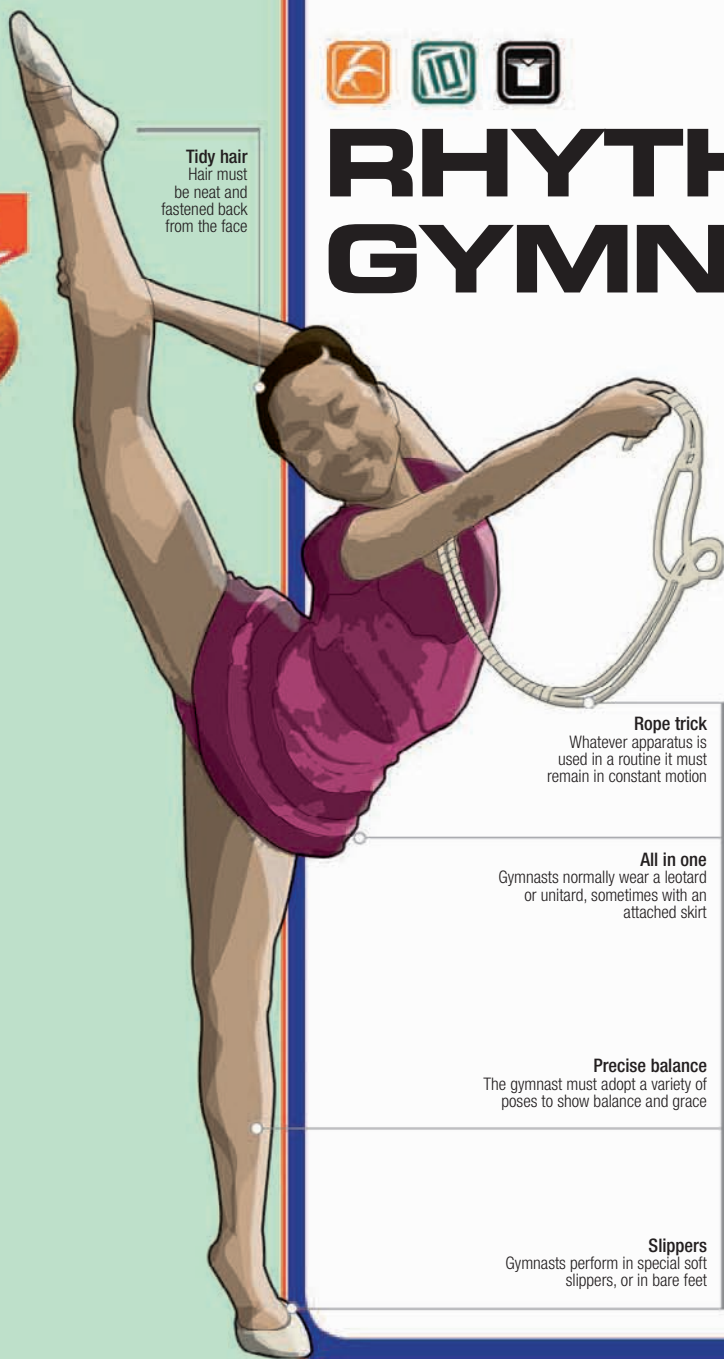
WHAT IS NOW THE VAULTING TABLE USED TO BE THE VAULTING HORSE. THE CHANGE WAS MAINLY MADE FOR SAFETY REASONS, BUT THE CATALYST WAS A MIX-UP AT THE 2000 OLYMPIC GAMES IN SYDNEY, WHERE 18 WOMEN PERFORMED BEFORE SOMEONE NOTICED THAT THE EQUIPMENT WAS SET 2 IN (5 CM) TOO HIGH.



RHYTHMIC GYMNASTICS

Tidy hair
Hair must be neat and fastened back from the face

086



Rope trick
Whatever apparatus is used in a routine it must remain in constant motion

All in one
Gymnasts normally wear a leotard or unitard, sometimes with an attached skirt

Precise balance
The gymnast must adopt a variety of poses to show balance and grace

Slippers
Gymnasts perform in special soft slippers, or in bare feet

EVENT OVERVIEW

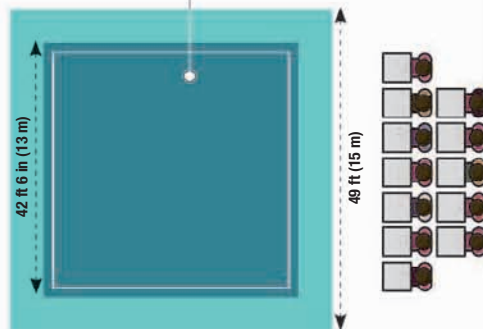
In this combination of gymnastics and ballet, competitors—either singly or in teams—perform graceful choreographed routines to music while working with different types of hand-held apparatus: club, hoop, ball, rope, and ribbon. The sport is dominated by women, although a few men also compete, especially in Japan.

PERFORMANCE AREA

Known as the platform, this is a carpeted area similar to but larger than that used for gymnastic floor exercises (see pp. 78–79). The ceiling must be at least 26 ft (8 m) and preferably 32 ft 6 in (10 m) above the ground so that the items of apparatus can be thrown as high as possible.

On the floor
Gymnasts must use the whole of the marked-out area

Judges
Between five and 12 judges assess both the composition of the competitor's routine and her skill in executing it



COMPETITOR PROFILE

As for any gymnastic discipline, competitors must have a strong, flexible body. In addition, rhythmic gymnasts need finely tuned hand-eye coordination for manipulating the apparatus, and an instinctive appreciation of music and rhythm.

“GRACE WITHOUT DANCING”

RHYTHMIC GYMNASTICS HAS ITS ORIGINS IN EXERCISES DEVELOPED IN THE 19TH CENTURY TO PROMOTE SELF-EXPRESSION FOR YOUNG WOMEN —“GRACE WITHOUT DANCING.” A KEY FIGURE IN THE EVOLUTION OF THE SPORT WAS U.S. DANCER ISADORA DUNCAN, WHO REJECTED WHAT SHE SAW AS THE RESTRICTIONS OF CLASSICAL BALLET TO CREATE A FREER FORM OF MOVEMENT.

NEED2KNOW

- ➔ Rhythmic gymnastics competitions take place at national and international levels; the discipline has been an Olympic sport since 1984.
- ➔ The world governing body of rhythmic gymnastics is the Fédération International de Gymnastique (FIG), which sets the rules for competitions and also trains judges.
- ➔ Acrobatic movements such as those used by artistic gymnasts do not necessarily find favor with rhythmic gymnastic judges and some movements, such as handsprings, are banned in competitions.

PERFORMING PARAMETERS

Each routine is accompanied by music chosen by the competitor and should last 75–90 seconds for an individual and 135–150 seconds for teams. Gymnasts perform with four out of the five pieces of apparatus—each year, the sport's governing body decides which apparatus is to be excluded.

SITTING IN JUDGEMENT

Although the number of judges may vary, it is never fewer than five. One judge or group of judges takes into account the degree of difficulty in a routine, another considers the choreography and artistry, and a third evaluates how well the routine was executed and how many technical mistakes were made. A judge coordinator oversees the panel and collates the marks, while a chief judge supervises the whole competition and has the last word in any dispute.

SCORING

In individual competitions, the maximum possible score is 20 points for each of the four pieces of apparatus being used, made up of a maximum 10 points for execution and a combined maximum of 10 points taken as an average of the technical difficulty and artistic marks. In group competitions, the gymnasts' scores are added together to give the team total.

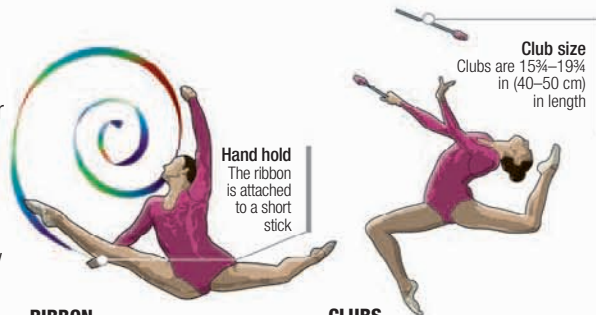
THE APPARATUS

The rules and requirements for using the apparatus are precise, and each piece makes specific physical and intellectual demands. The rope is an explosive, dynamic apparatus that calls for leaps and skipping. The ball is gentler and more lyrical, possibly the easiest piece of apparatus to perform with, while clubs test the gymnast's coordination. With the ribbon, a performer needs grace and dexterity to create dazzling colored images in the air. Handling the hoop arguably requires the greatest technical skill.

The clubs and balls were originally made of wood, the hoops of rubber, the ropes of hemp, and the ribbons of satin; the modern apparatus is nearly always made of synthetic materials such as plastics.

DRESS CODE

There are strict costume regulations and competitors can lose points for not adhering to them. An outfit (and apparatus) cannot be colored gold, silver, or bronze. There are rules regarding the pattern and material of a leotard, and even the cut of the garment's leg or neckline. Marks will be deducted for wearing jewelry, or a non-matching hair band. In a group routine, all the gymnasts must wear identical outfits.

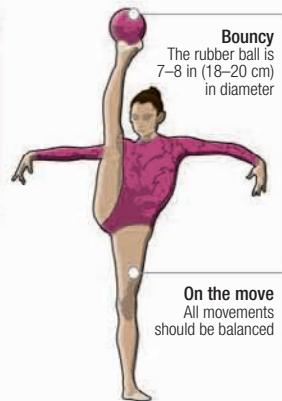


RYBON

The ribbon, which may be more than 20 ft (6 m) long, snakes and swirls as the gymnast performs her routine.

CLUBS

Bottle-shaped clubs are swung, spun, tossed, and caught to demonstrate dexterity and hand-eye coordination.



BALL

The gymnast is not allowed to grip the ball but must keep it moving: bouncing it, tossing it, and rolling it around her body and on the floor.



HOOP

Competition rules require the hoop to be rotated round the body, thrown, caught, and swung. Using the hoop is a difficult skill to master.

INSIDE STORY

By the early 20th century, various forms of exercise to music had combined in the Swedish school of rhythmic gymnastics. Although the sport had been introduced to the United States, it aroused little interest. At first, the only signs of growing popularity were in the former Soviet Union. There, rhythmic gymnastics championships were held from 1948 onward. The first international competition took place eight years later, but the event was only admitted to the Olympics in 1984 (1996 for group routines). Since then, competitors from Spain, Italy, and Brazil have challenged the traditional dominance of Eastern European countries.

SIDELINES

16 The age at which gymnasts qualify for senior events. Their performing careers are very short. Most rhythmic gymnasts peak in their late teens or early twenties; only a handful continue past the age of 30.

400 The weight in grams (14¼ oz) of the rhythmic gymnastics ball.

1,500 The monthly salary in US dollars offered in 2007 for a Russian or Ukrainian coach to help develop rhythmic gymnastics in Vietnam by teaching schoolgirls.

1 The number of gold, silver, or bronze medals awarded in the All Around group competition at the World Championships—teams include three or four gymnasts, so they just have to share.

9 The record number of victories in the rhythmic gymnastics world team championship, achieved by Bulgaria between 1969 and 1995.

2,000 The estimated number of top-class rhythmic gymnasts in the world today, according to the International Gymnastics Federation.

TRAMPOLINING



088

SPORT OVERVIEW

Trampolining is a recreational and competitive sport in which individuals perform acrobatics while bouncing on a spring-bound bed. With gymnastic routines full of twists, turns and elaborate moves reminiscent of diving, the sport is popular in the countries of Europe and the former Soviet Union, as well as the United States, Japan, and China. Trampolinists compete in individual and team events, including synchronized trampolining, double mini-trampolining and tumble tracking.

Early start

Many trampolinists develop their skills and power while relatively young, often between 9 and 14 years of age

Body control

Trampolinists can control the muscle tension in their limbs, shoulders, trunk, and abdomen

Clothing

Competitors usually prefer to wear leotards and trampolining shoes. Men may wear a t-shirt and tight-fitting trousers



NEED2KNOW

- The trampoline was invented by George Nissen in the United States in the 1930s. He named it after the Spanish word "trampolin," which means diving board.
- The minimum height of the ceiling in a competition hall is 26.25 ft (8 m) to allow trampolinists plenty of room to complete their routines safely.
- During World War II the United States Navy Flight School used trampolines to successfully increase the aerial awareness of trainee pilots.

COMPETITOR PROFILE

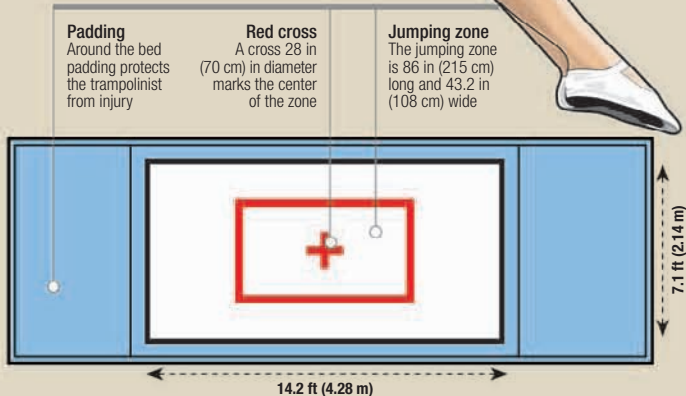
Regular and intense training keeps trampolinists physically and mentally fit and enables them to develop timing, coordination, and rhythmic movements. The ability to achieve precise balance and body control while rotating through the air leads to increased self-confidence.

THE TRAMPOLINE

Modern trampolines are safe and stable, providing good control in the jumping zone and rebound characteristics that generate the height needed for aerial maneuvers. It consists of a flexible jumping bed that is constructed from nylon bands kept under tension by the surrounding springs. A steel frame supports the bed and raises it off the ground.

LEARNING SKILLS

Beginners learn basic skills such as jumping with knees pulled up and landing on their front and back. Intermediate skills include front and back somersaults. Advanced skills include double or triple somersaults and precision moves in fractions, such as one and three quarter back somersaults and somersaults with half twists.



THE DIVING FOOL

LARRY GRISWOLD WORKED WITH GEORGE NISSEN IN THE EARLY DAYS OF TRAMPOLINES AND LATER BECAME KNOWN AS THE DIVING FOOL FOR THE ENTERTAINING ACROBATICS, TUMBLING STUNTS AND CLOWNING TRICKS HE PERFORMED IN A SWIMMING POOL, ON A DIVING BOARD AND ON TRAMPOLINES.

SIDELINES

17.50 The world record degree of difficulty score for men, recorded by Jason Burnett of Canada at the 2007 World Cup, held at Lake Placid in the US.

3,333 The world record for the number of consecutive somersaults, achieved by Brian Hudson in September 2003 at the Jumpers rebound center in Gillingham, UK. The previous record was 3,025.



INTERNATIONAL EVENTS

Individual men and women, as well as teams, compete regularly in international trampolining events such as the annual World Cup and the World Championship, which began in 1964 and alternates every 2 years with the European Championship and the Pan-Pacific Championship. Trampolining became an Olympic event at Sydney in 2000.

SCORING POINTS

The scoring system judges use at trampolining competitions may vary, but essentially they assess the style and execution of a routine. They look for such aesthetic elements as tidiness of form, consistency of height, and continuity of movement. They also award points when a trampolinist achieves moves that have a certain degree of difficulty.

BODY SHAPES

Trampolining routines consist of a sequence of acrobatic movements in the air, punctuated with contact with the trampoline bed. The aerial movements feature rotations and jumps with three main body shapes—the tuck, straight, and pike—of varying degrees of difficulty. Longitudinal rotations create somersaults, while lateral rotations produce twists. The moves are initiated by taking off and landing manoeuvres on the bed that involve the trampolinist's front, back, feet, or seat.

TUCK

The tuck is a body shape formed when the trampolinist clasps the knees with the hands and pulls them toward the chest. The tuck is often performed at the top of a straight jump.

Lower limbs
The lower limbs from the toe to the knees are parallel with the body

Head
The head leans forward toward the chest



PIKE

The pike is formed when the trampolinist keeps both legs straight and together, and folds the body toward them, while holding the calf muscles as far down the leg as possible.

Ankles and legs
The trampolinist keeps the ankles and legs together



PUCK

This body position is a combination of the pike and tuck positions. The puck position is allowed during competitions when performing multi-twisting multiple somersaults.

STRAIGHT

The straight is formed when the trampolinist keeps the body as straight as possible, with both legs together, while holding the hands and arms along the sides of the body.

Feet together
Keeping the feet together ensures the legs are straight

Arms to the sides
The arms and hands are kept straight and are held firmly along the sides of the body

Head back
The trampolinist keeps the neck curved with the head back



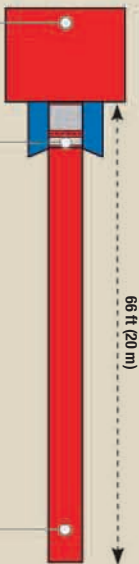
DOUBLE MINI-TRAMPOLINE

Competitors run up the track, mount the bed and perform two moves that include up to 3 contacts with the bed. They then dismount on to the landing zone.

Landing zone
The landing zone in the soft landing area measures 13.12 ft (4 m) by 6.56 ft (2 m)

Trampoline
The trampoline has a sloped end and a flat bed and is 9.35 ft (2.85 m) long

Run up
The run up is covered with floor mats 3.28 ft (1 m) wide and 1 in (2.5 cm) thick



TUMBLE TRACK

As competitors run up the track they perform a routine of 8 tumbling elements that are marked for good control, form and maintenance of tempo. They finish their routine in the landing zone.

Landing zone
The landing zone is 19.7 ft (6 m) by 9.8 ft (3 m)

Padding
Tumblers are protected by soft padding around the landing area

Run up
The run-up track is sprung and padded



INSIDE STORY

The World Age-Group Games are held in the same year and the same location as the World Championships. A maximum of 80 athletes from each federation affiliated to FIG (see below) are permitted to compete. Some games entertain as many as 800 athletes. Participating athletes are boys and girls who compete in four age groups: 11–12, 13–14, 15–16, and 17–18. They compete in individual trampoline, synchronized trampoline, double mini-trampoline, and tumbling.

GOVERNING BODY

The Fédération Internationale de Gymnastique (FIG) is the world's oldest sports federation. Formed in 1884 it governs the various sports in competitive gymnastics, including trampolining.

NEED2KNOW

090

- The World Championships of Sports Acrobatics have been held annually since the first event, which was organized by the International Federation of Sports Acrobatics (IFSA) in Moscow in 1974. Sports acrobatics featured as a demonstration sport at the 2000 Olympics Games in Sydney.
- The sport is most popular in Russia and China, but participation has grown in many other countries, including the United States and the UK.
- Sports acrobatics is also known as acrobatic gymnastics, or acro. It has close links with more conventional gymnastics, and there is increasing crossover between the two disciplines.



Top man

In men's groups, the acrobat who takes up positions at the top of a pyramid is smaller and lighter than other members of the team

Flexible footwear
Shoes should be soft, flexible, and supportive; they are usually white

Middle man

The acrobat at the heart of the balancing act needs both strength and suppleness

Firm base

The biggest and strongest members of the team form the foundation

Lyca clothing

One- or two-piece outfit made of Lycra or similar stretchy material

HUMAN PYRAMID

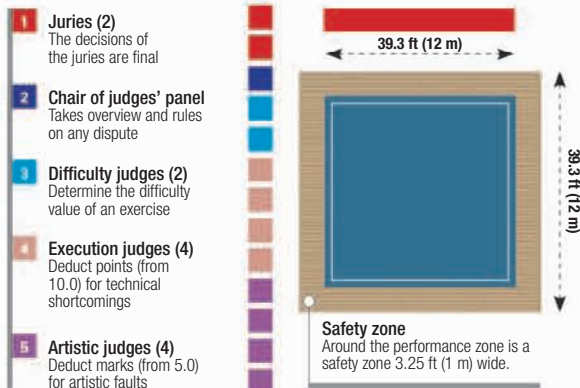
Points are awarded for technique and artistry in this balance routine.



Stabilizer
Takes up position after the middle man has stepped onto the base man

PERFORMANCE ZONE

Acrobats perform on either a rubber mat or a carpeted sprung floor. The judges sit together so that they have the same line of vision and can easily confer.



RULES OF PERFORMANCE

Sports acrobatics has five events: men's pairs, women's pairs, mixed pairs, women's triples, and men's quadruples. Competitors perform three routines to show off different skills, each a maximum of 2½ minutes. The routines focus on balance, dynamism, and a combination of both of these, respectively. The sequences need to be highly precise: a panel of officials is watching intently (see above).

ACROBATIC SKILLS

Competitions have three sections, each of which is designed to highlight one aspect of acrobatics and showcase certain key skills of the different members of the pair or team.

BALANCE ROUTINE Teams adopt and hold complex poses, including human pyramids. The positions must be held for three seconds.

DYNAMIC ROUTINE Also known as the tempo routine, this part of the event is more energetic than the balance section. Acrobats throw their partners in somersaults, for example, and carry out technically demanding tumbling at speed.

COMBINED ROUTINE The third routine should be a tour-de-force that combines the skills of the first two parts in a spectacular display.

COMPETITOR PROFILE

Team members usually complement each other: acrobats at the base are tall and strong, while the "flyers" who stand on or spring off them are small and supple. All acrobats have a strong sense of rhythm and so make good dancers.

EVENT OVERVIEW

Sports acrobatics combines the strength, balance, and grace of gymnastics with teamwork and a musical accompaniment. Two or more acrobats perform choreographed sequences of balancing acts, handsprings, somersaults, and tumbles, earning points for execution and artistic impression.

SPORTS ACROBATICS

NEED2KNOW

- ➔ Sports aerobics, also called aerobic gymnastics, developed from traditional aerobics exercises.
- ➔ Trios and groups can be all men, all women, or mixed, but pairs are always mixed. Six team members make up a group.
- ➔ In 2006, Jinping Ao from China became the world men's champion. Elmira Dassaeva from Spain became the world women's champion.

SPORTS AEROBICS

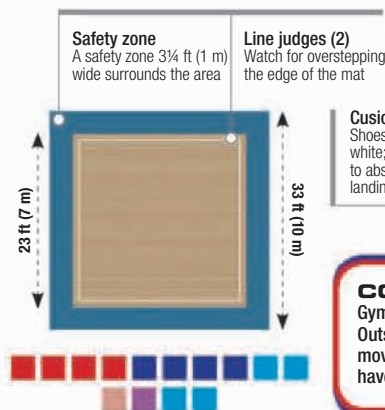


SPORT OVERVIEW

Aerobics is a fitness programme that became a sport. Gymnasts—alone or in pairs, trios, or groups—execute routines that must show dynamic and static strength, jumping ability, flexibility, and balance.

PERFORMANCE AREA

Sports aerobic competitions are held on sprung wooden floors. The performance area measures 23x23 ft (7x7 m) for individuals, pairs, and trios. Groups compete on a larger area measuring 33x33 ft (10x10 m).



COMPETITOR PROFILE

Gymnasts need a high level of cardiovascular capacity. Outstanding performers tend to be loose-limbed and can move quickly and elegantly in time to music. They all have superb coordination and suppleness.

OBEYING THE RULES

Accompanied by a vigorous piece of music that they have chosen themselves, gymnasts perform a continuous routine that should last exactly 1 minute 45 seconds. Using the entire performance area and moving rhythmically with the music, they must demonstrate at least 8 but no more than 12 compulsory elements, including supports, levers, jumps, leaps, flexibility, and turns. They have to perform at least two elements from pushups, freefalls, and circles with the legs, and display artistic beauty and originality.

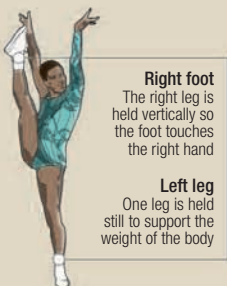
SCORING

Competitors start with 10 points, the maximum possible, and the panel of judges deducts points for errors. For example, they lose 0.2 points for every group element they miss and 1.0 point for performing prohibited moves.

- | | | | | | | | | | |
|----------|-----------------------------------------------------------------------|----------|-----------------------------------------------------------|----------|---------------------------------------------------------------------|----------|---------------------------------------------------------------------------------|----------|------------------------------------------------------------------------|
| 1 | Artistic judges (4)
Assess creative originality of programs | 2 | Execution judges (4)
Mark technical proficiency | 3 | Difficulty judges (4)
Mark performance on strict criteria | 4 | Time judge
Deducts points for programs that are too long or too short | 5 | Chair of judges' panel
Controls the work of the other judges |
|----------|-----------------------------------------------------------------------|----------|-----------------------------------------------------------|----------|---------------------------------------------------------------------|----------|---------------------------------------------------------------------------------|----------|------------------------------------------------------------------------|

FLOOR MOVES

A routine has to include at least one element from each of four groups, demonstrating flexibility and balance, dynamic strength, static strength, and jumping. Competitors also have to present the seven basic steps: march, jog, skip, knee lift, kick, jumping jack, and lunge.



HIGH KICK

The hip of the raised leg is flexed up to 180 degrees, while the knee stays straight and the toes pointed.



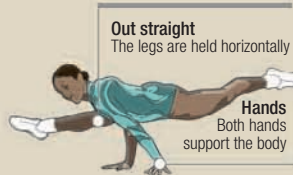
THE CAPOEIRA

This move demonstrates dynamic strength, an attribute which the judges are looking for.



JUMPS

The range of leaps and jumps includes scissors, straddles, and splits (above).



STATIC SUPPORT

The weight of the body is taken on the hands while the gymnast performs the splits in midair.

INSIDE STORY

Aerobics became established as a fitness routine during the late 1960s, with its greatest champion being actress Jane Fonda. At first, aerobics struggled to gain credibility as a sport but gradually achieved acceptance and was eventually recognized by the Fédération Internationale de Gymnastics (FIG) in 1994. The first sports aerobics World Championships were held in Paris, France, in 1995. More than 70 FIG affiliates include aerobics within their gymnastics program.



WEIGHTLIFTING



092

NEED2KNOW

- ➔ Weightlifting was a sport at the first modern Olympics in 1896. It reappeared in 1904 and became a regular event for men from 1920. The first women's Olympic weightlifting competition was held at the 2000 Games.
- ➔ Leading athletes can lift over twice their own bodyweight. In 1988, Belarussian Leonid Taranenko, representing the Soviet Union, made the heaviest clean and jerk of all time, with an astounding lift of 586.4 lb (266 kg).

EVENT OVERVIEW

Competitors lift bars, known as barbells, loaded at each end with weights. They are allowed three attempts at any one weight and after each successful lift the weight is increased. The winner is the person who lifts the heaviest weight. There are two distinct weightlifting techniques: the “snatch” and the “clean and jerk.”

HEAVY DUTIES

Competitors are divided into categories according to their body weight. There are currently eight divisions for men—the lowest is up to 123½ lb (56 kg), the highest over 231½ lb (105 kg)—and seven for women—from below 106 lb (48 kg) to over 165¼ lb (75 kg).

Athletes take turns making attempts at each weight. The competitor who has opted for the lowest weight lifts first. Anyone who fails at a given weight can either reattempt it or try a heavier barbell later.

Bar
Women Length: 6 ft 7 in (2.01 m)
Weight: 33 lb (15 kg) Diameter: 1 in (25 mm)
Men Length: 7 ft 2 in (2.2 m)
Weight: 44 lb (20 kg)
Diameter: 1 in (28 mm)

Weighty matters
The weights are made of lead, and color-coded from ½ lb (0.25 kg) to 55 lb (25 kg)



Lifting gear

The one-piece costume must not obscure the judges' view of knees and elbows

Tight belt

To support back and abdomen; may be no more than 4¾ in (12 cm) wide

Footwear

Raised heels to help the weightlifter achieve and maintain stability

ATHLETE PROFILE

Weightlifters have highly developed neck, shoulder, stomach, and thigh muscles. The effort of lifting and holding weights that are often heavier than their own bodies may produce heart rates of 190 beats per minute (the normal rate is 60–80).

LIFTING METHODS

In the snatch, athletes must lift the barbell in a single, steady movement. In the clean and jerk, they must first raise (clean) the barbell from the floor to shoulder level and then, in a separate movement, lift (jerk) the bar until their arms are straight above their heads. While lifting they must avoid touching the floor with their knees. Once the lifts are completed, they must hold the final position until the referee tells them to put the weight down.

THE SNATCH

- 1 **Get a grip**
The lifter grips the weight with hands fairly wide apart, and gathers his strength for the lift
 - 2 **Transit mode**
The lifter straightens his knees and prepares to bend his elbows
 - 3 **Knee thrust**
The knees may be bent again so that the lifter can get all his weight below the barbell
 - 4 **Final push**
The legs are straightened and the weight is controlled over the head
-

CLEAN AND JERK

- 1 **Hands on**
The lifter grips the bar and squats in readiness to apply upward movement
 - 2 **Lift off**
The first upward pull is powered mainly by thigh and back muscles, not the legs
 - 3 **Neck brace**
When the barbell reaches neck height, the lifter brings it close to the shoulders
 - 4 **Last push**
Knees bent to power final upthrust; legs spread for balance; arms completely straight
 - 5 **Ending up**
Legs locked to complete the lift; the position is held until the judges' signal
-

POWERLIFTING



EVENT OVERVIEW

Powerlifting is the ultimate test of pure strength. This relatively recent sport involves athletes raising weight-loaded bars in three different lifts: the “squat,” the “deadlift,” and the “bench press.” Powerlifting champions are justifiably known as the strongest men and women in the world.

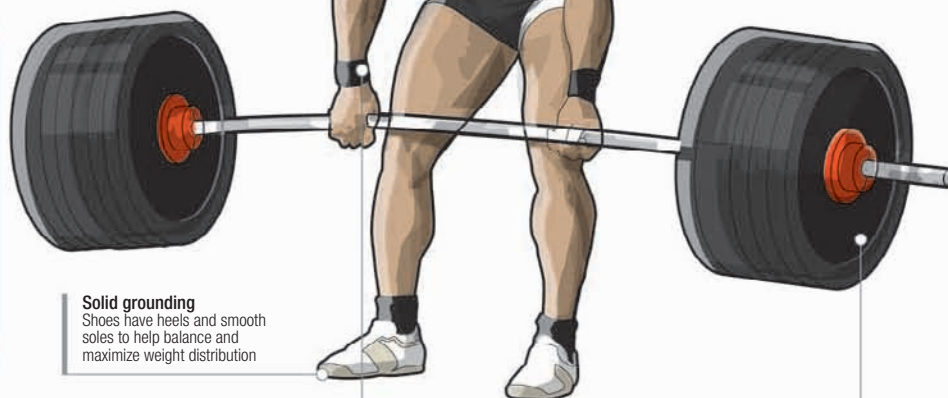
PLAYING THE GAME

There are four age groups, from over-14s to over-50s. For men there are 11 weight divisions between 114½ lb (52 kg) and 275½+ lb (125+ kg); women have 10 bands between 97 lb (44 kg) and 198+ lb (90+ kg).

Each event has three components: squat, bench press, and deadlift. After three failed attempts, athletes are eliminated. The winner is the competitor who lifts the highest combined weight.

ATHLETE PROFILE

The key areas of a powerlifter's strength are the shoulders, chest, arms, back, thighs, and knees. Regardless of muscular build, shorter men and women have an advantage over their taller rivals, as they do not have so far to raise the weights. Lifters work out as a matter of course, and before a contest frequently push themselves to the limit: trying to lift far heavier weights than they would expect to meet in competition.



Taking the strain
Great strength in the neck muscles contributes to the lifter's stability during sustained holds

Tight one-piece
These costumes help compress the athlete's chest and shoulders while lifting

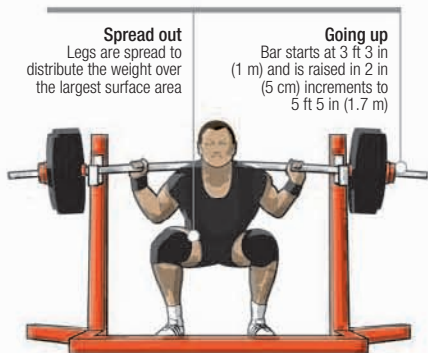
Solid grounding
Shoes have heels and smooth soles to help balance and maximize weight distribution

Wrist straps
Bandages may be used for support; they must not exceed 4 in (10 cm) in total width

Weight discs
These are made of lead, and may be color-coded so that officials can easily see which is which

MIGHTY METHODS

Each element of powerlifting demands the use of different muscles: competitions test a range of skills, rather than overall strength alone, and there are heavy point-penalties for deviations from the required techniques.



SQUAT

Competitors take the barbell off the rack, step back, and squat with the weight on the shoulders until the hips are below the knees. They then return to the starting position and hold it until the judges signal.

Going up
Bar starts at 3 ft 3 in (1 m) and is raised in 2 in (5 cm) increments to 5 ft 5 in (1.7 m)

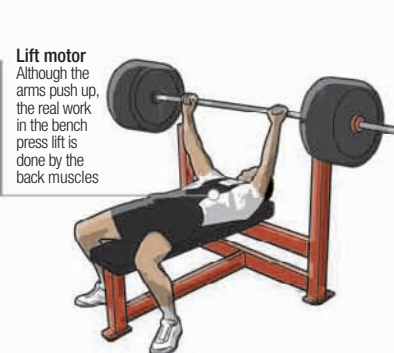
Spread out
Legs are spread to distribute the weight over the largest surface area



DEADLIFT

The barbell is raised until the competitor is upright with a straight back, and held until the judges signal; it must then be replaced on the ground, not dropped.

Strong arms
Deadlifts are powered by the biceps and triceps in the upper arms



BENCH PRESS

The competitor reclines on the bench, lowers the weight until it touches the chest, then pushes it back up to its original position and replaces it on the rack.

Lift motor
Although the arms push up, the real work in the bench press lift is done by the back muscles



TEAM
SPORTS

03

SOCCER



096

GAME OVERVIEW

The beauty and popularity of soccer (or football, as it's known in most of the world) lies in its simplicity: two teams of 11 players each attempt to kick a ball into the opposing team's goal. Compared with more complex team sports such as cricket or rugby, there are fewer rules, and matches are often free-flowing and highly exciting spectacles. Considered the world's most popular sport, soccer is enthusiastically played and watched by men and women in just about every country on Earth.



Shorts

Made of a durable synthetic material, soccer shorts allow good freedom of movement. While shirts may feature stripes, hoops, or other patterns; the shorts are usually one color, sometimes with a stripe down the sides

Shirt

Usually made of polyester, a soccer shirt is light and breathable. All the players on a team (except the goalkeeper) wear the same colors and patterns

Socks and shinguards

The socks must cover the shinguard, which is now a compulsory part of the player's equipment

Good traction

Studded soccer boots provide increased grip on sometimes muddy and slippery surfaces



Ball

The dimensions of the ball are specified in the Laws of the Game. If the ball bursts or becomes defective during the course of a match, play is stopped, and the referee requests a replacement ball

PLAYER PROFILE

Soccer players are mostly lean and athletic, with excellent ball skills. They are strong and balanced runners, able to quickly and repeatedly change direction. Players combine impressive sprinting skills with the huge reserves of energy required for 90 minutes of almost non-stop running. Since soccer is a contact sport, players—particularly the goalkeeper—require a degree of courage, especially when tackling or competing for a header.

"KING OF SOCCER"

BRAZILIAN LEGEND PELÉ (EDSON ARANTES DO NASCIMENTO) IS PROBABLY THE GREATEST PLAYER OF ALL TIME. HE WAS PART OF THE BRAZILIAN TEAM THAT WON THE 1958, 1962, AND 1970 WORLD CUPS, AND EARNED 91 CAPS AND SCORED 77 GOALS (A NATIONAL RECORD) FOR HIS COUNTRY. WITH EXTRAORDINARY TECHNIQUE, SPEED, CREATIVITY, AND FINISHING, PELÉ WAS THE PERFECT PLAYER.

NEED2KNOW

- The sport has been officially known as "association football" since the formation of the Football Association in 1863. The term "soccer" was originally derived from "association."
- A soccer match is played by two teams of 11 players on a rectangular field, or pitch. The game consists of two 45 minute halves separated by a short interval.
- Other forms of the game include beach soccer and indoor soccer (which is also known as "futsal" and is played by two teams of five players over two halves of 20 minutes each).
- The world governing body of soccer, Fédération Internationale de Football Association (FIFA), formed in 1904 and has 208 member nations.

GLOBAL PHENOMENON

ACCORDING TO FIFA'S GLOBAL "BIG COUNT" IN 2006, THERE ARE 265 MILLION MALE AND FEMALE PLAYERS AND FIVE MILLION OFFICIALS. THIS TOTAL OF 270 MILLION PEOPLE ACTIVELY INVOLVED WITH SOCCER REPRESENTS ABOUT FOUR PERCENT OF THE WORLD'S POPULATION.

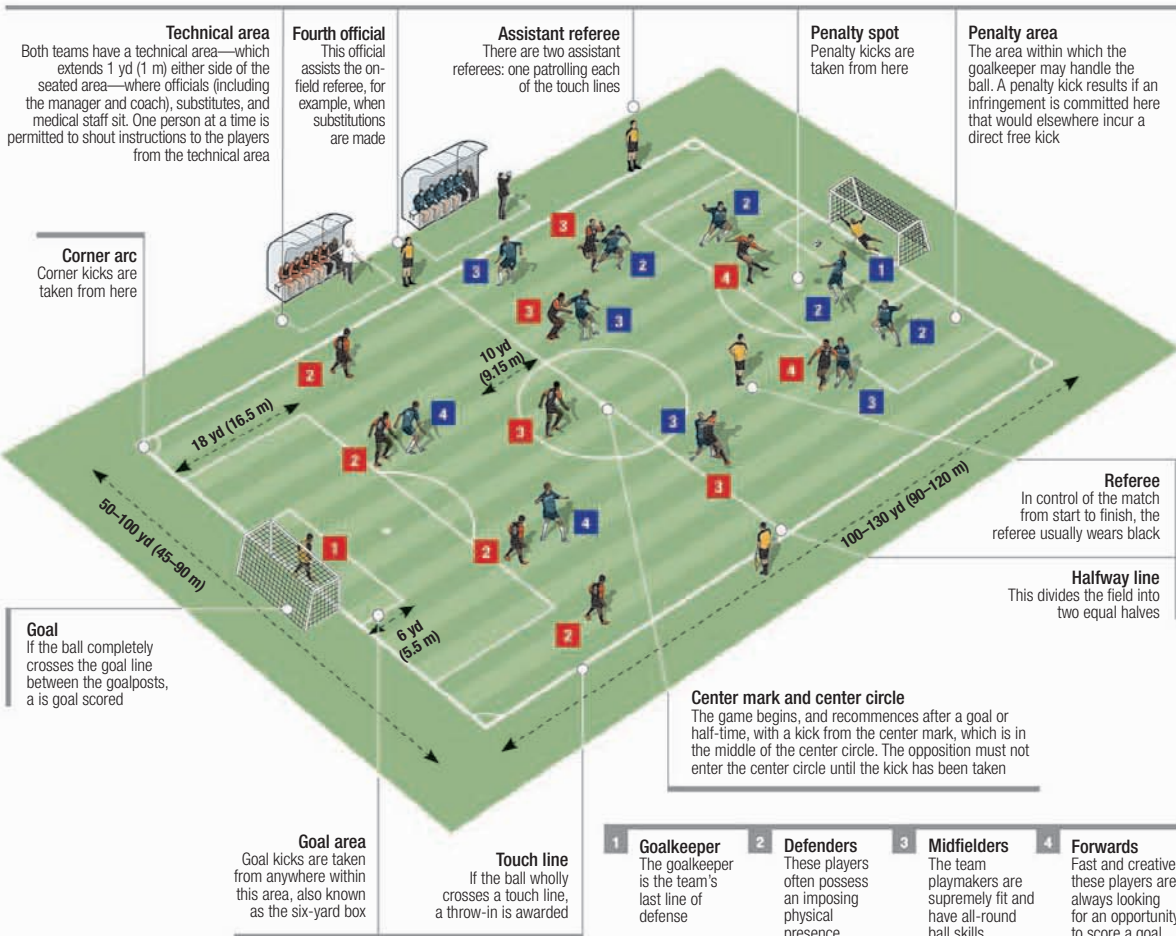
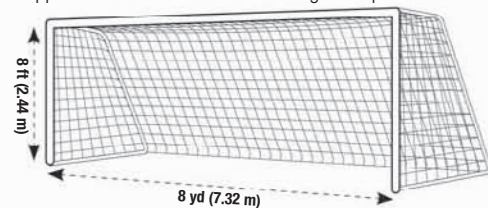


THE FIELD

Soccer is played on a flat, rectangular grass or artificial turf field (also known as a pitch), the dimensions and markings for which are shown below. The outer extremes of the field are delineated by the touch lines and goal lines, and if the ball wholly crosses any of these lines it is out of play (or a goal is scored if the ball crosses the goal line between the goalposts). If part of the ball is on the line, it is still in play. While most matches are played on grass, artificial turf is increasingly employed in places such as Africa, where conservation of resources like water is an acute issue. But whatever the surface, anyone can play social soccer: all that is needed are two teams, a ball, two makeshift goals, and a flat playing surface—anything from a park or field to a street or beach.

GOAL

This structure consists of two securely anchored vertical goalposts joined along the top by a horizontal crossbar, all of which are white. If a net is attached it must be properly supported and not interfere with the goalkeeper.



PLAYER POSITIONS

A soccer team is divided into forwards, midfielders, defenders, and one goalkeeper. Team members take positions that match their skills and style of play. The main job of the forwards, or strikers, is to score goals (although any player, including the goalkeeper, may score a goal). Strikers have excellent speed, good aerial ability, skillful footwork, and an accurate shot. The midfielders provide the link between the defenders and the forwards: their role involves both defensive and attacking play. Defenders assist the goalkeeper in protecting the goal. These players have an effective tackle, and are commanding in the air. The goalkeeper, the sole player allowed to handle the ball (but only within the penalty area), has good catching and kicking skills combined with considerable agility and sharp reflexes. Substitutes are permitted during a match, but once substituted a player may not rejoin the game.

BEHIND THE SCENES

Although a team of 11 people plus substitutes takes the field on match day, leading soccer clubs rely on the work of dozens of “back-room” staff to get their first team primed and ready. Specialized fitness trainers keep the players in physical condition, while teams of physical therapists and medics help to keep the players at their best and to recover from injuries. On the technical side, clubs employ a variety of coaches to work with different sections of a team, while at the helm is the manager, the chief tactician and team selector.



EQUIPMENT

One of the enduring appeals of the sport is that so little equipment is required. An informal game can therefore be enjoyed by all people, no matter what their means. For an official game, it is compulsory for players to wear a shirt with sleeves, shorts, socks, shinguards, and footwear. It is forbidden to wear anything, such as jewelry, that could present a hazard. A player incorrectly attired will be asked to leave the field of play by the referee and may only return when the referee has confirmed that the equipment is correct.

MODERN BALL

A game ball has a circumference of 27–28 in (68–70 cm), weighs 14–16 oz (410–450 g), and is inflated to a pressure of 8.5lb/sq in–15.6lb/sq in (600–1100 g/sq cm). Most balls have a covering of synthetic leather panels stitched together (real leather, as used in the past, tends to absorb water and make the ball very heavy). Inside is the air bladder, which is usually made from latex or butyl. Between the bladder and the outer covering is the lining, which is made from polyester or cotton and helps give the ball its strength and bounce.



Valve
The inner bladder includes a valve, which is attached to a pump when inflating the ball

Outer casing
The outer surface consists of hexagonal panels joined by stitching

PLAYING THE GAME

Before the match commences, the two teams take their positions in their respective halves in any one of a multitude of set formations (see p.103). Play begins with the kick-off, whereby the ball is placed on the centre mark and kicked forwards by one of the attackers. Then, very simply, each team attempts to kick the ball into the opposition's goal. The ball may be moved about the pitch using any part of the body except the hands and arms, and the winning team is the one that has scored the most goals after ninety minutes. If at the end of play neither team has scored, or if both teams have scored the same number of goals, the game is a draw. However, in order to find a winner, some competitions allow for "extra time" followed by, if necessary, a penalty shoot-out.

ATTACK

The team in possession of the ball and moving forward is said to be on attack. The ultimate aim of any attacking move is to score a goal, and this can only be achieved if the player with the ball is close enough to the goal to shoot. Attackers must therefore pass or dribble the ball around the field, retaining possession and avoiding defenders as they go. In order to outmaneuver the defense, attackers off the ball should always be looking for space—an area of the field where there are no defenders—to run into, ready to receive a pass.

One-two

Shown here is an attacking move in which a player beats an opponent by passing the ball to a teammate, then receives it back once in a more advanced position



On the move

A one-two relies on anticipation, quick passing, and the player's speed across the ground

PASSING

A well-executed pass consists of three elements: correct weighting (power used), appropriate direction, and good timing. Three parts of the foot can be utilized when passing: the inside for swift, short passes; the instep for long, powerful passes; or the outside for short, disguised passes on the run.

Retaining possession

This player is shielding the ball while dribbling



DRIBBLING

Running with the ball under close control, mostly using the outside and top of the foot, is known as dribbling. The player dribbling should look up often to assess attacking options and defensive dangers.



Curled cross

A well-played cross is an excellent way of beating defenses

CROSSING

The cross pass, where the ball is quickly moved from the edge of the pitch to the centre, is used to deliver the ball towards players in attacking positions. Well-hit crosses are very hard to defend against.



Head down

Watching the ball right on to the boot helps ensure an accurate shot

Forceful shot

A powerful swing of the kicking leg enables a strong shot

SHOOTING

As the ball will arrive to the player at a variety of speeds and angles, there are many shooting techniques. However, the most common method is a low, hard shot struck off the instep of the boot.

Studs

In some boots the studs are fixed, but more commonly these are detachable so that the length of stud can be altered to suit different playing conditions. Some modern boots feature moulded blades instead of studs, providing a more stable base



Shinguards

When tackling or being tackled, shinguards provide good lower-leg protection



Gloves

Many modern gloves have removable protective reinforcing inside the fingers

FOOTBALL BOOTS

Footballers need comfortable, lightweight, and durable footwear. On grass, players wear studded boots; on artificial turf, trainers with rubber pimples on the sole provide good grip.

SHINGUARDS

Guards protect the shins, are made of plastic, rubber, or similar, and must be covered entirely by the socks.

GLOVES

The goalkeeper wears gloves that provide extra grip when catching the ball. The back of the glove is breathable, and a wrist strap gives extra support.

DEFENSE

The job of the defending players is to prevent the attackers from scoring and to win back possession so as to mount an attack in return. Defenders can do this by intercepting attacking passes, closing down the space available to the ball carrier and other attackers, close marking of players in the hope of forcing a mistake, and by gaining possession of the ball directly via tackling. Soccer teams employ defensive strategies to help combat attacking moves. One example is the zone defense system, in which the defenders are assigned a set area in which to work and mostly move in relation to each other. Another strategy is person-to-person defense, where each defender is assigned a specific attacker to mark.



Fingers to the ball
At full stretch, arm extended, the goalkeeper stops the shot

Diving save
Goalkeepers require great agility and athleticism when protecting the goal

GOALKEEPING

This player saves goals by catching the ball, tipping it over the crossbar or beyond the goalposts, or punching or kicking it away. The goalkeeper then starts the next attack, with a kick or throw.

Battle for possession

The defender launches a feet-first slide towards the ball; he must take the ball and not the player



Quick work

Defenders need fast reflexes to intercept



Defensive pressure

The marker always stays close to the player being marked



TACKLING

Using the feet to take the ball away from a player is known as tackling. The slide tackle (above) can be highly effective, but the defender's timing must be perfect, and there is a risk of conceding a foul.

INTERCEPTION

When a defender intercepts an attacker's pass, this is often the result of the pressure applied by the defending team as a whole, through persistent marking and closing down the available space.

MARKING

When a defender closely shadows the movements of an attacker, this is known as marking. It gives the defender the chance of an interception, and an attacker might not pass to a marked teammate.

SIDELINES

11 The approximate number in kilometers run by a midfielder during a game. Forwards run about 5 miles (8 km), defenders 4 miles (7 km), and the goalkeeper 2 1/2 miles (4 km).

42 The age of the oldest player—Roger Milla of Cameroon—to score a goal in a World Cup finals game.

181 The world record number of international caps, won by Mohamed Al-Deayea of Saudi Arabia.

199,854 The number of spectators that turned up to watch the 1950 World Cup game between Brazil and Uruguay at the Estádio Municipal do Maracanã in Rio de Janeiro. This is the highest ever recorded official attendance at a soccer game.

11 The number of seconds it took Hakan Sukur of Turkey to score against South Korea in the third-place play-off of the 2002 World Cup. Turkey went on to win the game 3–2, and this remains the fastest goal in World Cup history.

1,281 The number of goals Pelé scored in 1,363 games over his 22-year career playing for Brazil, Santos, and the New York Cosmos.



SET PIECES

If the referee stops play for an infringement, or if the ball crosses a touch or goal line, a predetermined, fixed move—such as a corner kick or a throw-in—executed by the attacking team follows. This is called a set piece. As a high percentage of goals come from set pieces, the attacking team will take up positions and adopt patterns of movement designed to produce a score, while the defending team will do everything in its power to stop this from happening. For example, when a free kick is awarded near the goal, the defenders might set up a line of players (called a defensive wall) in front of the kicker to try to block the ball. For a throw-in or corner the attackers look for free space to run into and the defenders closely mark the attackers.



Correct technique
The player taking the throw-in must release the ball from behind the head using both hands and with both feet on the ground



Scoring opportunity
Many goals are scored from corners, often as a result of a header



Testing time
The goalkeeper must decide whether to defend from the goal line or to actively follow and attempt to clear the ball

THROW-IN

When the ball completely crosses the touch line, a throw-in is awarded to the team opposing the player who last touched the ball.

CORNER

When the ball crosses the goal line having last touched a defender, a corner kick is awarded. The kick is taken from the corner arc nearest the point where the ball crossed the line, and a goal may be scored directly.



The wall

A defensive wall is set up to try to prevent the kicker scoring but should not obscure the goalkeeper's view

Curve ball

The kicker will often try to curve the ball around the wall

Target area

The best chance of scoring is to aim high and into a corner



Arms spread

The goalkeeper fills as much of the goal mouth as possible

Ball position

All penalty kicks are taken from the penalty mark

FREE KICK

There are two types of free kick. With a direct free kick—awarded for a more serious offense, such as tripping—the kicker may score a goal directly. For an indirect free kick—given for a less serious offense, such as obstruction—a player other than the one taking the kick must touch the ball before a goal can be scored.

Ball position

The ball is placed where the infringement occurred

PENALTY KICK

If any of the offenses that would normally incur a direct free kick are committed inside the penalty area, a penalty kick is awarded. Until the kick has been taken, the goalkeeper must remain on the goal line. Because a goal is the usual result from a penalty kick, there can be enormous pressure on the kicker, particularly during a penalty shoot-out.

THE OFFICIALS

The referee has full and final authority during a match. This includes enforcing the 17 Laws of the Game (see p.101) and acting as match timekeeper. The referee may play "advantage" by allowing play to continue after an offense if it is felt that to stop play would disadvantage the team offended. A good referee will encourage a free-flowing, good-spirited game.

MISCONDUCT

If a serious breach of the Laws of the Game has occurred, such as showing dissent, the umpire may issue either a caution (indicated by a yellow card) or send the player from the field (indicated by a red card). Two yellow cards in the same match automatically incur a red card.

REFEREE SIGNALS

Distinguished from the players by differently colored clothes (usually black), the referee blows a whistle to start or stop play and uses a set of five official signals (see right) to indicate decisions made.



DIRECT FREE KICK

INDIRECT FREE KICK

YELLOW CARD (CAUTION)

RED CARD (SENDING OFF)

ADVANTAGE

ASSISTANTS

The two assistant referees—one on each touch line—officiate in situations where the referee is not in the best position to make a decision. These include offside infringements and which team should be awarded a throw-in.



Flag

This is used to communicate with the referee

THROW-IN

SUBSTITUTION

OFFSIDE

OFFSIDE

PLAYING BY THE RULES

In 1863, the first uniform set of rules for soccer were devised. Today, there are 17 Laws of the Game, and these are administered by the Fédération Internationale de Football Association (FIFA). They have been modified over time, including the most recent revision in 2009. The Laws regulate everything from the dimensions of the field of play and the equipment used to the referee's role, fouls, and set pieces.

COMMITTING A FOUL

Law 12 covers fouls and misconduct and the associated sanctions. A direct free kick is awarded if a player kicks, trips, jumps at, charges, strikes, or pushes an opponent with reckless or excessive force; the same is also applied if a player (except the goalkeeper) handles the ball, makes contact with the opponent before the ball during a tackle, or holds or spits at an opponent. An indirect free kick is awarded if a player impedes an opponent, stops the goalkeeper from throwing or rolling the ball, or plays in a dangerous way. It is also given for a variety of infringements specific to the goalkeeper, for example, if this player takes more than six seconds to release a ball held with the hands.



TACKLING THE PLAYER

If a defender tackles the player rather than the ball, this is a foul. Because it is difficult to play the ball first when tackling from behind, tackles are made from the front or side. A mistimed slide tackle (above) can easily result in a foul.



HOLDING

If one player holds another's clothing or person, this is a foul. Referees keep a sharp watch for holding, which is very frustrating for the player held.



DANGEROUS PLAY

This can take many forms but is most commonly associated with a high or reckless tackle, which is dangerous to the player tackled and the tackler.



OBSTRUCTION

If a player is positioned between the ball and an opponent and makes no attempt to play the ball, this is impeding the opponent (obstruction).



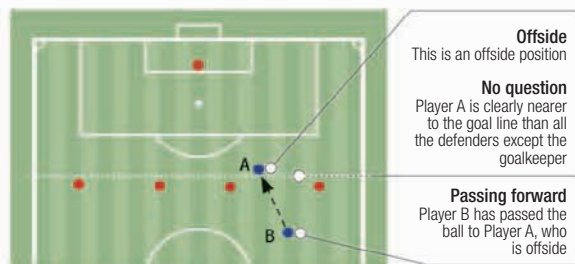
TRIPPING

Dangerous and unsporting, tripping constitutes a foul. However, it is sometimes difficult to tell if a player was tripped or fell deliberately.



THE OFFSIDE LAW

Law 11, "Offside," is probably the most controversial and regularly modified rule in the game. According to FIFA's *Laws of the Game 2009*, "A player is in an offside position if he is nearer to his opponents' goal line than both the ball and the second last opponent." Or, put another way, if there are not two defenders (one of which will usually be the goalkeeper) between an attacker and the goal line, then the attacker is offside. For offside offenses, an indirect free kick is awarded. Although it is not against the Laws to be in an offside position, it is an offense if—when the ball is played by a teammate—a player gains an advantage from being offside or interferes with play or an opponent while offside. A player receiving the ball directly from a goal kick, throw-in, or corner cannot be offside. The Law was introduced to prevent attackers from hovering around the goal, which could result in games consisting mostly of long kicks from one end of the field to the other—an unappealing proposition for spectators and players.



OFFSIDE

In the situation above, Player A is offside, and an indirect free kick would result. This is because when Player B passed the ball (indicated by the arrow), there was only one defender (the goalkeeper) between Player A and the goal line.

"HAND OF GOD"

SOMETIMES A PLAYER INFRINGES A LAW AND GETS AWAY WITH IT. PERHAPS THE MOST FAMOUS INSTANCE WAS DURING THE 1986 WORLD CUP QUARTER-FINAL BETWEEN ARGENTINA AND ENGLAND. JUST INTO THE SECOND HALF, ARGENTINE DIEGO MARADONA FOLLOWED A LOBBED BALL, LEAPED, AND PUNCHED THE BALL INTO THE NET. THE GOAL WAS ALLOWED, AND ARGENTINA WENT ON TO WIN THE GAME (2-1) AND THE TOURNAMENT. MANY YEARS LATER, MARADONA ADMITTED TO THE HAND BALL BUT AT THE TIME CLAIMED THAT IT WAS, "A LITTLE OF THE HAND OF GOD, AND A LITTLE OF THE HEAD OF MARADONA."



ONSIDE

In the scenario shown here, Player A is not offside. This is because when Player B passed the ball (indicated by the arrow), there were two defenders between Player A and the goal line. Player A may now continue the attack.

BALL SKILLS

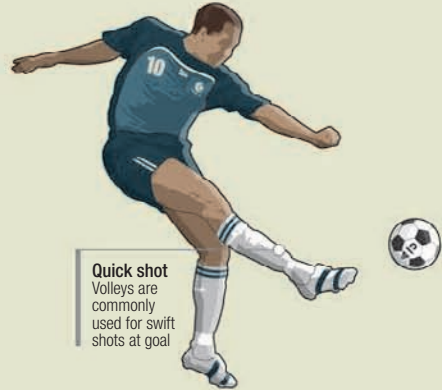
Soccer players must be able to control the ball with the feet, but also with any other body part except the hands and arms. A team that controls the ball retains possession. Key techniques are kicking and passing (see p.98), close control (including trapping, where the ball is stopped "dead" with the feet, head, chest, or thigh), running with the ball (dribbling, see p.98), shooting (see p.98), tackling (see p.99), and heading. The goalkeeper must master all these skills and a set of different techniques, too (see p.99).



Landing platform
With arms outstretched to push the chest out, this player has created the largest possible area on which to receive the ball



Good balance
With one foot off the ground, the arms are used for balance



Quick shot
Volleys are commonly used for swift shots at goal

CHESTING

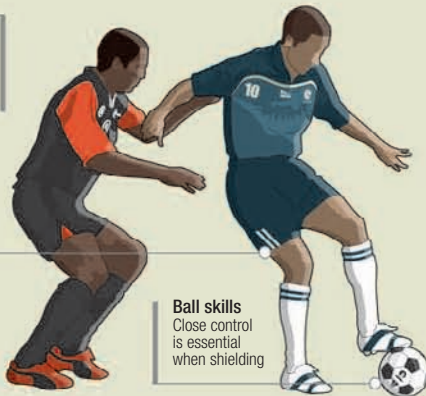
The player's chest can be used to trap or pass the ball. When trapping, the chest "cushions" the ball as it falls; when passing, the chest is thrust out to meet the oncoming ball.



Firm strike
Headers should come from the centre of the forehead

THIGH CONTROL

The thigh is used for balls arriving above knee height but too low for the chest. To control the ball, the thigh is lowered slightly before impact to cushion the ball.



Ball skills
Close control is essential when shielding

VOLLEY

Kicking the ball before it bounces is called a volley. Because the ball is not brought under control prior to being kicked, the direction of the kick is less easy to manage, but the ball is redistributed very quickly.

HEADING

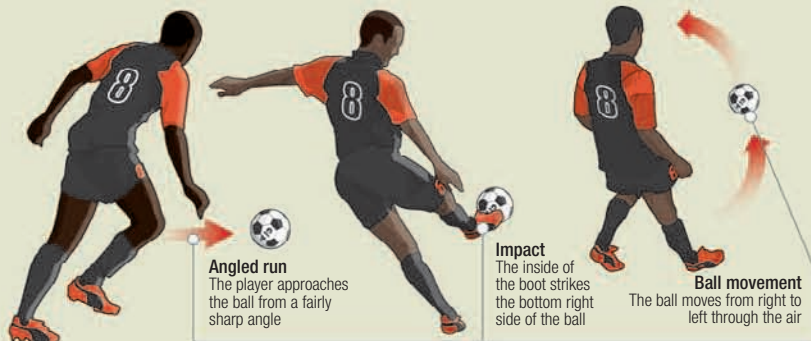
This is an important skill in soccer because it gives the player the opportunity to reach a ball too high to be controlled by means other than the head. It is used for passing, shooting, or controlling the ball.

SHIELDING

When a player in possession is positioned between the ball and a defender, this is known as shielding or "screening." So long as the person in possession is playing the ball, then this is perfectly legal.

BENDING THE BALL

To curve the ball from right to left (from the player's perspective) using the right foot, the player strikes the bottom half of the right side of the ball with the inside of the boot. To curve the ball from left to right with the right foot, the player strikes the left side of the ball with the outside of the boot. In both cases the foot and leg follow-through in the opposite direction from that of the intended flight path so as to slice across the ball to impart spin on it. This skill is used to curve the ball around defenders when passing, shooting, or when taking a penalty, corner, or free kick.



Angled run
The player approaches the ball from a fairly sharp angle

Impact
The inside of the boot strikes the bottom right side of the ball

Ball movement
The ball moves from right to left through the air

TRAINING

Soccer players train hard and often, and techniques can be practiced at team sessions or individually. Good fitness is also essential: an exhausted player is of little use to the team. Fitness training might include sprinting (to develop speed), circuits (for muscular endurance and stamina), weights (strength), and stretching (flexibility).

HIGH EARNERS

FOR THE MOST SKILLFUL PLAYERS, THE FINANCIAL REWARDS CAN BE STAGGERING. IN 2010, THE ESTIMATED EARNINGS OF THE HIGHEST-PAID SOCCER PLAYER (LIONEL MESSI OF BARCELONA) WAS \$44.4 MILLION. TOP ENGLISH PLAYERS CAN EARN MORE THAN 200 TIMES THE AVERAGE SALARY IN THE UNITED KINGDOM. THE RICHEST SOCCER CLUB IN THE WORLD IS CURRENTLY MANCHESTER UNITED, WITH AN ESTIMATED WORTH IN APRIL 2010 OF \$1.8 BILLION. THESE FIGURES REFLECT SOCCER'S STATUS AS THE WORLD'S MOST POPULAR SPORT.



FORMATIONS

A team's on-field formation is represented by a set of three or four numbers. For example, 4-4-2 describes four defenders, four midfielders, and two forwards. The numbers always add to 10 because the goalkeeper is not included in the formation. A team usually starts a match with a formation based on its style of play (see below), but according to the match situation, this might change. If, for example, a team with a lead does not want to risk conceding a goal it might employ a more defensive formation. There are an many combinations, and shown here are three common examples.



4-4-2

This is probably the most common formation used in soccer today. The 4-4-2, also known as the "flat back four," is an adaptable system in which the midfielders work extensively with the defenders and the forwards. Always the workhorses, the midfielders have plenty of running to do in this formation.



3-5-2

In this formation, the left and right midfielder players generally take a more attacking role supporting the forwards, while the central midfielder often works closely with the defense, to help resist opposition counterattacks launched when much of the team is in the opposition's half.



4-3-2-1

Also known as the "Christmas Tree," this formation is a variation of 4-4-2 (see above) in which one of the midfielders is pushed forward into an attacking position. This means that in effect there are three forwards, with the center forward playing slightly in front of the other two.

INSIDE STORY

The earliest known form of football was played in China in the second and third centuries BCE. Football-like games were also played in Ancient Greece and Rome and in other early civilizations. However, the development of modern soccer occurred mainly in Britain, over the last thousand years. Early games took many forms, and a "match" was often an anarchic contest between two whole villages. During the nineteenth century, the pivotal moment in the sport's history was reached. Earlier in the century, soccer had become very popular in private schools (known as public schools in England). But without standardized rules, some schools favored a rougher game that included handling and running with the ball, while others preferred a game based around dribbling.

SOCCER RULES

In 1863, meetings were held to formalize the rules. As part of this process, rugby football became a separate sport, and the Football Association and with it "association football"—where handling the ball was prohibited—was born. In 1872, the world's first soccer competition, the FA Cup, was held, and in 1904 the Fédération Internationale de Football Association (FIFA) was founded. Today, FIFA boasts 208 member nations.

INTERNATIONAL COMPETITIONS

Undoubtedly, the most significant international competition is the FIFA World Cup, held every four years. With worldwide total viewing figures in the billions, it ranks alongside the Olympic Games as one of the great uniting global sporting events. There are World Cups for men and women. Some of the many other international competitions include: the European Football Championship, Copa América (South America), the African Cup of Nations, and the Asian Cup.

CLUB COMPETITIONS

Many supporters follow club competitions with unparalleled fervor. Championships include the Premier League (England), La Liga de Fútbol Profesional (Spain), and Serie A (Italy). Some competitions are played between the top clubs of different nations, such as Copa Libertadores da América (South America) and the Champions League (Europe).

STAT CENTRAL

FIFA WORLD CUP WINNERS

YEAR	WINNER	RUNNER-UP
2010	SPAIN	NETHERLANDS
2006	ITALY	FRANCE
2002	BRAZIL	GERMANY
1998	FRANCE	BRAZIL
1994	BRAZIL	ITALY
1990	WEST GERMANY	ARGENTINA
1986	ARGENTINA	WEST GERMANY
1982	ITALY	WEST GERMANY
1978	ARGENTINA	NETHERLANDS
1974	WEST GERMANY	NETHERLANDS
1970	BRAZIL	ITALY
1966	ENGLAND	WEST GERMANY
1962	BRAZIL	CZECHOSLOVAKIA
1958	BRAZIL	SWEDEN
1954	WEST GERMANY	HUNGARY
1950	URUGUAY	BRAZIL
1938	ITALY	HUNGARY
1934	ITALY	CZECHOSLOVAKIA

EUROPEAN CHAMPIONSHIP WINNERS

YEAR	WINNER	RUNNER-UP
2008	SPAIN	GERMANY
2004	GREECE	PORTUGAL
2000	FRANCE	ITALY
1996	GERMANY	CZECH REPUBLIC
1992	DENMARK	GERMANY
1988	NETHERLANDS	USSR
1984	FRANCE	SPAIN
1980	WEST GERMANY	BELGIUM
1976	CZECHOSLOVAKIA	WEST GERMANY
1972	WEST GERMANY	USSR
1968	ITALY	YUGOSLAVIA
1964	SPAIN	USSR

COPA AMERICA WINNERS

YEAR	WINNER	RUNNER-UP
2007	BRAZIL	ARGENTINA
2004	BRAZIL	ARGENTINA
2001	COLOMBIA	MEXICO
1999	BRAZIL	URUGUAY
1997	BRAZIL	BOLIVIA
1995	URUGUAY	BRAZIL
1993	ARGENTINA	MEXICO
1991	ARGENTINA	BRAZIL
1989	BRAZIL	URUGUAY
1987	URUGUAY	CHILE
1983	URUGUAY	BRAZIL
1979	PARAGUAY	CHILE
1975	PERU	COLOMBIA
1967	URUGUAY	ARGENTINA
1963	BOLIVIA	PARAGUAY
1959	URUGUAY	ARGENTINA



BASKETBALL



104

GAME OVERVIEW

Invented in the late 19th century, basketball is a fast-paced, highly technical ball sport, whereby two teams of five players attempt to score points in the opposing side's basket. Most popular in the United States, where the National Basketball Association (NBA) runs the professional game, it also has a strong presence in Europe. Basketball has been an Olympic sport since 1976.

PLAYER PROFILE

Muscular and athletic, basketball players require all-around fitness. Being such a fast-paced game players need superb stamina allied to agility. Above all, of course, they need to be tall. Players are rarely under 6 ft (1.8 m) and often as tall as 7 ft (2.1 m).

Court gear

Players wear loose-fitting vest tops and shorts on court, which permit total freedom of movement for the upper and lower body

Wear and tear

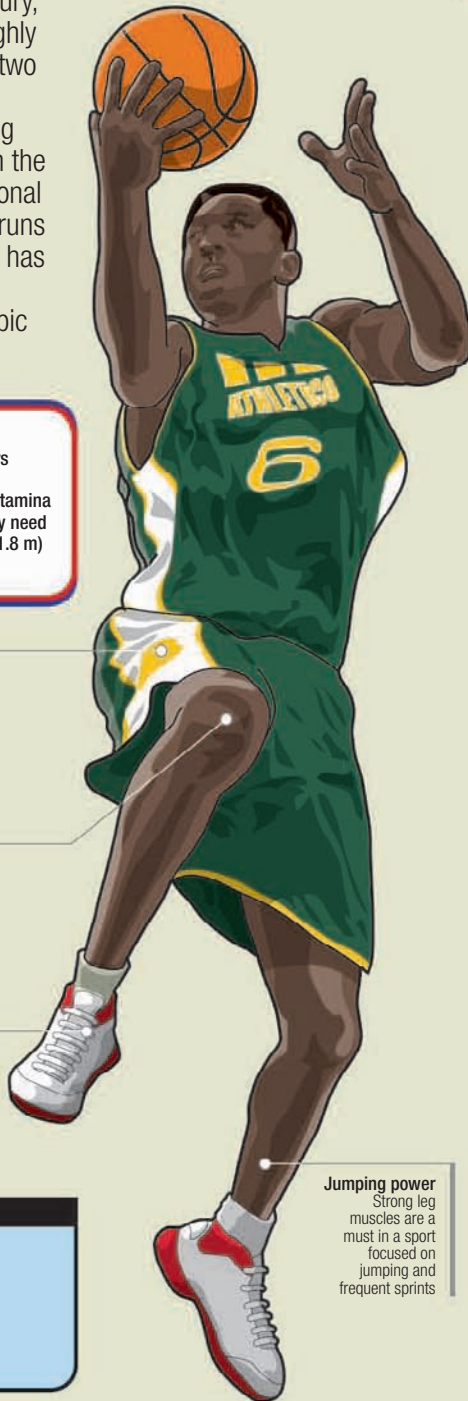
In a sport characterized by continual changes of pace and direction, players' knees are highly susceptible to injury

Big air

Modern day sneakers feature air-cushioned soles—which both provide comfort during fast-moving play and leverage for even higher leaps

JAMES A. NAISMITH

NAISMITH WAS NOT JUST A PIONEER OF BASKETBALL. HE IS ALSO CREDITED WITH BEING THE FIRST MAN TO INTRODUCE THE HELMET INTO FOOTBALL.



Jumping power
Strong leg muscles are a must in a sport focused on jumping and frequent sprints

NEED2KNOW

- ➔ Basketball was invented in 1891 by a Canadian, James A. Naismith.
- ➔ In the United States, more people play basketball than any other team sport, according to research by the National Goods Association.
- ➔ College basketball is at least the equal of the professional game in terms of popularity in the US—Alaska is the only state that does not have a Division I Men's Basketball program.
- ➔ Top NBA stars enjoy a superstar status and earn prodigious salaries—half of the sportspeople in the "Sport's Illustrated" 2007 Fortune 50 (top earners) are NBA stars.

2-point zone

Two points are awarded for any field goal scored from inside the 3-point line

The key

Players on the offense can remain in this area up to 3 seconds

3-point arc

A player who scores a field goal from anywhere outside this line earns 3 points

Out of bounds

The area outside of the court markings

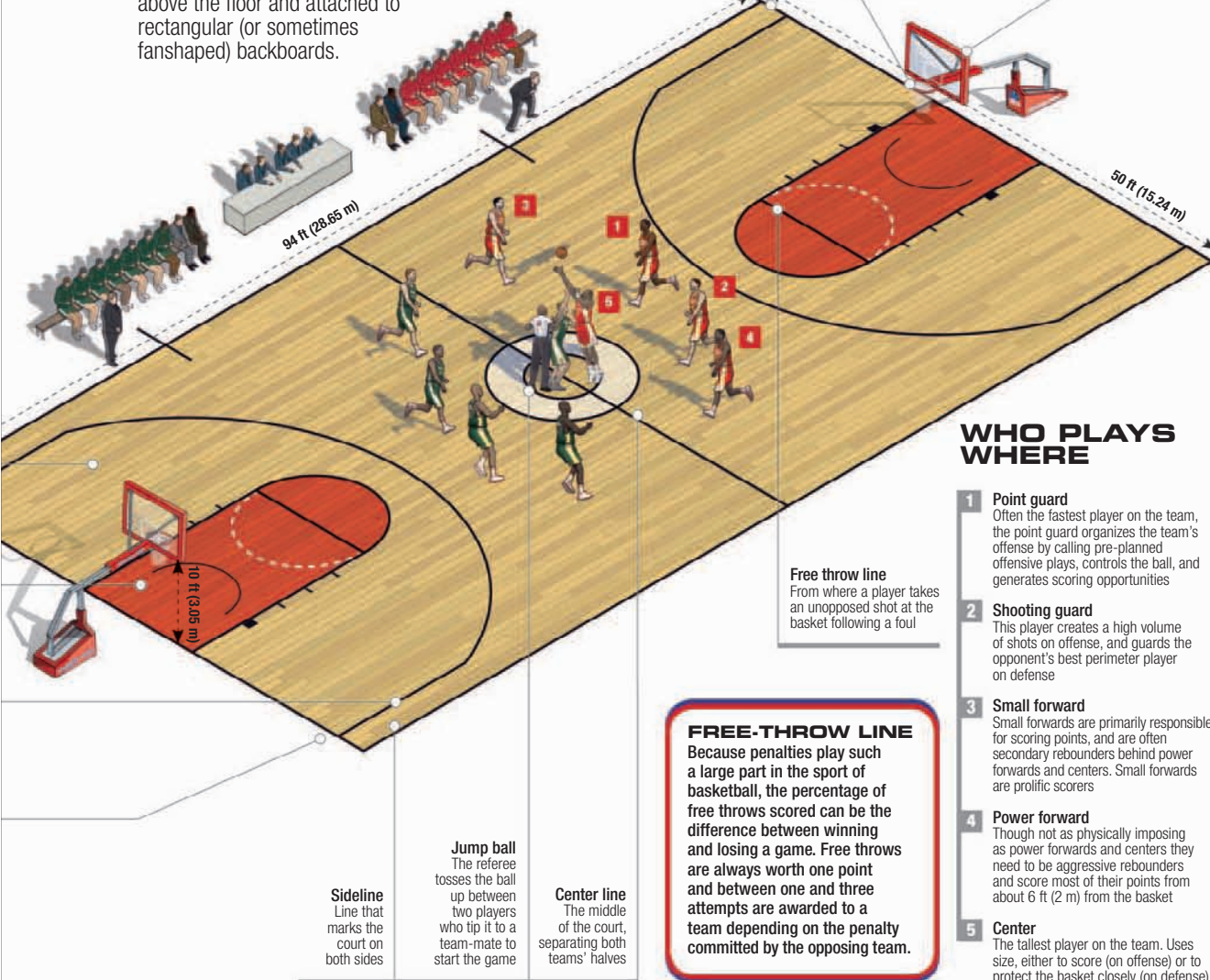
THE SHOT CLOCK

Introduced to the NBA in 1954 in an effort to speed up play, the shot clock is a 24-second timer. The offense team must shoot within that time frame. Failure to attempt a shot that hits the rim within this time results in loss of possession. A buzzer sounds when the clock reaches zero.



THE COURT

The basketball court is a rectangular playing surface usually made out of a hardwood, often maple, and highly polished. Courts come in different shapes and sizes. In the National Basketball Association (NBA), the court is 94 ft (28.5 m) long by 50 ft (15.25 m) wide. Under International Basketball Federation (FIBA) rules, the court is slightly smaller, measuring 92 x 49 ft (28 m x 15 m). Lines mark out the dimensions of the court, three-point line, and free-throw line. The baskets are always 10 ft (3.05 m) above the floor and attached to rectangular (or sometimes fanshaped) backboards.



Baseline
Marks the boundary of play at either end of the court

The basket
The scoring hoop, which is 18 in (45 cm) wide

Backboard
Rectangular in shape and made of reinforced plastic, glass, or fiberglass this is used to deflect the ball into the basket

94 ft (28.65 m)

50 ft (15.24 m)

10 ft (3.05 m)

WHO PLAYS WHERE

- 1 Point guard**
Often the fastest player on the team, the point guard organizes the team's offense by calling pre-planned offensive plays, controls the ball, and generates scoring opportunities
- 2 Shooting guard**
This player creates a high volume of shots on offense, and guards the opponent's best perimeter player on defense
- 3 Small forward**
Small forwards are primarily responsible for scoring points, and are often secondary rebounders behind power forwards and centers. Small forwards are prolific scorers
- 4 Power forward**
Though not as physically imposing as power forwards and centers they need to be aggressive rebounders and score most of their points from about 6 ft (2 m) from the basket
- 5 Center**
The tallest player on the team. Uses size, either to score (on offense) or to protect the basket closely (on defense).

Free throw line
From where a player takes an unopposed shot at the basket following a foul

FREE-THROW LINE

Because penalties play such a large part in the sport of basketball, the percentage of free throws scored can be the difference between winning and losing a game. Free throws are always worth one point and between one and three attempts are awarded to a team depending on the penalty committed by the opposing team.

Sideline
Line that marks the court on both sides

Jump ball
The referee tosses the ball up between two players who tip it to a team-mate to start the game

Center line
The middle of the court, separating both teams' halves

SIDELINES

23 The shirt number of former Chicago Bulls star Michael Jordan, widely considered the greatest player of all time. Jordan chose the number out of admiration for his older brother. Larry wore 45, and Michael, believing he had only half his brother's talent, chose 23 (rounded up from 22.5). It was also the shirt number chosen by soccer player David Beckham when he signed for Real Madrid in 2003.

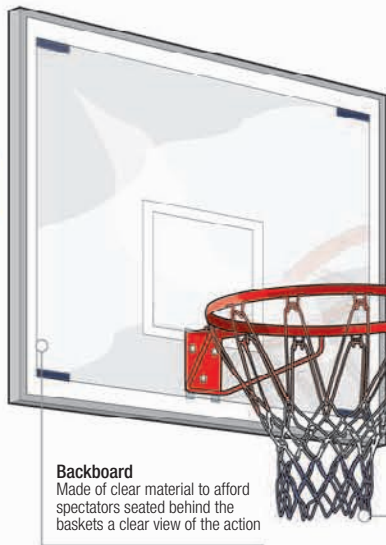
38,387 The total number of points accumulated by Kareem Abdul-Jabbar. Although retired since 1989, he remains the NBA's leading all-time points scorer.

139,381,526 The total annual earnings, in dollars, of the New York Knicks NBA team for the 2006-07 season.

2.31 The height, in meters—7 ft 7 in—of Manute Bol. The Sudanese center, who played in the NBA from 1985-1995, is the tallest in the association's history.

30 Circumference of a modern basketball in inches (76 cm). The ball is made from eight strips of rubber or leather.



**Backboard**

Made of clear material to afford spectators seated behind the baskets a clear view of the action

BASKET

James Naismith's first basket was an improvised peach basket which retained the ball. The modern basket is a metal-rimmed hoop, measuring 18 in (50 cm) across fixed to a backboard.

Hoop

Strong enough to withstand players hanging from it during dunking

Netting

Gathers the ball into a consistent drop for easy restarting of the game

EQUIPMENT

The beauty of basketball is that you can play almost anywhere, with very little equipment. All that is really required for social play is a ball and two baskets—or one if you play half-court. For tournament and professional play, teams wear regulation shirts and shorts bearing their chosen squad number. In a sport where the legs, particularly the ankles and knees, take heavy punishment, sneakers are carefully chosen for comfort and game-improvement, and some form of muscle and joint support is common. Wrist and headbands are usual, too.

BALL

The basketball has come a long way since the style first used in the late 19th century. That ball was heavy, with prominent stitching, and an inconsistent bounce. Today's basketball is made from eight finely stitched pieces of leather filled with air. It has a radius of 7½ in (19.3 cm) and a circumference of 30 in (76 cm). It weighs 21–23 oz (600–650 g).

**PLAYING THE GAME**

Following the jump off which starts the game (see right) the two sets of players simply aim to score more points than the other. Attacks are mounted via a combination of passing and dribbling and when a player feels they are in a position to score they shoot. Basketball is truly an “end-to-end” sport with numerous baskets scored during the course of a game. Often the winning side will have accumulated more than 100 points.

BASKETS, POSSESSION, AND REBOUNDS

If a player is successful in shooting a basket, the team is awarded two or three points depending on the distance from the basket. The game restarts with the opposing team in possession on the end line underneath their own basket. If a shot is unsuccessful, and it bounces off the rim or backboard, players compete for “rebounds.” If the offense picks up a rebound they can prepare for another shot, if it is the defense they then mount a speedy counter-attack. Having a center who is particularly adept at picking up rebounds on defense is a huge advantage as turning defence into attack at such speed catches the opposition unawares and often leads to a basket. In the NBA players such as Shaquille O’Neill have made careers out of this.

OUT OF BOUNDS

The ball is out of bounds when it touches the floor, or any object on, above, or outside of a boundary, or the backboard supports. When the ball goes out of play the clock is stopped. The ball is put back into play by the team that did not touch it last when it went out of bounds. A player has five seconds to put the ball in play after the referee signals the restart.

JUMP OFF

Also known as the jump-off this is the short passage of play that starts the game. The opposing players, usually centers, line up in mid-court either side of the referee. To start the game, the referee throws the ball into the air midway between the two players who jump and attempt to tip it to a teammate. Having a particularly tall center, (or a player who can jump particularly well) is an advantage. Gaining possession straight from the tip-off affords the offensive team the first opportunity to open the scoring.

Referee

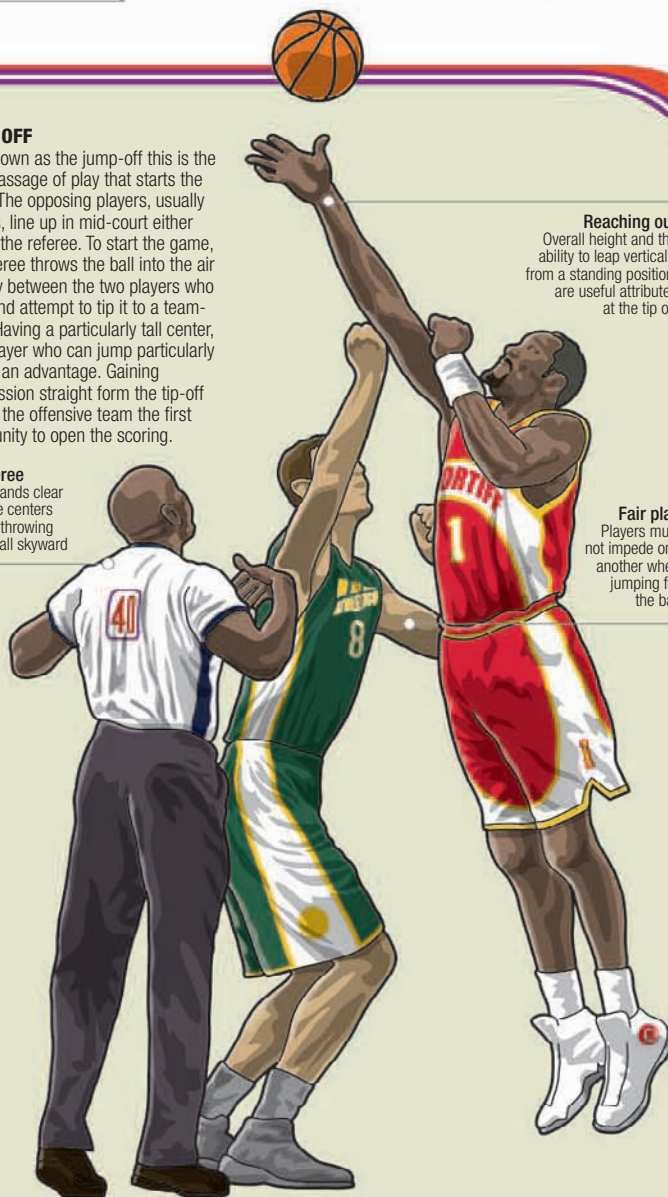
He stands clear of the centers after throwing the ball skyward

Reaching out

Overall height and the ability to leap vertically from a standing position, are useful attributes at the tip off

Fair play

Players must not impede one another when jumping for the ball





RULES AND REGULATIONS

Basketball was born in 1891 with 13 rules covering all the basics of play. Incredibly, the NBA has only 12 main rules today—but each has many clauses and sub-sections. There are subtle rules differences between the game played by the NBA, International Basketball Federation (FIBA), and National Collegiate Athletic Association (NCAA). Games are made up of four 12-minute quarters in the NBA. Teams can have up to 12 players but only five of these can be on the court at a time.

PERSONAL AND TECHNICAL FOULS

The team of a fouled player either receive the ball to pass inbounds, or receive one or more free throws if they are fouled in the act of shooting, depending on whether the shot was successful.

PERSONAL FOUL This is a breach of the rules that concerns illegal personal contact with an opponent including charging, blocking, pushing, holding, and reaching.

TECHNICAL FOUL This is an infraction of the rules usually concerning unsportsmanlike non-contact behavior, and is generally considered a more serious infraction than a personal foul. Including profane language by a player or coach, contesting decisions, fighting, time-wasting, and illegal substitutions.

VIOLATIONS

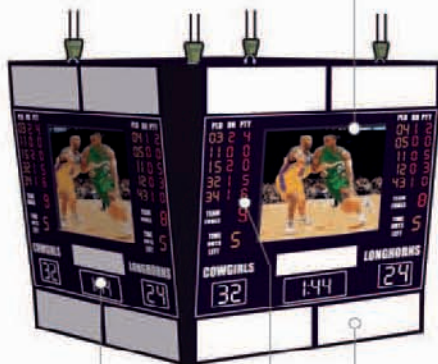
Violations are infractions of the rules governing how the ball can be handled. The ball must stay within the court; the last team to touch the ball before it travels out of bounds forfeits possession. The ball-handler may not move both feet without dribbling, known as traveling, nor may he dribble with both hands or catch the ball in between dribbles, a violation called double dribbling. A player's hand cannot be under the ball while dribbling; doing so is known as carrying the ball. A team, once having established ball control in the front half of the court, may not return the ball to the backcourt.

TIME LIMITS

There are various limits imposed on regulation play, all of which are designed to promote more greater offense. The time taken before progressing the ball past center court (eight seconds in international and NBA, ten seconds in NCAA and high school); before attempting a shot (24 seconds in the NBA, 35 seconds in NCAA); holding the ball while closely guarded (five seconds); and remaining in the restricted area (the lane, or "key") (three seconds): are all monitored by the referee.

SCOREBOARD

With four replicate sides, the scoreboard keeps all members of the crowd informed about the action. A main screen is surrounded by details of timeouts, points, fouls, score, and time remaining.



Big screen

This can offer a direct feed from the live action on the court, or replay action

Time and score

The bottom of the scoreboard displays the points total of the two teams and the amount of time left in a quarter, or half

Team/player stats

This section shows the total points scored and fouls committed by each player, as well as group fouls and timeouts

Advertising

In the NBA and in college basketball space around the perimeter of the board is used for advertising

OFFICIALS' SIGNALS

With a myriad of different rules to enforce—it is not just the players but also the coaching staff off-court who can incur penalties—basketball officials need to make split-second decisions and have excellent peripheral vision. Two referees are ably supported by a scorekeeper, timekeeper, 24-second clock operator, crew chief, and commissioner. Referees have a series of established gestures and signals to indicate aspects of play and rule breaches to fellow officials. A selection of these are shown below.



BLOCKING

The referee places clenched fists against the waist to indicate a player illegally impeding another.



CHARGING

An offensive foul that occurs when an attacking player runs into a defender, who has an established position.



TRAVELING

This rotating motion denotes traveling—essentially moving with the ball (definitions differ) for a period without bouncing it.



JUMP BALL

When two opposing players both have a grip of the ball the referee will hold his arms aloft to signal a jump ball.



2-POINT SCORE

Left arm raised with the index and middle fingers extended, denotes a 2-point basket to the watching scorekeeper.



3-POINT SCORE

Both hands raised with three fingers on each hand extended, indicates a score made from outside the 3-point arc.

TIMEOUT

Timeouts are breaks in the action which can be called by team coaches and players, usually at key points in the game, to discuss tactics and raise player morale. In the NBA, teams are allowed one 20-second timeout per half, and six regular timeouts over the course of the entire game.



STAT CENTRAL

108

NBA ALL-TIME LEADING POINTS

POINTS	PLAYER
38,387	KAREEM ABDUL-JABBAR
36,982	KARL MALONE
32,292	MICHAEL JORDAN
31,419	WILT CHAMBERLAIN
28,255	SHAQUILLE O'NEAL
27,409	MOSES MALONE
27,313	ELVIN HAYES
26,946	HAKEEM OLAJUWON
26,710	OSCAR ROBERTSON
26,668	DOMINIQUE WILKINS

NBA ALL-TIME PLAYOFF POINTS

POINTS	PLAYER
5,987	MICHAEL JORDAN
5,762	KAREEM ABDUL-JABBAR
5,248	SHAQUILLE O'NEAL
5,052	KOBE BRYANT
4,761	KARL MALONE
4,457	JERRY WEST
3,914	TIM DUNCAN
3,897	LARRY BIRD
3,776	JOHN HAVLICEK
3,755	HAKEEM OLAJUWON

NBA ALL-TIME PLAYOFFS PPG

POINTS	PLAYER
33.4	MICHAEL JORDAN
30.6	ALLEN IVERSON
29.8	TRACY MCGRADY
29.1	JERRY WEST
27.0	ELGIN BAYLOR
27.0	GEORGE GAVIN
26.6	SHAQUILLE O'NEAL
25.9	HAKEEM OLAJUWON
25.5	BOB PETTIT
25.4	DOMINIQUE WILKINS

NBA ALL-TIME PLAYOFF VICTORIES

WINS	TEAM
17	BOSTON CELTICS
11	LOS ANGELES LAKERS
6	CHICAGO BULLS
5	MINNEAPOLIS LAKERS
4	SAN ANTONIO SPURS
3	DETROIT PISTONS
2	PHILADELPHIA 76ERS
2	HOUSTON ROCKETS
2	NEW YORK KNICKS
2	PHILADELPHIA WARRIORS

TECHNIQUES

While height and athleticism are prerequisites for a basketball player, so too are ball-handling skills. An ability to pass, dribble, shield the ball from opponents, and above all shoot baskets is essential and must be mastered for a player to progress. Teamwork is also important. Basketball players will always work as a unit, whether on defense (double-teaming to turn the ball over), or in offense (setting screens to allow a teammate a clear shot). The following techniques are among the most common.

MOVING

Players have unrestricted movement on the court but are prohibited from running while holding the ball. While holding the ball, players can use the pivot foot—one foot set on the ground—while having full mobility with the rest of the body.



Which foot?

The player's position upon receiving the ball determines which becomes the pivot foot.

PASSING

When an opponent is positioned to block a normal chest pass, a player can bounce the ball to a teammate instead. This takes longer to complete than the chest pass, but it is also harder for the opposing team to intercept as it is aimed at the court floor.



Firm pass

Bounce passes must be made with conviction and not clearly telegraphed.

DRIBBLING

Dribbling is the act of bouncing the ball continuously, and is a requirement for a player to take steps with the ball. When dribbling past an opponent, the dribbler should dribble with the hand farthest from the opponent, making it more difficult for the defensive player to get to the ball. It is therefore important for a player to be able to dribble competently with both hands.

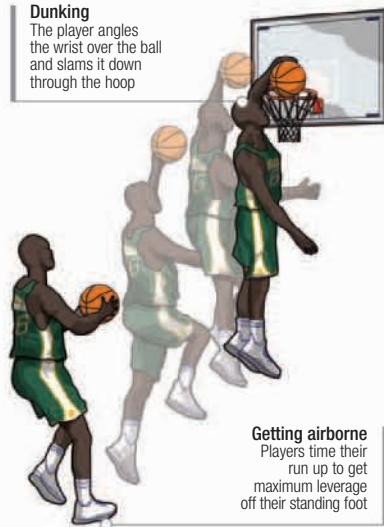


SHOOTING

Shots are commonly made from a standing or jumping position (known as a jump-shot), or as a lay-up shot, which requires the player to be in motion toward the basket, and to "lay" the ball in off the backboard. The highest-percentage accuracy shot is the crowd-pleasing slam dunk (right), in which the player jumps very high and throws the ball downward through the hoop.

Dunking

The player angles the wrist over the ball and slams it down through the hoop.



Getting airborne

Players time their run up to get maximum leverage off their standing foot.

LITTLE BIG MAN

MUGGSY BOGUES, FORMER PLAYER FOR THE CHARLOTTE HORNETS, IS THE SHORTEST PLAYER EVER TO PLAY IN THE NBA, AT 5FT 3 IN (1.60 M).



TACTICS

While the object of basketball is simple—to score more points than the opposing team—some of the strategies to achieve this can be increasingly complex as the standard of play rises. Offensive plays usually center around rapid counterattacks, using a variety of formations to get the ball up court as quickly as possible. Offense is often directed by the team's point guard. Defensive plays require discipline, tracking an opponent stride for stride and attempting to spoil their work. Timeouts called by the coach will invariably be used to discuss tactics.

OFFENSE

Teams almost always have several offensive plays planned to ensure their movement is not predictable, including the fast break (right). Plays normally involve planned passes and movement by players without the ball. A quick movement by an offensive player without the ball to gain an advantageous position is called a cut. A legal attempt by an offensive player to stop an opponent from guarding a teammate, is a screen or pick. Screens and cuts in offense allow the quick passes and teamwork which can lead to a successful basket.

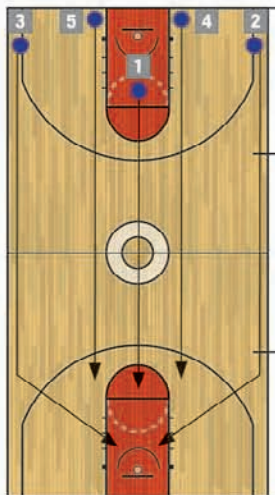
DEFENSE

There are two main defensive strategies: zone defense and man-to-man defense. Zone defense involves players in defensive positions guarding whichever opponent is in their zone, such as the zone press (right). In man-to-man defense, each defensive player guards a specific opponent and tries to prevent him from dribbling, making passes or shots by staying as close to him as possible—invading his “bubble.” Defenders always focus on the position of the hands (both their own and the attacker's) and must be adept at spotting a fake pass or shot and stealing.

THE NBA PLAYOFFS

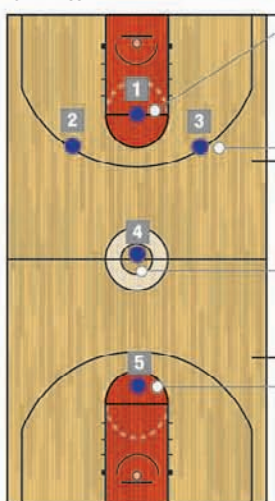
The NBA season starts in November with the regular season, in which teams from the Eastern and Western Conferences compete in a round-robin format, playing a grueling 82 games. The top eight teams from each Conference qualify for the playoffs, which begin in late April. Teams in the playoffs are seeded accordingly to their performance in the regular season. A series of elimination rounds culminates in a best-of-seven series between the victors of both conferences. Known as the **NBA Finals**, it is held annually in June. The victor in the NBA Finals wins the **Larry O'Brien Championship Trophy**. With 16 NBA Finals victories, the **Boston Celtics** are the most successful team in NBA history.

FAST BREAK



- 1 Best ball handler**
He or she should fill the middle land of the court.
- 2 Shooting guard**
Fills the left outside land and runs into court within 12 in (30 cm) of the sideline.
- 3 Small forward**
Fulfills same role as shooting guard but on other side of court. Too many players fail to do this and the team does not benefit from the spread (floor spacing) needed for a successful primary break.
- 4 Power forward**
Also the nonrebounder, trailing the play. He or she should continue downcourt to follow any attempted shots by players #1, #2, or #3.
- 5 Center/rebounder**
Keeps to his own lane and serves as “safety” in case there is a sudden change of possession.

ZONE PRESS



- Top-court press**
The shooting guard positions himself in the front half of the near foul circle and forces opponents to move. He should be a smaller player with good speed and quick hands. He is limited to lateral movements in the backcourt
- Wing men**
The wing men, #2 and #3, are taller forward players. The more athletic forward should be placed in the #2 position, as the defensive team should force the attack in his direction
- Middle man**
The center/forward should be the quickest player on the team with good court sense and anticipation
- Last line of defense**
The back man is usually the center, the biggest man and best rebounder. His primary responsibility is to prevent easy shots by the opposing players

INSIDE STORY

The International Basketball Federation, more commonly known by the French acronym FIBA, is an association of national organizations that governs international competition in basketball. The association was founded in Geneva in 1932, two years after the sport was officially recognized by the IOC. Its original name was *Fédération Internationale de Basketball Amateur*. Eight nations were founding members: Argentina, Czechoslovakia, Greece, Italy, Latvia, Portugal, Romania, and Switzerland. During the 1936 Summer Olympics held in Berlin, the Federation named James Naismith (1861–1939), the founder of basketball, as its Honorary President. FIBA has organized a FIBA World Championship for men since 1950 and a World Championship for Women since 1953. Both events are now held every four years, alternating with the Olympics.

NATIONAL BASKETBALL ASSOCIATION

The NBA is the world's premier men's basketball league. It has 30 teams; 29 in the United States and one in Canada. The league was founded in New York City on June 6, 1946, as the Basketball Association of America (BAA). The league adopted the name National Basketball Association in the fall of 1949 after merging with the rival National Basketball League. The league's several international and individual team offices are directed out of its head offices located in the Olympic Tower at 645 Fifth Avenue in New York City.

HARLEM GLOBETROTTERS

THE HARLEM GLOBETROTTERS ARE AN EXHIBITION BASKETBALL TEAM AND ONE OF THE WORLD'S MOST FAMOUS SPORTS FRANCHISES. THEY WERE CREATED BY ABE SAPERSTEIN IN 1927 IN CHICAGO. THE TEAM ADOPTED THE NAME HARLEM BECAUSE OF ITS CONNOTATIONS AS A MAJOR AFRICAN-AMERICAN COMMUNITY. OVER THE YEARS, THEY HAVE PLAYED MORE THAN 20,000 EXHIBITION GAMES IN 118 COUNTRIES, MOSTLY AGAINST DELIBERATELY INEFFECTIVE OPPONENTS. THEY HAVE WON OVER 98 PERCENT OF THEIR GAMES.



Oval ball

An official NFL football is 11 in (28 cm) long, has a 28 in (71 cm) circumference at its widest point, and weighs 15 oz (425 g)

Head gear

The helmet and mask protect the player's head and face from injury

Shoulderpads

Every player suits up with foam-lined plastic shoulderpads

Team colors

Every player wears a jersey in the team colors. The name and number identifies the player and includes NFL and team logos

Tight fit

A combination of nylon and spandex allows the pants to stretch over the bulky leg padding

Padded inserts

Players slip padded inserts under their pants to protect their legs against falls and blows from other players

Lightweight shoes

On grass, players wear shoes with hard plastic cleats, but on artificial surfaces shoes with molded soles are worn

NEED2KNOW

- ➔ Football is the most popular spectator sport in the United States. Every year, almost half of all Americans tune in to watch the Super Bowl—the NFL championship game.
- ➔ A professional league in Canada plays a version of football using specific Canadian rules.
- ➔ American football enjoys limited popularity outside of north America. Leagues exist in countries such as Britain, Germany, Japan, and Mexico.
- ➔ The first regular NFL season game to be held outside the United States was staged in Mexico City in 2005. An NFL-record, 103,467 people packed the stadium.

GAME OVERVIEW

Jokingly described as “not a contact sport but a collision sport,” football is also known as gridiron football in some countries, and just football in the US. Two teams of eleven players compete during four periods of play (known as quarters) to score points by advancing an oval ball into the opposition's end zone or by kicking it through the opponent's goalposts. The offense has a series of four attempts, or “downs,” to move the ball 10 yards up the field. If successful, it is granted a new set of downs. The defense attempts to stop them and win possession of the ball. While huge linemen clash at the line of scrimmage, running backs and lightning-quick receivers provide options for the playmaker: the quarterback. Highly tactical, explosive, and fast, football is like armored chess.

PLAYER PROFILE

Since there are so many different positions, each with specific roles and physical demands, there is no typical physical make-up. But most players combine strength and power with outstanding athletic ability, and excellent hand-eye coordination is essential. Depending on the position, heights range from 5'11" to 6'8" (1.8 to 2 m) and weights range from 190 to 300+ lb (86 to 136+ kg).

FOOTBALL



THE GRIDIRON

A professional football field is bounded by long sidelines and short end lines, forming a rectangle that measures 120 x 53 yd (109 x 49 m). The 100 yd (91 m) between the end zones are divided by yard lines that cross the field every 5 yd (4.5 m), and are numbered every 10 yd (9 m). Four rows of hash marks run the length of the field—the outer two mark 1 yd from the sidelines; the inner two mark the area in which plays must start if the ball goes out of bounds on the previous play. The scoring area (end zone) is bounded by the goal line, the end line, and sidelines. Most fields are covered in grass, but many have artificial surfaces.

PLAYERS AND POSITIONS

Every NFL team has a roster of up to 53 players. Only 11 are on the field at any one time, but many are used in the course of a game—some or all of the team may be substituted in the break between plays, if there is enough time. Each player has a specialized role within one of three main playing units: offense, defense, and special teams. The offensive players include the quarterback, offensive linemen, receivers, and running backs. The defensive positions include defensive linemen, linebackers, cornerbacks, and safeties. Positions in the special teams include placekicker, punter, holder, long snapper, short snapper, and punt returner.

ON SAFARI

THE REFEREE AND HIS TEAM OF OFFICIALS ARE SOMETIMES AFFECTIONATELY KNOWN AS “ZEBRAS,” DUE TO THEIR BLACK-AND-WHITE STRIPED UNIFORM.

End zone

The end zone is 10 yd (9 m) wide. There are two end zones, one at each end of the field.

Offense

The offense is the team possessing the ball, aiming to advance the ball downfield toward the opponent's end zone.

Markers

An official marks the yardage line that needs to be passed to secure a new first down with a large marker so players and coaches can see. On TV, a virtual line appears on screen to guide viewers.

Defense

The defense tries to stop the offense and take the ball away.

Gridiron pattern

The criss-cross pattern of yard lines and hash marks gives the field its “gridiron” nickname.

Goal line

The goal line runs across the front of both end zones, and is 8 in (20 cm) wide. Two short pylons mark the end of each goal line.

Cheerleaders

Most football teams have a squad of cheerleaders, who entertain the crowds with gymnastic dance routines, accompanied by chants during the halftime interval.

120 yd (109 m)

53 yd (49 m)

6 yd (5.6 m)

10 yd (9.1 m)

13 yd (11.9 m)

Crossbar

Upright

Sideline

The sideline is 2 yd (1.8 m) wide and forms a boundary along the length of each side of the field.

Officials

In the NFL, a team of seven officials enforce the rules of the game. Each official has a specific job to do. The referee is the head official on the field.

GOAL POSTS

The goal posts are positioned on the back line of the end zone. The offense can kick a field goal (3 points) or a conversion after a touchdown (1 point) between the two posts. The base is padded for the protection of the players.

SIDELINES

3,000,000

The estimated cost, in US dollars, to screen a 30-second television advertisement during coverage of the 2009 Super Bowl.

200

The NFL record for quarterback sacks—a defensive maneuver where the quarterback is tackled behind the line of scrimmage before he is able to release the ball. Held by Bruce Smith of the Buffalo Bills (1985–99) and Washington Redskins.

70,774

The attendance at the 2009 Super Bowl at the Raymond James Stadium in Tampa, Florida, where the Pittsburgh Steelers defeated the Arizona Cardinals.

48

The record for the most points scored in the Super Bowl throughout a player's career. The record is held by San Francisco 49ers player Jerry Rice, widely acknowledged as one of the greatest wide receivers in NFL history.



PADDED FOR PROTECTION

Football is a full contact sport. Every part of the body needs to be protected from charging players, or flying hits to the chest or ribs. Spectacular head-clashes are common, but serious injuries are rare. A helmet is the most vital piece of equipment, with internal padding, a chin strap, and a mask to protect the face from accidental blows. Most players also wear a mouthguard to shield the teeth from hits.

The players' equipment is what gives them their "top-heavy" appearance. Hard shoulder pads are worn over soft shock pads, which absorb hard blows. Other pads are used depending on the player's position and as protection against specific injuries. Linemen wear gloves to protect their hands from being trapped between helmets or shoulder pads.

PROTECTIVE PADDING

A range of pads can be worn, each of which are designed to protect specific parts of the body.



Neck roll

A foam-padded neck roll sits around the neck and stops the head from jerking back in a tackle.



Elastic fit

Elastic guards fit snugly over the forearm and wrist.

Arm guard

Tight-fitting arm guards are worn to cushion the forearms and protect any existing injuries.

Head and face

The helmet consists of a shell, the face mask, and a chin strap. Air bladders inside the helmet prevent it from slipping. The quarterback's helmet often incorporates a microphone and speaker so he can receive plays and discuss tactics with the coach.

Shoulder and chest

The shoulder pads protect the shoulders and chest area. The outer shell is made from a tough plastic, while the insides are padded with foam to make them more comfortable. The pads are fixed with straps and buckles.

Hip protection

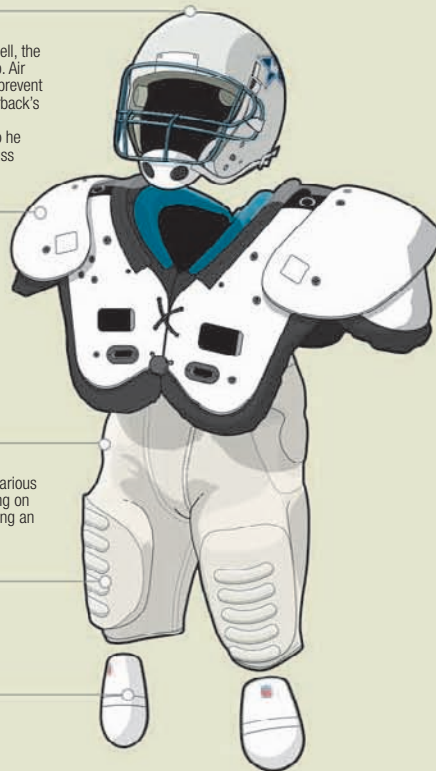
Pads for the hips come in various shapes and styles depending on field position. Players carrying an injury may also wear them for extra protection.

Thigh pads

Pads for the thighs give extra protection to these high-impact areas.

Knee protection

Rigid pads slip into pockets inside the pants to absorb blows to the knees.



SCORING POINTS

The aim of the game is to score more points than your opponent. The main way to do this is by scoring touchdowns, worth six points, by advancing the ball into your opponent's end zone. It can be run over the line or passed to a teammate in the end zone. After a touchdown, the offense can score an extra point by kicking the ball through the uprights, or two points by running or passing the ball into the end zone. A field goal worth three points can be scored by kicking the ball through the uprights. A safety (two points) is awarded if an opponent is tackled in his own end zone or drops the ball in his end zone and it goes out of play.

KICKOFFS

A kickoff starts each half and follows each score. The placekicker boots the ball from the 30-yard line, while his team-mates follow it upfield. The opposition's kick returner catches the ball and advances with it; the offensive drive starts where he is tackled. A "touchback" is signalled if the returner catches the ball in his end zone and kneels down (the drive then starts from the offense's 20-yard line). A touchback also occurs if the kick goes beyond the end zone, or if there is a turnover (the ball passing from offense to defense) in the end zone. If a safety is scored, the opposition kicks the ball to the scoring team from its 20-yard line.

PENALTIES

Penalties are given for rule violations, and usually consist of moving the ball toward the offending team's end zone, and replaying the down. Some of the most common penalties include:

BLOCK IN BACK An offensive player pushes an opponent in the back.

FACE MASK Grabbing an opponent's face mask.

HOLDING Illegally holding an opponent other than the ball carrier.

INTERFERENCE Illegally obstructing a player attempting to catch a pass.

ENFORCING THE RULES

Officials wear a distinctive uniform consisting of shirts with black-and-white stripes, white pants, and a black or white hat. The head referee guides six officials with specific duties—the umpire, head linesman, line judge, field judge, side judge, and back judge. An official signals an infringement by throwing a yellow flag. The referee then conveys the decision using a hand signal and an announcement. One referee described the job as "trying to maintain order during a legalized gang brawl involving 80 toughs with a little whistle, a hanky, and a ton of prayer."



INTERFERENCE

A penalty in which a player has interfered with another player during a passing play.



FIRST DOWN

The offense is granted a new series of four downs after gaining 10 yards.



FALSE START

This is called when a member of the offense moves illegally before the ball is snapped.



OFFSIDE

A defensive player is on the wrong side of the line of scrimmage at the start of play.



HOLDING

A penalty in which a player of either side has illegally held an opponent.



ILLEGAL BALL TOUCH

A penalty in which a player of either side has illegally touched the ball.

10 YARDS AT A TIME

Territory and possession are the keys to success in football. The team in possession of the ball is the offense. They have four chances, or "downs," to run or pass the ball 10 yards toward the end zone of the defense. If the offense gains the yards, they get another four downs in which to advance another 10 yards. The drive continues until the team scores, runs out of time, or loses possession. The offense might not make 10 yards in four downs, for example, or there could be a turnover if a pass is intercepted or the ball is fumbled. The two teams then switch roles and play continues.

IN POSITION

The three main playing units in a football team are the offense, defense, and special teams. Offense and defense are comprised of a range of different players in a variety of positions, such as the basic offense and defense formations (see right).

Special teams are the units that do anything that is not regular offense and defense, particularly kicking and returning kicks. They comprise kickers, snappers, ball holders, and returners. The placekicker kicks off and scores points by kicking the ball between the uprights. The punter "punts" the ball back to the opposition if his own team is unlikely to make 10 yards. Snappers restart play by passing the ball to a teammate. Ball holders hold the ball upright when a placekick is taken, and kick returners are catchers and runners who catch kickoffs and punts and advance them up the field.

BASIC DEFENSE

The defense aims to stop the offense from gaining yards. Most teams in the NFL use a formation called the 4-3 defense, in which four defensive linemen (two defensive ends and two defensive tackles) line up in front of three linebackers. Two safeties play behind to stop longer passes and runs, while two cornerbacks cover passes to the wide receivers.

POSITIONS:

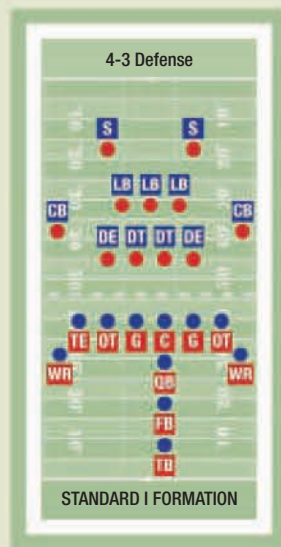
DE Defensive ends **DT** Defensive tackle
LB Linebackers **CB** Cornerbacks **S** Safeties

BASIC OFFENSE

The Standard I Formation is a common attacking offense using five offensive linemen (two offensive tackles, two guards, and the center). A tight end sits on one side of the line, and a wide receiver starts at each end of the line. This offense is typically used in running plays.

POSITIONS:

WR Wide receivers **OT** Offensive tacklers **G** Guards
C Center **QB** Quarterback **FB** Fullback **TB** Tailback
TE Tight End

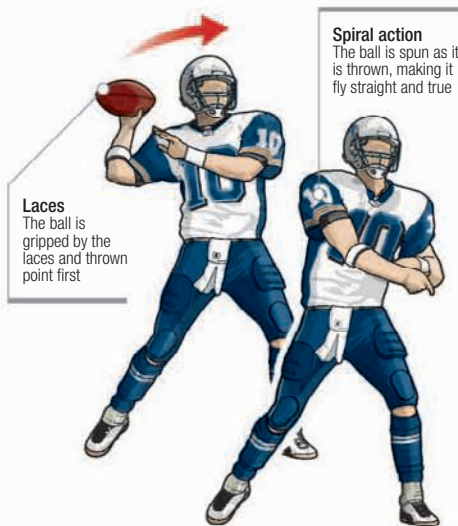


PLAYING BY THE BOOK

Strategy is an important part of every game of football. Every team, from the professional NFL down to high school teams, has a playbook of plays that have been practiced on the training field. Sometimes, teams start a game with five or six plays already decided, after which the coach calls plays to suit the stage of the game.

SPECIAL SKILLS

Each player develops specific skills according to his position. For example, blocking and tackling are important attributes of defensive linemen, a good throwing arm is an obvious requirement for a quarterback, while wide receivers combine lightning acceleration with excellent catching ability. Other players, such as the kicker and punt returner, specialize in one part of the game.

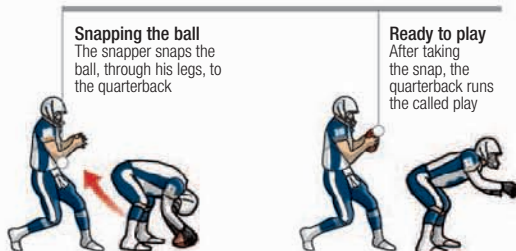


THROWING THE BALL

One of the most important duties of a quarterback is to pass the ball to a receiver. Strength and accuracy are vital, as he must be able to throw the ball to a specific player over long distances.

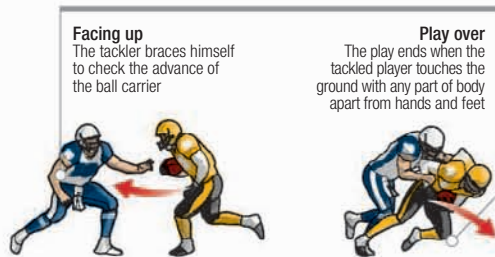
THE SNAP

Each down begins when the center snaps the ball to the quarterback. The quarterback usually stands directly behind the center. In the shotgun formation, he stands further back to create more space for the pass.



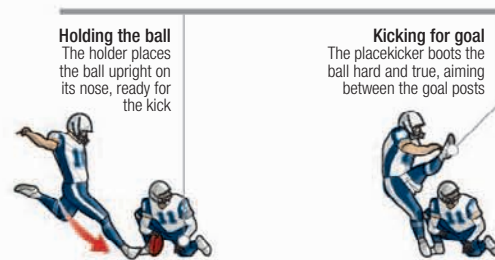
THE TACKLE

The tackler bends his knees and crouches as the ball carrier approaches. On impact, he accelerates up and through the opponent, generating power by straightening his legs and using his upper body to get the ball carrier to the ground.



THE FIELD GOAL

For a field goal attempt, the ball holder stands 7 yd (6 m) behind the center, who snaps the ball to him. The holder then catches it and sets it up for the kick. The kicker steps forward and swings his foot through the ball, propelling it between the uprights.



STAT CENTRAL

SUPER BOWL WINNERS

YEAR	WINNER
2010	NEW ORLEANS SAINTS
2009	PITTSBURGH STEELERS
2008	NEW YORK GIANTS
2007	INDIANAPOLIS COLTS
2006	PITTSBURGH STEELERS
2005	NEW ENGLAND PATRIOTS
2004	NEW ENGLAND PATRIOTS
2003	TAMPA BAY BUCCANEERS
2002	NEW ENGLAND PATRIOTS
2001	BALTIMORE RAVENS
2000	ST. LOUIS RAMS
1999	DENVER BRONCOS
1998	DENVER BRONCOS
1997	GREEN BAY PACKERS
1996	DALLAS COWBOYS

NFL ALL-TIME TOUCHDOWNS

NO.	PLAYER
208	JERRY RICE
175	EMMITT SMITH
158	LADAINIAN TOMLINSON
154	RANDY MOSS
150	TERRELL OWENS
145	MARCUS ALLEN
136	MARSHALL FAULK
131	CRIS CARTER
128	MARVIN HARRISON
126	JIM BROWN
125	WALTER PAYTON
116	JOHN RIGGINS
113	LENNY MOORE
112	SHAUN ALEXANDER
109	BARRY SANDERS

NFL ALL-TIME TOUCHDOWN PASSES

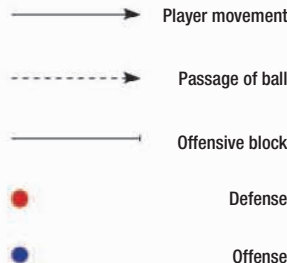
NO.	PLAYER
504	BRETT FAVRE
420	DAN MARINO
379	PEYTON MANNING
342	FRAN TARKENTON
300	JOHN ELWAY
291	WARREN MOON
290	JOHNNY UNITAS
275	VINNY TESTAVERDE
273	JOE MONTANA
261	DAVE KRIEG
255	SONNY JURGENSEN
254	DAN FOUTS
251	DREW BLEDSOE
247	BOOMER ESIASON
244	JOHN HADL

PHYSICAL SPORT

Because the only way in which to stop a ball carrier is to knock him to the ground, American football is physically very demanding on the players. Kicks, punches, and trips are strictly prohibited, and the tackler cannot lead with his helmet or grab the ball carrier's face mask in the tackle. Even with all the safety equipment, rules, and penalties governing physical contact, however, some tackles can still result in serious injuries. Most at risk are targeted players such as the quarterback and running backs. They rarely manage to play a full season without picking up an injury, and teams need a full roster of replacements.

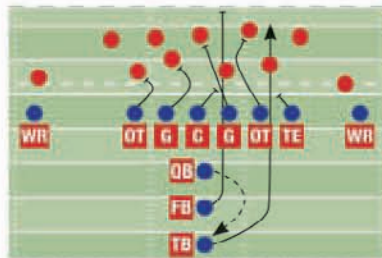
PLAYS

Offensive plays aim to advance the ball toward the opposition's end zone, with the ultimate goal of scoring a touchdown. Defensive plays aim to stop the offense from moving forward, forcing errors that could result in a turnover. Every team uses different positions and formations to deal with specific game situations.



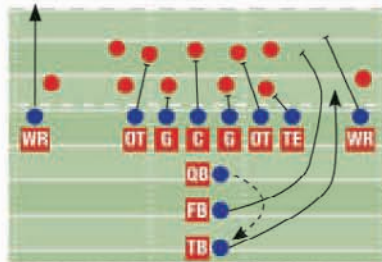
TB OFF-TACKLE

The tailback off-tackle is the most common running play in the offense. The quarterback hands the ball off to the tailback, who runs through a hole created by the offensive tackle and the tight end.



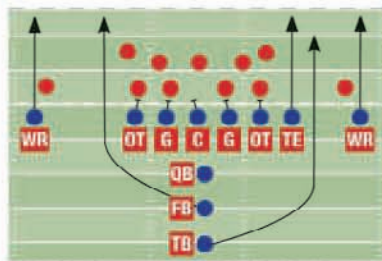
SWEEP

The sweep is a long-developing offensive running play in which the tailback takes a pass from the quarterback and then runs parallel to the line of scrimmage. This gives the fullback and offensive linemen time to block defenders in front of the tailback. Once a gap appears in the defensive line, the tailback turns back upfield and runs straight through it.



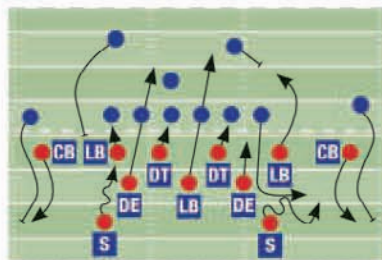
HAIL MARY

The Hail Mary is a passing play in which the quarterback throws a long ball toward a number of receivers who are simultaneously running at the defense's end zone. The play is often used as a last resort by the trailing team at the end of the game. The Hail Mary has relatively little chance of completion success, but it can force a pass interference penalty from a disorganized defense.



BLITZ DEFENSE

Defenses use the blitz to put extreme pressure on the opposing quarterback and try and force a sack. Linebackers, safeties, or cornerbacks rush the quarterback to disrupt the play. A blitz is a great way to force quarterback errors, but it also leaves receivers open to passes if the offense reads the play.



CANADIAN FOOTBALL

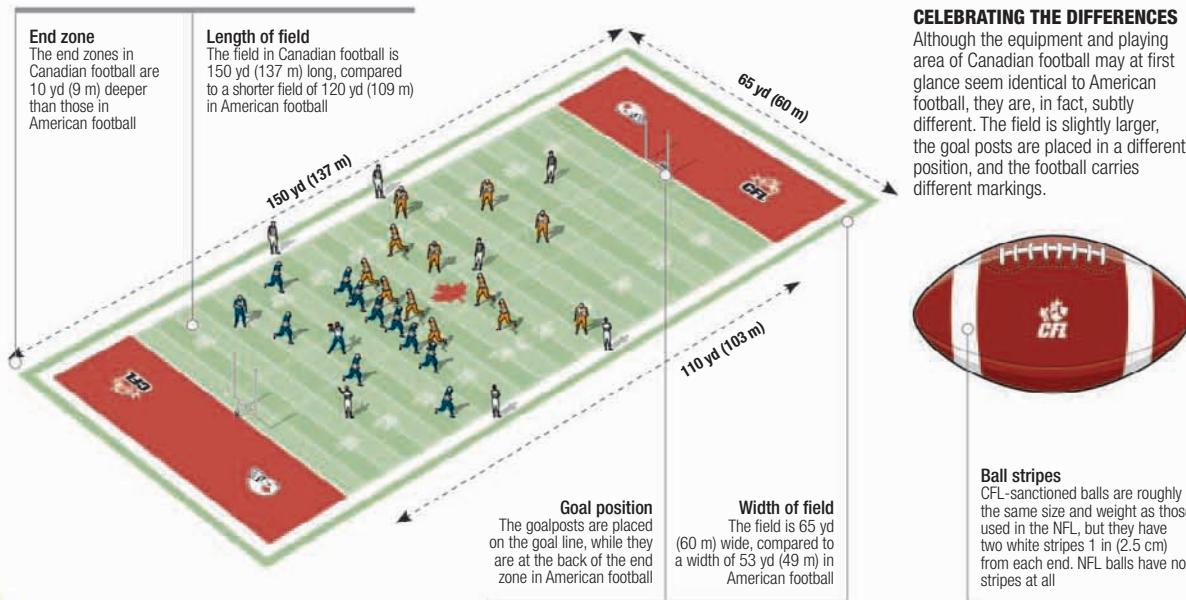
Canadian football is essentially the same as American football, but with a few key differences, as well as many minor rule distinctions. The playing field in Canadian football is generally longer and wider. Each team has 12 players on the field at any one time—the extra player in the Canadian game usually occupies a backfield position. And there are three downs to advance the ball 10 yards in Canadian football compared to four in the American game.

CANADIAN FOOTBALL LEAGUE

The Canadian Football League (CFL) has been the national governing body for Canadian football since 1958. Prior to this, the sport came under the ruling of the Canadian Rugby Union (CRU). Canadian football has developed independently of American football, and the governing bodies in each country have retained separate rules and regulations.

CROSS COUNTRY

SOME FOOTBALL PLAYERS HAVE PLAYED IN BOTH AMERICAN AND CANADIAN LEAGUES, SUCH AS THE HIGHLY DECORATED QUARTERBACK WARREN MOON. THE ONLY PLAYER TO BE INCLUDED IN BOTH NFL AND CFL HALLS OF FAME, MOON'S CAREER STATS COMBINE TOTALS FROM BOTH LEAGUES.



CELEBRATING THE DIFFERENCES

Although the equipment and playing area of Canadian football may at first glance seem identical to American football, they are, in fact, subtly different. The field is slightly larger, the goal posts are placed in a different position, and the football carries different markings.

INSIDE STORY

Football grew from rugby football, a game played in England in the early 1800s. By the 1880s, football and rugby football had grown apart as each sport developed standardized rules. Originally a college sport, football went professional in the early 1900s, and the National Football League (NFL) was formed in 1920. It became more popular in the 1950s, when TV coverage brought the sport to a national audience. Since the 1990s, football has eclipsed baseball as the most popular spectator sport in the US.

THE SUPER BOWL

The annual Super Bowl is the championship game of the NFL. Following a play-off series involving 12 teams from the NFL conferences (6 from the American Football Conference and 6 from the National Football Conference), two teams compete for the Vince Lombardi Trophy, named after the coach of the Green Bay Packers, who won the first two Super Bowls in 1967 and 1968. Traditionally, the game takes place on "Super Bowl Sunday" (in late January or early February), and is watched by hundreds of millions of people worldwide.

AMERICAN FOOTBALL AROUND THE WORLD

AMERICAN FOOTBALL ENJOYS LIMITED POPULARITY OUTSIDE THE UNITED STATES AND CANADA. THE NFL NOW STAGES AT LEAST ONE REGULAR-SEASON GAME OUTSIDE THE UNITED STATES EACH YEAR. THE SAN FRANCISCO 49ERS WERE SCHEDULED TO TAKE ON THE DENVER BRONCOS AT WEMBLEY STADIUM IN LONDON, ENGLAND, IN OCTOBER 2010. SEVERAL EUROPEAN NATIONS RUN LEAGUES WITH VARYING DEGREES OF SUCCESS. JAPAN HAS THE SUCCESSFUL PRO-X LEAGUE, AND THE SPORT IS ALSO PLAYED IN AUSTRALIA, MEXICO, AND NEW ZEALAND.

NATIONAL FOOTBALL LEAGUE (NFL)

The NFL is the leading pro football league in the United States. It comprises 32 teams in two conferences—the American Football Conference (AFC) and the National Football Conference (NFC). Each team plays 16 games during the regular season. The top six teams from each conference then compete in play-offs that culminate in the annual Super Bowl competition.

NATIONAL COLLEGE FOOTBALL LEAGUE

The college football season begins two to three weeks earlier than the NFL, toward the end of August. The regular season continues through early December, ending with the annual Army-Navy Game and several conference championship games on the same weekend. The postseason consists of a series of bowl games that showcase top college teams.



PLAYER PROFILE

Rugby Union is a hard-fought contact sport that requires players to be extremely fit, strong, and robust. The contest is particularly tough between the forwards, who are often more than 6 ft 6 in (2 m) tall and weigh in excess of 240 lbs (110 kg). They tend to have great upper-body strength and powerful leg muscles, which they use to drive themselves forward. Backs are usually shorter and smaller in frame, and tend to be more nimble. Ball handling and balance are important for the backs, who execute passes, moves, and tackles at high speed. They also need the coordination and coolness to kick and catch the ball under considerable pressure.

Rugby boots

Similar to soccer boots, they have leather uppers and flexible, synthetic soles holding studs or cleats

Leg protection

Beneath the long cotton socks, many players wear shin pads to protect their legs

Head protection

Bandages, soft padding, or scrumcaps are often worn by forwards, whose heads regularly come in contact with other heads, knees, and boots

Oval ball

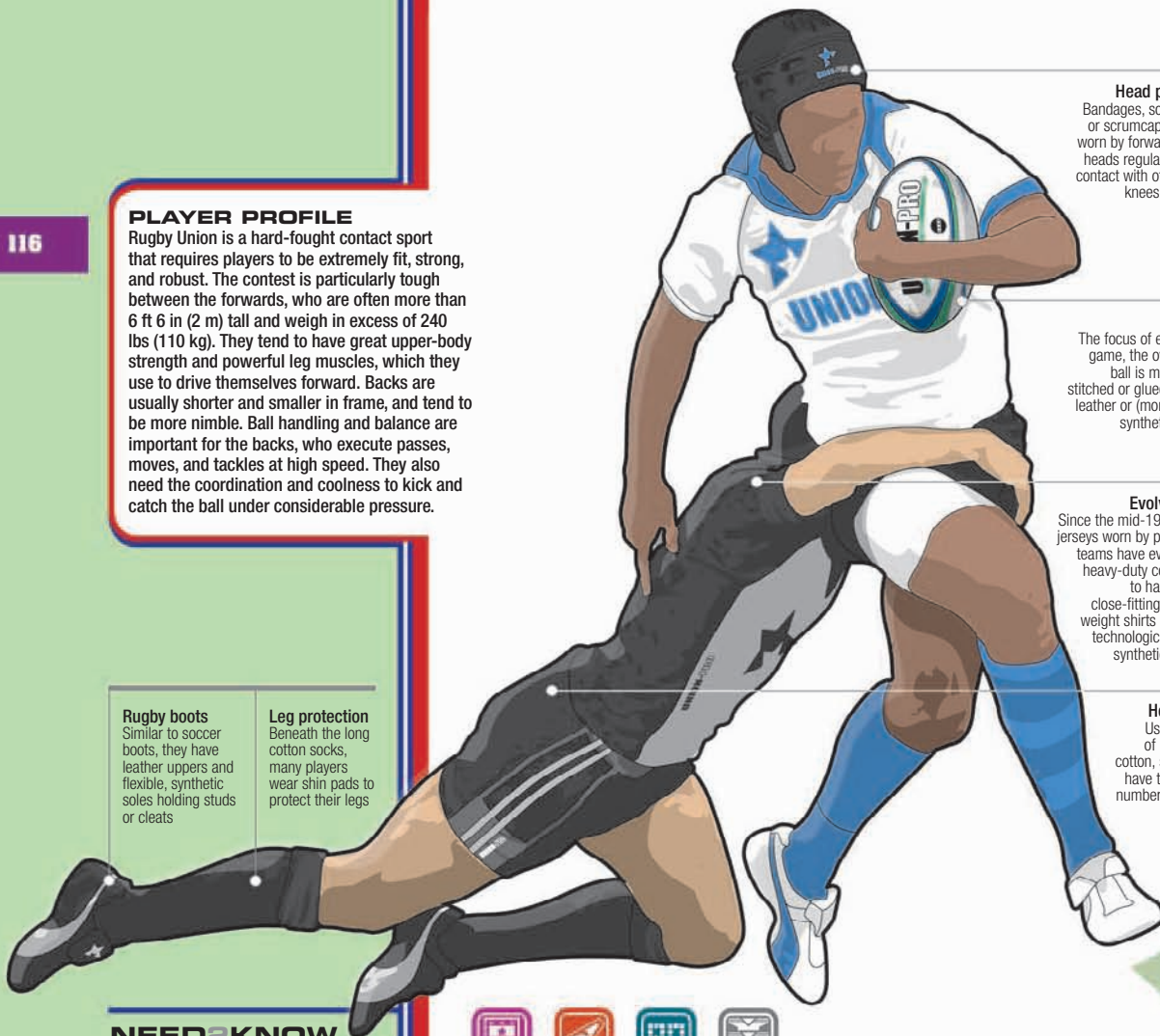
The focus of every rugby game, the oval-shaped ball is made of four stitched or glued panels of leather or (more recently) synthetic material

Evolving style

Since the mid-1990s, rugby jerseys worn by professional teams have evolved from heavy-duty cotton shirts to hard-to-grab, close-fitting, and lightweight shirts made from technologically crafted synthetic materials

Heavy duty

Usually made of heavy-duty cotton, shorts may have the player's number on the leg

**NEED2KNOW**

- Rugby Union is the most popular form of rugby, the other being rugby league (see pp.122–25).
- The sport is played in more than 100 countries around the world. It is particularly popular in Britain, Ireland, France, Australia, New Zealand, and South Africa.
- The inaugural Rugby World Cup, held jointly in New Zealand and Australia in 1987, was won by rugby's most famous team—the New Zealand All Blacks.
- The Women's Rugby Football Union was set up in Britain in 1983. The first official women's Rugby World Cup was held in 1998.



RUGBY UNION

GAME OVERVIEW

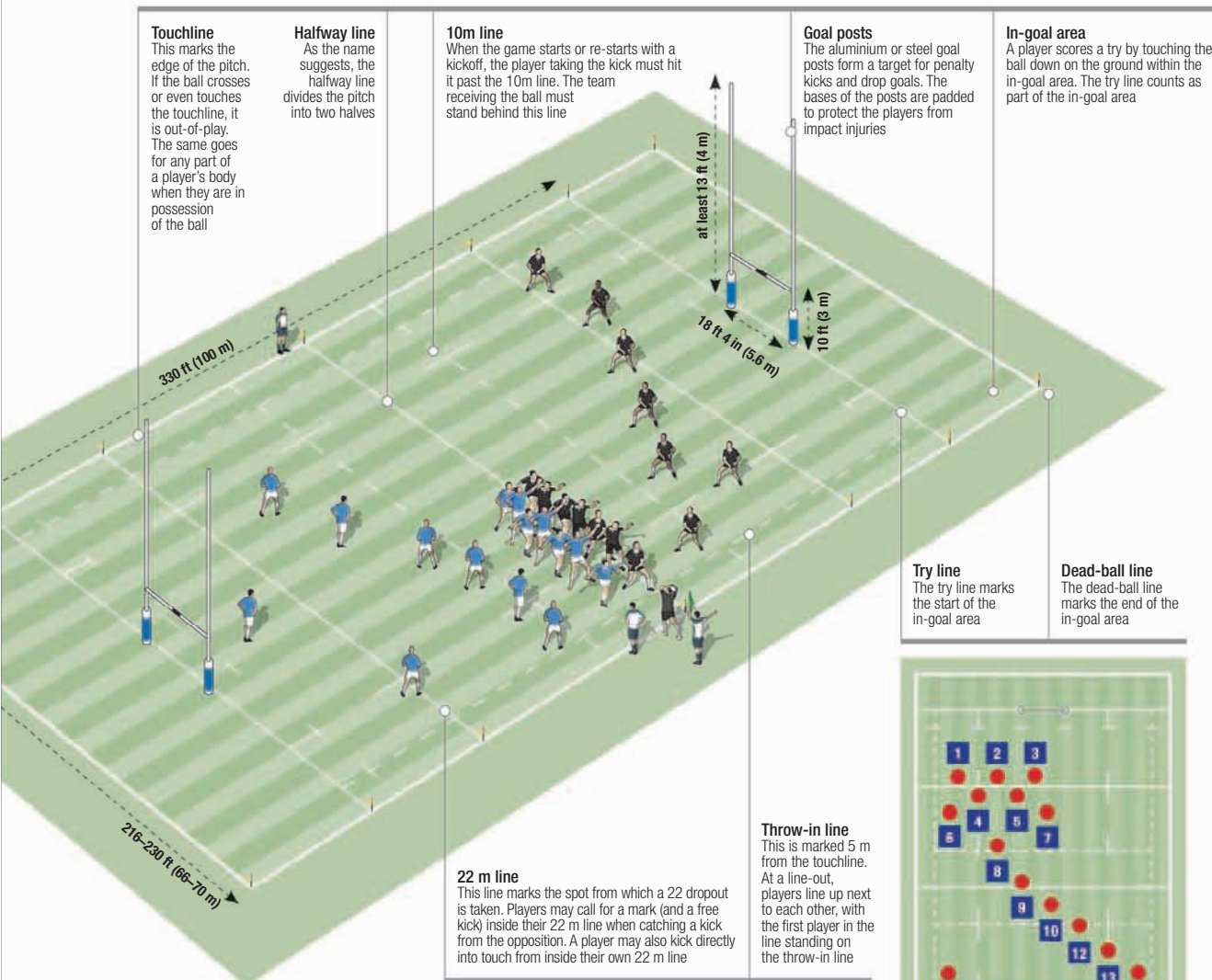
Vividly described as “a hooligans’ game played by gentlemen,” rugby union is one of the most physically punishing of all ball sports, played under a rigorous rule code. Wearing minimal protection, two teams of 15 players clash to win possession of the oval ball then advance it toward the opposition’s try line. After two halves of 40 minutes each, the winner is the team that has amassed more points by scoring tries—grounding the ball in the opposition’s in-goal area—or by kicking conversions, penalty kicks, and drop goals between the uprights and above the crossbar of the opposition’s goal posts. The fast pace and great physicality of the game can make it a highly dramatic spectacle.

DECLARATIONS OF WAR

MANY SOUTHERN HEMISPHERE TEAMS PSYCH THEMSELVES UP AND INTIMIDATE THEIR OPPONENTS BY PERFORMING TRADITIONAL WAR DANCES BEFORE INTERNATIONAL MATCHES. THE MOST FAMOUS IS THE "HAKA" OF THE NEW ZEALAND ALL BLACKS. THE FIJIAN RUGBY TEAM PERFORM THE "CIBI" (PRONOUNCED "THIMBI"), THE TONGAN TEAM PERFORM THE "KAILAO", AND THE SAMOANS PERFORM A WAR DANCE CALLED THE "MANU."

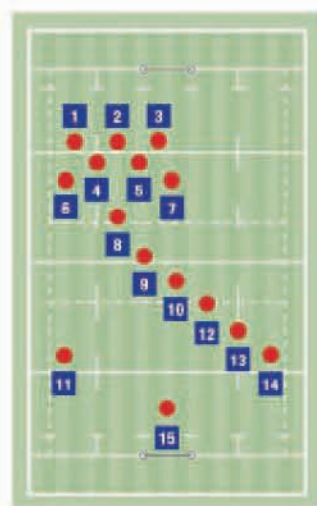
THE RUGBY PITCH

Rugby union is played on a rectangular grass playing field or pitch. In professional rugby, the length of the pitch is always 330 ft (100 m) from try line to try line, but the width of the pitch and the distance from try line to dead ball line may vary. Each team defends an in-goal area behind the goal posts defined by the try line, the dead ball line, and the touchlines. Between the two try lines, a series of solid and dotted white lines are marked at regular intervals. These divide the pitch into zones, indicating where restarts are taken from and where players need to position themselves during set-pieces.



TEAM UNITS

A rugby team is made up of eight forwards and seven backs. The forwards are made up of a sturdy front row—two props and a hooker; a towering second row—two locks; and a tough but mobile back row—two flankers and a number eight. In the backs, the tenacious scrum half follows the ball and moves it between the forwards and the backs. The fly half is the team's play maker and pivotal figure. He calls and initiates moves, and usually does most of the kicking. The two centers are the defensive heart of the backs and, in attack, look for holes in the opposition's defenses. The wingers and full back are the team's real speed merchants—often running in tries at the end of backs moves—but also the last line of defense.



POSITIONS BY NUMBER:

1 Loosehead prop **2** Hooker **3** Tighthead prop
4 Left lock **5** Right lock **6** Left flanker **7** Right flanker
8 Number eight **9** Scrum half **10** Fly-half
11 Left wing **12** Left center **13** Right center
14 Right wing **15** Full back

RUGBY GOLDMINE

ALTHOUGH RUGBY LEAGUE HAD LONG BEEN A PROFESSIONAL SPORT, RUGBY HELD ON TO ITS AMATEUR STATUS UNTIL 1995. POPULAR WITH SPECTATORS AND TV AUDIENCES, IT HAS SINCE BECOME THE MORE PROMINENT AND LUCRATIVE FORM OF THE GAME, AND HAS ATTRACTED SOME OF THE BEST LEAGUE PLAYERS.

WHAT THEY WEAR

Traditional rugby gear consists of just a jersey, shorts, socks, and boots. Although at most levels of the game little has changed, the professional game has seen quite an advance in the materials used in making rugby shirts (see p.116). Similarly, a new approach to injury prevention has seen the emergence of various body protection systems.

Some forwards wear scrum caps to avoid “cauliflower ear”—permanent swelling caused by rubbing of the ears during scrums—and to provide protection against impacts. Upper-body padding has evolved more recently and is becoming increasingly popular.

BODY PROTECTION SYSTEMS

Unlike most sports that involve crunching physical contact, rugby players traditionally wore relatively little in the way of protective clothing. Some professional players now choose to wear padding around the head, shoulders, and collarbone.

Scrum cap

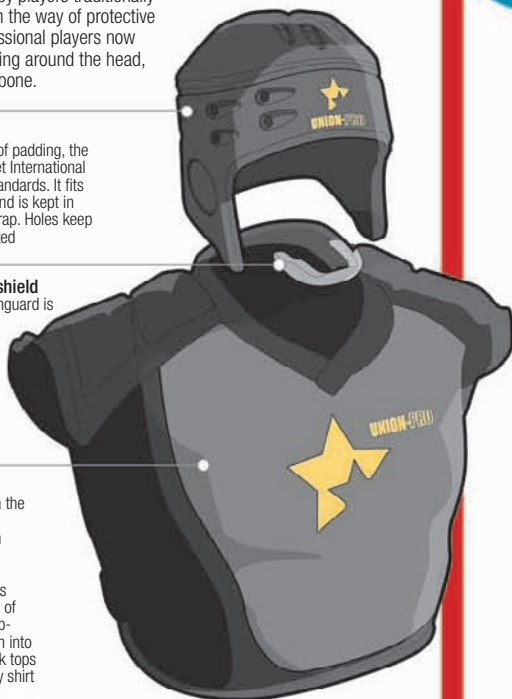
Like the other items of padding, the headguard must meet International Rugby Board (IRB) standards. It fits snugly on the head and is kept in place using a chin strap. Holes keep the head well ventilated.

Universally worn shield

An orthodontic mouthguard is custom-made by a dentist. Cheaper versions are molded by biting into a mouthguard that has been softened in hot water.

Body padding

Any padding worn on the shoulders must be light and thin enough to conform to strict IRB guidelines. Most shoulder-pad systems are made of sections of ventilated honeycomb-formed material sewn into tight-fitting nylon tank tops worn under the rugby shirt.



BALL DIMENSIONS

Although balls used in junior rugby come in smaller sizes, balls used in senior rugby must be 11–12 in (28–30 cm) long and 23–24 in (58–62 cm) at their widest point.



HIGH-CUT BOOTS

Although some rugby boots are made with high-cut designs, giving extra ankle protection, many rugby players prefer to wear low-cut soccer shoes offering extra mobility.

SCORING POINTS

There are four main ways of scoring in rugby: a try, a conversion, a penalty goal, and a drop goal. A player scores a try by grounding the ball in the opposition's in-goal area. A try is worth five points and earns the chance of a conversion—a place kick that is worth an extra two points. A kick at goal as the result of a penalty is taken just like a conversion, but is worth three points. Also worth three points, a drop goal can be taken at any time from anywhere on the pitch, but the player must drop the ball on the ground just as he kicks it.

TELEVISION MATCH OFFICIAL

Professional rugby matches are frequently shown on sports channels. In these games, a television match official will be present to assist the match referee. The television match official (TMO) is a fully qualified referee, and his or her main job is to decide whether a try has been scored when the match referee is in doubt. Most TMO decisions confirm whether the player is in full control of the ball when it is grounded. The TMO studies television replays from various angles to decide whether to award a try.

PLAYING THE GAME

Teams gain territory by running with the ball in hand, and passing it between players. Passes must not go forward, but kicking the ball forward is allowed. Kicking is a key way to gain territory, often by sending the ball into touch and setting up a line-out. The main method of defense is tackling the player with the ball. Tackles must be made below chest height, and tackling a player without the ball is forbidden.

SET PIECES

Central to the sport are the set pieces that restart a game after a stoppage: restart kicks at the start of each half and after a score; line outs when the ball has gone in to touch; and scrums after infringements such as a forward pass.

Throw in

The hooker throws the ball toward a teammate in the line. Coded calls identify the player who should jump for the ball, so that the opposition does not know who to jump against.

Jumper

The tall locks are the common targets in a line-out. The props help to lift the jumper. The flankers and number eight clean up and secure possession.



LINE-OUT

The line-out is a jumping contest to secure the ball, complete with deception, lifting, and precise timing. Each team may put between two and seven players in the line.

GROUNDING THE BALL

The grounding of a ball in the opposition's in-goal area is technically more complicated than it might appear. The key rules are that, first, the player must be inbounds, and second, that they must be in control of the ball as they ground it. Players are allowed to slide into the in-goal area to score a try, but they cannot make a double movement to get the ball on or over the line.



In control
Here, the attacking player grounds the ball with sufficient downward pressure to show he is in full control

PENALTY TRY

A penalty try is awarded for deliberate or repeated foul play, or if a penalty offense prevents the scoring of a probable try. The subsequent conversion is lined up between the posts.



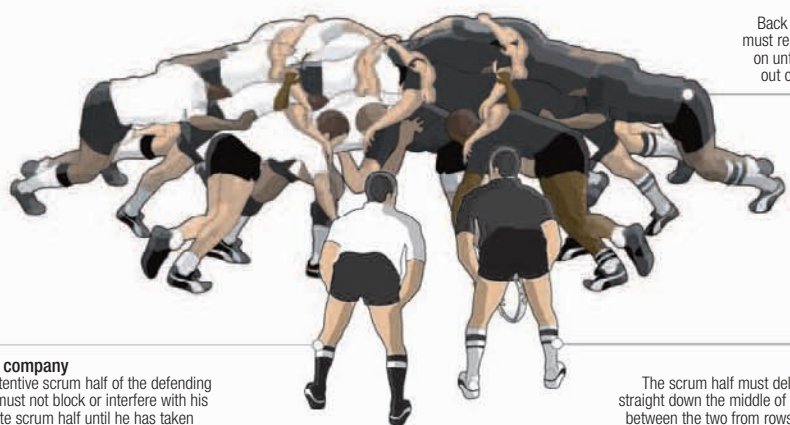
Successful kick
The ball must pass between the uprights and above the crossbar to score

KICKING POINTS

A penalty kick is taken from the place where the offense was committed, or from where the ball lands if a player is obstructed after he punts it. While the kick is being taken, the opposing team cannot encroach within 33 ft (10 m). A conversion is taken from any distance in line with the spot where the try was scored. Defenders can start to charge down conversion attempts as soon as the kicker starts to move toward the ball.

HEAD TO HEAD

A scrum is a contest of brute strength and scrummaging technique. The forward pack of each team binds together in formation, and on the order of the referee engages the other pack head-on. On a signal given by the hooker, the scrum half rolls the ball into the channel between the two teams. The hooker then attempts to secure the ball by heeling it toward the back of the scrum.



Bound on
Back row players must remain bound on until the ball is out of the scrum

Close company
The attentive scrum half of the defending team must not block or interfere with his opposite scrum half until he has taken the ball from the scrum

Put-in
The scrum half must deliver the ball straight down the middle of the channel between the two from rows. A crooked delivery results in a penalty for "feeding"

RUCKING AND MAULING

Rucks and mauls are contests for ball possession during open play. A ruck forms when the player carrying the ball goes to ground. The first players to arrive from either side can bind together over the ball, pushing their opponents back and using their feet to "ruck" the ball back to their side. A maul is similar to a ruck, but the ball carrier remains on his or her feet, allowing the clump of players to move up and down the field.



Gone to ground
When the ball carrier goes to ground he or she must release the ball immediately or risk a penalty

NO HANDS
Players bound in a ruck may not use their hands to free the ball. If the ball becomes stuck, a scrum is given to the advancing side.

SIDELINES

6,288 The distance, in yards (5,750 meters), that the average professional rugby back covers during a game.

45 The highest number of points scored by a single player in an international competition. It was achieved by Simon Culhane of New Zealand during its 145-17 victory over Japan during the 1995 Rugby World Cup.

750,000 The estimated number of people who gathered in London's Trafalgar Square on December 9, 2003, to greet England's World-Cup winning squad.

152 The highest winning margin in an international game. Argentina beat Paraguay 152-0 in May 2002. Japan won by the same margin in its 155-3 victory over Chinese Taipei in July 2002.



RULES OF RUGBY

The most fundamental rule in rugby is that the ball must not be passed or knocked forward from the hands. The result is a scrum to the opposition. Free kicks are awarded for lesser infringements, such as technical offenses, while penalties are awarded against players who become involved in the game while in an offside position, or commit acts of foul play.

STAYING ON SIDE

During open play a player is deemed offside if he or she is in front of a team-mate who is carrying the ball. They are liable to concede a penalty if they try to take part in the game before they are back in an onside position. A scrum is awarded against players that are accidentally involved in the game while in an offside position. The offside rule also comes in to play at set-pieces and when mauls and rucks are formed.

PENALTIES AND FOUL PLAY

Many penalties are awarded for fouls at close quarters, such as in a ruck or maul. Players often foul to slow down the speed at which the opposition release the ball into play, or in order to speed up their own ball. Examples of foul play fall in to one of four categories: obstruction, unfair play, repeated infringements, and dangerous play and misconduct.

OBSTRUCTION—charging or pushing when players are running for the ball; running in front of a ball carrier; blocking a tackler; blocking the ball; a ball carrier running in to a team mate during a set-piece; obstructing a scrum half during a scrum.

UNFAIR PLAY—time wasting; intentionally throwing or knocking the ball out of play; intentionally infringing any law of the game or playing unfairly.

REPEATED INFRINGEMENTS—a player's repeated infringement of any law of the game, whether intentional or not; repeated infringements committed collectively by a team.

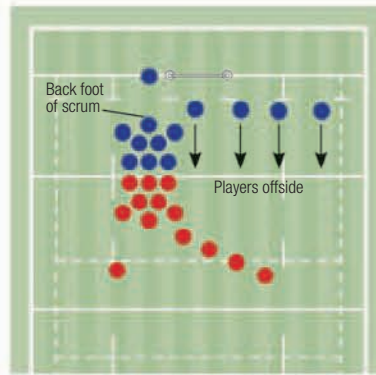
DANGEROUS PLAY AND MISCONDUCT—offenses include: stamping on or kicking an opponent; tripping an opponent with a leg or foot; early or late tackles; tackling an opponent above shoulder height; tackling a player without the ball; tackling a player with their feet off the ground; intentionally charging a player that has just kicked the ball; dangerous play in a scrum, ruck, or maul; retaliation.

CARD CAUTIONS

As in other sports such as soccer, rugby referees may make use of a card cautioning system. Any player who infringes any part of the foul play law is subject to a verbal warning, then yellow and red cards. If the referee awards a player a yellow card they must spend ten minutes off the pitch, in what has become known as the "sin bin," leaving their team short-handed. If the player commits a further cautionable offense once back on the pitch they are awarded a red card, and sent off for the remainder of the match.

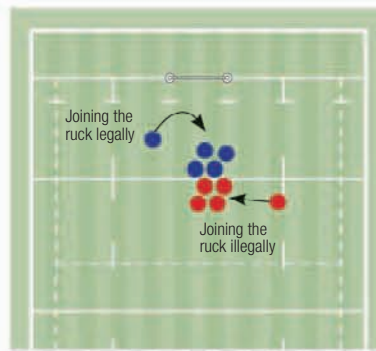
"HE IS A FREAK...!"

THE 1995 RUGBY WORLD CUP SAW THE EMERGENCE OF A TRUE RUGBY SUPERSTAR. AFTER JUST TWO CAPS, JONAH LOMU'S INCLUSION IN THE ALL BLACKS SQUAD CAUSED RAISED EYEBROWS. BUT BEFORE LONG HE WAS SWEEPING ASIDE ALL BEFORE HIM. IN THE SEMI-FINAL, IN A DISPLAY OF PURE POWER, LOMU DESTROYED THE ENGLISH BACK, SCORING FOUR TRIES AND LEAVING THEIR PRIDE AND BODIES DENTED. AFTER THE GAME, THE DEFEATED ENGLAND CAPTAIN WILL CARLING SAID OF LOMU, "HE IS A FREAK, AND THE SOONER HE GOES AWAY, THE BETTER."



OFFSIDE AT A SCRUM

As in other set-pieces, once a scrum is formed, specific offside rules come into play. Imaginary offside lines run across the pitch 5m behind the rear player in the scrum on each side. Any players, apart from the scrum halves, that cross these lines are deemed offside.



RUCK INFRINGEMENT

Offside rules apply to players joining rucks and mauls. During a ruck or maul a player is deemed offside if he or she enters from the side or from the side of the opposing team. Players may only join the ruck or maul, and bind on to their team mates, from the very back.

TACTICAL APPROACHES

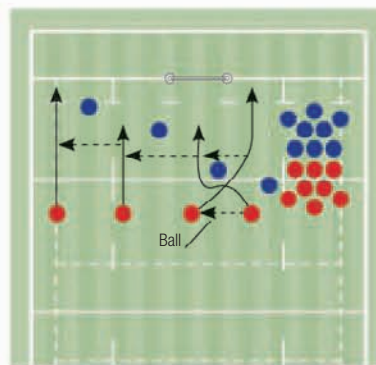
Although the styles of rugby playing have evolved over time, and have even varied in different parts of the world, there are two main tactical approaches to the game of rugby.

KICKING GAME

The first is a forward-dominated, kicking game in which the attacking team secures the ball and keeps it at close quarters, using forward drives and resulting mauls, rucks, and scrums. They also use searching kicks into touch to move upfield and rely on forward muscle to regain the ball in advanced positions. Coupled with a keen blanket defense, this is often an effective approach, resulting in lots of kicks at goal.

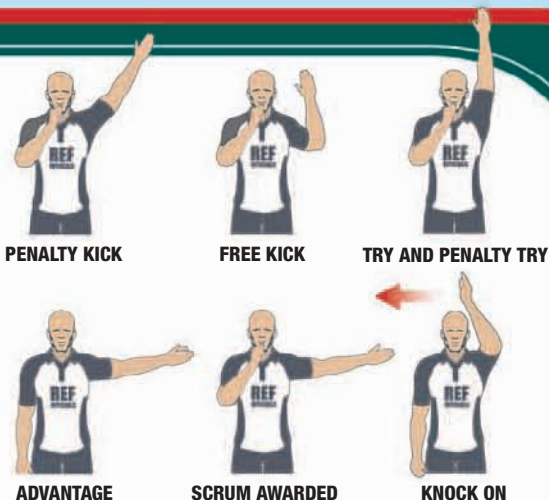
15-MAN RUGBY

The second approach is a fast-moving running game in which the team uses speed of movement and ball skills to create space and gain territory. Often referred to as "15-man rugby," this style of play relies on the full integration of mobile forwards and swift backs and at its best results in an entertaining display of try-scoring action.



SET MOVES

Both forwards and backs have set moves or plays that they practice in training. The backs' move shown left, known as a loop, involves drawing opposing players out of position to create an overlap that the fast wide players can exploit.



RUGBY SEVENS

The origins of rugby sevens lie in the Scottish town of Melrose in the 1880s, when local butcher Ned Haig organized a game as a charity fundraiser. The game proved popular and quickly spread across the world. Sevens is played using the laws of rugby union, but each team fields only three forwards and four backs. The game is played on a full-size pitch, so players have to cover a huge amount of ground—sevens is a game for the super fit. A match is played over two 7–10 minute halves. The IRB organizes international competitions, including the IRB Sevens World Series and the Rugby World Cup Sevens. The first women's Rugby World Cup Sevens will take place in 2009.

INSIDE STORY

The apocryphal story of the game's invention recounts how William Webb Ellis, a pupil at Rugby School in the 1820s, picked up the ball during a game of soccer and ran with it. By the end of the century the Rugby Football Union (RFU) and the International Rugby Football Board (IRFB) had been formed to standardize the rules and govern the game. Eventually the RFU joined the IRFB, and in 1995 the IRFB became the International Rugby Board (IRB) as the game entered the professional era. The IRB now boasts a membership of more than 100 member and associate member countries.

MAJOR CHAMPIONSHIPS

Staged every four years since 1987, the Rugby World Cup is the sport's leading competition with 20 countries competing to become world champions. The World Cup features group and knock-out stages, and the winners of the final are awarded the Webb Ellis Cup. Rugby's other international championships, held annually, are the Tri Nations in the southern hemisphere and the Six Nations in the northern hemisphere.

DOWN UNDER

The Tri Nations Series is the annual competition contested by the Southern Hemisphere's rugby superpowers: Australia, New Zealand, and South Africa. The competition is organized as a mini-league, with each team playing the other three times. The overall winning team in the matches between Australia and New Zealand also win a trophy called the Bledisloe Cup.

OLD RIVALRIES

In the Northern Hemisphere, the Six Nations (previously the Five Nations) is the premiere European tournament. England, France, Ireland, Italy, Scotland, and Wales play each other once, with home advantage alternating from year to year. Victory in all five games is called a Grand Slam. There is also a women's Six Nations that used to feature Spain and not Italy, but Italy has now replaced Spain.

STAT CENTRAL

RUGBY WORLD CUP WINNERS

YEAR	COUNTRY
2007	SOUTH AFRICA
2003	ENGLAND
1999	AUSTRALIA
1995	SOUTH AFRICA
1991	AUSTRALIA

MOST FIVE AND SIX NATIONS TITLES

NO WINS	(SHARED)	COUNTRY
25	(10)	ENGLAND
24	(11)	WALES
17	(8)	FRANCE
14	(8)	SCOTLAND
11	(8)	IRELAND

EUROPEAN (HEINEKEN) CUP WINNERS

YEAR	TEAM	COUNTRY
2010	TOULOUSE	FRANCE
2009	LEINSTER	IRELAND
2008	MUNSTER	IRELAND
2007	WASPS	ENGLAND
2006	MUNSTER	IRELAND
2005	TOULOUSE	FRANCE
2004	WASPS	ENGLAND
2005	TOULOUSE	FRANCE
2002	LEICESTER	ENGLAND
2001	LEICESTER	ENGLAND

HIGHEST POINTS TOTAL IN TESTS

POINTS	PLAYER	TEAM
1178	JONNY WILKINSON	ENG/LIONS
1118	DAN CARTER	NZL
1090	NEIL JENKINS	WAL/LIONS
1010	DIEGO DOMINGUEZ	ARG/ITALY
967	ANDREW MEHRTENS	N.ZEALAND
963	RONAN O'GARA	IRE/LIONS
911	MICHAEL LYNAGH	AUSTRALIA
893	PERCY MONTGOMERY	RSA
878	MATT BURKE	AUSTRALIA
868	STEPHEN JONES	WAL/LIONS

MOST TRIES IN TESTS

TRIES	PLAYER	TEAM
69	DAISUKE OHATA	JAPAN
64	DAVID CAMPESE	AUS
51	SHANE WILLIAMS	WALES
49	RORY UNDERWOOD	ENGLAND
49	DOUG HOWLETT	NZL
46	CHRISTIAN CULLEN	NZL
46	JOE ROKOCO	NZL
40	GARETH THOMAS	WALES



GAME OVERVIEW

Regarded as one of the most demanding contact sports in the world, rugby league is played between two teams with 13 players on each side. The object of the sport is to use a ball to score more points than the opposing team over two 40-minute periods. Points are awarded by touching the ball down over the opposition's try line and by kicking the ball over the crossbar. With its roots in the north of England, this fast-paced sport also enjoys popularity in Australia, New Zealand, and the Pacific region.

SIDELINES

40 The percentage of active rugby league supporters who are female.

1,735 The greatest number of points in all competitions in one season was scored by Wigan over 45 matches in 1994–95.

11 The number of tries scored by George West of Hull Kingston Rovers when playing Brookland Rovers in 1905.

40,000 The number of registered rugby league players in the UK, playing for over 450 clubs nationwide.

RUGBY LEAGUE



Head protection

Helmets are especially worn by front-row forwards to protect them in the scrum and are made of lightweight, shatter-resistant plastic.

Shirt

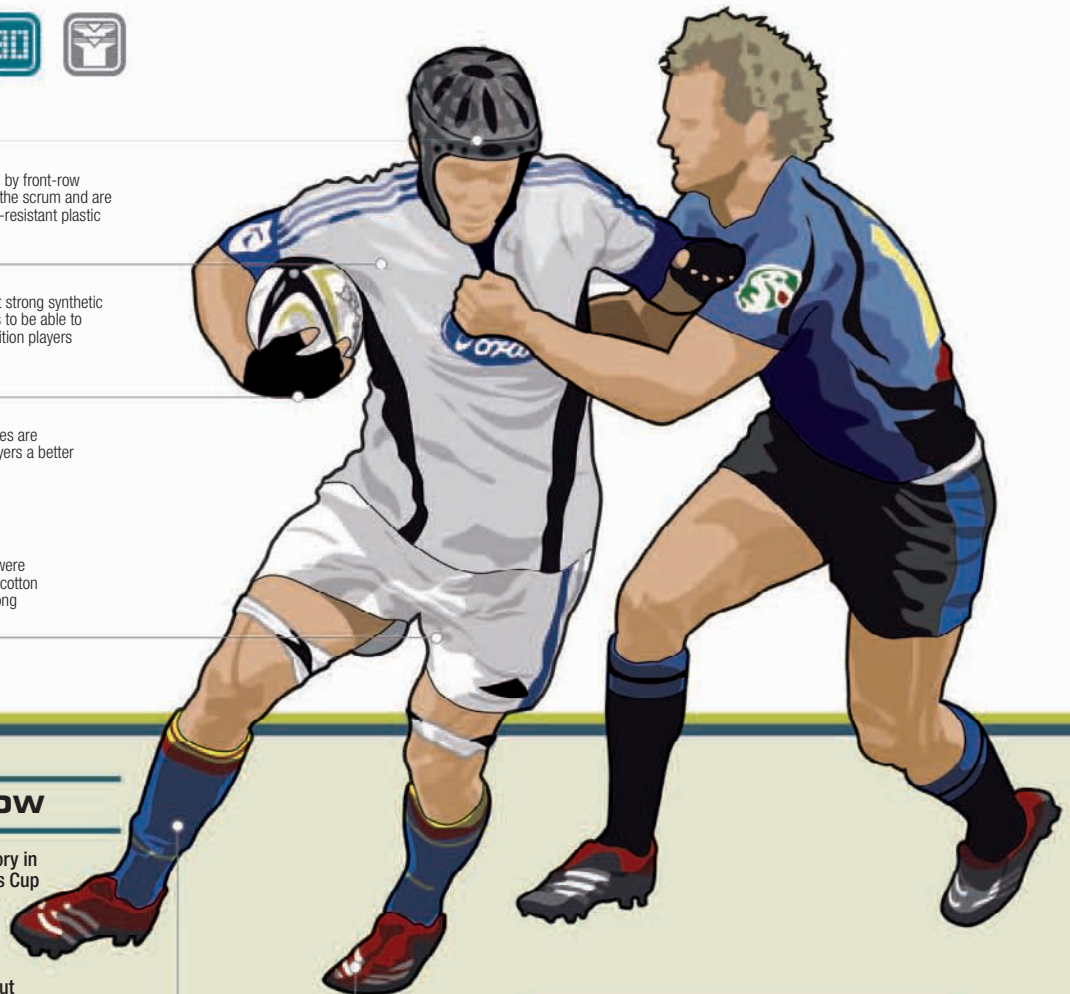
Made from a lightweight but strong synthetic material, a player's shirt has to be able to withstand the tugs of opposition players.

Tight grip

Fingerless, close-fitting gloves are sometimes worn to give players a better grip of the ball.

Shorts

As with rugby shirts, these were traditionally made of strong cotton but are now available in strong synthetic materials.



NEED2KNOW

- New Zealand's victory in the 2005 Tri-Nations Cup was Australia's first test series loss for 27 years.
- The biggest knockout rugby league competition in the world is the Carnegie Champion Schools tournament held in New Zealand, with 1,000 schools and 16,000 players taking part.
- The first Rugby League World Cup was held in France in 1954, with Great Britain, Australia, and New Zealand playing alongside the host nation.

Socks
Part of the team uniform, socks provide some protection for the lower leg.

Boots
High cut to provide support for the ankle.

PLAYER PROFILE

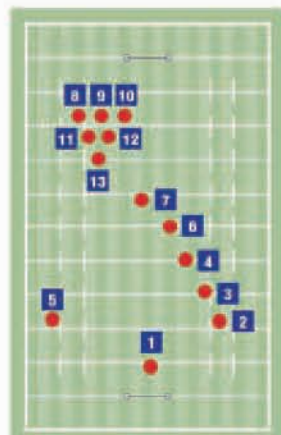
To succeed in a demanding sport like rugby requires physical strength, stamina, and speed. Ball-control skills are key, both through kicking and catching, with an ability to handle the ball at pace a vital skill. All-around tactical awareness is essential, particularly for those in positions such as stand off and scrum half.

LEAGUE FIELD

A rugby league field is a grass playing area covered with markings and with goal posts at either end. The playing area is bordered by a touchline and is divided into a number of different zones. The line that runs underneath the posts is called the try line, and it is across this that a team will attempt to touch the ball down to score a try. Behind this is the dead ball line, beyond which is out-of-bounds. Lines are also marked out every 33 ft (10 m) along the field.

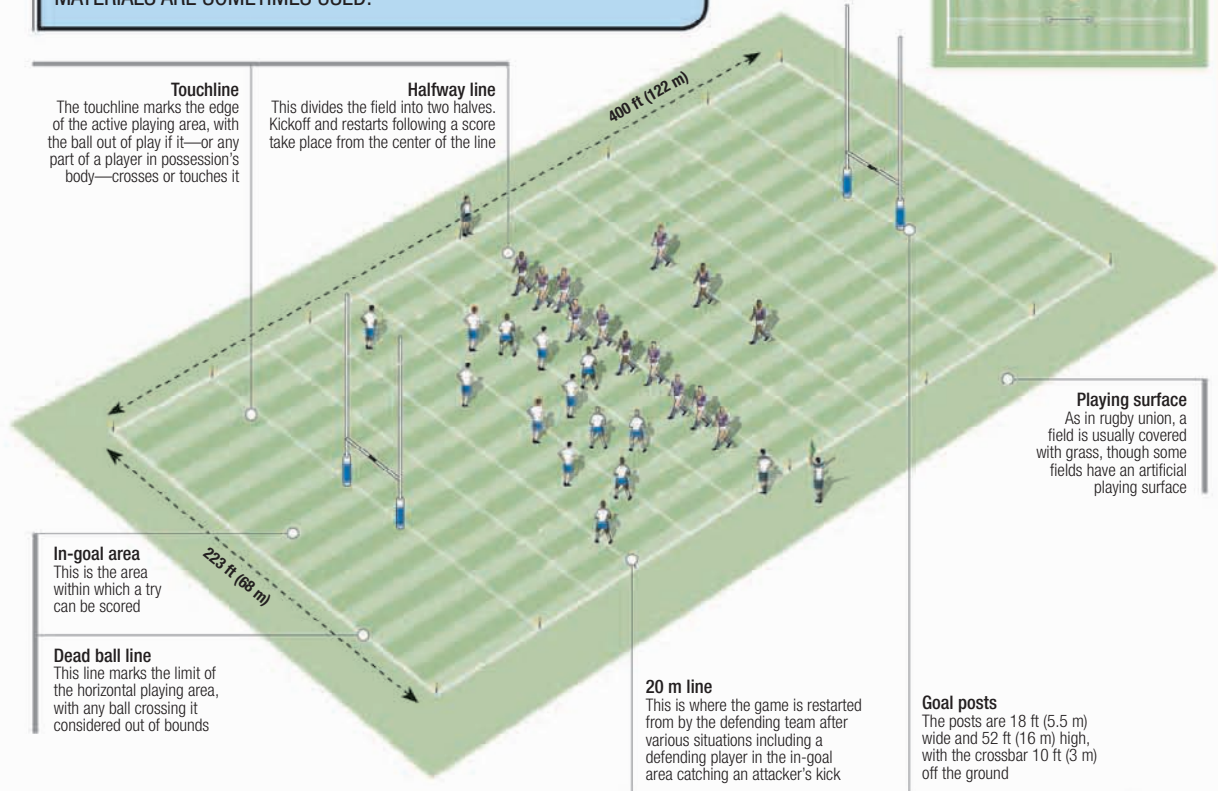
POSITIONS BY NUMBER:

- 1 Full back
- 2 Right wing
- 3 Center
- 4 Center
- 5 Left wing
- 6 Stand-off
- 7 Scrum half
- 8 Prop
- 9 Hooker
- 10 Prop
- 11 Second row
- 12 Second row
- 13 Loose forward



THE RUGBY BALL

RUGBY LEAGUE IS PLAYED WITH AN OVAL-SHAPED BALL THAT HAS TO MEASURE BETWEEN 11–12 IN (280–300 MM) IN LENGTH. MOST ARE MADE OF LEATHER, ALTHOUGH WATER-RESISTANT SYNTHETIC MATERIALS ARE SOMETIMES USED.



Touchline
The touchline marks the edge of the active playing area, with the ball out of play if it—or any part of a player in possession's body—crosses or touches it

Halfway line
This divides the field into two halves. Kickoff and restarts following a score take place from the center of the line

In-goal area
This is the area within which a try can be scored

Dead ball line
This line marks the limit of the horizontal playing area, with any ball crossing it considered out of bounds

20 m line
This is where the game is restarted from by the defending team after various situations including a defending player in the in-goal area catching an attacker's kick

Playing surface
As in rugby union, a field is usually covered with grass, though some fields have an artificial playing surface

Goal posts
The posts are 18 ft (5.5 m) wide and 52 ft (16 m) high, with the crossbar 10 ft (3 m) off the ground

WHAT THEY WEAR

This high-impact sport needs high-quality body protection. Gumshields are universally used, while many players also choose to wear body padding and some sort of headgear. All will provide some degree of protection from opposing players' flailing boots and grappling hands.



Custom fit
The gumshield is individually made by a dentist

GUMSHIELD
Made from molded plastic, this protects the teeth and mouth and is an essential piece of equipment.



Head protection
The helmet should be a comfortable fit, but too tight to be pulled off

HEADGEAR
Helmets, or skullcaps as they are sometimes known, wrap around the head and ears. They are usually worn by the players that form part of the scrum.



Pad flexibility
Foam pads are often removable to suit a player's needs

Shoulder pads
Padding protects the most impact-prone area of the body

Chest plate
This protects the sternum (breast bone)

Flexible material
Elasticated material allows freedom of movement

PROTECTIVE UNDERSHIRT
Rugby tackles put immense strain on a player's shoulders, hence the reason why many wear padding on the upper body. Protective undershirts are made from a breathable, elasticated material.



PLAYING RUGBY LEAGUE

A game starts with a player from one team kicking the ball into the opposition team's half. As soon as the ball is under control by a player, that player's team is given the chance to try to work the ball up the field and over the opposition try line by passing the ball to each other while avoiding being tackled and kicking the ball upfield. If the attacking team has not scored after being tackled six times then possession is handed over to the opposing team, although if a try seems unlikely after the fifth tackle then the usual course of action is a long kick into the opposition's half.

PLAY-THE-BALL

After a player has been tackled, he must return the ball into active play through a motion called a "play-the-ball." This involves the player standing up and rolling the ball under his feet to a teammate standing behind him who then initiates play once more by running with the ball, passing it, or kicking it. During the play-the-ball, players from the opposing team must be situated at least 33 ft (10 m) away from the action, otherwise the referee has the option of awarding a penalty against that team for being "offside."



RESTARTING PLAY

After a break in play the game is restarted with a kick-off, a play-the-ball, a dropout kick, a penalty, or a "scrum." A scrum is when the six forwards from each side interlock and apply pressure against each other, with the ball then fed into the central "tunnel."

20 M DROPOUT

If a team is awarded a penalty it can decide to kick into "touch" (out of bounds but in a penalty situation moves the action up to the point where the ball crossed the line). If the kick crosses the dead-ball line, the game restarts with a drop-kick from the 20 m line.

20 M RESTART

Play restarts from the 20 m line if a player from a defending team standing in the "in-goal" area (behind the try line) cleanly catches a ball kicked by an attacking player. It also restarts from here if an attacking player touches a ball before it crosses the dead-ball line.

40/20 KICK

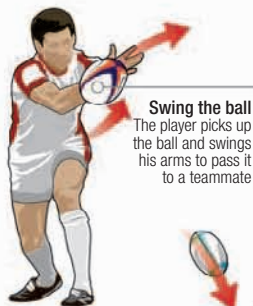
If a player positioned within his team's 40 m line kicks the ball in general play and the ball bounces before it goes into touch within the opposing team's 20 m line, his team gets put in at a scrum. The likelihood is that the team will win the scrum and get a further six tackles.

SPECIALIST SKILLS

Rugby league involves a range of individual skills and techniques that, when used together, enables a team to secure the points needed to win a game. Players need good passing and catching ball-handling skills, while the ability to make a strong tackle is a core prerequisite of playing the sport. All kicks, whether a drop-kick, a positional punt upfield, or a placekick after a try need to be executed with accuracy.

PASSING

Passing is a basic skill required by players in every position. If timed and delivered well, a pass can take out opponents and create a try-scoring opportunity. Players must always pass the ball backward—a forward pass results in the team in possession being penalized.



PASSING FROM THE GROUND

Picking the ball up from the ground and passing it occurs after a play-the-ball and a penalty kick into touch.

CATCHING

This can range from taking a pass from a teammate in close proximity to catching a high kick from the opposing side with that team's forwards bearing down on you. Good hand-eye coordination is essential.

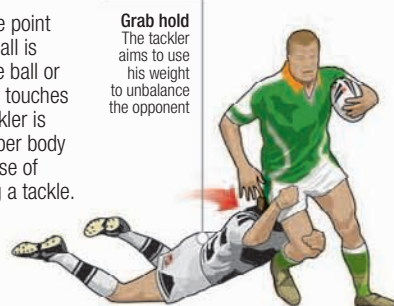


CATCHING A HIGH BALL

A player needs to keep his eye on the ball and, if opposition players are close by, time his jump to make the catch.

TACKLING

A tackle is defined as the point when a player with the ball is brought down so that the ball or the arm carrying the ball touches the ground while the tackler is touching him. Strong upper body strength and a good sense of timing are key to making a tackle.

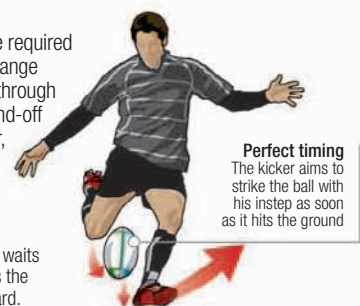


MAKING A SIDE TACKLE

The player lowers his shoulders and wraps his arms around the opponent.

KICKING

A range of kicking skills are required during a game, from long-range penalty kicks to deft chips through a group of players. The stand-off is a team's specialist kicker, executing most of the tactical and penalty kicks.



DROP-KICKING A BALL

Throwing the ball up, a player waits until the point when it just hits the ground before striking it forward.

ILLEGAL TACKLES

A tackle around the neck is deemed to be dangerous and is penalized by the referee, as is any player who tackles another player who is not in possession of the ball.

POINTS SYSTEM

The highest number of points (4) is obtained by touching down for a try, but there are a number of other ways that a team can score points. Immediately following a try the scoring team can secure an extra 2 points if one of its players is able to placekick the ball over the crossbar between the posts; this is known as a conversion. Penalties are awarded against a team for numerous offenses and one of the options available is to kick for goal as in a conversion, and also with a value of 2 points. Drop-kicking the ball over the crossbar from open play is worth 1 point.

TRY

A try is deemed valid if the player crossing the try line applies downward pressure on the ball to touch it on the ground. If two players of opposing sides are both holding the ball as it is grounded, the try also counts. It is invalid if a player has any part of his body in touch.

CONVERSION

A conversion can be taken anywhere along a line directly opposite where the try was scored. In top-class games, touch judges stand next to the posts and check whether the ball passes over the crossbar and between the posts.

SCRUM

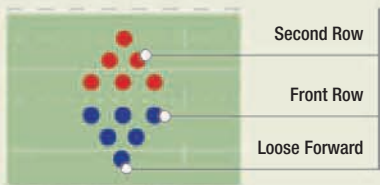
A forward pass, knock-on (accidental forward movement of the ball, which then touches the ground), and restart after kick into touch all result in a scrum. This consists of a maximum of six forwards—a front row of two props and a hooker, two second row forwards, and a loose forward slotting in at the back.

PENALTY

A penalty is given to one team when a player from the opposing team violates the rules, and is taken from the point that the offense occurred. If the infringement happens while the ball is in touch, the penalty is taken 33 ft (10 m) in from the touchline.

DROP GOAL

The extra point secured by a drop goal can win a match if the two teams are level approaching full-time and the attacking team is still some way from the try line. A player can score a drop goal from anywhere on the field.

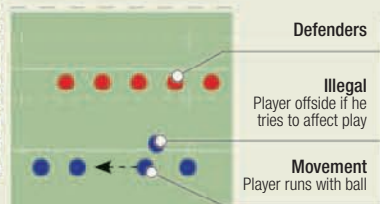


RUGBY RULES

While most infringements are punished by a penalty or a scrum, some more serious violations will result in a player being sent to an area next to the field called the sin bin. He is forced to remain there for 10 minutes, thereby putting his team at a disadvantage for that period.

OFFSIDE

A complex rule of the game, offside can take place in open play for a few reasons, one of which is when a player ahead of the one with the ball tries to play the ball. At a penalty kick, a player is offside if he is in front of the kicker.



ADVANTAGE

Instead of blowing the whistle for an infringement by one team, a referee can keep a game flowing by giving the other team an advantage. An example is if a player is high-tackled but still passes the ball out to a teammate to score.

TEAM TACTICS

With the object of the game to score more points than the opposing team, rugby league is about penetrating attacking play and a solid defense. Both rely on a combination of teamwork and individual skills such as throwing a dummy (making a motion toward passing to a teammate but keeping the ball and running past the opposing player). Kicking into touch is another key tactic, used by an attacking team to gain territorial advantage or by a defending side to relieve pressure on the back line.



THROWING A DUMMY

A player approaches an opponent with a teammate nearby and just after looking over at him positions the ball in his hands as if he is about to pass it to him.

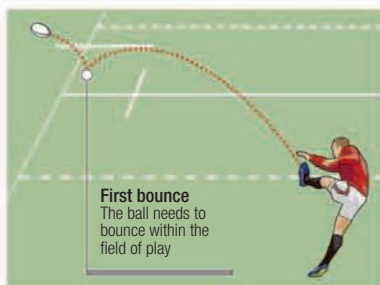


SIDE-STEPPING PAST

With the opponent thinking that the ball is going to be passed, his weight shifts over to that side, making it easier for the attacker to side-step him and run past.

KICK TO TOUCH

The most important thing to remember when kicking the ball into touch in open play is that the ball must bounce within the field of play before it goes out. The resulting scrum is taken 33 ft (10 m) in from the point where the ball crosses the line. However, if the ball goes straight out, the scrum-down takes place at the point of the original kick. In both situations the opposite team to that of the kicker puts the ball in at the scrum, so territorial advantage is countered by a high chance of ball possession.



GOLDEN POINT

If a game is tied at the end of full-time, ten minutes extra time is played. This period is often called "sudden death", as the first team to score wins the game.

INSIDE STORY

Rugby league was born out of the original union game (see pp.116-19) that began in the 1830s. A dispute in 1892 between the Rugby Football Union (RFU) and clubs in the north of England that were paying their players—which went against the amateur spirit of the game—led to the breakaway Northern Rugby Football Union being formed in 1895. The 13-a-side game began in 1906 and the name rugby league was adopted in 1922.

In the UK, the Rugby Football League (RFL) administers the sport. It controls the national leagues, the Super League, the Challenge Cup, and Great Britain's national team.

WORLDWIDE GOVERNING BODY

The Rugby League International Federation (RLIF) is the controlling body in charge of the sport worldwide. It makes decisions on laws and international team rankings.





- Australian Rules is played in more than 20 countries, as well as in Australia. It is popular in Britain, New Zealand, Indonesia, South Africa, Canada, and Japan.
- The annual Australian Football League (AFL) Grand Final attracts crowds of nearly 100,000, making it the world's best attended domestic club championship event.
- Women's Australian Rules football has also spread to many countries; such as the USA, Britain, New Zealand, Canada, and Papua New Guinea.

AUSTRALIAN RULES FOOTBALL

GAME OVERVIEW

Australian Rules Football—known to locals as “Aussie Rules” or “footy”—is a very tough, fast-paced team sport. Two teams of 22 players (18 on the field, 4 interchangeable) display great courage in their ferocious attack on opponents and the ball, which is passed with incredible accuracy across an oval-shaped field. The aim is to score points by kicking the ball through a set of goals, made of four upright posts. After four quarters of 20 minutes each, the team that has amassed the most points wins. Australian Rules is the most popular winter sport in Australia.

Head protection

Although lightweight guards called “helmets” are permitted, most players choose not to wear them

Mouth guard

Most players wear a mouth guard to protect their teeth

Team colors

Players wear jerseys that display their team colors and an identifying number on the back

Home and Away

The home team wears shorts that match their team colors. The away team wears white shorts and, if the two teams have similar-colored jerseys, it also wears a clash strip or away jersey

PLAYER PROFILE

Australian Rules players are usually tall and athletic. They are fast sprinters and must have enough stamina for sustained running. Players are also physically strong and able to withstand the force of on-rushing opponents.

Cleated shoes

Players wear soccer-style shoes with studs or cleated soles

8 7/8 in (225 mm)

28 1/2–28 3/4 in
(720–730 mm)



Oval ball
An Australian Rules football is an inflatable bladder enclosed in four pieces of leather

Goal posts

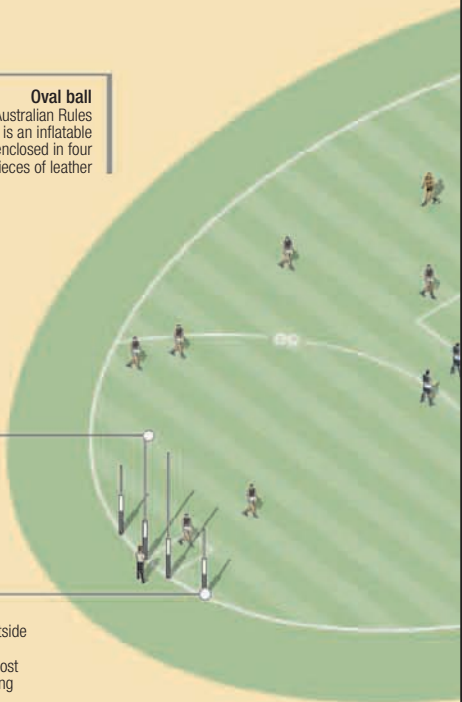
These are the two posts in the center. If an attacking player kicks the ball between them, their team is awarded six points

Behind posts

Two shorter posts stand outside of the goal posts. If the ball passes between a behind post and a goal post, the attacking team scores one point

OVAL FIELD

An Australian Rules football field is comprised of three areas. Play begins with a “center bounce”, in the “center square” in the middle of the ground, at the beginning of each quarter and after a goal is scored. The “wings” of the field are the two areas on either side of the center square—transitional play from defense to attack is directed through these areas. The “goal arcs” are the prime goal-scoring areas, marked by a line about 164 ft (50 m) from the goal face at each end of the field.



GO THE DISTANCE

On average, an Australian Rules player will cover close to 8 mi (13 km) over the four 20-minute quarters. The majority of this distance is covered by jogging and sprinting. In comparison, a rugby-union player (see pp.118–121) will only cover around 4 mi (6 km). Women also play Australian Rules football and, while the tackling rules are sometimes modified, the women need just as much stamina as the men.

Boundary umpires

Two umpires police the boundary line. If the ball rolls or bounces out of play, an umpire throws it back in. They also award penalties if it is kicked over the line in the air

Field umpires

Three umpires adjudicate on-field play, covering the center of the ground, the wings, and both goal arcs

Goal umpires

An umpire stands on each goal line to judge if it crosses the line and assess if it is a goal or point

Center square

Only eight players are permitted inside this area before play starts—the other 28 cannot enter until play has begun

50 m line

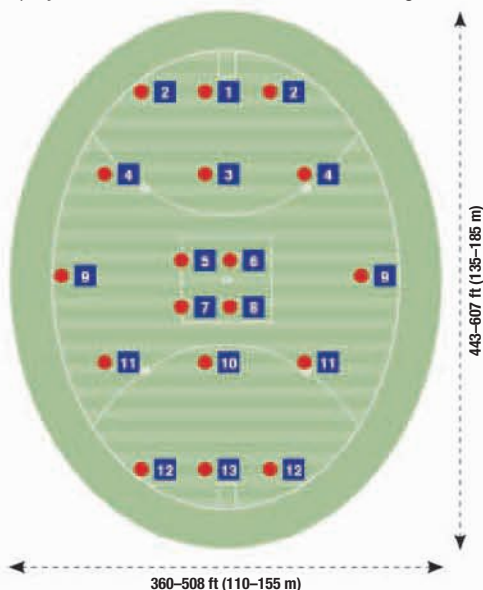
This is a curved line used to designate the goal arcs at both ends of the ground

Substitute players

Four substitute players are allowed per team, with no limit on the amount of times players can be interchanged

WHO PLAYS WHERE?

Positions are fluid: players go where needed, rather than staying in strict zones. The diagram below shows positions for a team at the start of play. Play starts with a center bounce, which can only be contested by the ruckman. Offensive players (“forwards”) move around the forward area seeking possession of the ball, while defensive players (“defenders”) try to negate opposition forwards and create play by running up the field. Midfield players contest the ball in all areas of the ground.

**POSITIONS:**

1 Full forward **2** Forward pockets **3** Center-half forward **4** Half-forward flanks
5 Ruckman **6** Ruck-rover **7** Rover **8** Center **9** Wingmen **10** Center half-back
11 Half-back flanks **12** Back pockets **13** Full back

INTERNATIONAL RULES

Australia and Ireland contested the first official International Rules series in 1998. Mixing elements of Australian Rules and Gaelic football (see pp.168–169), the games are fast-paced and infamous for violent clashes between players (in 2006 the extreme violence led to the cancellation of the 2007 match). To date, Australia has won five of the matches, Ireland seven, and two matches have resulted in a draw.

SIDELINES

6,204,056 The total number of Australians who attended top-grade AFL games in 2006—that's roughly equal to one-third of the Australian population.

121,696 The highest ever attendance at a top-grade game. Achieved at the 1970 Grand Final between Carlton and Collingwood, which Carlton won by 10 points.

35,250 The average attendance at an AFL regular season game in 2006 (English Premier League soccer averaged 33,875 in the 2005–2006 season).



RULES

The ball may be passed in any direction, using only the feet (a kick), a clenched fist (a handpass), or an open-handed tap. A mark is awarded if a player catches the ball from a kick. That player can take a kick or handpass unimpeded from where they caught the ball. A player can run with the ball, but must bounce it or touch it to the ground every 50 ft (15 m). A player running with the ball can be put under pressure or tackled, and if tackled must pass or dispose of the ball immediately or risk being penalized. Penalties, known as free kicks, are awarded for infringements such as pushing an opponent in the back, tackling illegally (see opposite), and holding a player who does not have the ball. Finally, a player can be placed on report for striking, tripping, pushing, or kicking another player, and potentially suspended from future games.

SCORING

A goal (six points) is scored only when an attacking player kicks the ball between the goal posts. A behind (one point) is scored when the ball crosses the line between a behind post and the nearer goal post, or is kicked into a goal post. A behind still counts if it comes off a defender's foot, or is knocked over the goal or point line by any other part of a player's body. The total score is the sum of goals and points expressed in two parts: for example, "20.14 (134)" means 20 goals and 14 behinds, a total of 134 points.

Hitting the goal post

If the ball hits a goal post from a kick, it counts as a behind

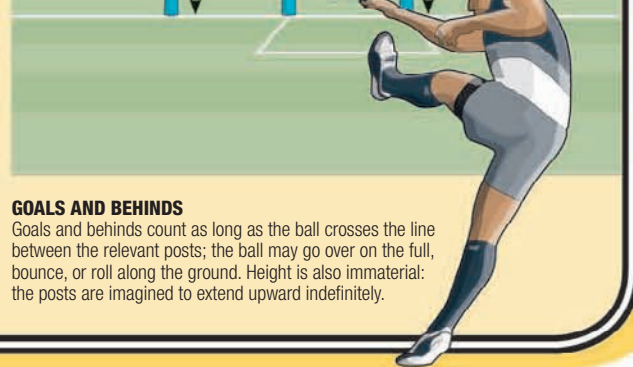
21 ft (6.4 m) 21 ft (6.4 m) 21 ft (6.4 m)
1 point 6 points 1 point

Out of bounds

If the ball hits a behind post on the full (without bouncing) from a kick, the opposing team is awarded a free kick

min. 10 ft (3.0 m)

min. 20 ft (6.0 m)



GOALS AND BEHINDS

Goals and behinds count as long as the ball crosses the line between the relevant posts; the ball may go over on the full, bounce, or roll along the ground. Height is also immaterial: the posts are imagined to extend upward indefinitely.

ANTIPODEAN ARTISTRY

Considered a chaotic game to the uninformed, Australian football is, in fact, a highly skillful affair. Players must win and maintain possession of the ball and advance up the field using strategic passes to teammates. Accurate kicking and passing is the most efficient way of doing this. Players use passes by foot to leading or open players, and quick handpasses, taps, or punches to find an open teammate when in close proximity. Once near goal, players will try to score either from a mark and kick, or by kicking on the run.

THE HANDPASS

Almost as common as a kick for passing the ball in today's game, the handpass involves a punch applied with the thumb and index finger of a clenched fist to the pointed end of the ball.

Shoulder turn

The shoulder of the arm that is used to hit the ball is turned back to maximize the length of swing

Ball release

A swinging clenched fist is used to punch the end of the ball, propelling it toward a teammate



HANDPASSES

This form of delivery is used to move the ball quickly to nearby teammates and for passing in confined space when under pressure. It is a popular move by midfielders to set up play before kicking the ball into the forward line.

MACEDONIAN MARVEL

ONE OF THE MOST SKILLFUL PLAYERS EVER WAS PETER DAICOS, OTHERWISE KNOWN AS THE "MACEDONIAN MARVEL." DAICOS WAS RENOWNED FOR HIS AMAZING KICKING SKILLS AND THE ABILITY TO KICK UNLIKELY GOALS CONSISTENTLY FROM ANYWHERE IN THE OFFENSIVE PART OF THE GROUND. DAICOS PLAYED FOR THE COLLINGWOOD MAGPIES DURING THE 1980s AND 1990s.

KICKING

There are four main kicks: the drop punt, used in general play; the torpedo, a spiraling rugby-style kick used for extra distance; and the snap and checkside (or "banana") kicks, used to curve the ball.

Guiding the ball

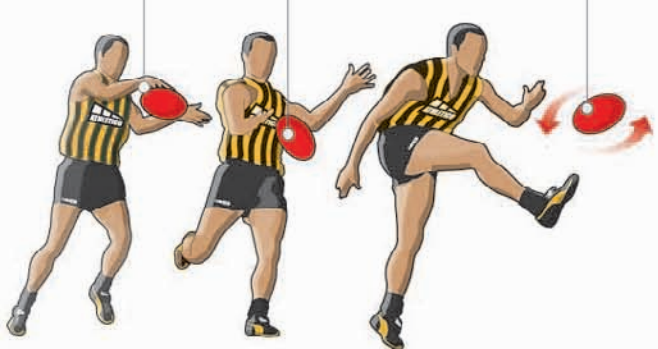
The ball is guided toward the foot with the palm of the hand

Ball release

The ball leaves the palm dropping point down toward the foot

Spinning ball

By striking the ball close to one end, the ball spins end-over-end as it travels through the air



DROP PUNT

Due to its consistent spin, the drop punt is accurate and easy to control. Players use the drop punt for passing in general play and for most shots on goal. It has become much more common than the punt kick, which does not spin the ball.

BUMPS AND MARKS

Marking and tackling are the main elements of Australian football that make it such an exciting and tough sport. Players catch the ball running at full speed or by launching themselves fearlessly into the air, often using opponents to propel themselves skyward. The main form of defense is tackling. Players run down or charge opponents who have the ball, hitting them hard to jolt the ball free or wrestling them to the ground to halt their progress.

MARKING

The mark is the primary method by which players maintain possession. When a ball has been kicked by a player more than 50 ft (15 m) and is caught by another player, the catching player is awarded a mark. The player can then kick or handpass from that spot without the threat of being tackled or pressured by opposition players.

Contesting a mark

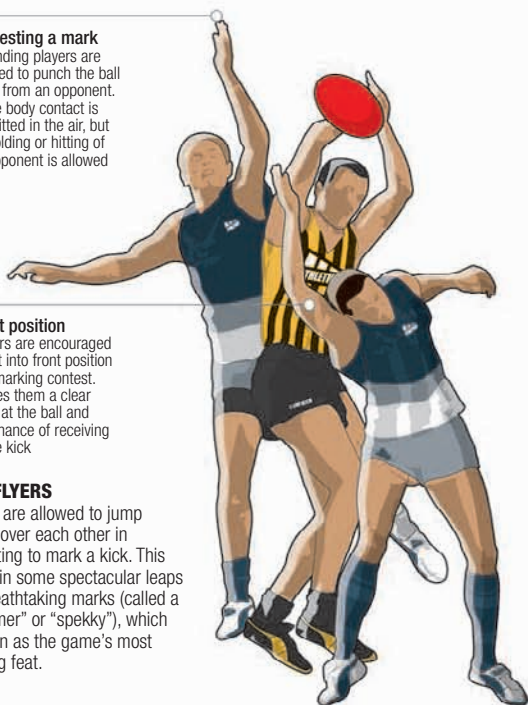
Defending players are allowed to punch the ball away from an opponent. Some body contact is permitted in the air, but no holding or hitting of an opponent is allowed.

Front position

Players are encouraged to get into front position in a marking contest. It gives them a clear jump at the ball and the chance of receiving a free kick.

HIGH FLYERS

Players are allowed to jump on and over each other in attempting to mark a kick. This results in some spectacular leaps and breathtaking marks (called a "screamer" or "specky"), which are seen as the game's most amazing feat.



MARK OF THE CENTURY

Former Geelong player Gary Ablett is considered one of the most exciting players of all time. He kicked more than 100 goals in three consecutive seasons from 1993 to 1995, winning the Coleman Medal for scoring the most goals. Ablett, a high-flying forward, took what is widely touted as "the mark of the century" playing against Collingwood in 1994. He leaped onto his opponent's shoulders and caught the ball with one outstretched hand before crashing to the ground.

TACKLING

A player with the ball can be tackled by being held or wrestled to the ground. A tackle must be applied below the shoulders and above the knees, and can be made by more than one player. If a tackled player doesn't dispose of the ball immediately, the opposition is awarded a free kick.



Eyes on the ball

A ball that spills free in a contest is fair game for either side.

Shoulder action

Players can use their bodies and shoulders to jostle for position.

Standing strong

Good balance and sturdy feet are essential to applying a strong tackle or heavy bump.

USING THE HIPS

A player can legally bump an opponent (called a "hip and shoulder") when the ball is within 15 ft (5 m) of the opponent, as long as the bump is made with the hip or shoulder. Contact to the head is not allowed.

STAT CENTRAL

AFL GRAND FINALS

YEAR	WINNER	SCORE	RUNNER-UP	SCORE
2010	COLLINGWOOD MAGPIES	16.12 (108)	ST. KILDA SAINTS	7.10 (52)
2009	GEELONG CATS	12.8 (80)	ST. KILDA SAINTS	9.14 (68)
2008	HAWTHORN	18.7 (115)	GEELONG CATS	11.23 (89)
2007	GEELONG CATS	8.10 (58)	PORT ADELAIDE	6.8 (44)
2006	WEST COAST EAGLES	12.13 (85)	SYDNEY SWANS	12.12 (84)
2005	SYDNEY SWANS	8.10 (58)	WEST COAST EAGLES	7.12 (54)
2004	PORT ADELAIDE POWER	17.11 (113)	BRISBANE LIONS	10.13 (73)
2003	BRISBANE LIONS	20.14 (134)	COLLINGWOOD MAGPIES	12.12 (84)
2002	BRISBANE LIONS	10.15 (75)	COLLINGWOOD MAGPIES	9.12 (66)
2001	BRISBANE LIONS	15.18 (108)	ESSENDON BOMBERS	12.10 (82)
2000	ESSENDON BOMBERS	19.21 (135)	MELBOURNE DEMONS	11.9 (75)
1999	NORTH MELBOURNE	19.10 (124)	CARLTON BLUES	12.17 (89)
1998	ADELAIDE CROWS	15.15 (105)	NORTH MELBOURNE	8.22 (70)
1997	ADELAIDE CROWS	19.11 (125)	ST. KILDA SAINTS	13.16 (94)
1996	NORTH MELBOURNE	19.17 (131)	SYDNEY SWANS	13.10 (88)

INSIDE STORY

Australian football was devised in 1857 by sportsman Tom Wills as a fun way for cricketers to keep fit during the winter months. The first recorded match took place in 1858, between Scotch College and Melbourne Grammar School. The first professional league, the Victorian Football League (VFL), was established in 1896, and the following year the league's first games were held. By 1987, the league was flourishing and became national. It was renamed the Australian Football League in 1994. A Rules Committee manages the laws of the game.

AUSTRALIAN FOOTBALL LEAGUE

The AFL Commission is the official governing body of Australian Rules football. It took over national governance of the sport in 1993 and is one of the world's strongest sporting authorities. The AFL Commission is responsible for the administration of the competition and regularly updates the laws of the game, with most changes aimed at making the sport faster and more attractive to supporters.



CRICKET



130

GAME OVERVIEW

To the uninitiated, cricket can appear an incomprehensible spectacle acted out by eccentrics in long pants; to millions of devotees the world over, it is the ultimate combination of skill and strategy. Contested by two teams of 11 players, cricket essentially involves a bowler hurling a ball at a batter, who attempts to hit the ball. From this simple premise radiates a multitude of complexities. Once considered genteel, cricket today is as hard-nosed as any professional sport, and the tension that builds over a close five-day Test match is immense.

PLAYER PROFILE

While there is no physical "type" for cricketers, fast bowlers are mostly tall and athletic. Batters require excellent hand-eye coordination and the ability to make rapid decisions. Good fielders are agile and have a strong, accurate throw. All cricketers need fast reactions and the capacity to sustain concentration for long periods.

Gloves

Padded gloves provide good hand protection while not unduly restricting hand and finger movement

Chest protector

Not all batters wear a chest protector, but this piece of equipment is commonly used when fast bowlers are operating. It is worn beneath the shirt and helps prevent bruising and broken ribs

Box

A heart-shaped, hard plastic protector, the box is worn inside the trousers to shield the genital area

Pads

Heavily padded leg guards are worn on both legs, to protect from the ankle to above the knee. Modern pads are compact and lightweight, allowing the batter to play strokes and run freely

NEED2KNOW

- ➔ The two international forms of cricket are Test matches (which last five days) and limited-overs games, which are usually 50 overs per side, (although "20/20" cricket allows only 20 overs per innings). Other forms include first-class, club, indoor, and beach cricket.
- ➔ There are over 100 cricket-playing nations, but only the best compete in Tests. Currently the Test-playing nations are: Australia, England, Pakistan, India, Sri Lanka, South Africa, New Zealand, West Indies, Zimbabwe, and Bangladesh.

Tool of the trade

Made of willow and comprising a blade and handle, the bat must not exceed 38 in (96 cm) in length

Head protection

Seldom worn prior to the 1980s, protective helmets are now commonplace

THE BALL

With a leather exterior and a interior of cork, rubber, and tightly wound string, the cricket ball is extremely hard. Although the red ball is traditional, white balls are regularly used in limited-overs matches.

9 in (22.9 cm)



Seam

A raised, stitched seam encircles the ball

THE WICKET

The wicket consists of three wooden stumps and two wooden bails. The bails sit on the stumps in shallow grooves cut along the top of each stump. Two wickets are used in a match—one at either end of the pitch.

Bails

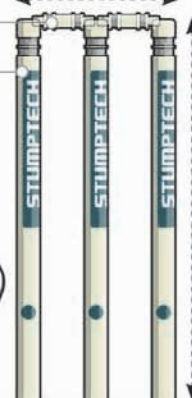
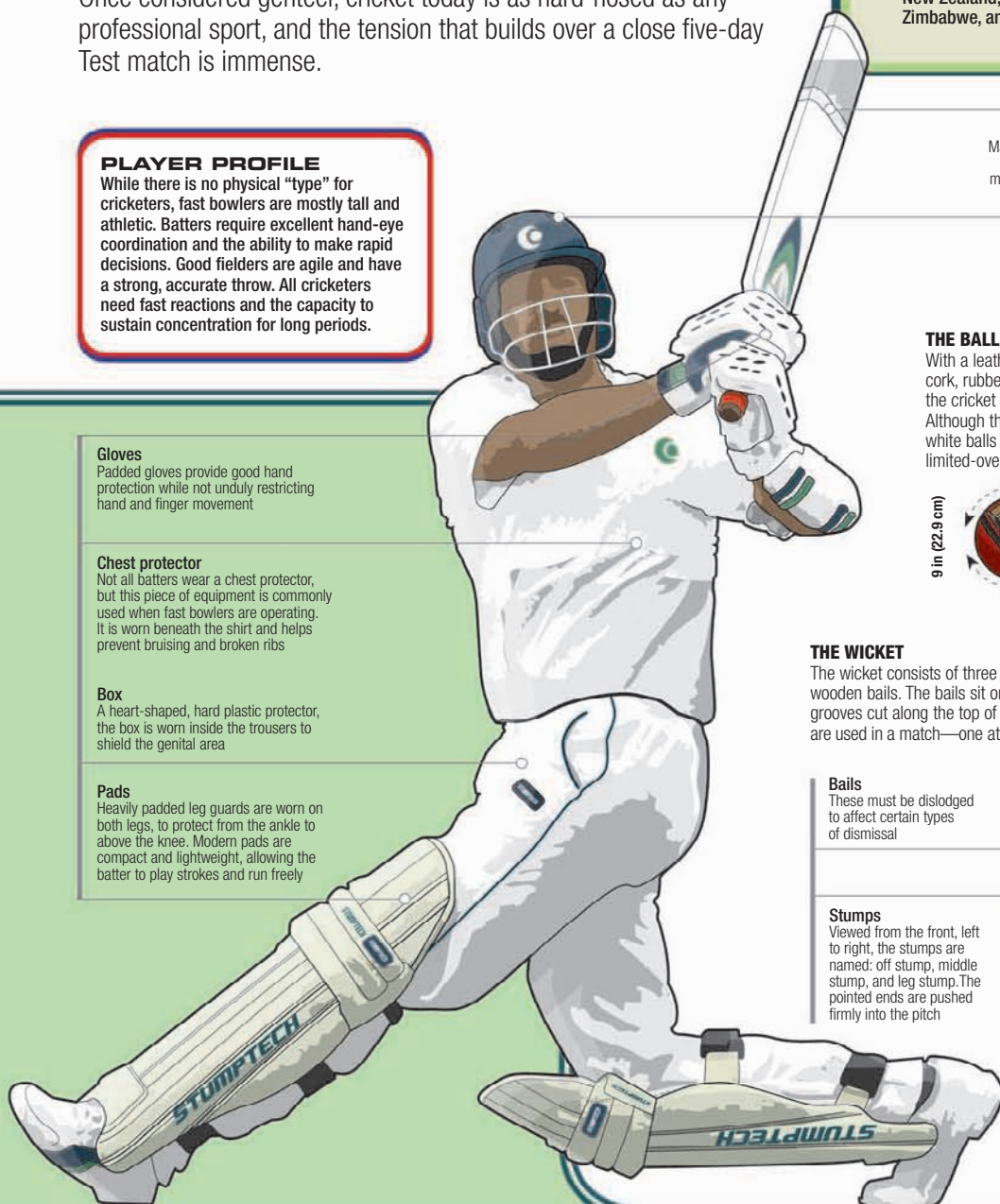
These must be dislodged to affect certain types of dismissal

9 in (22.9 cm)

Stumps

Viewed from the front, left to right, the stumps are named: off stump, middle stump, and leg stump. The pointed ends are pushed firmly into the pitch

28 in (71.1 cm)



THE FIELD OF PLAY

Cricket is played on a large, flat oval or circular field with a pitch in the middle. On the field of play there is always two umpires, two batters, and all of the fielding team (the bowler, wicketkeeper, and nine other fielders). The fielding team is organized into positions the captain feels will either prevent run scoring or effect a dismissal (see Modes of Dismissal, p.133). At the end of each over (see Playing the Game, p.132) a new bowler bowls from the opposite end of the pitch, and all the fieldiers and umpires are repositioned accordingly.

PASSIONATE SUPPORTERS

CRICKET FOLLOWERS ARE A FERVENT GROUP—ESPECIALLY THE 90,000 OR MORE THAT ASSEMBLE AT EDEN GARDENS, INDIA, WHERE THE NOISE IS OFTEN SO DEAFENING THAT UMPIRES ARE UNABLE TO DETECT SNICKS.

30-yard circle

This field marking divides the infield from the outfield. In limited-overs cricket, a set number of fielders must remain within this circle for a fixed number of overs

FIELDING POSITIONS

The image below shows most of the common fielding positions the fielding captain may choose from when a right-handed batter is on strike.

- | | | |
|-----------------------|----------------------|----------------------|
| 1 Bowler | 12 Silly mid-off | 23 Deep square leg |
| 2 Non-striking batter | 13 Mid-off | 24 Deep mid-wicket |
| 3 Striking batter | 14 Wide mid-off | 25 Long-on |
| 4 Wicketkeeper | 15 Leg slip | 26 Straight hit |
| 5 Slips | 16 Short leg | 27 Long-off |
| 6 Gully | 17 Forward short leg | 28 Deep extra cover |
| 7 Silly point | 18 Silly mid-on | 29 Deep cover |
| 8 Point | 19 Mid-on | 30 Sweeper |
| 9 Cover point | 20 Wide mid-on | 31 Backward point |
| 10 Cover | 21 Mid-wicket | 32 Third man |
| 11 Extra cover | 22 Square leg | 33 Fine leg |
| | | 34 Long leg |
| | | 35 Deep b/w fine leg |
| | | U Umpires |

Off side

The half of the field of play further from the on-strike batter's legs when the batter is waiting for the bowler to bowl is known as the off side

Infield

Fielders in the infield possess quick reflexes and must always be alert

Sightscreens

These moveable structures allow the batter better visibility of the ball

On side
The half of the field of play on the same side as the on-strike batter's legs when the batter is waiting for the bowler to bowl is called the on side (or the leg side)

Batter on-striker

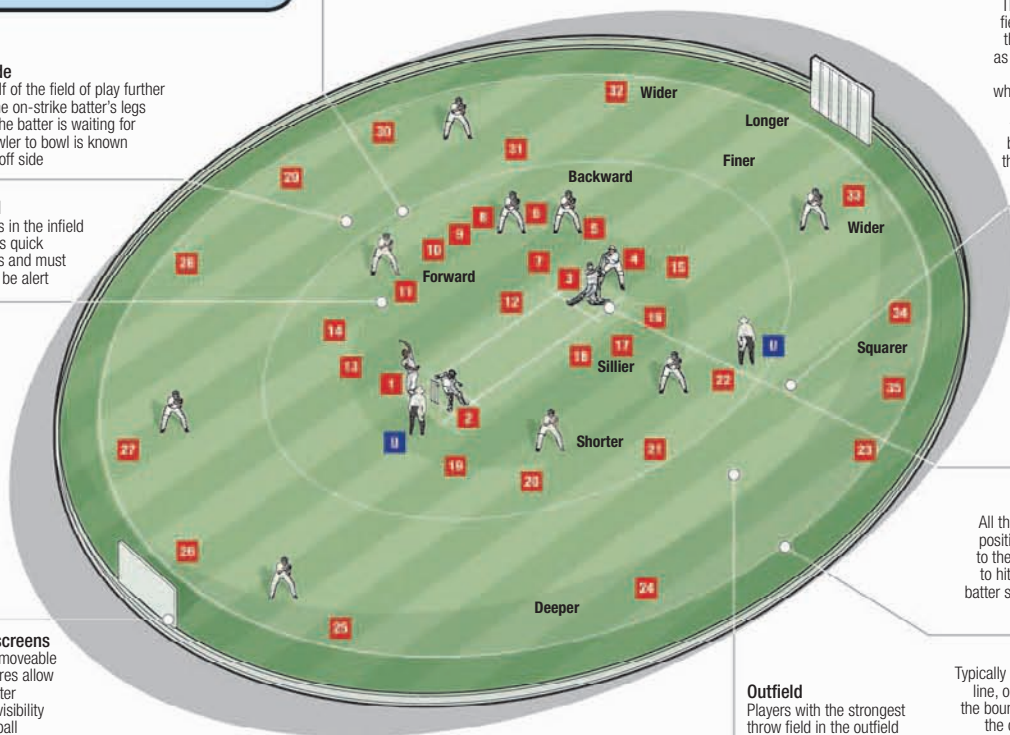
All the fielders are positioned relative to the batter about to hit the ball. The batter shown here is right-handed

Boundary

Typically a rope, white line, or set of flags, the boundary defines the outer edge of the field of play

Outfield

Players with the strongest throw field in the outfield



GLOSSARY OF FIELDING TERMS

Cricket uses a number of potentially confusing technical terms, and many of these arise in relation to the field and fielding positions.

STRAIGHT Closer to an imaginary line through the centre of the field of play and in front of the batter.

WIDE Further from an imaginary line through the centre of the field of play and in front of the batter.

FINE Closer to an imaginary line through the centre of the field of play and behind the batter.

SQUARE Further from an imaginary line through the centre of the field of play and behind the batter.

FORWARD In front of the batter's wicket.

BACKWARD Behind the batter's wicket.

SHORT Closer to the batter.

SILLY Very close to the batter.

DEEP Further from the batter.

THE PITCH

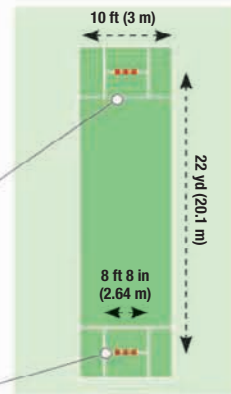
The closely mown, even surface at the center of the field of play is known as the pitch. Moisture content, grass height, soil type, and degree of soil compaction are among the many pitch-related factors that help determine how the ball will travel after it strikes the pitch.

Popping crease

Unless part of the bowler's front foot is behind this line when the ball is delivered, the umpire will call "no ball"

Bowling crease

The length of a pitch (22 yd/20.1 m) is the distance between the two bowling creases. A wicket is placed on each of the two bowling creases



SIDELINES

99.94

Australian Don Bradman's batting average in Tests. Bradman began his final Test innings with an average over 100 and needed only four runs to maintain a three-figure average. Instead, he was dismissed without scoring. 99.94 is the record highest Test average.

400,000,000

The estimated television audience in India for some of the biggest games. This is nearly 40 percent of India's population.

501*

The highest ever individual score in a first-class match, made by West Indies' Brian Lara, for Warwickshire, in 1994. (* denotes "not out".)

THE ASHES

WHEN AUSTRALIA DEFEATED ENGLAND IN 1882, A NEWSPAPER PUBLISHED AN "OBITUARY" FOR ENGLISH CRICKET: "THE BODY WILL BE CREMATED AND THE ASHES TAKEN TO AUSTRALIA." THIS IS THE ORIGIN OF THE REGULARLY COMPETED "ASHES" TEST SERIES, ONE OF SPORT'S GREAT RIVALRIES.

PLAYING THE GAME

Before play begins, the two captains toss a coin to see which side will "bat" and which side will "field." All of the fielding side take their positions, but only two batters are on the field at a time. At the start of play, the batter "on strike" assumes a batting stance (usually with the body side on to the bowler but the head facing), ready to receive the first bowl. The other batter (the "non-striker") stands at the opposite end of the pitch. The bowler bowls the ball (a "delivery") overarm toward the striker's wicket. If the batter does not hit the ball, the wicketkeeper usually catches it. If the striker hits the ball, the two batters then have the choice whether to run or not. If the batter hits the ball inside the field of play and it then crosses the boundary, this counts as four runs. If the ball is propelled directly over the boundary without bouncing in the field of play, six runs are awarded. After six legal deliveries have been bowled, the umpire calls "over". While the batters attempt to score as many runs as possible, the fielders try to dismiss the batters (see Modes of Dismissal, p.133).

THE END OF AN INNINGS

When a batter is dismissed ("out"), that player leaves the field and the next member of the batting side is "in." When 10 of the 11 members of the batting side are out (there will always be one batter "not out" because batters must operate in pairs), the allocated time is up, or the set number of overs have been bowled, the innings is complete (see Forms of the Game, below). For the next innings, the batting and fielding sides swap roles.

COMPLETING A RUN

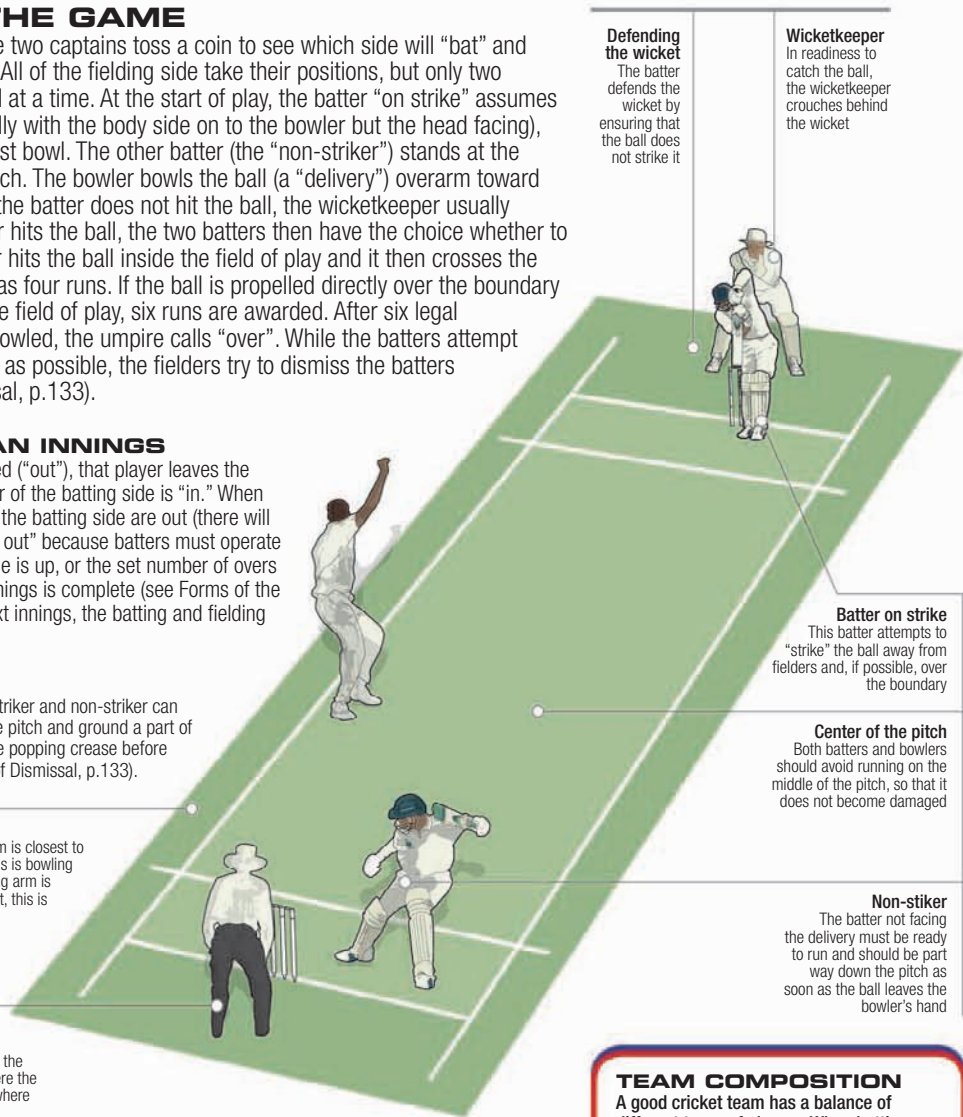
One run is completed if the striker and non-striker can run to the opposite end of the pitch and ground a part of their bat or person behind the popping crease before being "run out" (see Modes of Dismissal, p.133).

Bowling angle

When the bowler's bowling arm is closest to the wicket (as shown here), this is bowling "over the wicket". If the bowling arm is the one further from the wicket, this is bowling "round the wicket"

Umpire

The bowler's end umpire has several things to watch as the ball is delivered, including where the bowler's front foot lands and where the ball pitches



Defending the wicket

The batter defends the wicket by ensuring that the ball does not strike it

Wicketkeeper

In readiness to catch the ball, the wicketkeeper crouches behind the wicket

Batter on strike

This batter attempts to "strike" the ball away from fielders and, if possible, over the boundary

Center of the pitch

Both batters and bowlers should avoid running on the middle of the pitch, so that it does not become damaged

Non-striker

The batter not facing the delivery must be ready to run and should be part way down the pitch as soon as the ball leaves the bowler's hand

FORMS OF THE GAME

Test cricket – which is played over five days – is the sport's flagship event. Each side has two innings, bowlers may bowl an unlimited number of overs, and to win a Test match is not a straightforward proposition. For example, if the two teams competing are X and Y, for side X to win it must bowl out side Y (by taking all ten wickets) twice. It must do this before side Y can score more than the total runs side X scored. If neither team can do this in five days, the result is a draw. In limited-overs cricket, each side only has one innings – usually limited to 50 overs. The number of overs allocated to each bowler is restricted (ten each in a 50-over game), and wickets lost do not affect the result – simply the team that scores the most runs wins.

TEAM COMPOSITION

A good cricket team has a balance of different types of players. When batting, the side is organized into a batting order. Although there are many variations on a batting order, numbers one to five are usually the specialist batters, number six is often an all-rounder (a highly skilled batter and bowler), the wicketkeeper regularly occupies the number seven position, and numbers eight to eleven are mostly the specialist bowlers.

GAME CONTROL

There are 42 Laws of Cricket, and three umpires uphold these Laws. On the field, one umpire stands at the bowler's end and another at square leg. The on-field umpires may refer close decisions for runouts, stumpings, catches, or boundaries to the third (off-field) umpire, who adjudicates using television replays.

TELEVISION REVOLUTION

TELEVISION TECHNOLOGIES, SUCH AS HAWK-EYE, WHICH TRACKS THE PROJECTED PATH OF THE BALL, HAVE REVOLUTIONIZED THE WAY WE WATCH AND UNDERSTAND CRICKET.

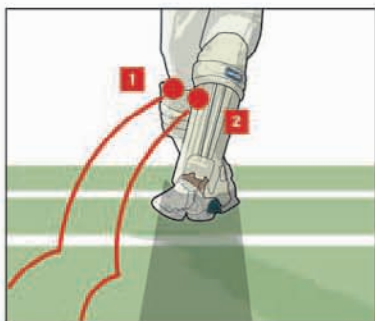
MODES OF DISMISSAL

There are ten ways in which a batter can be dismissed, although it would be extraordinary if all ten were seen in a single match. Some dismissals, such as "Timed Out" and "Hit the Ball Twice," are very rare. The most common dismissals are caught (often caught behind by the wicket keeper or slip fielders), LBW, and bowled.

- BOWLED** When the bowler delivers a ball that breaks the wicket (dislodges at least one bail).
- TIMED OUT** If the incoming batsman takes more than three minutes to reach the pitch.
- CAUGHT** If a fielder catches the ball after the batter hits it and before it touches the ground.
- HANDLED THE BALL** When a batter handles the ball without the consent of the fielding side.
- HIT THE BALL TWICE** When the batter strikes the ball twice (unless guarding the wicket).
- HIT WICKET** If the bat or any part of the batter's person breaks the wicket.
- LBW** When part of the batter intercepts a ball that would have hit the wicket (see below).
- OBSTRUCTING THE FIELD** If the batter deliberately obstructs or distracts the fielding side.
- RUN OUT** If the wicket is broken and the bat or the batter is not behind the popping crease.
- STUMPED** If the wicketkeeper breaks the wicket and the batter is outside the popping crease.

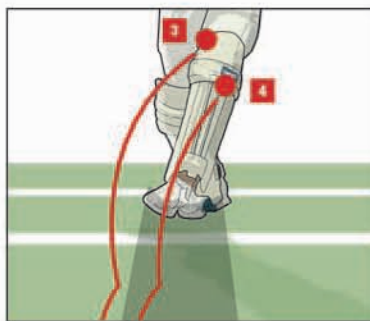
LEG BEFORE WICKET

Law 36—Leg Before Wicket (LBW)—is perhaps the most complex, controversial, and difficult to judge of all the Laws. This is because there is always an element of subjectivity: would the ball have continued on to hit the wicket?



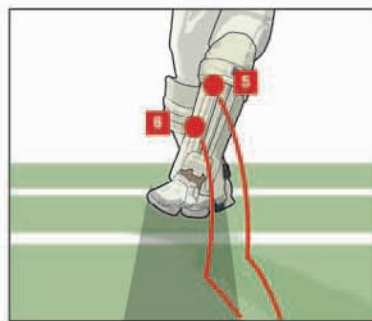
Not out or out. The ball has hit the batter's pad outside the wicket-to-wicket line on the off side. If playing a shot, the batter is not out. However, if the batter makes no attempt to play the ball, and the umpire is sure that the ball would have hit the wicket, the batter can be given out. This part of the Law was introduced to stop batters protecting their wicket using only their pads.

Out. The ball has struck the batter's pad in line with the wicket and would have gone on to hit the wicket. It is of no relevance that the ball pitched outside the line of the off stump.



Not out. The ball has hit the batter's pad in line with the wicket, but its projected flight path is such that it would have gone over the top of the wicket.

Not out. The ball has hit the pad in line with the wicket, but its projected flight path is such that it would have missed the wicket and continued on a line outside the leg stump.



Not out. Although this ball would have continued on to hit the stumps, it has pitched outside the wicket-to-wicket line, on the leg side. The batter can never be out if the ball pitches outside the line of the leg stump, whether playing a shot or not.

Out. The ball has not pitched outside the leg stump, has hit the pad in line with the wicket, and would have gone on to hit the wicket.

KEEPING SCORE

The scorer uses numbers and a set of symbols entered in a special cricket scorebook to keep a tally of runs scored and associated statistics. To ensure the scoreboard is filled in correctly, an umpire signals to the scorer when any one of a set of particular circumstances arises. The scoreboard provides the spectators and players with an ongoing summary of the match situation.

EXTRAS

Runs scored that did not arise from the batter striking the ball are called extras. The most common extras are no balls, byes, leg byes, and wides.

NO BALL When the delivery is deemed illegal, typically if the bowler oversteps the popping crease.

BYE When the batting pair complete a run, but the ball did not touch the bat or the batter. Byes typically arise when the wicketkeeper misfields.

LEG BYE When the batting pair complete a run after the ball struck any part of the batter except the glove or bat.

WIDE When a delivery passes out of the reach of the batter when in a normal batting stance.

UMPIRES' SIGNALS

An umpire will signal if certain events occur, including: if the fielding side concedes an extra (see below, left), if four or six runs are scored, when the batter is dismissed ("out"), when the ball is not in play (dead ball), and when the batters do not properly complete a run (short run).



LEG BYE



SHORT RUN



OUT



NO BALL



BYE



FOUR RUNS



SIX RUNS



DEAD BALL



WIDE



CRICKET SKILLS

Cricketers must master several skills. Every team member must bat and field, at least four players will be expected to bowl, and there is one specialized wicketkeeper. These disciplines all employ different techniques.

BOWLING

Perhaps more than any other player, the bowler determines how a match progresses. If the bowlers are bowling well, there is often little the batters can do beyond trying not to be dismissed. Broadly speaking, there are two types of bowler: pace bowlers (which includes medium-pacers and fast bowlers), who deliver ball at up to 100 mph (160 kph); and spin bowlers (which includes leg-spinners and off-spinners), who deliver the ball more slowly but have a greater variety of deliveries. Bowlers usually bowl a number of overs (a "spell") from one end of the ground.

PACE BOWLER'S ACTION

To propel the ball at high speed requires great skill and athleticism: pace bowling is less about brute strength and more about rhythm and technique. The illustrations below freeze the three crucial stages in a pace-bowler's action the split-second before the ball is released.

The coil

The bowler is in a side-on position, looking at the batter over the left shoulder and with the ball near the face



Delivery stride

Here the left arm is raised and the body remains upright. The back leg supports the bowler as the front leg extends and points at the batter



Delivery

At release, weight transfers to the front leg



WICKETKEEPING

While the wicketkeeper's primary task is to stop the ball, this player must also take catches and effect run outs and stumpings. For a spin bowler, the wicketkeeper will stand directly behind the stumps; for a pace bowler, the wicketkeeper may stand more than 22 yd (20 m) back.

Special gloves

The large, heavily padded gloves include webbing between the thumb and first finger



Shorter pads

Slightly shorter than batting pads, wicketkeeping pads still provide vital protection for the legs

Stumped

If the batter's foot is not behind the popping crease as the wicketkeeper breaks the wicket, the batter is out, or stumped

KING OF SPIN

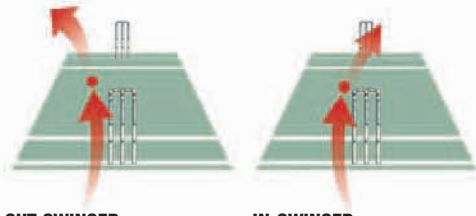
WHEN HE RETIRED IN JANUARY 2007, SHANE WARNE HAD TAKEN A WORLD-RECORD 708 TEST WICKETS, A TOTAL SURPASSED ONLY BY MUTTIAH MURALITHARAN LATER THAT YEAR. ALTHOUGH SOMETIMES A CONTROVERSIAL FIGURE OFF THE FIELD, HE IS PROBABLY THE MOST SIGNIFICANT PLAYER OF RECENT TIMES AND IS GENERALLY REGARDED AS THE FINEST LEG-SPIN BOWLER EVER.

BOWLER'S ROLE

The bowler tries to pitch the ball in an area from which the batter cannot easily score runs and is in danger of being dismissed. This is bowling a "good line and length." The bowler can either attack, in an attempt to take wickets quickly while risking being hit for runs, or bowl defensively, making it difficult for the batter to score. The bowler can also employ several tactical variations, such as changing the line, length, pace, or angle of the delivery.

MOVEMENT

Good bowlers are able to make the ball deviate from its expected "normal" flight path. Pace bowlers do this using swing (movement through the air) and seam (movement off the pitch). A delivery from a spin bowler rotates in the air and then spins away from or into the batter after pitching.



OUT-SWINGER

If the ball moves in the air away from the batter and toward the slips, this is an out-swinger—a very attacking type of delivery.

IN-SWINGER

When the delivery moves through the air toward the batter, it is an in-swinger (and can be difficult to score from).



LEG-CUTTER

If a fast delivery moves away from the batter as a result of the way the seam struck the pitch, it is termed a leg-cutter.

OFF-CUTTER

Another pace bowler's weapon, the off-cutter moves off the seam and into the batter, which can result in an LBW decision.



LEG-SPINNER

Similar to the leg-cutter but slower, the leg-spinner moves mainly because of the bowler's wrist action.

OFF-SPINNER

Usually achieved as a result of spin imparted from the bowler's fingers, an off-spinner deviates toward the batter.

BATTING

The art of batting involves striking the ball with enough technical competence, timing, and placement to score runs (without being dismissed). To achieve this, the batter employs an array of strokes (four of which are illustrated below), each in response to a certain type of delivery. In general, good line and length balls are defended; poor deliveries can be attacked and hit for runs. Balls that pitch closer to the batter are usually played with the weight on the front foot, and balls that land closer to the middle of the pitch are mainly played from the back foot. Most batters "building an innings," which usually involves playing more carefully to begin with then accelerating the scoring rate as the game progresses and the player's confidence increases.

Eyes on the ball

The batter's eyes are directly over the ball, to help ensure that the ball strikes the middle of the bat



Front foot

The batter takes a pronounced step toward the pitch of the ball



Elbow high

A high left elbow facilitates a straight bat, which increases the chances of making clean contact with the ball

Weight back

As this stroke is mostly played to rising deliveries, the weight is on the back foot, which helps direct the ball downward

FORWARD DEFENSIVE

This stroke is played to a well-pitched-up delivery that the batter feels is too risky to try to hit for runs. The batter should not leave a gap between the bat and the front leg's pad, to avoid being bowled. There is no follow-through: the bat stops level with the pad.



Dominant hand

The top hand controls the stroke, so that the ball is played along the ground

Foot position

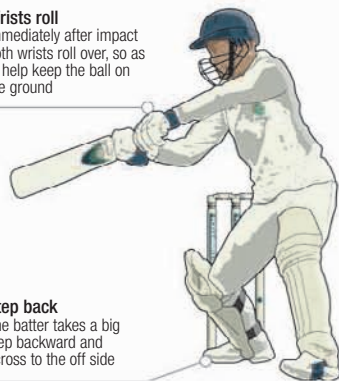
Both feet point toward the intended target area (the covers)

BACKWARD DEFENSIVE

This stroke is often employed to fast, short-pitched deliveries directed at the batter's body, thereby rendering an attacking shot unwise. As with the forward defensive, there is no follow-through, and the ball should drop safely just in front of the batter.

Wrists roll

Immediately after impact both wrists roll over, so as to help keep the ball on the ground



Step back

The batter takes a big step backward and across to the off side

COVER DRIVE

This attacking, front-foot shot is played to a very full delivery that pitches outside the line of the off stump. Although it can yield many runs, if the ball swings away, a catch behind the wicket may result.

SQUARE CUT

Among the riskiest shots in cricket, this cross-batted stroke (in which the bat is horizontal) is played to a short-pitched delivery on the off side. The ball should be played into the off side, square of the wicket.

HOWZAT?

The familiar and distinctive cry of "howzat?" (officially "how's that?") can be heard at cricket grounds the world over. This is because under Law 27 the fielding team must appeal to the umpire before the umpire can declare the batter "out."

STAT CENTRAL

MOST TEST RUNS

PLAYER	MATCHES	RUNS
SACHIN TENDULKAR	169	13,837
RICKY PONTING	145	11,954
BRIAN LARA	131	11,953
RAHUL DRAVID	142	11,490
ALLAN BORDER	156	11,174
STEVE WAUGH	168	10,927
JACQUES KALLIS	137	10,843
SUNIL GAVASKAR	125	10,122
GRAHAM GOOCH	118	8,900
JAVED MIANDAD	124	8,832

MOST TEST WICKETS

PLAYER	MATCHES	WICKETS
MUTTIAH MURALITHARAN	133	800
SHANE WARNE	145	708
ANIL KUMBLE	132	619
GLENN MCGRATH	124	563
COURTNEY WALSH	132	519
KAPIL DEV	131	434
RICHARD HADLEE	86	431
SHAUN POLLOCK	108	421
WASIM AKRAM	104	414
CURTLY AMBROSE	98	405

WORLD CUP WINNERS

YEAR	WINNER
2009 (WOMEN)	ENGLAND
2007 (MEN)	AUSTRALIA
2005 (WOMEN)	AUSTRALIA
2003 (MEN)	AUSTRALIA
2000 (WOMEN)	NEW ZEALAND
1999 (MEN)	AUSTRALIA
1997 (WOMEN)	AUSTRALIA
1996 (MEN)	SRI LANKA
1993 (WOMEN)	ENGLAND
1992 (MEN)	PAKISTAN
1988 (WOMEN)	AUSTRALIA
1987 (MEN)	AUSTRALIA
1983 (MEN)	INDIA
1982 (WOMEN)	AUSTRALIA
1979 (MEN)	WEST INDIES
1978 (WOMEN)	AUSTRALIA
1975 (MEN)	WEST INDIES

INSIDE STORY

The first official record of a game of "kreckett" was in England, in the 16th century. Early matches were very different from those today, with the bat more like a hockey stick, and the ball delivered underarm. It was not until the 19th century that overarm bowling and equipment such as batting pads were introduced. Today, cricket is played in over 100 countries, and there is a men's and a women's World Cup.

ICC

The International Cricket Council (ICC) is the sport's international governing body. Its many tasks include organizing the World Cups.

MCC

The Marylebone Cricket Club (MCC) is based at Lord's (the "home of cricket"), London, and administers the Laws and Spirit of Cricket.





BASEBALL

GAME OVERVIEW

Often seen as the defining American sport, baseball is a bat-and-ball game played by two teams of nine players. A game usually lasts for nine innings, during which both teams take turns at bat to score runs by advancing players around four bases. When the fielding team get three players out, they bat. The team with the most runs at the end of the game wins.

FIELD OF DREAMS

The baseball field is divided into infield and outfield. The infield consists of the "diamond", the corners of which are the four bases, and the pitcher's mound. It is bounded by the infield grass line and two foul lines that extend out from home plate and mark the limits within which the ball must be hit. The outfield is all the fair territory between the infield grass line and the outfield fence.

Bat attack

The baseball bat can measure anywhere between 25 in (63.5 cm) and 40 in (101.6 cm) in length and tapers at the handle. Professional players must use a wooden bat. Aluminium bats may be used in amateur baseball.

Batting gloves

Batting gloves enhance the hitter's grip on the bat.

BASEBALL IN BOOKS

THE NOVELIST JANE AUSTEN TALKS ABOUT A GAME OF "BASE-BALL" IN HER BOOK *NORTHANGER ABBEY*, WHICH WAS WRITTEN IN 1798. IT IS ONE OF THE EARLIEST WRITTEN REFERENCES TO THE GAME.

PLAYER PROFILE

Baseball is a game of skill, strategy, and athletic ability. Catching, hitting, and throwing all require excellent hand-eye co-ordination. It also helps to have great reflexes when facing the pitcher. Batters have just a fraction of a second to decide whether or not to swing at a pitch. Fitness is another important part of the game, for sprinting between bases and chasing down fast-moving balls in the field. Physical endurance is also crucial as the pros endure a gruelling 162-game regular season.

NEED2KNOW

- ➔ Baseball is a North American adaptation of the British sport rounders. While there is no official birth date for baseball, the first full documentation of a game dates to 1838.
- ➔ Professional baseball is primarily an American sport, but it has also spread to other countries. There are professional leagues in China, Japan, South Korea, Taiwan, Cuba, and Venezuela.

Head protection

Some pitchers can deliver the ball at 100 mph (160 kph) or more, so a helmet is essential for a batter's safety.

Player identification

Players from all the Major League teams except the New York Yankees have their names on the back of their jerseys. A number on the front of the jersey also identifies the player.

Team stripe

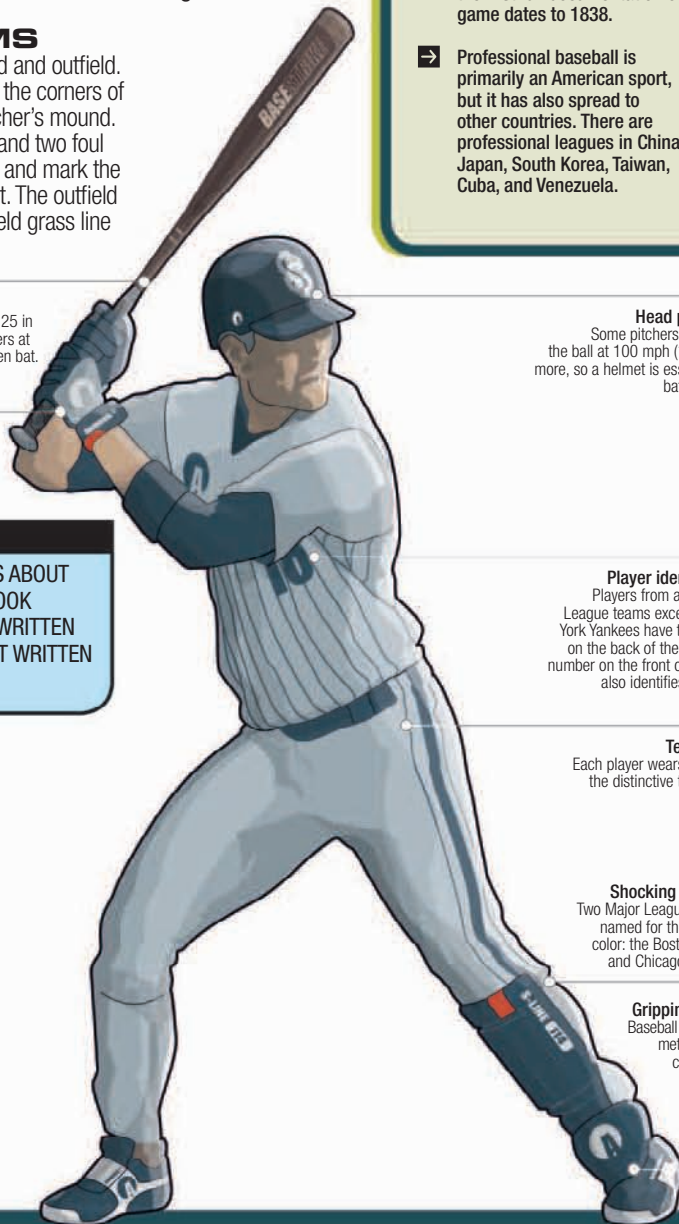
Each player wears a stripe in the distinctive team colors.

Shocking stockings

Two Major League clubs are named for their stocking color: the Boston Red Sox and Chicago White Sox.

Gripping the dirt

Baseball shoes have metal or plastic cleats on the soles that provide grip when running on dirt.

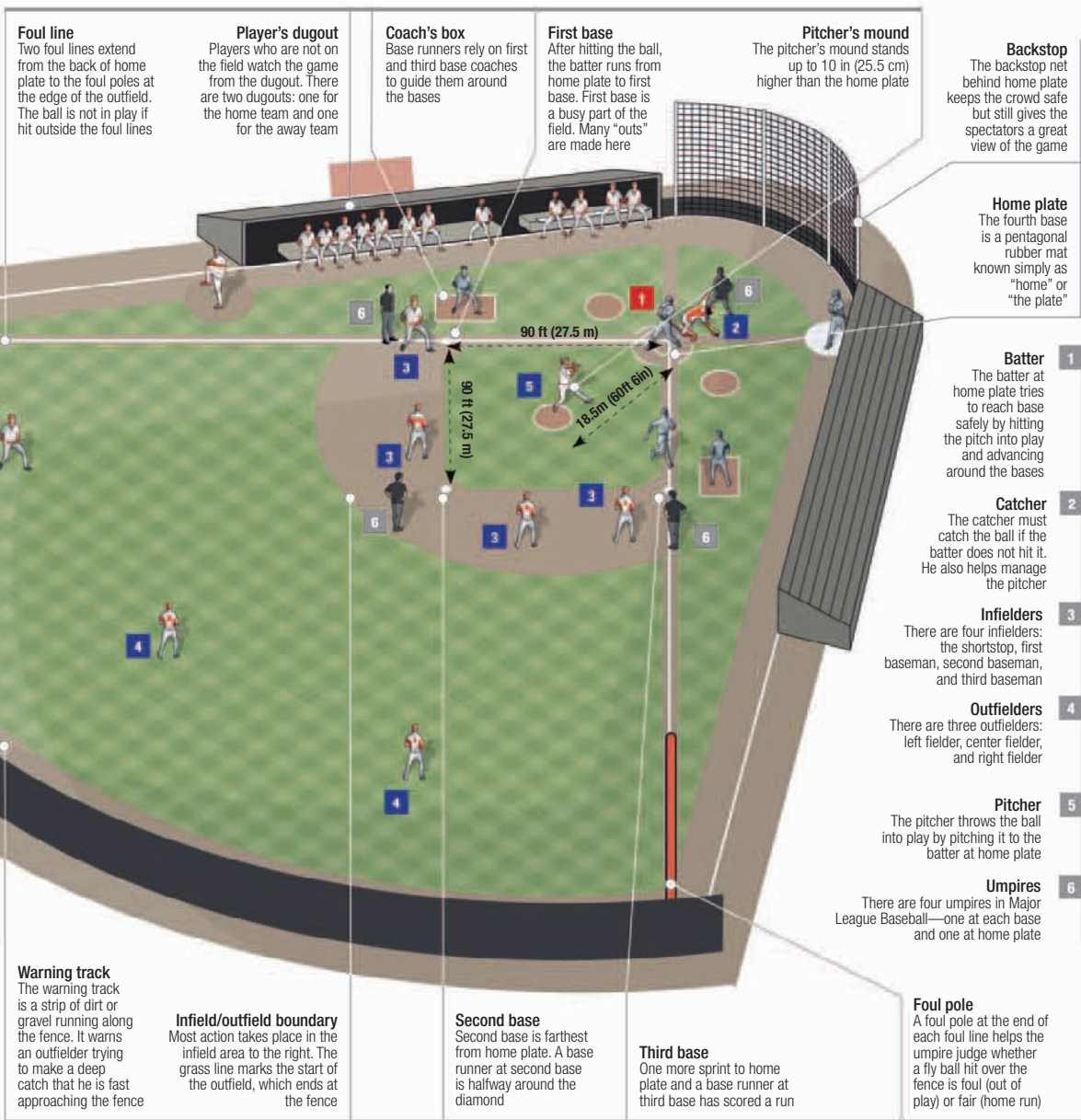


ON THE FIELD

There are nine defensive positions on the field. The pitcher stands on the mound to pitch, and the catcher squats behind home plate to catch the ball. The first baseman, second baseman, third baseman, and the shortstop cover the infield. The left, center, and right fielders patrol the outfield.

PITCHER'S MOUND

The pitcher's mound is a 18 ft (5.5 m) dirt circle up to 10 in (25.5 cm) high. Just behind the center of the mound is a small pad called the pitcher's rubber. The pitcher must keep one foot touching the rubber during the pitch and so can only take one step back and one forward.



SIDELINES

92,706

The highest ever attendance figure for a game in the US was recorded on October 6, 1959, when the LA Dodgers played the Chicago White Sox. The Colorado Rockies hold the record for highest season attendance—4,483,350 in 1993.

3,562

The record number of games played during a pro career. The record is held by Pete Rose, who played for 24 years.

59

The age of the oldest ever pro, Satchel Paige, who played his last game for the Kansas City Athletics on September 25, 1969.

2,700,000

The price in dollars of the most expensive piece of baseball memorabilia—the ball that St. Louis Cardinals player Mark McGwire hit for record-setting home run number 70 in 1998. Canadian comic book artist and avid baseball fan Todd McFarlane purchased the ball at an auction in 1999.



CATCHER'S GEAR

Standing right behind the batter, the catcher is exposed to pitches traveling at up to 100 mph (160 kph), so his gear is designed for protection. The mask, knee pads, and shin guards are made from hard plastic, and the chest protector is padded to protect the vital organs.

Catcher's mask

Modern masks are generally a one-piece design, similar to those worn by hockey goalies

Chest protector

Padding cushions the ribcage from pitches and deflected bats

Extra padding

Padding over the stomach prevents the catcher from getting winded

Knee pads

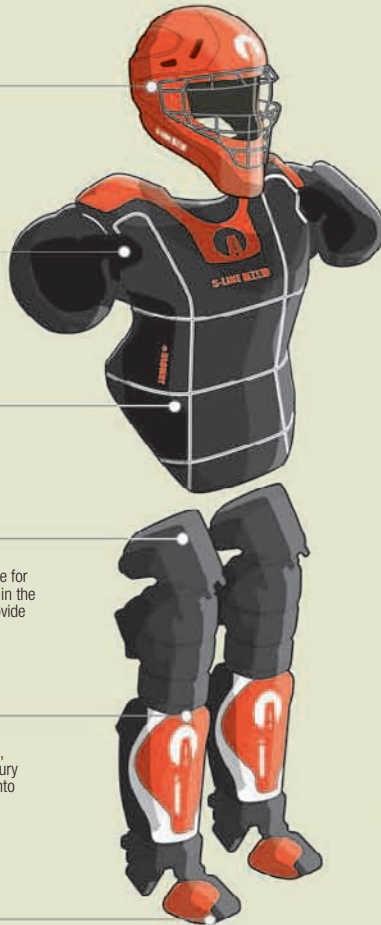
Special pads are comfortable for the catcher to rest on when in the squat position; they also provide protection for the knee joint

Shin guards

Also called spike protectors, they are used to prevent injury from base runners sliding into home with "spikes up"

Foot guards

Hard plastic guards cover the catcher's shoes to prevent damage to the feet



INNINGS AND OUT

Baseball is played in segments called innings. During an inning, each team takes a turn in the field and a turn at bat. The visiting team always bats in the first half, called the top half. The home team bats in the second half, called the bottom half. In most leagues, the team with the most runs at the end of nine innings wins. If the score is tied at the end of nine innings, the teams play extra innings until one team has a lead at the end of an inning. The most innings played in a Major League game is 25. The longest game lasted 8 hours and 40 minutes.

GETTING OUT

Baseball is one of the few team sports in which the defense has the ball. The aim is to get three batters out, which can be achieved in a number of ways. Four are listed here: the umpire calls three strikes against the batter; the batter hits a ball into the air (a fly ball) that is caught by a fielder before it hits the ground in fair territory or foul; a runner who is not standing on a base is tagged by a fielder holding the ball; or a fielder with the ball touches the base to which a runner is forced to go before he gets there.

THE CATCH HE SHOULD HAVE DROPPED

CHICAGO CUBS FAN STEVE BARTMAN WENT INTO HIDING AFTER A 2003 NATIONAL LEAGUE CHAMPIONSHIP GAME AGAINST THE FLORIDA MARLINS. BARTMAN LEANED OVER THE FENCE TO CATCH A BALL – AND PLUCKED IT OUT OF THE HAND OF A CUBS' OUTFIELDER. THE INCIDENT CONTRIBUTED TO THE CUBS' SUBSEQUENT LOSS. BARTMAN BECAME THE SUBJECT OF AN INTERNET HATE CAMPAIGN AFTER THE MARLINS LATER ADVANCED TO THE WORLD SERIES.

VITAL GEAR

The bat and ball are obviously vital to a game of baseball. Other important gear includes the fielders' gloves, which help them field the ball.

STITCHED UP

The ball has a core made from rubber and cork. Red cotton yarn is then wound around the core, and the ball is covered with two strips of leather. The leather is then stitched tightly together with more red cotton yarn.



3 in (7.5 cm)

GLOVES

Leather gloves make it easier for fielders to catch the ball. The size of the gloves depends on the fielding position. Infielder gloves have a size limit of 8½ in (21.3 cm). The short pockets of infielder gloves make it easier to remove the ball from the glove and throw it quickly.

Padded protection

The gloves of all the fielders are well padded to protect the fingers



Catcher's mitt

The fingerless mitt of the catcher guards the hand and makes it easier to catch pitches



BAT IN HAND

Made from either wood or metal, the smooth bat tapers from the thickest part, called the barrel, to the handle. Bats typically weigh no more than 4 lb (1.8 kg).

Barrel

The thickest part of the bat, the barrel, is the part used to hit the ball

Midpoint

The area between the barrel and the handle is the narrowest part of the bat

Tapered bat

The barrel tapers to the handle, which has a rubber or cloth covering to help grip the bat

Safe in hand

The wider "knob" at the end of the handle keeps the bat from sliding out of the batter's hands

up to 2½ in (7 cm)



up to 40 in (101.6 cm)

THREE STRIKES AND YOU'RE OUT

A batter has three attempts to hit a ball pitched into the strike zone above home plate. If he or she swings but misses the ball, the umpire calls a "strike" whether or not the pitch was in the zone. A strike is also called if the batter does not swing at a ball pitched into the strike zone or hits the ball into foul territory. If the batter has two strikes, a foul does not count as the third strike—with one exception. If the batter attempts to hold the bat over the plate, called a bunt, and the ball goes foul on more than two occasions, the batter is out. If the batter swings and hits the ball into fair territory, he or she must try to advance to first base.

THE BABE

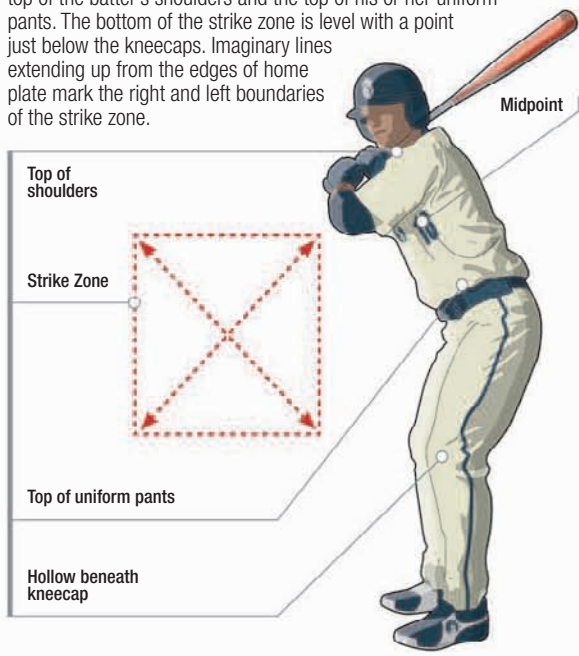
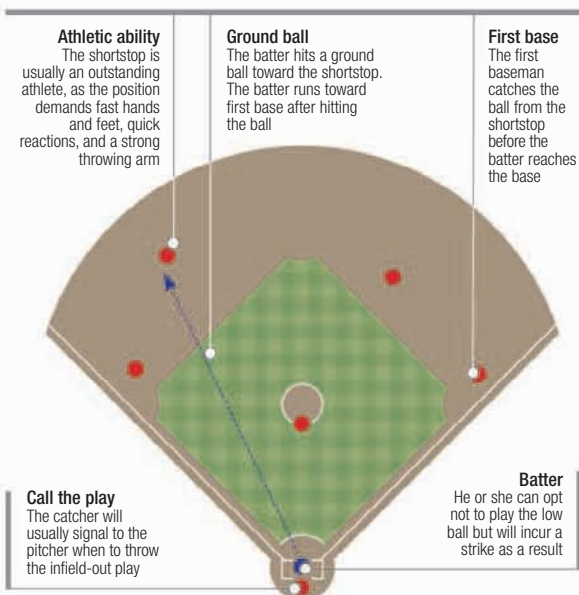
GEORGE HERMAN "BABE" RUTH, JR., THE LEGENDARY NEW YORK YANKEES OUTFIELDER, WAS ALSO KNOWN AS "THE GREAT BAMBINO," "THE SULTAN OF SWAT," AND "THE COLOSSUS OF CLOUT."

THE GROUND OUT

If a ball is hit on the ground to an infielder, he must field the ball and throw it to first base before the batter reaches the base. If the fielder does so, the batter is out. If the batter reaches base before the throw, he is safe. In the event of a tie, the batter is deemed safe.

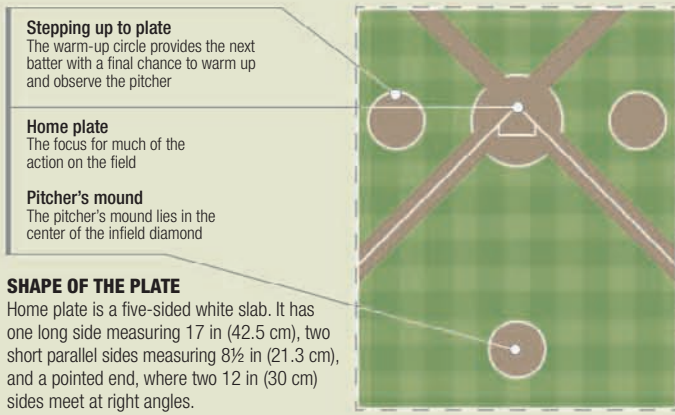
STRIKE ZONE

The strike zone is an imaginary window over home plate through which a pitch must pass to count as a strike if the batter does not attempt to hit the ball. The top of the strike zone is the midpoint between the top of the batter's shoulders and the top of his or her uniform pants. The bottom of the strike zone is level with a point just below the kneecaps. Imaginary lines extending up from the edges of home plate mark the right and left boundaries of the strike zone.



ON-DECK CIRCLES

A circle is marked on either side of home plate. These circles, called on-deck circles, are areas designated for the next batter, who may take practice swings to loosen up before his or her turn at bat.



DESIGNATED HITTER

Traditionally, all members of a baseball team had to be able to take the field. Starting in 1973, however, the American League introduced the designated hitter (DH), a batter who takes the pitcher's turn at bat but does not play a defensive position. The DH allows teams to play a specialized pitcher, who may not be particularly good at batting, or a specialized batter who may be useless in the field, both of whom were liabilities under the old rules. Most Minor League and amateur baseball also allows use of a DH, but the National League prohibits the DH and requires the pitcher to bat.

BLACK SOX SCANDAL

IN 1919, EIGHT MEMBERS OF THE CHICAGO WHITE SOX TEAM WERE BANNED FROM BASEBALL FOR THROWING GAMES IN THAT YEAR'S WORLD SERIES. THE CONSPIRACY WAS THE BRAINCHILD OF WHITE SOX FIRST BASEMAN ARNOLD "CHICK" GANDIL.



HITS AND MISSES

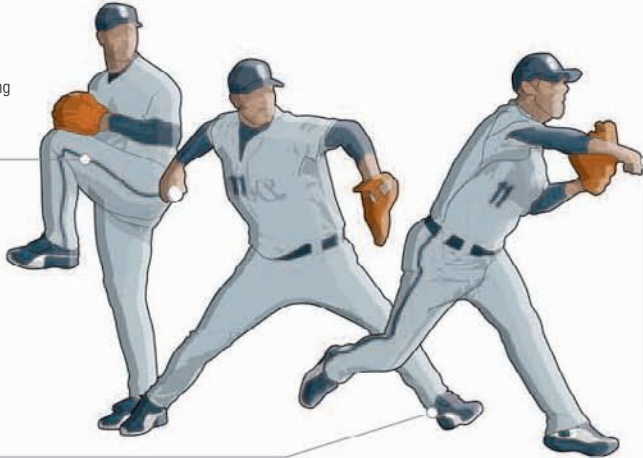
Baseball is a game of strategy as well as athletic ability. Strong pitching is vital, since it is the most common way to get batters out. The pitchers' ideal situation is a "shutout," where the batting side does not score during the game. Batters do not simply practice hitting. They also spend hours studying throwing styles to try and "read" a pitch by watching the movement of the pitcher's arm or the positioning of the catcher's feet.

PITCHING

The type of pitch a pitcher throws depends on how he grips and releases the ball. Major League pitchers usually master at least two or three types of pitch. The catcher calls for a particular type of pitch using hand signals.

Windup

The pitcher winds up with his back foot on the pitching rubber, often raising the other leg to his chest



Stride

The pitcher plants his front foot down firmly and swings the hand holding the ball over his head. A few pitchers, including some of the hardest to hit, pitch sidearm or nearly underarm

Pitch

The pitcher releases the ball toward the batter as his throwing arm reaches its full extent. He throws his entire body weight onto his front foot as he releases the ball

PITCHING STYLES

Pitchers throw a variety of pitches, each of which has a slightly different velocity, trajectory, and/or arm angle. These variations are introduced to confuse the batter in various ways, and ultimately aid the defensive team in getting the batter or baserunners out.

CURVEBALL

The curveball pitch has plenty of topspin, which causes the ball to break, or curve downward, unexpectedly. A well-placed curveball will drop just before it hits the plate, forcing the hitter to swing above it.



Wrist twist

The wrist is twisted inward to add spin to the throw

SLIDER

Halfway between a curveball and a fastball, the slider pitch doesn't break as dramatically as the curveball but travels faster, often tricking the hitter into believing it is a straight fastball.



Slider grip

The ball is gripped slightly off center

FASTBALL

The fastball is the most common pitch in baseball. Some fastballs move or break in flight, some do not—but all of them are delivered at great speed.

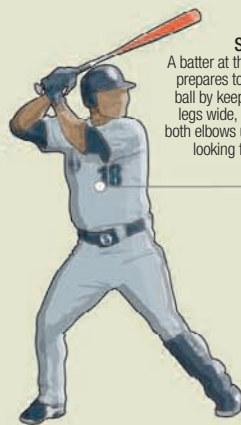


Fast fingers

Two fingers are placed over the top of the ball

BATTING

Having warmed up in the on-deck circle, the batter steps up to the plate. He grips the bat firmly around the handle, with hands close together and fingers aligned at the knuckles. Then the chess game begins as the batter and pitcher try to outwit and overpower each other. Batting is often cited as one of the most difficult feats in sport. In fact, if a batter can get a hit in three out of 10 pitches faced, giving him a batting average of .300—pronounced three-hundred—he or she is considered a good hitter. In Major League Baseball, no batter has hit over .400 in a season since Ted Williams in 1941, and no batter has ever hit over .367 in a lifetime.



Stance

A batter at the plate prepares to hit the ball by keeping his legs wide, holding both elbows up, and looking forward



Swing

The batter strides forward into the pitch and rotates his hips to generate power

Follow-through

As he follows through, the hitter keeps his head down and completes his swing



SIDELINES

114,000 The highest ever attendance for a baseball game—an exhibition between Australia and an American services team during the 1956 Olympics.

162 The number of baseball games played by every Major League team during the season, which lasts from April to September.

73 The record number of home runs hit by one player during a MLB season. The record is held by Barry Bonds.

SCORING STATS

Baseball aficionados pore over batting, pitching, and fielding averages to rate their heroes, and scorers record all manner of statistics. Batters, for example, are awarded base hits for getting safely on to a base: a single for first base, double for second, and triple for third.

BASEBALL JARGON

For the uninitiated, baseball may seem to have a language all of its own—in fact, there are entire books published on the sport's jargon. The following list of selected terms will help you interpret some of the more common phrases to be heard on the field.

BASES LOADED A situation where there are baserunners on first, second, and third bases.

BEANBALL A pitch deliberately thrown to hit the batter, usually on the head, if he or she does not move out of the way.

DOUBLE A hit in which the batter gets to second base safely.

DOUBLE PLAY When two players from the batting team are put out on the same play.

HOMER A "homer" (or home run) is a hit over the outfield fence that allows the batter automatically to run through all the bases and score a run.

LEFT ON BASE A term used to refer to the total number of baserunners who are left waiting on a base when the third out is called by an umpire.

PINCH HITTER A substitute batter who replaces a weak batter during a critical play (a "pinch").

SHUTOUT When one team prevents the other from scoring.

STOLEN BASE A stolen base occurs when a runner successfully advances to the next base.

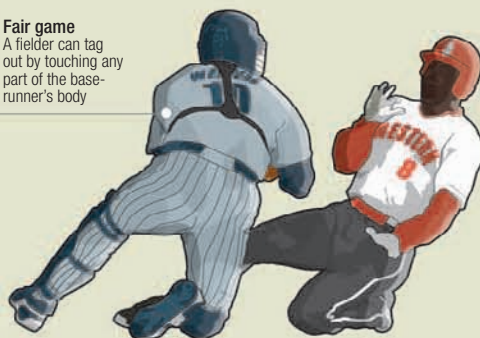
BASERUNNING

Once the ball is in play, baseball is a contest between the speed of the batter's feet and the speed of the fielder's throwing arm. Baserunners can be tagged or forced out when they are not touching a base. They make desperate and spectacular slides to reach a base beneath the fielder's hands, calling for fine judgment from the umpire on the spot.

TAG OUT

The tag out (or simply a "tag") occurs when a fielder holding a live ball touches the base runner when he or she is not touching a base.

Fair game
A fielder can tag out by touching any part of the base-runner's body



SLIDE

A runner slides into a base to avoid being tagged out or overrunning the base. A runner may slide into the base with enough speed to knock over an infielder attempting a tag out.

The Pete Rose

When a runner slides head-first into a base it is known as a "Pete Rose," after the gritty player



INSIDE STORY

The Major Leagues consist of two set leagues—the National League (formed 1876) and the American League (formed 1901). Professional baseball has also become popular in other parts of the world, notably Asia and Latin America. Amateur baseball was an official Olympic sport from 1992, but has been dropped for the 2012 London Games.

INTERNATIONAL BASEBALL FEDERATION (IBAF)

The IBAF is the worldwide governing body for baseball. Founded in 1938, the IBAF manages tournaments such as the World Cup of Baseball and the World Baseball Classic. Despite its international authority, the IBAF has little control over professional baseball in North America.

MAJOR LEAGUE BASEBALL

Major League Baseball is the dominant force behind professional baseball in North America. There are 30 teams in two major leagues: 16 in the older National League and 14 in the American League. Each league has three divisions grouped by geographical location. At the end of the season, the top teams from each league compete in a best-of-seven game series called the World Series to determine the overall champion.

STEALING THE SHOW

Runners risk being tagged out as they try to reach the next base before the pitcher releases the ball. Second base is behind the mound, and first and third bases are at the edges of the pitcher's vision, so he or she has to be alert to a runner making a sudden dash. Pitchers are allowed to throw the ball to a baseman instead of pitching to the batter, forcing the runner to scurry back to safety or get tagged out.

STAT CENTRAL

WORLD SERIES LEADING WINNERS

FRANCHISE	WINS
NEW YORK YANKEES	27
ST. LOUIS CARDINALS	10
OAKLAND ATHLETICS	9
BOSTON RED SOX	7
LOS ANGELES DODGERS	6
CINCINNATI REDS	5
SAN FRANCISCO GIANTS	5
PITTSBURGH PIRATES	5
DETROIT TIGERS	4
ATLANTA BRAVES	3
BALTIMORE ORIOLES	3
CHICAGO WHITE SOX	3
MINNESOTA TWINS	3
CHICAGO CUBS	2
CLEVELAND INDIANS	2
NEW YORK METS	2
FLORIDA MARLINS	2
TORONTO BLUE JAYS	2

WORLD CUP OF BASEBALL

NATION	WINS
CUBA	25
UNITED STATES	4
VENEZUELA	3
COLOMBIA	2
SOUTH KOREA	1
PUERTO RICO	1
DOMINICAN REPUBLIC	1
GREAT BRITAIN	1

TOP MLB CAREER HOMERS

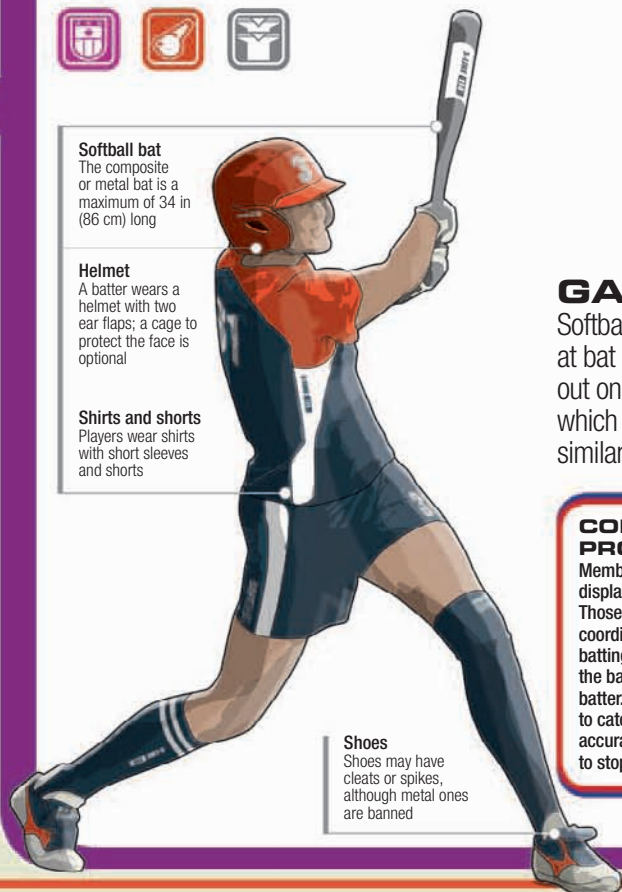
NAME	HRS
BARRY BONDS	762
HANK AARON	755
BABE RUTH	714
WILLIE MAYS	660
KEN GRIFFEY JR.	630
ALEX RODRIGUEZ	613
SAMMY SOSA	609
FRANK ROBINSON	586



SOFTBALL



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Softball bat

The composite or metal bat is a maximum of 34 in (86 cm) long

Helmet

A batter wears a helmet with two ear flaps; a cage to protect the face is optional

Shirts and shorts

Players wear shirts with short sleeves and shorts

Shoes

Shoes may have cleats or spikes, although metal ones are banned

GAME OVERVIEW

Softball is a game in which two teams of nine players take turns at bat as they try to score the most runs around four bases laid out on a field of play. A game usually consists of 7 innings in which each team bats and fields 7 times. Softball has some similarities with baseball, which is also known as hardball.

COMPETITOR PROFILE

Members of a team may display a range of skills. Those with good hand-eye coordination may excel at batting while others can pitch the ball cleverly to deceive the batter. All outfielders know how to catch, pick up, and throw accurately from base to base to stop runners from scoring.

NEED2KNOW

- The sport that we know today as “softball” is said to have begun indoors in 1887 on Thanksgiving Day in Chicago.
- One or more onfield umpires monitor the game to make sure the rules are followed.
- The International Softball Federation (ISF) is the governing body and has more than 120 member countries.

FIELDING EQUIPMENT

The catcher standing behind the batter wears a helmet with a face mask and throat protector. Fielders wear a leather glove with webbing between the thumb and forefinger to help them catch and field the ball. They may wear sliding shorts to protect their thighs when sliding toward the bases. The stitched white or yellow leather ball is usually either 12 in (30 cm) or 11 in (28 cm) in circumference.

FIELD OF PLAY

The softball field features a diamond with three bases and a home plate where the batter stands and tries to hit the ball. To score a run, batters run around the diamond, touching the bases and home plate. The outfield can be any size, depending on the space available and the level of play. Slow-pitch softball can be played in larger arenas than fast-pitch softball because the batters hit the ball farther.

Center field

The distance from home plate to the center field fence can be as much as 300 ft (90 m)

Diamond

The sides of the diamond are 60 ft (18.3 m) long

Pitching circle

The pitcher stands on the pitching circle and throws the ball at the batter

Backstop

The backstop is 25–30 ft (7.62–9.14 m) behind home plate

Foul line

The batter must hit the ball within the foul lines

Safety base

Batters run to the safety base to avoid a collision with the fielder at first base

Home plate

Batters hit the ball from home plate and then attempt to run around the diamond

GETTING OUT

In each half-inning, the fielding (defensive) team needs to get three of the batting (offensive) team out. A batter may be out in several ways: if three strikes (failure to hit a fair delivery) are called (a strikeout); if a hit ball is caught before bouncing (a flyout); if the batter is touched by the ball or by a glove worn by a fielder holding the ball while the batter is away from a base (tagged); or if a fielder holding the ball touches a base before the batter arrives there (a force out or a force play).

TYPES OF SOFTBALL

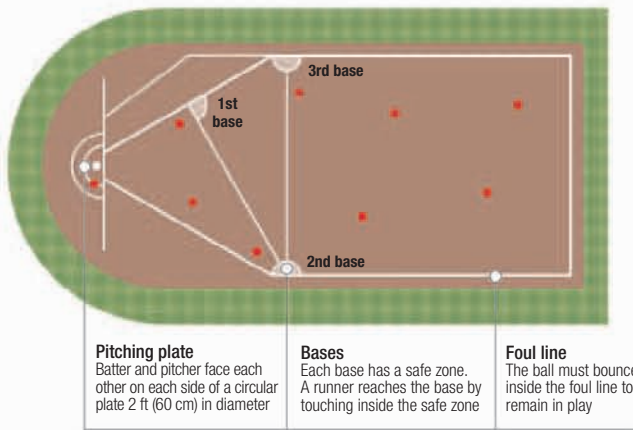
Fast-pitch, slow-pitch, and modified pitch are the 3 types of softball. Fast-pitch softball favors the pitcher, who, using a windmill motion, delivers the ball underhand as quickly and skillfully as possible, making it hard to hit. Slow-pitch softball favors the batter, since the ball is lobbed up, making it easier to hit. Modified-pitch softball is like a slowed-down version of fast-pitch softball.

PESÄPALLO



GAME OVERVIEW

Also known as pesis, pesäpallo is Finland's most popular sport. As in baseball, two teams of nine players take turns batting and fielding, and the batting team scores when it advances a player around four bases. When they are batting, teams may also use three extra designated hitters, or jokers.



SCORING

A full game is played over two periods of four innings, with an extra inning if scores are tied. The ball must bounce within the playing area to count as a legal play. Any ball that is hit past the back line is called a strike, so the batter must be careful not to hit the ball too hard. After three strikes a batter is out. If a fielder catches the ball inside the playing area, the batter is "wounded" and cannot bat again in the inning unless the team scores. An inning ends when three players are out or all players are either wounded or on a base. The team's plays are directed by a manager, who works out how best to score in this highly tactical game.

FIELD OF PLAY

The game is played on asphalt or other surfaces suitable for running. For men, the field is 302 ft (92 m) long and 138 ft (42 m) across. A strip of grass 33 ft (10 m) wide surrounds it. The bases are laid out in a zigzag, with the distance between each base progressively longer, to a total distance of 413 ft (126 m). For women, the field is 10 percent smaller.

NEED2KNOW

- ➔ Pesäpallo was invented in the 1920s by combining the rules of baseball with traditional Finnish games.
- ➔ The pitcher delivers the ball by throwing it up vertically to a height of at least 3 ft 3 in (1 m) above the batter's head. This makes hitting the ball easier than in baseball.

ROUNDERS



GAME OVERVIEW

Rounders is a game played by two teams of at least 6 but no more than 15 players, who take turns to bat and field. The team that scores the most rounders at the end of a number of innings is the winner. The game is mainly played by teams in the UK, Ireland, and Canada. The National Rounders Association (NRA) in the UK and the Gaelic Athletic Association (GAA) in Ireland have developed two sets of rules, although there is some overlap between them and games are played between the two codes.

SCORING

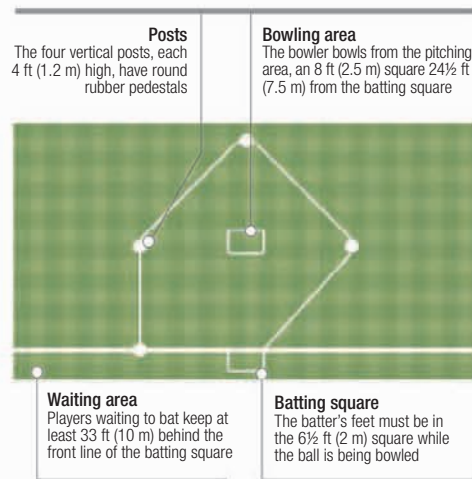
A rounder is scored if a batter hits the ball and runs without stopping around all four posts before the ball can be returned to the bowler. Under NRA rules, a half-rounder is scored if the batter hits the ball and reaches second or third base or if he or she runs all the way around without having hit the ball. A penalty half-rounder is scored if the bowler delivers two consecutive no-balls to a batter.

FIELD OF PLAY

Rounders may be played on grass, asphalt, or any surface suitable for running, but not on mixed surfaces. The hitting area and the first three posts form a square with 39 ft 5 in (12 m) sides. The fourth post is 27 ft 10 in (8.5 m) from the third post.

NEED2KNOW

- ➔ Rounders is thought to have originated in Great Britain and Ireland, perhaps as early as the 16th century. It was probably the inspiration for baseball and softball.
- ➔ The game is played by men, women, and children. There may be no more than five men on a mixed team.



NEED2KNOW

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- Originally developed in Canada, ice hockey is played in about 30 countries, mainly in North America and Europe.
- Ice hockey is one of the four major North American professional sports.
- The North-American-based National Hockey League, known as the NHL, is the sport's premier league.
- Only six of the 30 NHL franchises are based in Canada, but Canadians outnumber Americans in the league by three to one.

PLAYER PROFILE

Hockey players must think fast, act fast, and be masters of strategy. To reach speeds of up to 25 mph (40 kph), players must be extremely fit and strong, and to turn and maneuver at these speeds they need supreme control of their bodies. The puck can travel at frightening speeds, so to control and pass it or shoot on goal, players need lightning reflexes.

Equipment

The gloves, like all hockey gear, is focused on protection—lots of padding is worn to avoid injury during high-speed collisions with other players, the boards, or the puck

Tool of the trade

The main tool of the hockey player's craft, the hockey stick, is used to control and shoot the puck and also serves as a barrier between a player and the opposition

Bladed boots

Hockey skates feature space-age material technology, all sitting on a razor-sharp blade that carves up the ice—and anything else that gets in its way. Skates can cost up to \$6,000 per pair and are custom-made for the pros

GAME OVERVIEW

Ice hockey, or just “hockey” as it's known in the United States and Canada, is a fast-paced, action-packed sport played on ice. During 60 minutes of regular time, split into three 20-minute periods, each team of six padded players tries to score by shooting a vulcanized rubber puck into the opposition's goal using their stick or by deflecting it off their skates. Ice hockey is a dynamic and exciting game to play and watch; it attracts huge television audiences and legions of fanatical supporters.

THE RINK

Hockey rinks are specifically designed for the game. They are rectangular with rounded corners and are surrounded by “the boards”—a wall roughly 3 ft 3 in (1 m) high topped with a shatterproof plexiglass screen to protect the crowd. There are two standard sizes for hockey rinks: the one used primarily in North America is narrower than that used in Olympic competition and in most other national leagues. At each end of the ice, there is a goal consisting of a metal frame and a cloth net. The ice is about $\frac{3}{4}$ in (2 cm) thick and made up of eight to ten thin layers.

Red line

Divides the rink into two zones—one for each team

Neutral zone

Both teams must change players within this zone. Various attack and defense strategies are organized in the neutral zone

Face-off circles and spots

The five circles and nine spots indicate where face-offs take place

Position lines

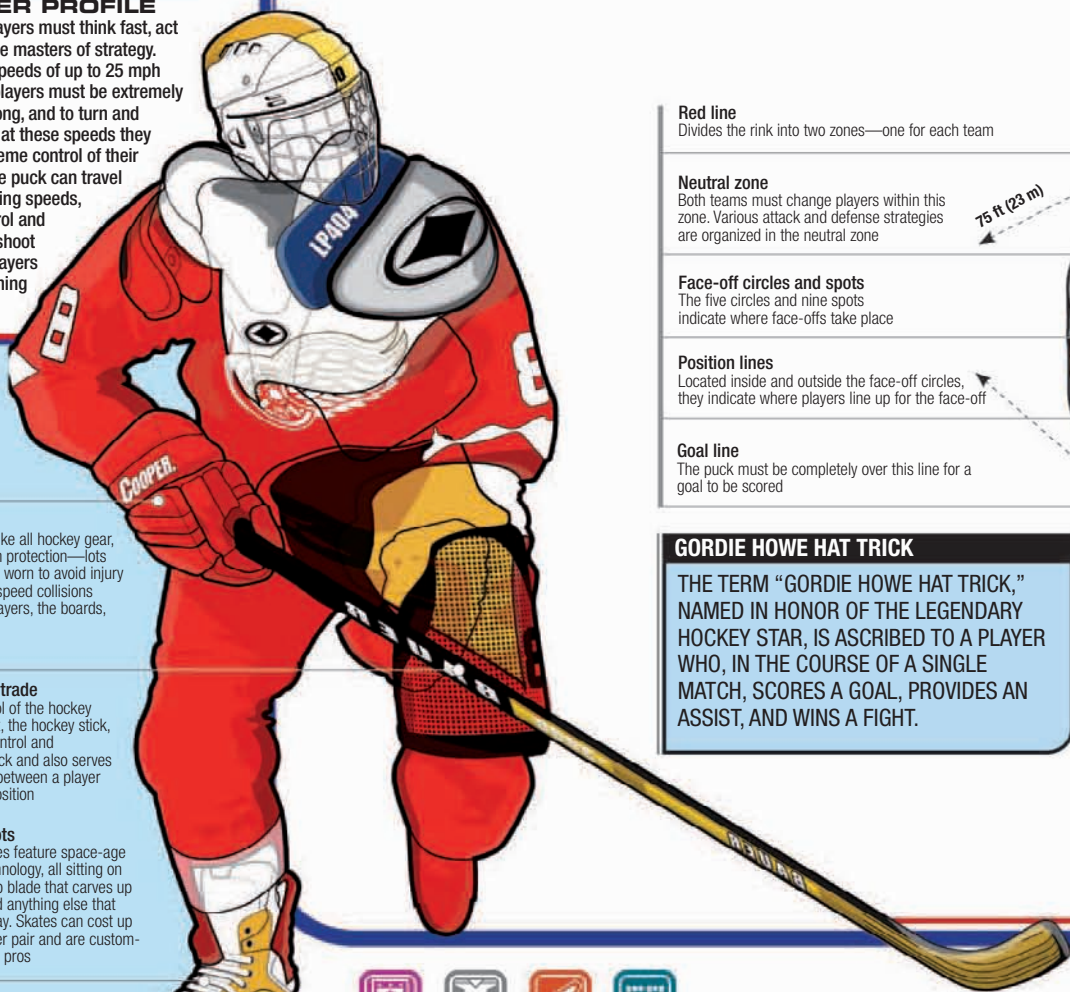
Located inside and outside the face-off circles, they indicate where players line up for the face-off

Goal line

The puck must be completely over this line for a goal to be scored

GORDIE HOWE HAT TRICK

THE TERM “GORDIE HOWE HAT TRICK,” NAMED IN HONOR OF THE LEGENDARY HOCKEY STAR, IS ASCRIBED TO A PLAYER WHO, IN THE COURSE OF A SINGLE MATCH, SCORES A GOAL, PROVIDES AN ASSIST, AND WINS A FIGHT.



ICE HOCKEY

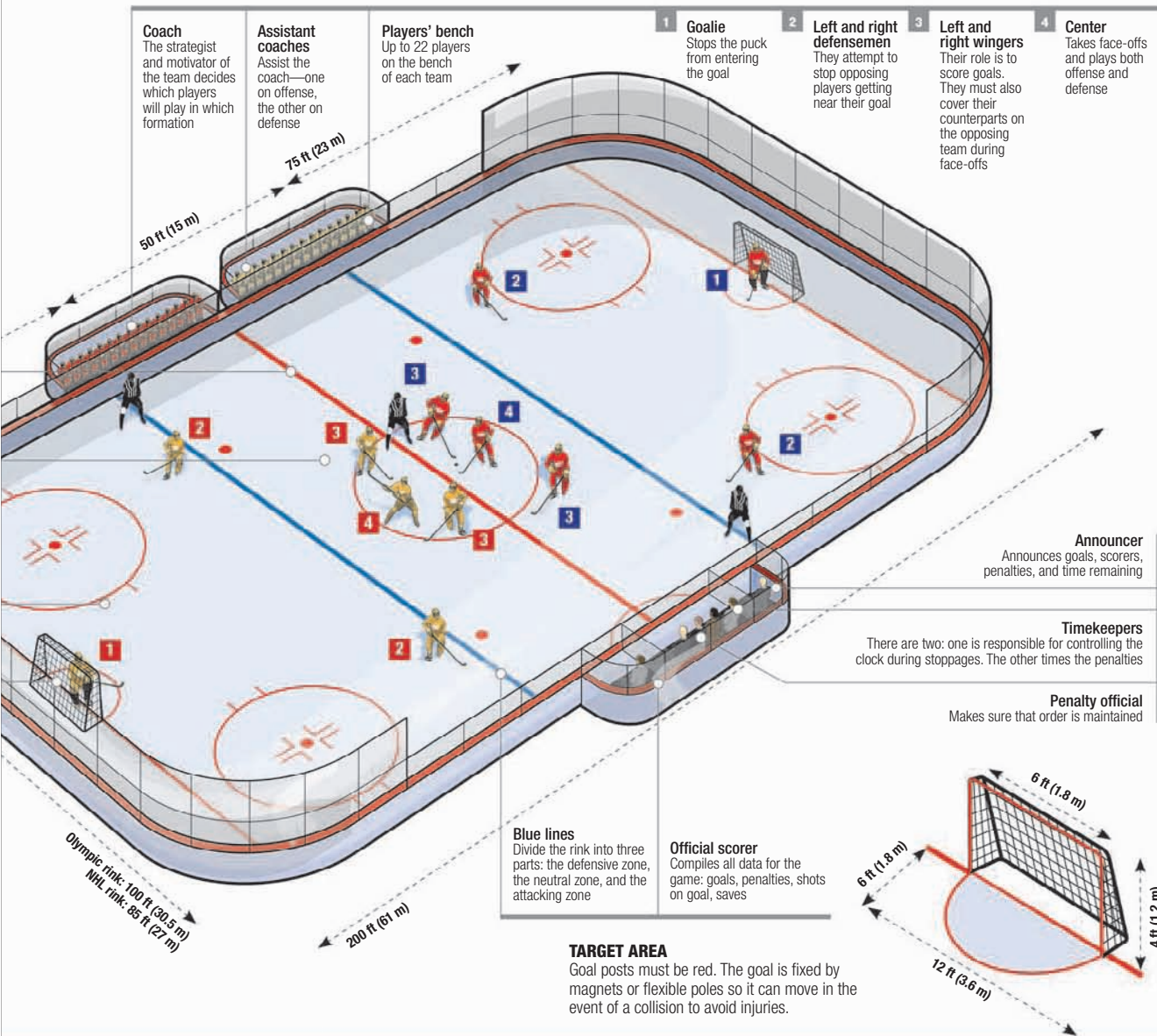


THE FACE-OFF

Each game starts with a face-off in the center circle, and restarts in the same way after every goal that's scored. This is not a moment for the faint-hearted. One player from each team squares up, toe-to-toe, their sticks at the ready, their blades remaining on the ice, poised for action. To start the game, the referee or linesman drops the puck between the two players, then backs out of the way. The players then battle—sticks clashing—to gain possession of the puck and make an assault on the opposition's goal.

WHO PLAYS WHERE?

A team consists of, at most, 22 players, including at least two goaltenders. Six players from each team take the ice at the same time. Usually one of the six is a goalie, who wears heavy-duty protective clothing and positions himself in front of the goal. He is allowed to stop the puck with his hands, body, or stick. His five teammates are divided into three forwards and two defensemen. The forward positions—the “glamor” players—are the left wing, right wing, and center. In defense, laying in wait for the opposition, are the left and right defense.



SIDELINES

74,544 The largest crowd ever packed in the Spartan Stadium to watch archrivals Michigan State University and the University of Michigan.

552 The record number of consecutive games played by NHL hockey goalie Glenn Hall.

35 The record number of professional games without a loss is held by the Philadelphia Flyers (1980).

5 “Five goals, five different ways” is known as a quinella. Mario Lemieux scored the only quinella in NHL history.

1 The number of American-born goaltenders out of the 34 total enshrined in the Hockey Hall of Fame.



WHAT THEY WEAR

The hard surfaces of the ice and boards, and pucks flying at up to 120 mph (190 kph)—not to mention other players looking for blood—pose a multitude of safety hazards. Besides ice skates and sticks, hockey players are usually equipped with an array of safety gear to lessen the risk of injury. This includes a helmet, shoulder pads, elbow pads, mouth guard, protective gloves, heavily padded shorts—sometimes known as Breezers—a “jock” athletic protector, shin guards, and sometimes a neck guard. Goaltenders wear masks and much bulkier, specialized equipment designed to protect them from many direct hits from the puck.

BODY GUARDS

Ice hockey players are among the best protected sports players—and for good reason. Here is the array of equipment worn by most NHL hockey players.

Face protection

Visors are made of steel bars or mesh, or of transparent reinforced plexiglass

Upper body

A hybrid of a wet suit and an NFL player's shoulder pads, this upper-body suit offers great protection and flexibility

Composite materials

Body padding is made of hi-tech materials that are strong yet breathable

The jock

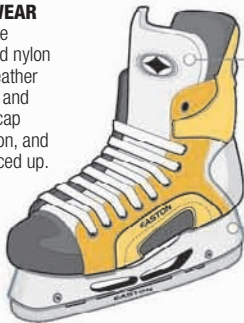
The groin and pelvis protector is one of the most valued items in the lockers of male hockey players

Thigh guards

Breezers protect the hockey players' best developed and most used muscles

FASTER FOOTWEAR

Hockey skates are made of hardened nylon reinforced with leather around the ankle and heel. A hard toe cap provides protection, and the skates are laced up.



Cold comfort

Hockey players spend up to 12 hours a day in their hockey skates, so comfort is high on the list of requirements. Boots are lined with natural, breathable materials such as cotton and silk

Steel blade

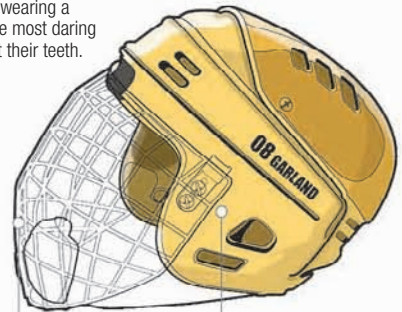
The blades on hockey skates are made of hardened steel

“THE GREAT ONE”

NICKNAMED “THE GREAT ONE,” WAYNE GRETZKY IS REGARDED AS THE BEST PLAYER OF HIS ERA AND IS ACKNOWLEDGED AS THE GREATEST HOCKEY PLAYER EVER BY SPORTSWRITERS, PLAYERS, COACHES, AND FANS. ALONG WITH HIS MANY AWARDS, RECORDS, AND ACHIEVEMENTS, HE IS THE ONLY PLAYER TO EVER HAVE HAD HIS PLAYING NUMBER, 99, OFFICIALLY RETIRED ACROSS THE ENTIRE NATIONAL HOCKEY LEAGUE.

HEAD GEAR

Since they were made mandatory in the 1980s, helmets have prevented many a cracked skull. Although wearing a visor is optional, all but the most daring players use one to protect their teeth.



Goalie's visor

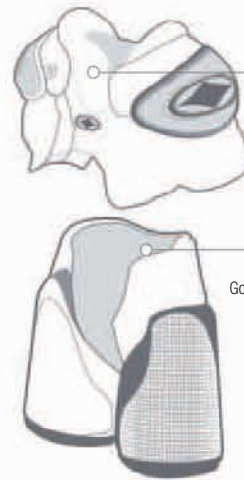
Goaltenders wear larger visors that offer more coverage against pucks flying in from all angles

Hard hat

Light but super-strong fiberglass resists the blows of sticks and pucks

GOALIE'S GETUP

The ice hockey goalie inhabits potentially the most vulnerable position in sport. Being bombarded by speeding pucks requires a whole extra level of protection.



Puck-proof vest

The goalie's vital organs are protected by a vest made of steel mesh and graphite—not quite bulletproof, but almost

Pants protection

Goalies wear an extra pair of strengthened pants. Nothing can get in and nothing can escape out

CHOOSE YOUR WEAPON

Hockey players choose their sticks carefully and look after them well. Made of wood reinforced with fiberglass, these flexible lances, 6 ft 6 in (2 m) in length, pack a mighty punch at puck or opponent.

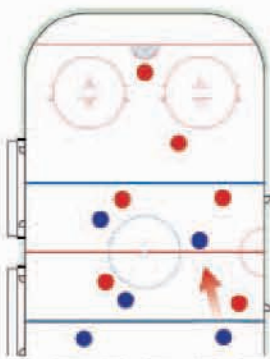


PLAYING BY THE RULES

Shooting the puck into the opposition's goal is the aim of the game. Getting it there is a task pretty much unhindered by rules and regulations—fighting is all part of the game—although offside rules do dictate patterns of play.

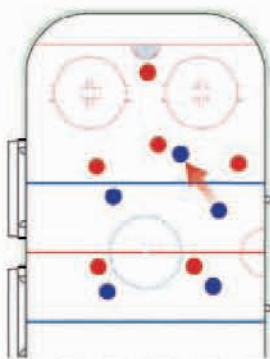
STAYING INSIDE

The purpose of the offside rule is to prevent attacking players from goalhanging. The most important offside rule dictates that attacking players must follow the puck into the attacking zone. A player is called offside if both his skates go into the attacking zone before the puck does. The other key offside rules are outlined below.



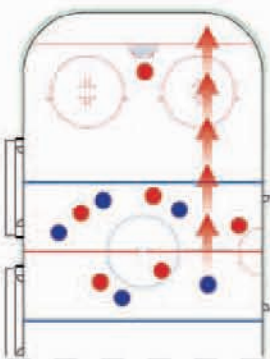
ADVANCING THE PUCK

Players can't pass the puck to a teammate across any two lines. Both skates must be over a line to determine player positions.



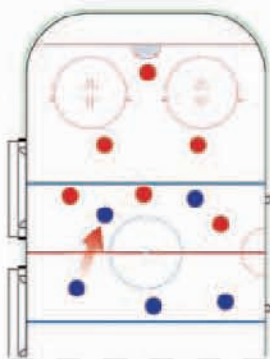
PRECEDING THE PUCK

They can't cross into the attacking zone ahead of the puck and then touch it. Offside is not called if they leave the attacking zone without touching it.



ICING

Icing is called when a player hits the puck across the opponent's goal line from his or her own half, unless it goes into the goal. Icing is legal when a team is shorthanded.



TWO-LINE PASS

The two-line pass (also known as an offside pass) occurs when a player passes the puck from his defending zone to a teammate across the red center line.

THE POWER PLAY

The object of a power play is to score a goal while the opposing team is playing shorthanded after a penalty has been awarded. Up to two players per side may be penalized, giving a team a possible five-on-three power play. The coach will then usually put on his best attacking players to try to push home the advantage. From the face-off they try to gain control of the puck and head for the opposition's goal. The players then pass the puck between them until an opening is created and a player gets to take a shot on goal. A power play lasts the length of a penalty (two, four, or five minutes) or ends when a goal is scored by either team.

COMMITTING A FOUL

In men's hockey, players use their hips or shoulders to hit other players if the player has the puck or has just passed it. This is called body-checking and is perfectly legal. However, the following are expressly forbidden and incur penalties:

- BOARDING** Throwing an opponent violently into the boards
- BUTT-ENDING** Jabbing an opponent with the shaft of one's stick
- CHARGING** Taking more than two steps toward an opponent before body-checking him
- CLIPPING** Throwing one's body below an opponent's knees
- CROSS-CHECKING** Hitting an opponent with the shaft of the stick while both hands are on the shaft
- ELBOWING** Impeding or striking an opponent with one's elbow
- DELAY OF GAME** Failing to keep the puck in motion
- HIGH-STICKING** Hitting an opponent above the shoulders
- HOLDING** Impeding an opponent with hands or arms
- HOOKING** Impeding an opponent with one's stick
- INTERFERENCE** Body-checking an opponent who does not have the puck or who has not just passed it
- KNEEING** Hitting an opponent with one's knee
- SLASHING** Swinging one's stick at an opponent
- SPEARING** Jabbing an opponent with the blade of one's stick
- TRIPPING** Impeding an opponent around his legs

OFFICIALS' SIGNALS

There are two categories of officials: on-ice officials are the referees and linesmen that enforce the rules during game play; off-ice officials have an administrative role rather than an enforcement role. The referee will halt the game using a whistle then signal when he spots any of the offenses outlined above. The signals used in ice hockey are unique to the game. There are more than a dozen signals used by referees during a game; below are among the most commonly seen during a game.



DELAYED PENALTY



HOOKING



SLASHING



GOAL DISALLOWED



CROSS CHECKING



GOAL SCORED

FISTICUFFS

FIGHTING IN ICE HOCKEY IS A CONTROVERSIAL ASPECT OF THE SPORT. ALTHOUGH IT RESULTS IN A MAJOR PENALTY, PLAYERS WHO ENGAGE IN FIGHTING DO NOT GET EJECTED FROM THE GAME. HOCKEY REMAINS THE ONLY MAJOR PROFESSIONAL SPORT IN NORTH AMERICA THAT DOESN'T EJECT PLAYERS FOR FIGHTING. FIGHTS ARE OFTEN SPONTANEOUS KNEE-JERK REACTIONS TO AN ON-ICE INCIDENT DURING A CRUCIAL PART OF A GAME.



STAT CENTRAL

ALL-TIME NHL POINT SCORERS

POINTS	PLAYER
2,857	WAYNE GRETZKY
1,887	MARK MESSIER
1,850	GORDIE HOWE
1,798	RON FRANCIS
1,771	MARCEL DIONNE
1,755	STEVE YZERMAN
1,723	MARIO LEMIEUX
1,641	JOE SAKIC
1,599	JAROMIR JAGR
1,590	PHIL ESPOSITO
1,579	RAY BOURQUE
1,531	PAUL COFFEY
1,485	MARK RECCHI
1,467	STAN MIKITA
1,425	BRYAN TROTTIER

NHL TITLE WINNERS

NO	TEAM
24	MONTREAL CANADIENS
13	TORONTO MAPLE LEAFS
11	DETROIT RED WINGS
5	BOSTON BRUINS
5	EDMONTON OILERS
4	OTTAWA SENATORS
4	NEW YORK RANGERS
4	NEW YORK ISLANDERS
4	CHICAGO BLACKHAWKS
3	PITTSBURGH PENGUINS
3	NEW JERSEY DEVILS
2	MONTREAL MAROONS
2	PHILADELPHIA FLYERS
2	COLORADO AVALANCHE
1	CALGARY FLAMES
1	VICTORIA COUGARS

OLYMPIC MEN'S MEDAL WINNERS

YEAR	GOLD	SILVER	BRONZE
2010	CANADA	USA	FINLAND
2006	SWEDEN	FINLAND	CZECH
2002	CANADA	USA	RUSSIA
1998	CZECH	USSR	FINLAND
1996	SWEDEN	CANADA	FINLAND
1992	USSR	CANADA	CZECH
1988	USSR	FINLAND	SWEDEN
1984	USSR	CZECH	SWEDEN
1980	USA	USSR	SWEDEN
1976	USSR	CZECH	W. GERMANY
1972	USSR	USA	CZECH
1968	USSR	CZECH	CANADA
1964	USSR	SWEDEN	CZECH
1960	USA	CANADA	USSR
1956	USSR	USA	CANADA

PLAYING THE GAME

Ice hockey is a crowd-pleasing, no-nonsense game of attack and defense. When in possession of the puck, players charge up the rink aiming to get into position for a shot on goal. In defense, the players try to intercept the puck and steal it from the opposition by hassling players and blocking their progress up the rink. This high-tempo game relies on players' swift movement across the ice, great passing and shooting techniques, and wily playing strategies.

SLAMMING THE PUCK

Shooting the puck into the net is the goal of every player, and what the crowds pay to see. Shooting techniques are more aggressive versions of those used for passing. There are four basic shots used by ice hockey players.

High stick
The player draws his stick back high



SLAP SHOT

This is the most powerful but least accurate shot. The stick is slapped against the puck with no previous contact.

Shifting weight
The player's weight goes toward his back foot



WRIST SHOT

The blade of the stick starts cupped over the puck, and then straightens as the player transfers his weight from back foot to front foot, before a final flick with the wrist whips the puck up into the air.



SNAP SHOT

The puck is pushed forward against the stick until, at the right moment, the pressure is increased and the puck is whipped away.



BACKHAND SHOT

Because of the curve of the stick blade, this is a tricky shot to pull off. It is very hard to defend against because it is difficult to predict in what direction the puck will go.



KEEPING IN CHECK

Hockey is a rough sport, and the players are allowed, under certain circumstances, to smash into each other. When a player is carrying the puck forward, players from the opposing team are allowed to impede his progress by skating into him. This is called checking. They can also check a player who has just received a pass.



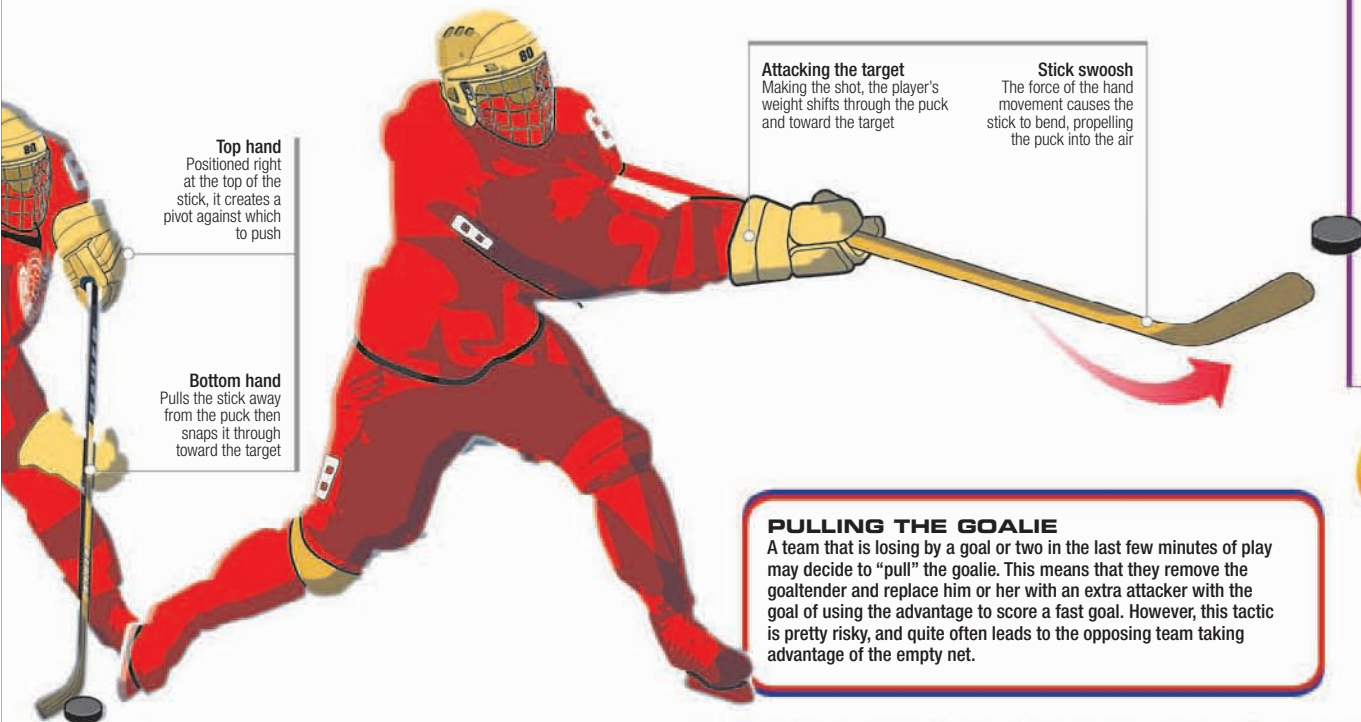
PICK A TARGET

Checking is all about anticipation and timing—picking the target, tracking his movement, and approaching at just the right time.



TAKE HIM OUT

The weight and momentum of the attacking player travels through his target, pushing him away from the puck.



Top hand
Positioned right at the top of the stick, it creates a pivot against which to push

Bottom hand
Pulls the stick away from the puck then snaps it through toward the target

Attacking the target
Making the shot, the player's weight shifts through the puck and toward the target

Stick swoosh
The force of the hand movement causes the stick to bend, propelling the puck into the air

PULLING THE GOALIE

A team that is losing by a goal or two in the last few minutes of play may decide to “pull” the goalie. This means that they remove the goaltender and replace him or her with an extra attacker with the goal of using the advantage to score a fast goal. However, this tactic is pretty risky, and quite often leads to the opposing team taking advantage of the empty net.

“THE HAMMER”

DAVE “THE HAMMER” SCHULTZ SCORED PLENTY OF GOALS FOR THE PHILADELPHIA FLYERS, BUT MOST OF HIS ACHIEVEMENTS ARE NOW FORGOTTEN. WHAT PEOPLE REMEMBER IS THE TIME HE SPENT IN THE SIN BIN: 259 MINUTES IN HIS ROOKIE YEAR, 348 MINUTES THE FOLLOWING SEASON, AND 405 THE NEXT. HIS CHARGE SHEET IS UNPARALLELED IN NHL HISTORY.

SIDELINES

2,856 The distance, in meters (3,123 yd), that the average hockey player covers during an NHL game.

108 The noise level, in decibels, at an Edmonton Oilers match when the team took to the ice.

168 The height, in centimeters (66 in), of the Stanley Cup, one of the largest trophies in professional sport.

574,125 The number of registered Canadian hockey players. That's a staggering 1 in 50 of all Canadians.

INSIDE STORY

Ice hockey originated in Canada in the 19th century and soon grew in popularity, spreading to the United States and then Europe. The North American-based National Hockey League (NHL) was founded in 1917, and ice hockey was included in the Olympic games in 1920, and the winter games in 1924.

The game has since become one of the most popular spectator sports in the world, and is shown on TV networks worldwide. Ice hockey is played in over 30 countries—mostly those with some natural ice cover. It is the official national winter sport of Canada, where the game enjoys immense popularity, and it is also the most popular sport in Finland. The most prominent and successful ice hockey nations are Canada, Czech Republic, Finland, Russia, Slovakia, Sweden, and the United States.

GOVERNING BODY

The International Ice Hockey Federation (IIHF) was founded in 1908 and is the worldwide governing body of ice hockey. It is responsible for the management of international ice hockey tournaments, and maintains the IIHF World Ranking. Despite its worldwide authority, the IIHF has little control of hockey in North America.

BEST PLAYERS, TOP LEAGUE

The National Hockey League (NHL) is the world's top league, featuring the world's best players. The league's teams are divided into two conferences, each comprising three divisions.



NEED2KNOW

- Bandy is an ancestor of ice hockey. The sport resembles both field hockey and soccer—its alternative names include “hockey on ice” and “winter football.”
- The leading bandy-playing nations are Sweden, Norway, Finland, and the Baltic states (Estonia, Latvia, and Lithuania). The game is also popular in parts of Canada, Russia, and the United States.

PLAYER PROFILE

Bandy players must be good ice skaters and, because dribbling with the feet is permitted, many also have the ball skills of top soccer players. They need strong lungs—the round ball travels quicker than a flat puck, so bandy is an even faster game than ice hockey. The matches last longer, too (45 minutes each half, as opposed to ice hockey's three 20-minute periods), and stamina is essential. The strategic complexity of the game means that players also need an instinct for positioning.

Skid lid

Helmets have ear protection and chinstraps; they are required at all levels of the game

Saving face

Players must wear a mouth guard; the goalkeeper, who needs greater protection, has a face guard

SOCKED BY SOCCER

IN VICTORIAN BRITAIN, IT BRIEFLY SEEMED THAT BANDY MIGHT RIVAL SOCCER IN POPULARITY. BOTH SHEFFIELD UNITED AND NOTTINGHAM FOREST SOCCER CLUBS BEGAN LIFE PLAYING BOTH SPORTS. BUT BANDY'S POPULARITY FELL SHARPLY IN THE LATE 19TH CENTURY, AS SOCCER CONQUERED THE WORLD.

BRIGHT BALL

The ball used for bandy is hard, usually bright orange or red in color, and approximately the same size as a tennis ball. Traditionally, the outer surface was made of cord, which covered a cork core, but many modern bandy balls are plastic.

Speedy

The ball travels fast when hit



2 1/4 in (6.5 cm)

Protective layer

Padding is essential, but is not as thick as that used in ice hockey, because bandy involves much less physical contact

Hand guards

Gloves protect against low temperatures and opponents' sticks

Handy bandy

The wooden stick is lighter and shorter than that used in field hockey—up to 4 ft 1 in (1.25 m) long. These reduced dimensions make for easier control, which is necessary because bandy players use only one hand to hold the stick

Cutting edge

Bandy boots have thick layers of leather or nylon to protect the players' feet and lower legs. The blades are rounded on both ends to assist rapid stops and changes of direction

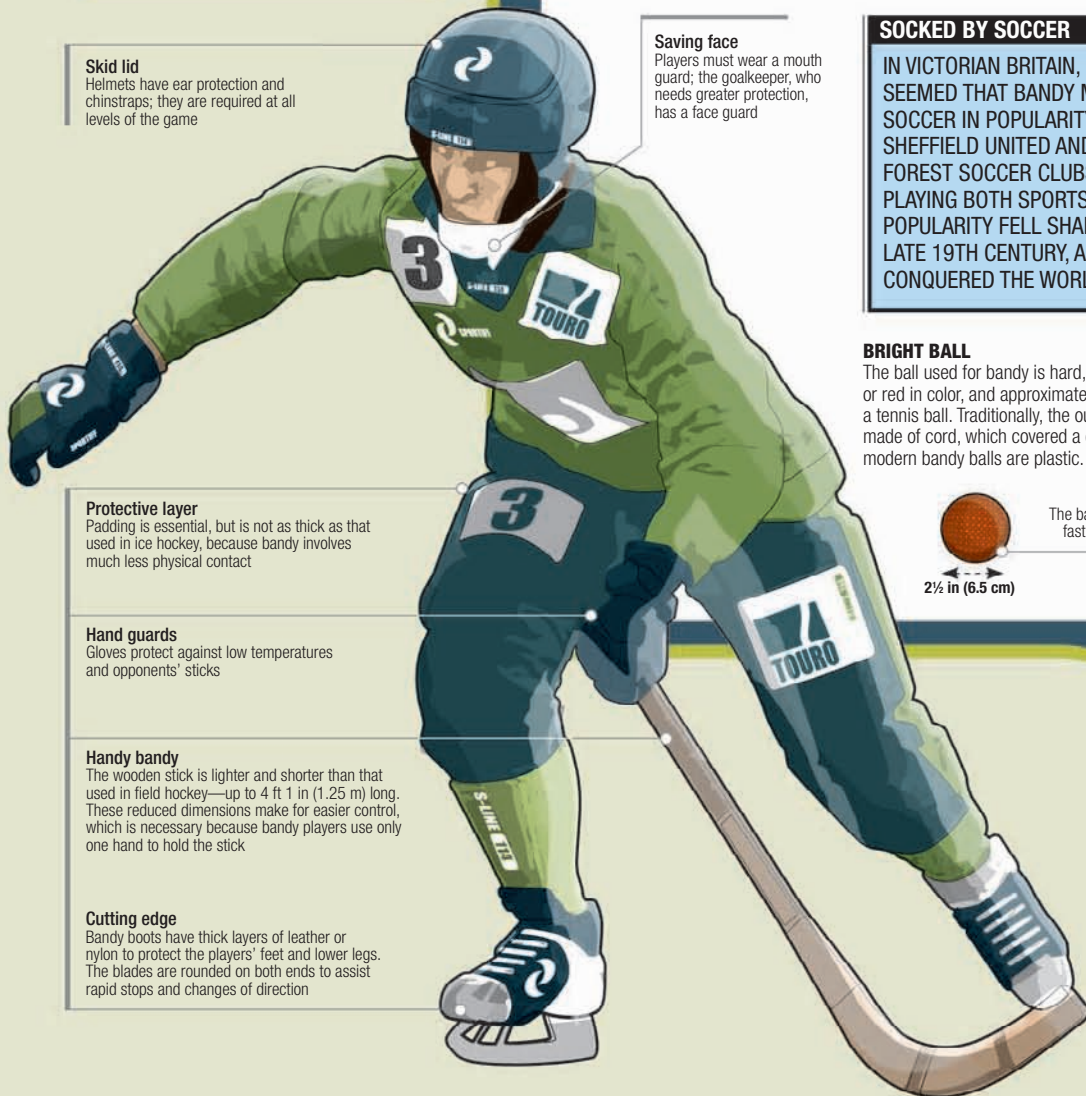
BANDY



GAME OVERVIEW

Bandy, or “banty,” is a winter sport that is usually played on an outdoor ice rink, although there are some indoor rinks. Two teams of 11 players compete over 45-minute halves to hit a small ball into goals at either end of the rink. Players wear skates and wield curved sticks, known as “bandies.” They can control the ball with their feet or bodies, but must not use their hands.

The game is fast-moving and high-scoring, averaging seven or eight goals per match. To keep up the tempo, each side can use three substitutes (four in international games), who may come on and off as often as the captain or coach requires. One of bandy's peculiarities—and for some its attraction—is the paucity of rules: there are only 18 in total.



THE RINK

Bandy was originally played on frozen fields, but now usually takes place on all-weather ice rinks similar in size to soccer fields. Low wooden fences along the sidelines keep the ball on the rink. Between matches, the ice is smoothed over by a special motorized vehicle widely known by the name of the leading manufacturer, Zamboni.

- 1 Goalkeeper**
He is permitted to use hands and arms to play the ball, but only within his own penalty area
- 2 Fullbacks**
They guard each side against attack from the wingers
- 3 Middle fullback**
This player marshals the other defenders from a central point
- 4 Halfbacks**
They are the first line of defense, and the key to getting the ball forward and turning defense into attack
- 5 Quarterbacks**
The strategic generals: their job is to use the ball to create goal-scoring opportunities for the forwards
- 6 Forwards**
Two wingers and a central striker are constantly in motion to receive their teammates' passes

Players' bench

In standard games, teams are allowed up to 14 players, including substitutes; only 11 can be on the ice at one time

Block board

The wooden guards keep the ball on the rink and so the game keeps moving—there's no let up for the players

Penalty spot

Attackers are expected to score from this point



Target area
The bandy goal is 11 ft 6 in (3.5 m) across, 6 ft 10 in (2.1 m) high, and 6 ft 6 in (2 m) deep. The midpoint of the goal line is the center of the semicircle that marks the penalty area

Corners
The attacking side puts the ball back into play from here after it has been put out by the defenders

Centerline
The line passes through the center spot where the first stroke of each half of the game is played

Free-stroke spots
When a trivial foul is committed inside the area, the free stroke is taken from the nearest of the four spots. More serious fouls result in a penalty

Penalty area
This semicircle marks the area in which the goalkeeper may handle the ball—he can hold it up for up to five seconds—and in which serious fouls lead to the award of a penalty

BANDY CANS

Many elements of bandy, such as corners and free strokes, are closely related to soccer (see pp. 96–103). If the ball goes out over the side fence, a stroke-in is awarded to the opposition. If the ball goes over the goal line off a defending player, an attacker takes a corner, playing the ball toward the goal. Attackers must be outside the penalty area when the corner is taken; defenders must be on the goal line.

BANDY BANS

Bandy players may not head the ball or control it with their arms or hands; nor can they raise their sticks above head height to control the ball. Although physical contact is allowed, kicking, tripping, pushing, grasping, and slashing are punished by a free stroke or penalty. Players who commit serious or repeated fouls may be sent to a “sin bin” for five or ten minutes. Free strokes are awarded for fouls. They must be taken within five seconds.

BEST FOOT FORWARD

The best bandy players combine the quick-footed dribbling skills of soccer players with either the kind of spectacular shots familiar from field hockey and ice hockey or delicate lobs that take out the opponent's midfield defenders. Forwards cover miles during a game, since they need to make sure that they're always available for a pass.

STICKLESS WONDERS
Bandy goalkeepers do not have sticks: they catch the ball or block it with their bodies. They wear protective padding on their legs in addition to the clothing worn by outfield players. Having caught the ball, they may hold it for no more than five seconds before throwing or kicking it to an outfield player. When the ball goes out of play behind the goal off an attacker, the goalkeeper restarts the game with the ball in his hand. All other players must be outside the penalty area.

INSIDE STORY
Bandy world championships for men and women have been held in every odd-numbered year since 1957. For the first two decades they were dominated by the Soviet Union, which won the first 11 titles. Since that nation broke up at the end of the 1980s, Russia, one of its former components, has started as favorite in most tournaments, with Sweden as its main challenger.

GOVERNING BANDY
The Federation of International Bandy (FIB) was formed in 1955 in Stockholm, and is still based in Sweden. There are 27 member nations—including India, a nation not usually associated with winter sports.

NEED2KNOW

- Field hockey is played in more than 120 countries. In India and Pakistan it is a national sport, together with cricket.
- Hockey rules have changed dramatically in the last 20 years: a contested start (the bully) has been replaced by an uncontested push-off, offside has been abolished, and rolling substitutions are permitted.
- Hockey remains largely an amateur sport, because it has not found large audiences in wealthier nations.

PLAYER PROFILE

Outfield players cover a lot of ground during a match, so they need to be fit, with good stamina but also capable of short sprints. Their training involves demanding leg exercises. They also work hard to perfect their touch—the ability to “feel” the ball through their sticks.

Clothing

Both shirt and shorts or skirt are usually made of cotton to allow athletes to perspire. They are in matching team colors; all have numbers, apart from the goalkeepers' shirts

Stick

Although rules limit the size of the head of the crook-shaped stick and the overall weight, there is no specified stick length. Most sticks are about 3 ft 1 in (95 cm) long

Shin guards

Protection from other sticks and the ball is recommended, but not required

Boots

Sometimes have studs, but now normally have plastic ridges

Ball

Usually plastic over a cork core, sometimes with indentations to reduce drag on a wet field



FIELD HOCKEY

GAME OVERVIEW

Field hockey—often just called “hockey” in countries where ice hockey is not a major sport—is a fast-moving, exciting, and potentially tough game in which two 11-a-side teams of men or women try to hit, push, pass, or dribble a small, hard ball into each other's goal just using J-shaped sticks. The winner is the team with more goals after two 35-minute halves. Gameplay often resembles soccer with sticks—in some countries hockey is the more popular of the two games.

TURKISH DELIGHT

HOLARI IS A UNIQUE FORM OF HOCKEY PLAYED IN TURKEY. THE GOALS AND FIELD OF PLAY ARE SIMILAR TO THOSE IN REGULAR HOCKEY, BUT A WOODEN CYLINDER REPLACES A BALL AND THERE ARE NO CODIFIED RULES AND NO SET TIMES. GAMES MAY START AT DAWN AND GO ON UNTIL THEY ARE TIMED OUT BY SUNSET.

“Long” corner

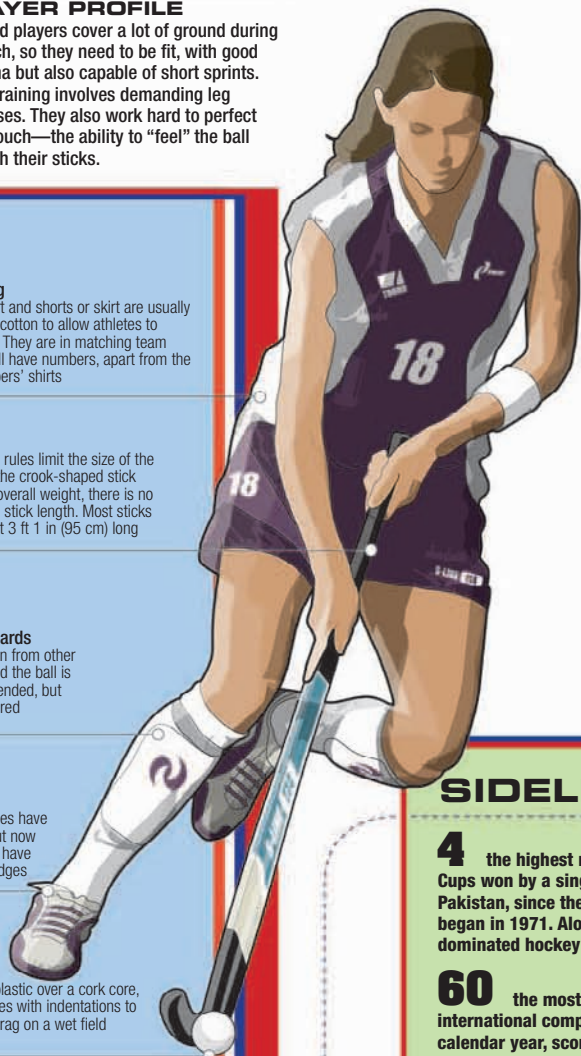
When a defending player puts the ball out of play behind his or her back line, the attacking team restarts the game with a free hit from the nearest of these marks

Umpires

Two; each is meant to take charge of one half of the field, with the division along an imaginary line running diagonally from corner to corner. In practice, the game is so fast that they have to work closely together and cooperate throughout the field

Back line

This is the limit of the field at each end. The part of the back line between the posts is known as the goal line



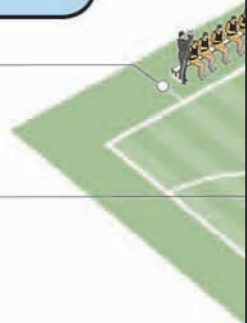
SIDELINES

4 the highest number of World Cups won by a single nation, Pakistan, since the competition began in 1971. Along with India they dominated hockey in the 1970s.

60 the most goals in international competition in one calendar year, scored by Pakistan's Sohail Abbas in 1999.

143 the number of goals scored by German defender Florian Kunz in only 39 games for his national team in the 1990s. He was World Hockey Player of the Year 2001.

166 the record number of international goals, scored by attacking midfielder Alyson Annan in 228 appearances for Australia.





ON THE CARPET

As the name suggests, field hockey was originally played on real grass. Today, though, many top-tier matches are played on a type of watered synthetic grass, which is easier to maintain. This speeds up play by providing a flatter surface to help the ball run true. A sand-based field is also sometimes used, but it can cause abrasions if players get knocked over. Synthetic fields also reduce the likelihood of matches being postponed due to adverse weather conditions.

INDOOR HOCKEY

Developed in the 1950s as a way for hockey enthusiasts to play during the winter, indoor hockey takes place in a sports hall on a small field 145 ft x 72 ft (44 m x 22 m) between teams of six players. Most elements of the game are like field hockey, but the ball may only be pushed rather than hit, and must stay on the ground except during a shot. Long boards run along the sidelines to keep the ball in play—making the game faster than the outdoor version.

- 1 Goalkeeper**
Inside the circle, the keeper can stop the ball with any part of his or her body, and kick it, but may not catch it
- 2 Fullbacks**
Two: their main task is to stop opposing wingers from breaking down the sides and crossing the ball
- 3 Halfbacks**
Two: they try to control midfield and break up attacks
- 4 Center halfback**
The fulcrum of the defense; marks the opposing center forward
- 5 Inside forwards**
Two: turn defense into attack by feeding the ball to the forwards
- 6 Wingers**
Two: stationed near the sidelines in the attacking half of the field
- 7 Center forward**
Hangs close to the goal; main job is to score, but also harries opposing fullbacks

Officials

They check the players' equipment, monitor substitutions, and keep the time and score

Substitutes

Each team can have up to five substitutions, and replacement players can themselves be replaced

Penalty spot

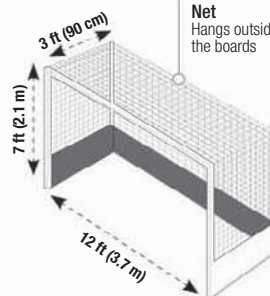
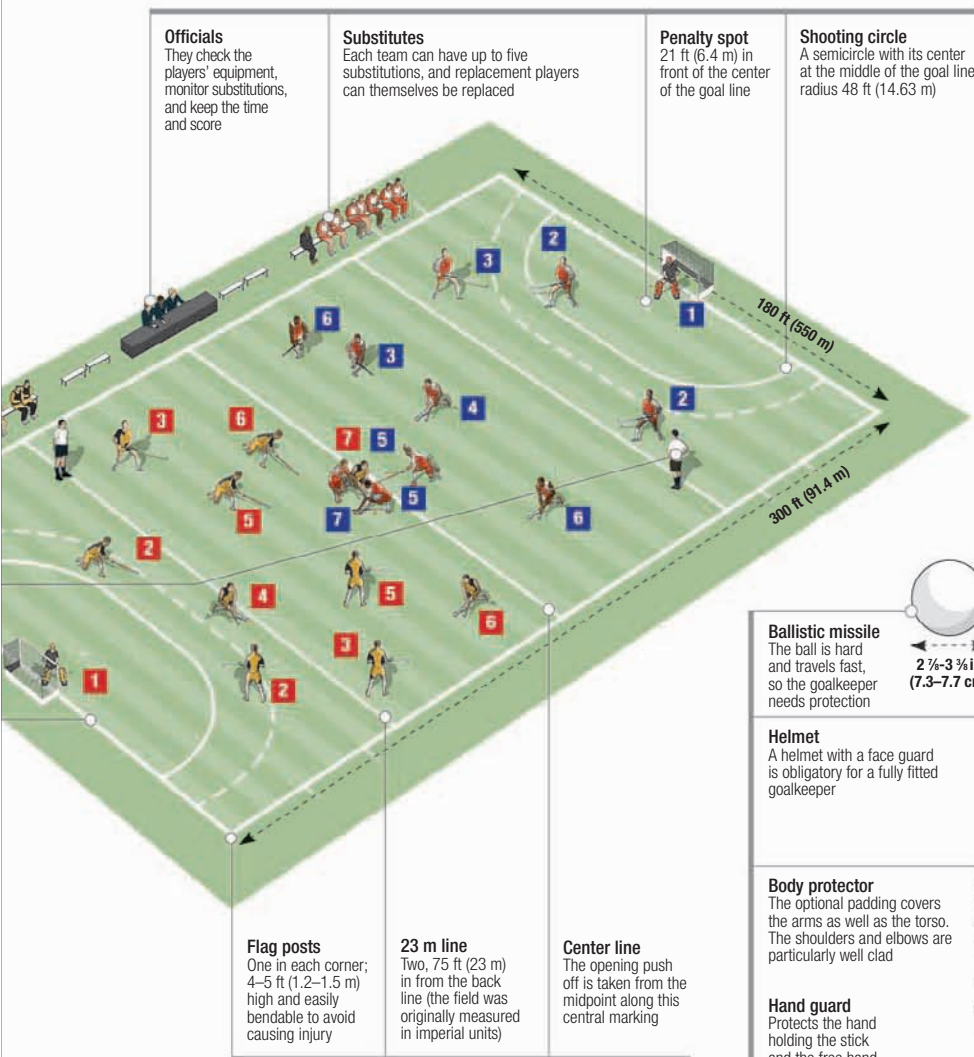
21 ft (6.4 m) in front of the center of the goal line

Shooting circle

A semicircle with its center at the middle of the goal line; radius 48 ft (14.63 m)

Net

Hangs outside the boards



GOAL

Along the sides and back of the goal are solid boards 18 in (46 cm) high and dark colored on the inner side. These help referees to see and hear if a shot at a penalty corner has risen too high to count. The goal nets are fitted slackly to stop the ball bouncing back out.

Ballistic missile

The ball is hard and travels fast, so the goalkeeper needs protection

2 1/4-3 1/2 in
(7.3-7.7 cm)

Helmet

A helmet with a face guard is obligatory for a fully fitted goalkeeper

Body protector

The optional padding covers the arms as well as the torso. The shoulders and elbows are particularly well clad

Hand guard

Protects the hand holding the stick and the free hand

Pads

Unlike shinpads, goalkeepers' pads are worn externally; they are made of springy foam, so a blocked ball bounces a long way



GOALKEEPING GEAR

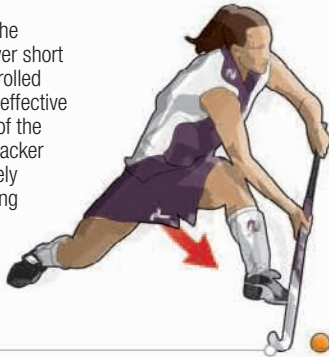
The hockey rule book makes it compulsory for the goalkeeper to wear a protective helmet, preferably one that completely covers the head and throat. It is permissible for the keeper to remove the helmet to take a penalty stroke. Most goalkeepers also wear full body protection against the speeding ball, including padded shorts, hand protectors, and shin pads.

HOCKEY STROKES

Stopping, controlling, or playing a small ball with a thin stick requires great touch and accuracy. The skills required range from perfectly timed tackles that stop the ball without touching the player, dribbling by using the stick both forehand and backhand, and smashing the ball at high speeds. In general play, the ball must not be raised into the air when hit. However, it can be raised using a scooping or long pushing action of the stick. When the ball is in the air, a player must not play if it is above shoulder height.

PUSH

Less powerful than a drive, the push is used for accuracy over short distances; the stroke is controlled mainly by the wrists. It is an effective stroke in the close quarters of the shooting circle where the attacker has to push the ball accurately between the players defending the goal.



Gentle stroke

The lower hand pushes the stick through the ball

FLICK

Used mainly from dead ball situations, the flick or scoop is a push with a last moment turn of the wrists to lift the ball off the ground. The stroke can take defenders out of the game, but will be penalized if the ball endangers an opponent.



Upward lift

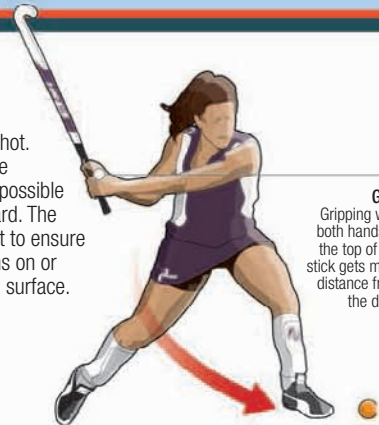
A flick of the wrist scoops rather than hits the ball into the air

SAFETY FIRST

Hockey has many rules, and they change often. Most are aimed at making the game safer, but they are highly complex. The ball cannot be hit into the air, for example—unless a player is taking a shot, or unless it is lifted by a scooping motion and does not endanger another player. In the same way, if the ball is in the air, a player may not raise his or her stick above the shoulder to stop it—unless it is to save a shot. When a player brings a high ball under control, opponents must remain 16½ ft (5 m) away until it is on the ground.

DRIVE

A strong hit along the ground may be either a pass or a shot. The player takes the longest backswing possible before hitting forward. The knees are kept bent to ensure that the ball remains on or close to the playing surface.



Grip
Gripping with both hands at the top of the stick gets more distance from the drive

DRIBBLING

Keeping the ball under close control at the end of the stick involves being able to play both forehand and with the stick reversed, or hooked over the ball, so that the stick is always shielding the ball from a potential tackler.



Protective stance
The head of the stick protects the ball from potential attack as the player moves up the field

Rapid reverse

The stick head flicks back and forth over the ball to keep it under tight control.

FOULS

Depending on where on the field they occur, fouls are punished by the award of either a free stroke or a penalty hit to the opposition. Since most goals are scored through penalty hits, this is an effective way of preventing foul play. These are the main offenses:

STICKS Raising the stick above shoulder height.

BACKHANDERS Playing the ball with the rear, rounded surface of the stick.

OBSTRUCTION Tripping, shoving, charging, or striking an opponent

FEET Deliberately kicking the ball.

CARDS

Umpires may show a player a card for dangerous play or an intentional foul. A green card is issued as an official warning. When umpires show a yellow card, the player is sin-binned for five or more minutes. For persistent fouling or serious offenses, a red card is shown and the player is sent off.

PENALTIES

Most goals come from penalty strokes or penalty corners. Penalty corners are awarded against defenders for deliberately playing the ball over their back line; a foul between the 23 m (75½ ft) line and the circle; or an unintentional foul inside the circle.



PENALTY STROKE

These are awarded for deliberate fouls by defenders inside the circle or for any foul that prevents a goal. The taker hits the ball from the penalty spot. Only the opposing goalkeeper may defend; all other players must stand behind the 23 m (75½ ft) line.



TAKING A PENALTY CORNER

Teams drill to get the ball as quickly as possible from the corner taker to a teammate on the edge of the shooting circle, who either traps it or plays it to another one of their team to slam home before the advancing defense blocks it.

INSIDE STORY

Games similar to hockey were played in Egypt some 4,000 years ago, and by the ancient Romans and Greeks and the Aztecs. The modern game evolved in British schools in the mid-18th century, and hockey became an Olympic sport in 1908 (1980 for women). Until the 1980s, hockey was dominated by the national teams of India and Pakistan, but since then Australia, Germany, and the Netherlands have been the most successful national teams.

GOVERNING BODY

The International Hockey Federation was founded in 1924 to oversee the development of the game. It has 118 member associations in five continents. Based in Lausanne, Switzerland, it organizes the Hockey World Cup, the Women's Hockey World Cup, and is responsible for deciding the rules for the sport.

TACKLING

Players may not make a tackle that will lead to contact with an opponent or use their own body to shield the ball. Likewise, the player with the ball cannot use his or her body to push the other player away.

BLOCK TACKLE

This is one of the most commonly used tackles. The defender drops the stick to the floor, thus impeding the attacker's further progress. In a successful tackle, the stick is dropped at the last possible moment.

No swing

The object is not to swing the stick, but to keep it low on the ground



Crossed sticks

The tackler risks hitting the attacker's stick or body before hitting the ball



Defender

Lunges across the attacker toward the ball

REVERSE-SIDE TACKLE

The defender comes from the attacker's left with his stick reversed; the reverse tackle risks giving away a foul because the stick must cross the attacker's body.

STAT CENTRAL

HOCKEY WORLD CUP

YEAR	WINNER	RUNNER-UP	SCORE
2010	AUSTRALIA	GERMANY	2-1
2006	GERMANY	AUSTRALIA	4-3
2002	GERMANY	AUSTRALIA	2-1
1998	NETHERLANDS	SPAIN	3-2
1994	PAKISTAN	NETHERLANDS (4-3 PENS)	1-1
1990	NETHERLANDS	PAKISTAN	3-1
1986	AUSTRALIA	ENGLAND	2-1

OPEN-SIDE TACKLE

A defender approaching from the right potentially has an easier job—he or she can use his stick the "normal" way around.

Open access

The tackler stands a better chance of taking possession of the ball

Losing control

The attacking player has been forced off the ball



FLOORBALL



GAME OVERVIEW

Often likened to ice hockey without the skates, floorball (also called floor hockey) is a fast-moving game played indoors on a gym floor between two teams of six players. A lightweight plastic ball is used instead of a heavy puck and body-checking is not allowed. This makes the game less physical and more skills-oriented than its ice-based cousin.

NEED2KNOW

- ➔ Floorball was developed in Scandinavia in the 1970s. The best teams are Finland, Sweden, Switzerland, and Czech Republic.
- ➔ The sport was officially recognized by the IOC in 2008, and it is hoped that it will make its debut at the 2020 Olympics.

MATCH RULES

A game consists of three 20-minute periods, with extra time and penalties if scores end level. At any one time, five outfield players and one goalie are allowed on the rink, but up to 20 players are allowed in the squad and players may be substituted without stopping play.

LIGHT AND FAST

Outfield players use a lightweight stick with a curved plastic blade to strike a ball that weighs just 1 oz (23 g). Skilled players may propel the ball at speeds of up to 120 mph (190 kph). The goalminder does not carry a stick.

Lightweight stick
The stick must weigh no more than 12 oz (350 g)

Floor ball
The plastic ball has 26 holes in it and may be covered in dimples to make it more aerodynamic



LACROSSE



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GAME OVERVIEW

Lacrosse is a fast and furious game where two teams of 10 men or 12 women vie to get a hard ball into the opposition goal. They use crosses—sticks with net pockets—to catch, dribble, tackle, carry, scoop, and throw the ball. The skills of passing the ball huge distances are combined with force: crosses are also used to check opposition sticks and players.

PLAYER PROFILE

Lacrosse players are tough all-around: they have the hand-eye coordination to catch a small ball traveling at high speeds, the stamina of middle-distance runners, and the physical resilience of rugby players.

PLAYING AREA

Lacrosse is played on grass or artificial turf. The women's field is bigger than the men's because female teams have two more players.

- | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1 Goalkeeper
A goalkeeper remains in or near the goal crease (circle) and tries to stop the opposition from scoring</p> | <p>2 Defenders
Three defenders form the penultimate line of protection in front of the goal</p> | <p>3 Midfielders
Three midfielders link the defense and attack, they can move up and down the field to support either as necessary</p> | <p>4 Attackers
Their job is to score goals. They may not enter the crease around the opposition goal, but their sticks can</p> |
|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|

PLAYING TIME

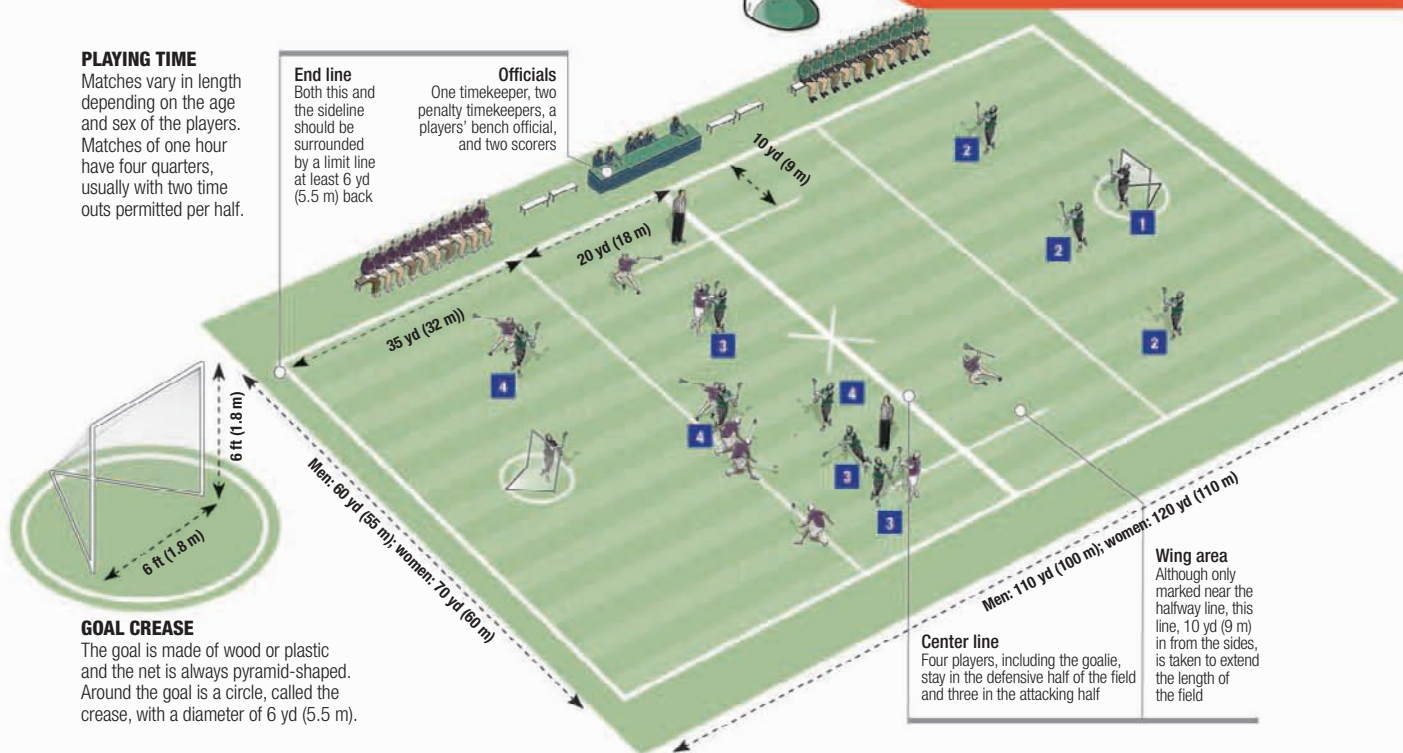
Matches vary in length depending on the age and sex of the players. Matches of one hour have four quarters, usually with two time outs permitted per half.

End line

Both this and the sideline should be surrounded by a limit line at least 6 yd (5.5 m) back

Officials

One timekeeper, two penalty timekeepers, a players' bench official, and two scorers



GOAL CREASE

The goal is made of wood or plastic and the net is always pyramid-shaped. Around the goal is a circle, called the crease, with a diameter of 6 yd (5.5 m).

Helmet
Men wear helmets with a face mask and chin pad. All players have mouth guards.

Shoulder guards
Shoulder guards are required for all players except the goalie

Gloves
All players must wear protective gloves

Arm pads
Men wear arm pads for protection when body checking

Body armor
Many players wear rib protectors; goalies must also wear throat and chest protection

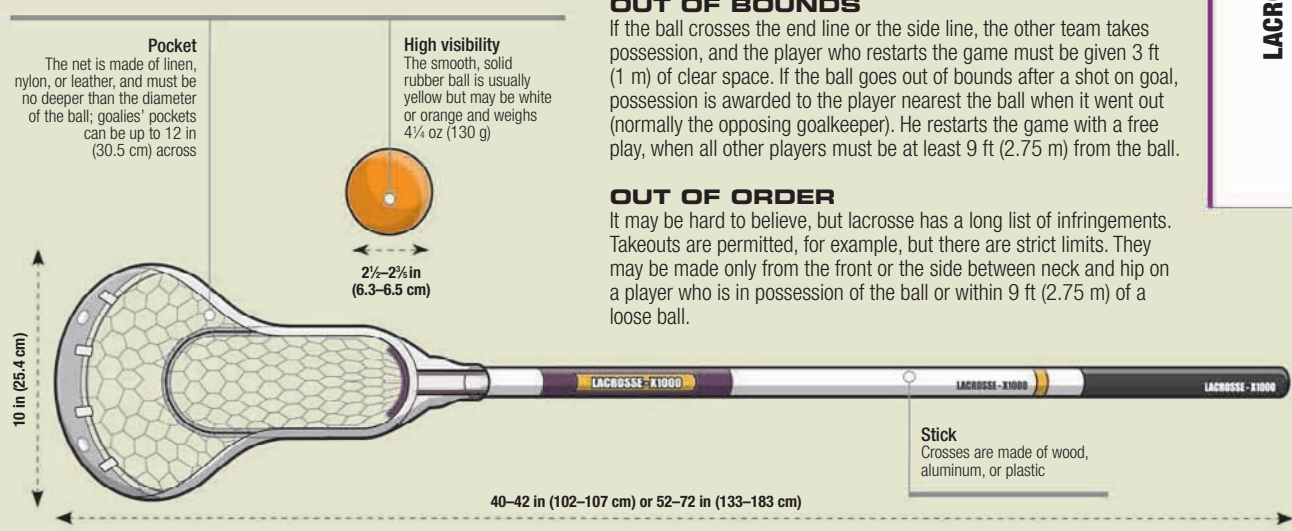
Sound footing
Players usually wear soccer or rugby boots, with studs or cleated soles for grip

NEED2KNOW

- ➔ Lacrosse is most popular in North America, where it originated. It is the official summer sport in Canada, and the fastest-growing sport in the United States.
- ➔ Invented in the 1980s, Intercrosse is a popular noncontact form of the game played by mixed teams of men and women.

CUTTING IT DOWN TO SIZE
 THE POPULARITY OF LACROSSE HAS INCREASED IN INVERSE PROPORTION TO THE SIZE OF THE FIELD AND THE NUMBER OF PLAYERS. IN ITS ORIGINAL FORM—A TRAINING EXERCISE FOR IROQUOIS WARRIORS KNOWN AS BAGGATAWAY—IT WAS PLAYED ON A FIELD 500 YD (457 M) LONG BETWEEN TEAMS OF 200 PER SIDE.

LONG AND SHORT OF IT
 Crosses come in two sizes: at least half of each team—usually midfielders and attackers—must use short crosses, which are easier to manipulate. Only five players—usually the defenders and always the goalie—can use long crosses.



STRUCTURED MAYHEM
 Lacrosse is one of the fastest of all ball sports, with play switching from end to end in a couple of throws and players barging each other off the ball. The game sometimes looks like a free-for-all—which is why it takes up to three officials to control the game: a referee, an umpire, and a field judge. All three perform the same duties, but the referee can override the others in the case of a dispute.

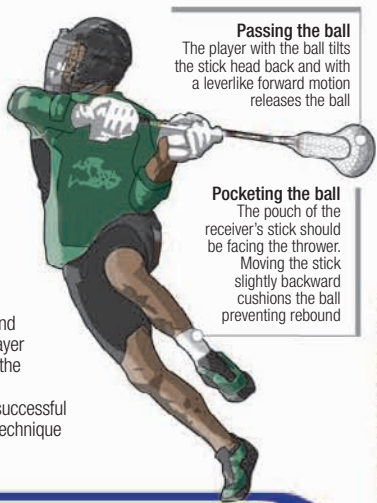
FACE-OFF
 The men's game begins with a face-off—one player from each team squats low in the middle of the center line on either side of the ball. The referee calls "Are you ready? Play." then blows his whistle, and both players try to scoop up and pass the ball. Play is then continuous, except for stoppages for out of bounds or infringements.

OUT OF BOUNDS
 If the ball crosses the end line or the side line, the other team takes possession, and the player who restarts the game must be given 3 ft (1 m) of clear space. If the ball goes out of bounds after a shot on goal, possession is awarded to the player nearest the ball when it went out (normally the opposing goalkeeper). He restarts the game with a free play, when all other players must be at least 9 ft (2.75 m) from the ball.

OUT OF ORDER
 It may be hard to believe, but lacrosse has a long list of infringements. Takeouts are permitted, for example, but there are strict limits. They may be made only from the front or the side between neck and hip on a player who is in possession of the ball or within 9 ft (2.75 m) of a loose ball.

IN CONTROL
 The skill of scooping the ball up from the ground is hard to learn, but nothing as difficult as catching an airborne ball in the pocket of the crosse. Another crucial skill is distribution—the ability to propel the ball over a long distance to a teammate running into space.

CROSSE MESSAGES
 Stick checking is the method used to try and dislodge the ball from the pocket of the player in possession. The defender tries to strike the attacker's stick with a well directed but not necessarily forceful blow, but may not be successful if the other player has good ball handling technique or uses his body to shield the stick.



Passing the ball
 The player with the ball tilts the stick head back and with a leverlike forward motion releases the ball

Pocketing the ball
 The pouch of the receiver's stick should be facing the thrower. Moving the stick slightly backward cushions the ball preventing rebound

THE WOMEN'S GAME
 Women's lacrosse differs from the men's game in several ways. The field is larger (see right) and there are two more players on each team. All women players use the short stick, which has a shallower pocket than that of the men's crosses. Women cannot body check an opponent. They wear less protective clothing, and they can't kick the ball. To shoot at the goal they must have a clear view of it, whereas men can shoot through a group of players.

INSIDE STORY
 The first lacrosse Men's World Championship in 1967 had only four entrants: Australia, Canada, England, and the United States. Since then, the sport has spread to Japan and Korea, Italy, Finland, Denmark, Argentina, Hong Kong, and Tonga. The 2006 tournament had 21 competing nations: Canada beat the US in the final. The most popular form of the sport in Canada is box lacrosse, or boxla. Played indoors, the game was developed in the 1930s by owners of ice-hockey rinks to make use of their rinks during the winter season. The game resembles outdoor lacrosse but there are only six players per team. It is faster, as attacking players must pass the ball within 30 seconds.

SIDELINES

12 The number of National Lacrosse League (indoor) teams: nine in the United States, and three in Canada.

8 The number of countries playing in the 2007 World Indoor Lacrosse Championship in Halifax, Canada: Australia, Canada, the Czech Republic, England, Ireland, Scotland, the United States, and the Canada-based Iroquois Nationals.

NEED2KNOW

- ➔ More than 800 million people across the globe play volleyball at least once a week, leading to claims that it is the most popular sport in the world.
- ➔ The game is particularly popular in eastern and southern Europe, Asia, and North America.
- ➔ Invented in 1895, volleyball became an Olympic sport in 1964.

SIDELINES

8 The maximum number of seconds allowed for a serve; any longer and the ball is given to the opposition.

3 The number of consecutive Olympic gold medals won by the Cuban women's volleyball team; their triumphs came at Barcelona in 1992, Atlanta in 1996, and Sydney in 2000.

0.3 The time, in seconds, it typically takes a volleyball to travel from one baseline to the other when served by a top-class player, a speed of 121 mph (194 kph).

1,100,000,000 According to the Fédération Internationale de Volleyball (FIVB), the number of people who played or watched the game on one or more occasions in 2006—one in six of the world's population.

VOLLEYBALL

GAME OVERVIEW

Volleyball is a high-energy sport played between two teams of six players. The object is to score points by hitting a ball over a net so that the opposition cannot return it before it hits the ground. Defensive players dive around the court to get their hands under the ball and push it up toward their teammates in attack, who are ready to leap high to smash it back over the net. At top levels, teams are either all-male or all-female, but volleyball is also a popular recreational sport, played by mixed teams of all ages and abilities.



Headwear

Forehead bands or caps may be worn to keep hair in place or to hold perspiration; hats and jewelry are forbidden.

Courting clothes

Shirts or blouses; shorts or skirts; preferably lightweight cotton; may be in team colors and numbered front and back.

PLAYER PROFILE

Volleyball was initially created as a genteel form of relaxation, but in its first 100 years developed into a high-energy game requiring great aerobic ability. Training concentrates on cardiovascular exercises—sprints, long-distance runs, and jumping rope. Jumping is important. Players also work out with dumbbells.

Protective kneepads

Often worn to prevent grazes caused by digging (diving to reach the ball before it hits the ground).

Shod or unshod

Players normally wear flat-soled shoes, but may go barefoot with permission.

ROUND AND ROUND

The players usually move around clockwise after every point so that they all serve and take turns in every position. Some teams, however, have a dedicated defender, known as a "libero," who always stays in the back zone and is not allowed to serve.





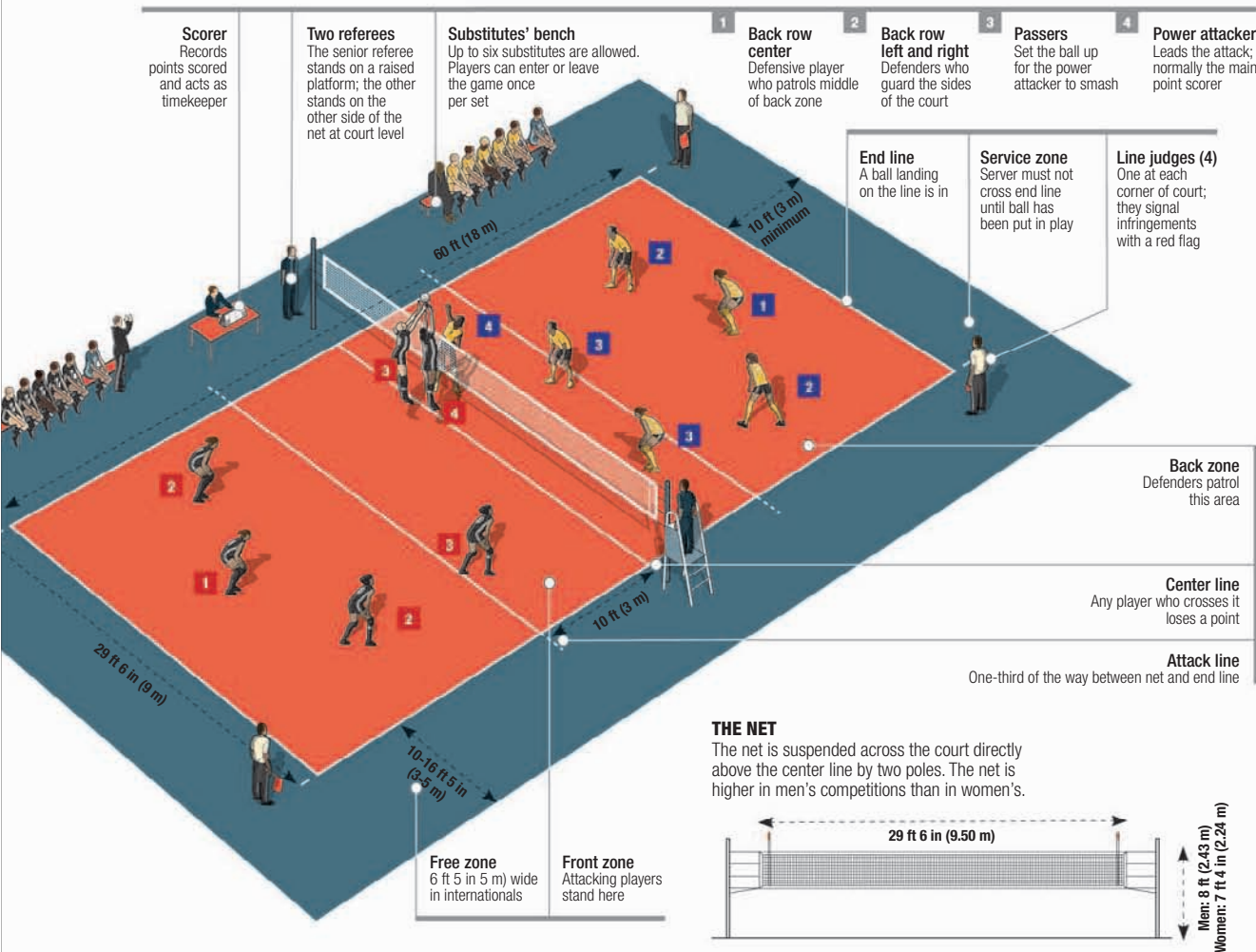
THE COURT

The playing area is usually made of wood or synthetic material—but the game can be played on any surface that does not cause injuries to diving players. Indoor courts must be flat, but outdoor courts can slope for drainage.

Lines on the court show where players may stand at the start of each point: three defenders in the back zone (including the server, who starts anywhere behind the end line) and three attackers in the front zone close to the net. The standards supporting the net are set 3 ft (1 m) at either side of the sidelines and are sometimes padded to safeguard the players.

KEEP IT UP

Once the ball is in play, each team has up to three hits to get it back over the net. As long as they do not catch or carry the ball, players can strike it with any part of their bodies, but in practice they usually use an open hand, wrist, or fist. The team that wins a rally wins a point, and if not serving wins the right to do so. Matches are usually the best of five sets. In the first four games, the winner is the first to 25 points; in the fifth game, the winner is the first to 15 points. If the score reaches 24–24 or 14–14, respectively, two clear points are needed for victory.



THE BALL

Volleyballs should be inflated to a pressure that keeps them slightly soft, so that they have some "give." They are then comfortable to play with using the hands.

Pump action
Bicycle pumps are commonly used to inflate the volleyball to the requisite pressure and weight



INFLATED WEIGHT

The match ball should weigh 9.17–9.87 oz (260–280 g).

KEEP COOL, DON'T GLARE

VOLLEYBALL IS THE ONLY GAME IN THIS BOOK WITH PRECISE RULES ABOUT THE TEMPERATURE AND AMOUNT OF LIGHT REQUIRED FOR PLAY. MATCHES CANNOT START OR CONTINUE IF THE AIR IS COLDER THAN 50°F (10°C). IN WORLD CHAMPIONSHIPS, THE TEMPERATURE MUST BE NO LOWER THAN 61°F (16°C) AND NO HIGHER THAN 77°F (25°C). THE LIGHT ON COURT MUST BE BETWEEN 1,000 AND 1,500 LUX—ABOUT ONE-FIFTH OF WHAT YOU GET ON A CLOUDY DAY—SO THAT PLAYERS DON'T GET DAZZLED.



DIG AND SMASH

Competitive volleyball players master six basic skills: serving, passing, setting, attacking (spike or dink), blocking, and digging.



Hip twist
The front arm and leg are placed ahead of the striking hand to allow a follow-through

Cocking the trigger
The attacker hits the ball at the top of its flight, then swings his arm through 270°



SERVE

The serve is hit either underarm or (usually) overarm; jumping is allowed. Any serve that reaches the opponents' court is valid, even if it touches the net.



Open palms
From this position the attacker can flip the wrists on contact and thus angle the shot

ATTACK (SPIKE)

In this spectacular smash, a player jumps above the net and hits the ball hard toward the ground in the other court.

Backhand extremism
Players can stretch farther with downturned palms



TIP OR DINK

A light touch by an attack-zone player sends the ball softly over the net into an unguarded area of the opponents' court.

DIG

Players dive or get down low to stop the ball from touching the ground, trying to get enough height on it to allow teammates to play it.

Four hands
Teamwork presents an impenetrable barrier



Against all odds
The attempted spike is intercepted

BLOCK WALL

Blockers crowd the net and stretch above it to return the ball as soon as it has crossed the center line, before it can do any damage in their court.

INSIDE STORY

Volleyball was invented in 1895, and originally named mintonette. The first recorded competitive game was played at Springfield College, Massachusetts, in 1896. The sport's popularity spread from North America in the early 20th century. In 1949, volleyball's first World Championship was held in Prague. The sport was given Olympic status in 1964, although it was first featured as part of a demonstration of US sports at the Paris Olympics of 1924.

LARGEST BODY

The Fédération Internationale de Volleyball (FIVB) was founded in 1947 as the sport's governing body. It has 218 affiliated national federations, making it the world's largest international sporting federation.

GAME OVERVIEW

Very similar to standard volleyball, this version of the game is played on sand, on a slightly smaller court, and with a team of only two players. Beach volleyball has been played professionally since the late 1960s and has been an Olympic sport since 1996.

NEED2KNOW

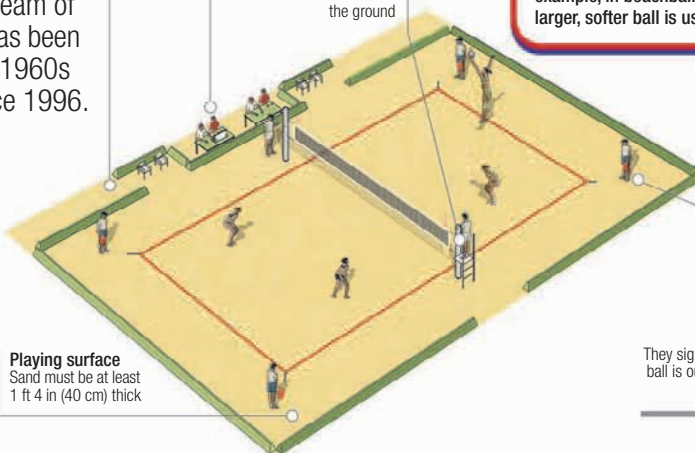
- ➔ The sport was originally a casual form of volleyball played on the beachfront in Santa Monica, California.
- ➔ The US, Brazil, and Australia dominate the sport at the highest level.
- ➔ Players wear shorts or swimsuits on court.

Rest area
For players between games

Scorer
Records points and keeps time

Referees (2)
The senior official on a high platform, the other on the ground

RULES CHANGE
Beachball differs from regular volleyball in several ways. For example, in beachball a slightly larger, softer ball is used.



Playing surface
Sand must be at least 1 ft 4 in (40 cm) thick

Line judges (4)
They signal when the ball is out of play (on the line is in)

BEACH VOLLEYBALL



FOOTVOLLEY



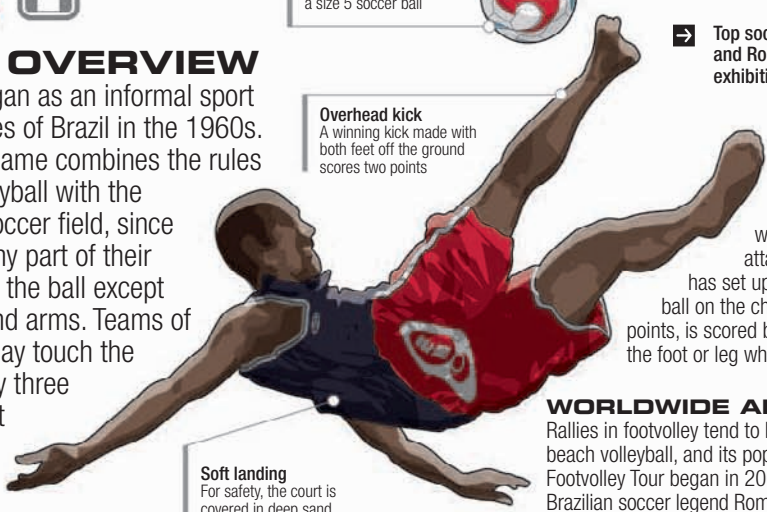
GAME OVERVIEW

Footvolley began as an informal sport on the beaches of Brazil in the 1960s. The modern game combines the rules of beach volleyball with the skills of the soccer field, since players use any part of their bodies to play the ball except their hands and arms. Teams of two players may touch the ball alternately three times before it is returned over the net.

Soccer ball
The standard ball is a size 5 soccer ball



Overhead kick
A winning kick made with both feet off the ground scores two points



Soft landing
For safety, the court is covered in deep sand

NEED2KNOW

- ➔ The net height is set at 6 ft 10 in (2.1 m)—lower than a beach volleyball net.
- ➔ Top soccer players, such as Ronaldo and Ronaldinho, regularly compete in exhibition footvolley matches in Brazil.

HEAD TO TOE

A point is started by one player kicking the ball into the opponents' court. A team will often return the ball with an attacking header, after one player has set up their partner by controlling the ball on the chest. A "super point," worth two points, is scored by making the winning shot with the foot or leg while both feet are off the ground.

WORLDWIDE APPEAL

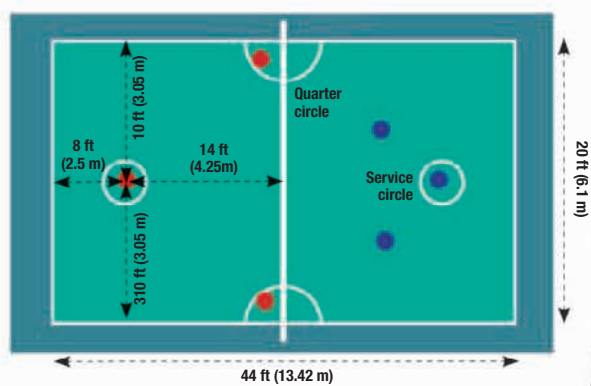
Rallies in footvolley tend to be longer than rallies in beach volleyball, and its popularity is spreading. The Pro Footvolley Tour began in 2008 and attracts large crowds. Brazilian soccer legend Romario is one of the biggest stars.



SEPAK TAKRAW

GAME OVERVIEW

Sometimes known as "kick volleyball," sepak takraw is a spectacular three-a-side game in which a ball is propelled over a high net using any part of the body other than the hands—usually the foot, knee, shoulder, or head. Points are scored by getting the ball to hit the ground on the opposition's court. The game combines soccer and gymnastics.

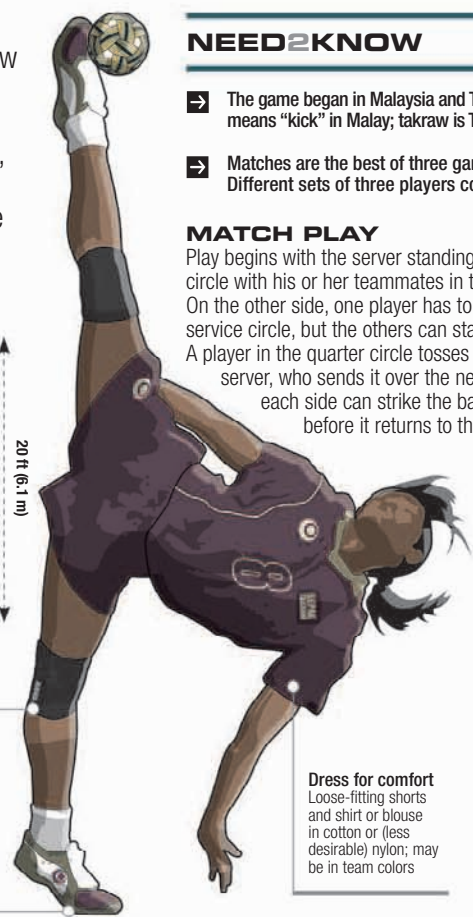


THE COURT

The game is usually played on a badminton doubles court (see pp. 186–188) with two circles and semicircles marked to show players' positions for service. The top edge of the net is set at 5 ft (1.54 m) for men and 4 ft 9 in (1.45 m) for women.

Leg and knee bandages
These prevent grazing from inevitable bumps on the floor

Foot covering
Sneakers with smooth soles



Dress for comfort
Loose-fitting shorts and shirt or blouse in cotton or (less desirable) nylon; may be in team colors

LIKE A ROCK-HARD BALL OF YARN

Traditionally hand-woven to create a rigid sphere, the takraw ball is made of rattan stems or very hard plastic. It weighs approximately 8.8 oz (250 g).



1 ft 3/4 in (40 cm)

NEED2KNOW

- ➔ The game began in Malaysia and Thailand. Sepak means "kick" in Malay; takraw is Thai for "woven ball."
- ➔ Matches are the best of three games up to 15 points. Different sets of three players contest each game.

MATCH PLAY

Play begins with the server standing in the service circle with his or her teammates in the quarter circles. On the other side, one player has to have a foot in the service circle, but the others can stand anywhere. A player in the quarter circle tosses the ball to the server, who sends it over the net. As in volleyball, each side can strike the ball three times before it returns to the opposition half.

GAME OVERVIEW

Originally conceived as a version of basketball for women, netball rapidly became a sport in its own right and is today enjoyed by millions of dedicated players all over the world. Netball is an exciting, fast-paced game played by two teams of seven players on a rectangular court. The object is to shoot the ball from within the goal circle into a netted hoop more times than the opposition. The players may neither run with nor dribble the ball and are restricted to set zones (determined by their playing position). This means that accurate, often lightning-quick passes and disciplined teamwork are paramount.

NETBALL



Ball

As netball can be played indoors or outdoors, the ball used is durable and waterproof.

Shooting

Only two players on each team—the goal shooter and goal attack—are permitted to shoot for goal. To perfect this skill requires good technique and much practice.

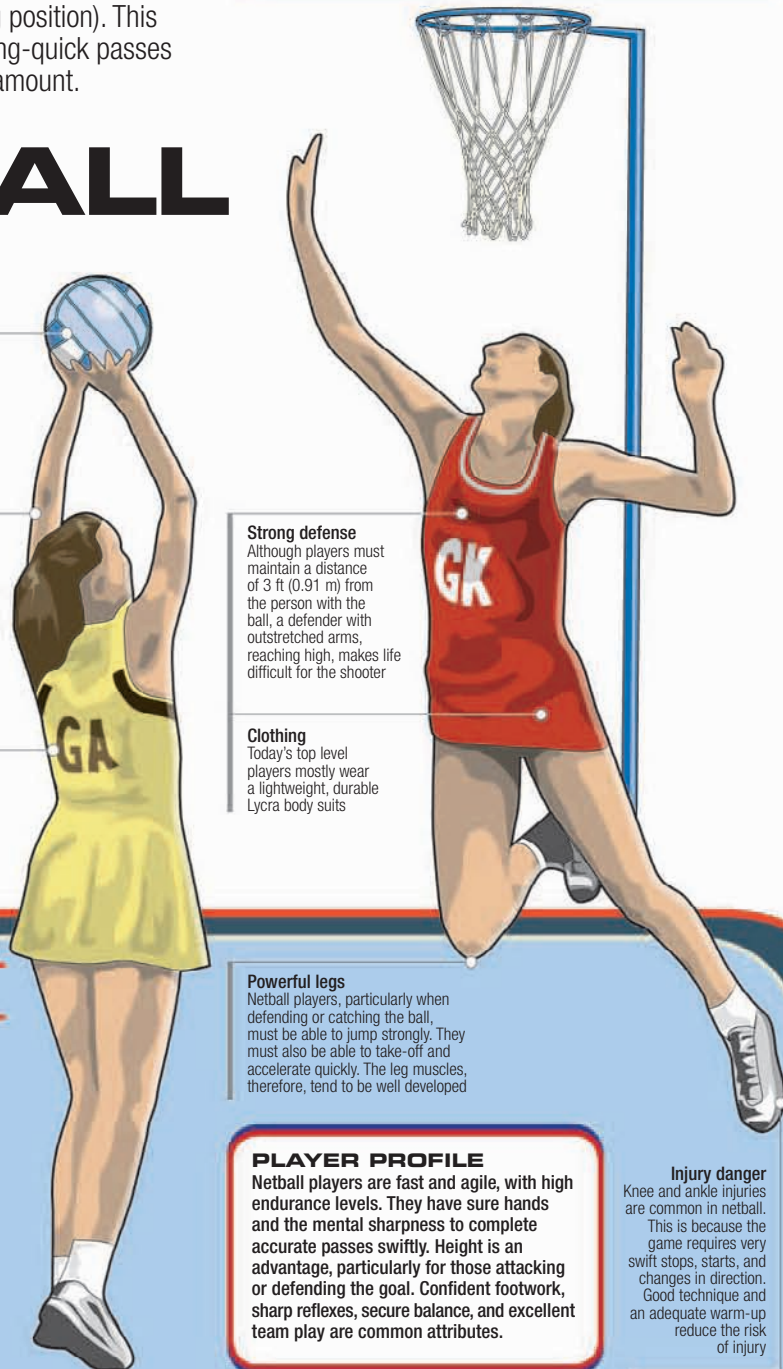
Player identification

A bib or patch must be worn by players to identify their position. "GA," for example, denotes goal attack. This helps the umpires ensure that the players are within their allocated playing zones.

SIDELINES

20,000,000 The approximate number of players worldwide. In the Commonwealth, netball boasts more participants than any other sport.

I The winning margin, in goals, for Australia in the 1963 and 1999 World Championships finals. On both occasions, New Zealand was the opposing team.



Strong defense

Although players must maintain a distance of 3 ft (0.91 m) from the person with the ball, a defender with outstretched arms, reaching high, makes life difficult for the shooter.

Clothing

Today's top level players mostly wear a lightweight, durable Lycra body suits.

Powerful legs

Netball players, particularly when defending or catching the ball, must be able to jump strongly. They must also be able to take-off and accelerate quickly. The leg muscles, therefore, tend to be well developed.

PLAYER PROFILE

Netball players are fast and agile, with high endurance levels. They have sure hands and the mental sharpness to complete accurate passes swiftly. Height is an advantage, particularly for those attacking or defending the goal. Confident footwork, sharp reflexes, secure balance, and excellent team play are common attributes.

Injury danger

Knee and ankle injuries are common in netball. This is because the game requires very swift stops, starts, and changes in direction. Good technique and an adequate warm-up reduce the risk of injury.

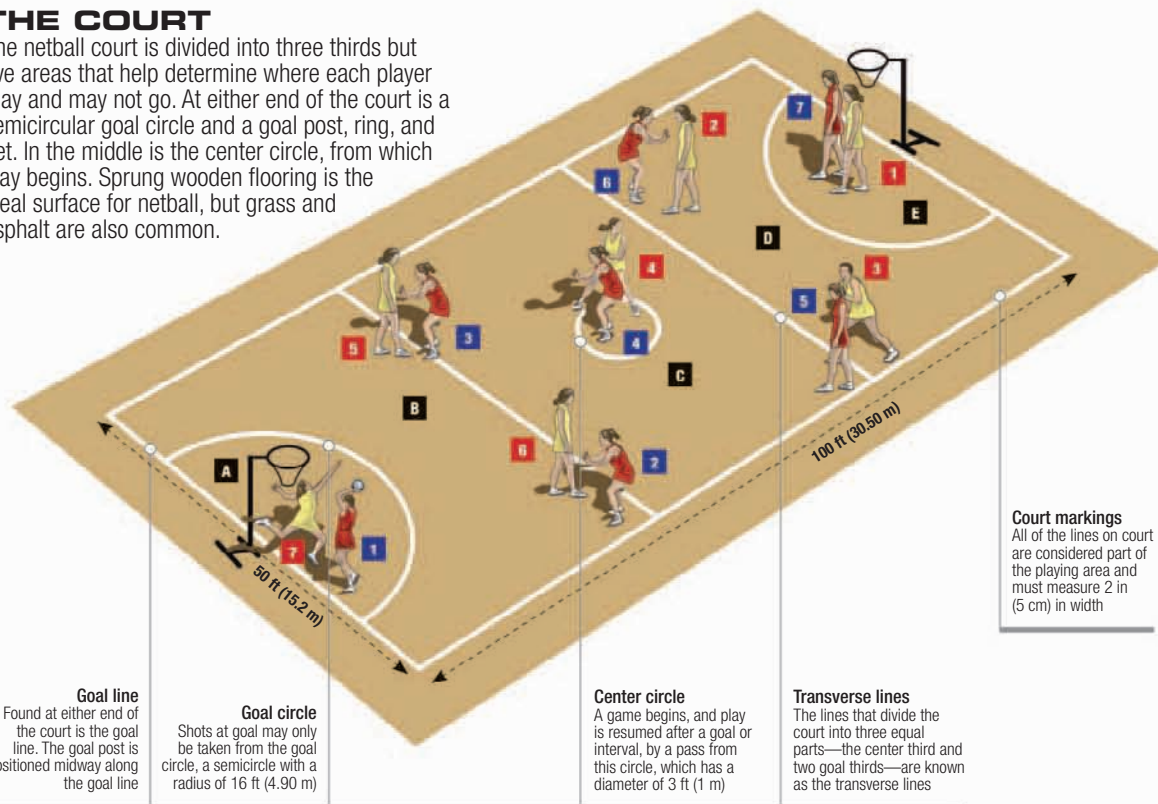
NEED2KNOW

- Netball evolved directly from basketball and was originally known as "women's basketball."
- Only seven players from each team are permitted on court, but both sides are allowed an additional five substitute players.
- The World Netball Championships are held every four years. Twenty-four teams took part in the 2003 tournament.
- Although netball is traditionally a women's sport, there are also a number of mixed and men's leagues.

- 1 Goal Shooter GS**
The team's primary goal scorer, the goal shooter has an accurate shot. The blue team's goal shooter (below) is restricted to areas A and B.
- 2 Goal Attack GA**
The team's secondary goal scorer, the goal attack also feeds the goal shooter. The blue team's goal attack plays in areas A, B, and C.
- 3 Wing Attack WA**
These players use precise passes to provide possession for the team shooters. The blue team's wing attack is restricted to areas B and C.
- 4 Center C**
This player—the team's workhorse—provides the link between attack and defense. The blue team's center is allowed in all areas except A and E.
- 5 Wing Defense WD**
This player marks the opposition wing attack and tries to intercept passes into the goal circle. The blue team's wing defense is restricted to zones C and D.
- 6 Goal Defense GD**
This player marks the goal attack and works to restrict the opposition's scoring opportunities. The blue team's goal defense plays in areas C, D, and E.
- 7 Goal Keeper GK**
The last line of defense, the goal keeper marks the goal shooter and protects the goal. The blue team's goal keeper works in areas D and E.

THE COURT

The netball court is divided into three thirds but five areas that help determine where each player may and may not go. At either end of the court is a semicircular goal circle and a goal post, ring, and net. In the middle is the center circle, from which play begins. Sprung wooden flooring is the ideal surface for netball, but grass and asphalt are also common.



Court markings
All of the lines on court are considered part of the playing area and must measure 2 in (5 cm) in width

Goal line
Found at either end of the court is the goal line. The goal post is positioned midway along the goal line

Goal circle
Shots at goal may only be taken from the goal circle, a semicircle with a radius of 16 ft (4.90 m)

Center circle
A game begins, and play is resumed after a goal or interval, by a pass from this circle, which has a diameter of 3 ft (1 m)

Transverse lines
The lines that divide the court into three equal parts—the center third and two goal thirds—are known as the transverse lines

PLAYING THE GAME

Play begins with a pass from the center circle. The team in possession then attempts to pass the ball into their goal circle so that either the goal shooter or goal attack may shoot for goal. After each goal scored, play is restarted with a center pass. A match is played over four quarters, each of which is 15 minutes long. A team consists of 12 players, but only seven are allowed on court at a time. Unlimited substitutions are permitted between the quarters or during injury breaks.

CONTROLLING THE GAME

Two umpires officiate over infringements of the rules of netball. Major infringements include contact (a player must not come into contact with another if this interferes with play) and obstruction (a player must not be closer than 3 ft, 0.91 m, to the player with the ball). Common minor infringements include: held ball (the player with the ball must pass or shoot within three seconds), offside (players must not move outside their playing zones), and footwork (the player with the ball must not re-ground the first landed foot until the ball is passed). For a minor infringement, the infringed team is awarded a free pass, but may not shoot for goal. Major infringements incur a penalty pass or shot, during the taking of which the offending player stands out of play. Furthermore, if the penalty occurs inside the goal circle, the goal shooter or goal attack may shoot for goal.

Standing still

The players must remain still, arms at their side, until the umpire blows the whistle and tosses up the ball



Umpire's job

The umpire throws the ball from just below the level of the shorter player's shoulders



Face off

The players must be at least 3 ft (0.91 m) apart and each face their goal end



TOSS UP

When two infringements occur simultaneously, or if the umpire is unsure which team last had contact with a ball out of play, a toss up results. The two players adopt positions opposite each other, the umpire—standing between them—tosses the ball into the air, and the players compete for possession.

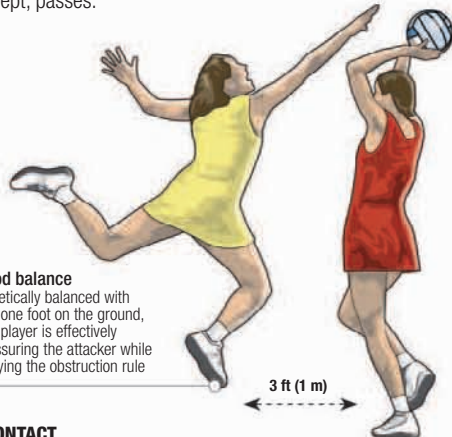


NETBALL TECHNIQUES

Netball is a fast-moving game in which players must make decisions and precisely execute a variety of techniques in a very short space of time. All players must be able to catch and pass effectively, and the goal shooter and goal attack must also master the art of shooting for goal. All players constantly use solid and decisive footwork throughout the course of a game.

DEFENDING

Sound defense often wins games. It is the job of the defense to gain possession of the ball, which is mainly achieved by pressuring the opposition into making mistakes. Good defenders are determined and persistent, with the ability to predict the flight of, and then intercept, passes.



Good balance

Athletically balanced with just one foot on the ground, this player is effectively pressuring the attacker while obeying the obstruction rule

3 ft (1 m)

NO CONTACT

Netball is a noncontact sport, and the rules stipulate that the defender must maintain a distance of at least 3 ft (1 m) from the player holding the ball. This makes defending a challenging, but vital, task. Agility, anticipation, and timing are all essential.

FOOTWORK

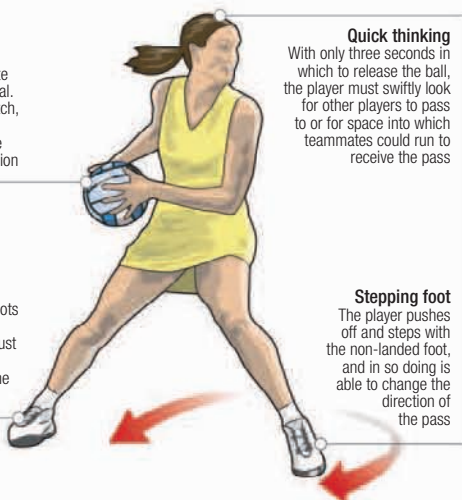
In a fast-moving game such as netball—where players are required to stop, start, and change directions very quickly—good footwork is essential. Without it a player can easily lose balance and body control, therefore becoming slow and cumbersome on court. In particular, netball's "one-step" rule necessitates specialized footwork skills.

Handling

Sharp, accurate handling is vital. A fumbled catch, or inaccurate pass, can give away possession

Landed foot

The player pivots on the landed foot, which must not drag or slide during the maneuver



Quick thinking

With only three seconds in which to release the ball, the player must swiftly look for other players to pass to or for space into which teammates could run to receive the pass

Stepping foot

The player pushes off and steps with the non-landed foot, and in so doing is able to change the direction of the pass

THE PIVOT

After catching the ball, the player may not re-ground the foot that first touched the ground until the ball is passed. However, the player may step with the other foot any number of times. This is particularly useful when the ball-carrier lands facing one direction but wishes to pass in another. The player pivots on the landed foot and steps in the direction of the intended pass with the other.

OUTSTANDING ANTIPODEANS

THE MOST SUCCESSFUL NATIONAL TEAM IN THE HISTORY OF NETBALL, AUSTRALIA WON THE INAUGURAL NETBALL WORLD CHAMPIONSHIPS IN 1963. ALTHOUGH AUSTRALIA HOLDS THE MOST CHAMPIONSHIP TITLES, ITS CLOSEST CHALLENGER IS LOCAL RIVAL NEW ZEALAND.

SHOOTING

The shooting skills of the goal shooter and goal attack must be finely tuned. In the past the ball was released low, but today it is usually held high, making interception more difficult. The shot is normally taken from a stationary position. The shooter "freezes" as the player shoots, and attention focuses on the goal. Steady nerves are essential.

Protecting the ball
The ball is held high to keep it safe from the attentions of the defenders. This allows the shooter to concentrate solely on the target



Balance
The knees are bent before the ball is released



Delicate release
The index finger guides the ball out of the hand and also imparts a touch of backspin



Liftoff
As the shot is made, the legs extend to maintain momentum

PREPARATION

In preparing to shoot for goal, the player stands with the knees slightly bent, eyes fixed on the target, and the ball rests on the fingers of the shooting hand.

RELEASE

The ball is released with a flick of the wrist, so that it travels in a high arc upward and then down into the ring. The knees extend slightly to aid momentum.

PASSING

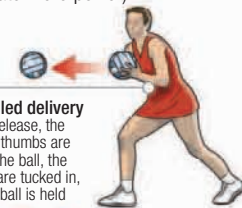
Since players cannot run with or dribble the ball, netball is a passing game. Professional teams can move the ball from one end of the court to the other with impressive speed. Passes fall into two categories: two-handed (which generally give the player more control and are easier to execute) and one-handed (which generate more power).

CHEST PASS

This easily controlled, two-handed pass is useful when a swift, accurate offload is required. It is commonly utilized when passing to a player who is positioned in front of a defender. The chest pass is effective over short or long distances.

Controlled delivery

Before release, the player's thumbs are behind the ball, the elbows are tucked in, and the ball is held



SHOULDER PASS

The most frequently used one-handed pass, the shoulder pass is a good option when the player requires a long, direct transfer. It is often employed when defenders wish to clear the ball from their goal third.

Powerful release

The ball is held on the fingertips and close to the shoulder. The non-throwing hand is used to protect the ball



Eyes forward

The player has knees bent, elbows in, and eyes fixed on the target

BOUNCE PASS

This pass is perfect when the player is "crowded" and is often used by an attacker wishing to outmaneuver defenders. The two-handed pass offers disguise, while the one-handed pass allows the player to reach around defenders.

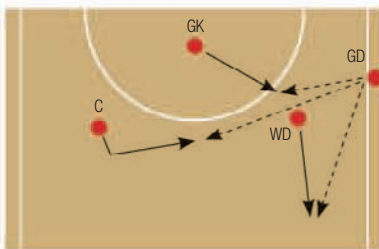


STRATEGIES

Because the players are restricted to set areas, teamwork is vital: simply to move the ball from end to end the team must cooperate effectively. And with fourteen people on a relatively small court, efficient use of space is also important. Pre-planned strategies are one way in which to work effectively as a team and to best utilize the available court space.

THREE-OPTION ATTACK

This strategy gives the ball-holder three passing options. First is to pass to a player who has moved into space and is in front of the defenders. However, if this alternative becomes unsafe, the second option is to pass to another player who has made a definite move. The third choice is a safety option—often a back pass to allow the attack time to regroup.

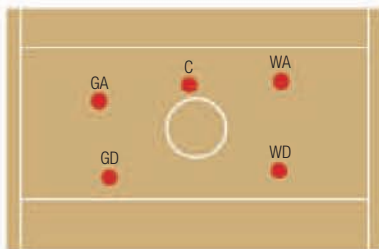


THREE-WAY TIE

THE 1979 WORLD CHAMPIONSHIPS, HELD IN TRINIDAD AND TOBAGO, FAMOUSLY DID NOT FEATURE A FINAL. AS A RESULT, THREE TEAMS—NEW ZEALAND, TRINIDAD AND TOBAGO, AND AUSTRALIA—SHARED THE TITLE.

DEFENSIVE PRESS

Defenders must apply constant pressure, anticipate attackers' movements, and close down the available space. One strategy that achieves all these aims is the defensive press, which involves a group of defenders moving into a specific court area to force an error and secure a turnover. This move can effectively break up free-flowing attacking play.



INSIDE STORY

In 1895 “women’s basketball” was introduced to England, and it was here that the game was developed. There were no court markings then, and the players wore long skirts and sleeves. In 1901, the first recorded rules of netball were published. Traveling teachers and others propagated netball throughout the British Empire, and the sport became especially popular in New Zealand and Australia. In 1960 the International Federation of Women’s Basketball and Netball was founded, and World Championships have been held every four years since 1963.

GOVERNING BODY

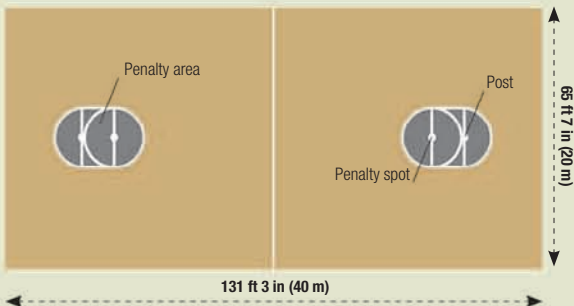
The International Federation of Netball Associations (IFNA), which is based in Manchester, England, is the governing body for netball. It is responsible for the rules of netball and claims more than 40 member nations. These countries are organized into five groups, each of which has a Regional Federation, which aids the implementation of IFNA policies.

KORFBALL



GAME OVERVIEW

Korfball claims to be the world’s only truly mixed-gender team sport. It is played between two teams of four male and four female players, who pass a ball between each other by hand, with the ultimate goal of shooting it through the opposition’s basket, or “korf.” Korfball is played in more than 50 countries and is especially popular in Belgium and the Netherlands, where it originated.



IN THE ZONE

The game is played on a rectangular court divided into two halves, or zones. Each zone features a post, with a korf at the top, surrounded by a shaded penalty area.

NEED2KNOW

- Korfball was developed in the Netherlands, and the game takes its name from the Dutch word for basket, “korf.”
- Men and women play side by side, although defenders may only oppose players of their own sex.

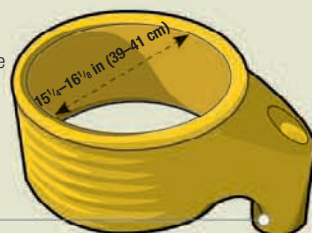
GAME OF TWO HALVES

A korfball match consists of two halves of 30 minutes. Two men and two women from each team are positioned in each zone, and take up the role of attackers or defenders, depending on whether they are in their own or the opposition’s half. Once there have been two goals scored in the game, each player’s role reverses—defenders become attackers, and vice versa—and the teams attack the opposite ends.

Defenders may only oppose attackers of their own sex. They “defend” the attacker by standing between them and the korf, with one arm raised to block a shot. As goals may only be scored by an attacker when they are not being defended, they must take a shot before the opponent takes up their position. Taking a shot while being defended results in a free pass to the opposition, while defending an attacker of the opposite sex is a penalty offense.

DUTCH BASKET

Usually made of cane or synthetic material, the korf is attached to the post, with its top edge 11 ft 6 in (3.5 m) above the ground.



Synthetic korf

This molded korf is slotted onto the top of the post



Small soft ball

The ball is made of leather or synthetic material; men's diameter 7¼–7½ in (18.5–19 cm); women's 6¼–7 in (17–18 cm)

Digital strapping

Players often wear protective bands around their thumbs and fingers to prevent injury while trying to catch fast-moving balls

Sweat bands

These are not required, but they are useful on hot indoor courts

Team strip

Players wear lightweight shirts and shorts or skirts made of cotton or viscose

Light shoes

Any kind of trainer or tennis-type shoe; must not mark the court

PLAYER PROFILE

Handball players must be able to run quickly in short bursts, and be capable of changing direction quickly in order to wrongfoot opponents. These are the skills they practice most often off-court. Catching ability is also essential, together with a fast and accurate throw.

NEED2KNOW

- ➔ Handball is one of Europe's most popular participation games, with up to 18 million regular players.
- ➔ In Denmark, the sport rivals soccer for popularity with players and spectators.
- ➔ Scores often reach as high as 30–30.

WHO PLAYS WHERE

In addition to the goalkeeper, teams usually comprise two wing players, a center-left, a center-right, and two centers, one of whom is primarily defensive, the other the playmaker. The outfielders' roles are fluid, and change according to the state of the game: references to 6–0, 5–1, and 4–2 (the number of attackers is always stated first) relate to the players' positions at a given moment of play, rather than throughout a match. The classic line-up is the 4–2 formation: four attackers and two defenders.

- 1 **Keeper**
Can touch the ball with any part of the body as long as one foot is in the area
- 2 **Wingers**
Two; tend to operate along the touch lines, but cut inside on demand
- 3 **Outlying centers**
One is on the left, the other on the right, but they may alternate
- 4 **Attackers**
Two; aka "centers," they focus on the opponents' goal but do not do all the scoring

COURT IN THE ACT

Since demand for handball courts exceeds supply, in many parts of the world the game is played on basketball courts, which are much more numerous. The two games are similar, with the same aim of scoring more goals than the other side. However, with an area of 502 sq yd (420 sq m), the basketball court is only slightly more than half the size of a dedicated handball arena, which is 957 sq yd (800 sq m). While organized competitive events are played indoors on designated courts, many informal games of team handball are played outdoors on flat areas of grass, pavement, or a beach, with a makeshift goal.

REICHS AND WRONGS

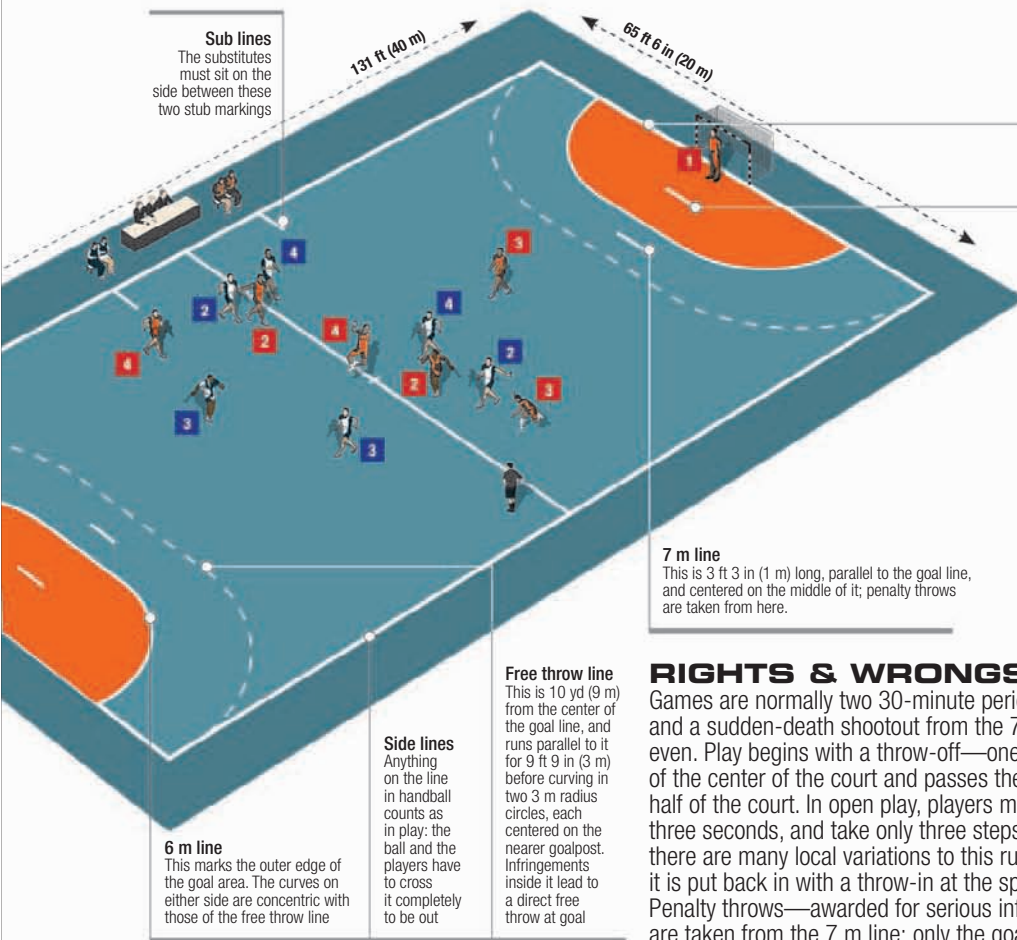
HANDBALL MADE ITS OLYMPIC DEBUT IN 1936 IN BERLIN, AT THE INSTIGATION OF ADOLF HITLER, WHO LOVED THE GAME. BECAUSE OF THIS UNHAPPY ASSOCIATION WITH THE NAZI DICTATOR, IT WAS DROPPED AFTER WORLD WAR II, BUT WAS REINTRODUCED AT MUNICH IN 1972.

GAME OVERVIEW

Handball developed in the late 19th century in Germany and Scandinavia. It is a fast and sometimes furious contact sport for men and women in which two teams of seven players (plus up to seven substitutes) bounce and pass a ball toward and ultimately into each other's goal. Players commonly bump into each other—deliberately, as well as accidentally. But they are allowed to do so only with their torsos—any attempt to grab or trip an opponent is a foul.

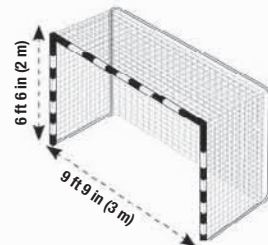
HANDBALL





ULTIMATE OBJECTIVE

The goalposts and crossbar must be marked with alternating bands in two different colors that contrast with the offcourt surroundings; red and white are most often used.



RIGHTS & WRONGS

Games are normally two 30-minute periods, with 10 minutes' extra time and a sudden-death shootout from the 7 m line if the scores are still even. Play begins with a throw-off—one player stands within 5 ft (1.5 m) of the center of the court and passes the ball to a teammate in the same half of the court. In open play, players may normally hold the ball for only three seconds, and take only three steps with it in the hand, although there are many local variations to this rule. If the ball goes out of play, it is put back in with a throw-in at the spot where it crossed the line. Penalty throws—awarded for serious infringements, such as tripping—are taken from the 7 m line; only the goalkeeper may defend them.

MANUAL METHODS

Speed of movement and passing are important, but when both teams are comparably fast, other skills come into play. One of the most important of these is faking—making opponents think you're going to do one thing, and then, having wrongfooted them, doing another.

Seven o'clock

This angle of bounce helps close control



DRIBBLE

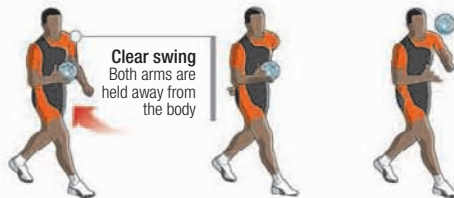
The player bounces the ball as he advances, and redirects it at the top of its upward flight with the downturned palm of his hand. Only he knows if he will go left, right, or straight on. (If he takes too many steps, though, possession is given to the other side.)

Two for one

By the time the ball returns to the hand, the player has made two strides

FIST

One basic passing movement is a punch with the fist clenched in the "thumbs up" position. The leg on the same side as the hand holding the ball is thrust forward, to make room for the swinging arm.



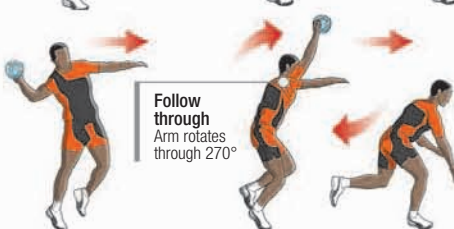
WRIST

The player creates the impression that he is either going to keep ahold of the ball or pass to one side, but then, with an upward flick of the wrist, passes it from below his downturned palm in the opposite direction.



OVERHEAD PASS

Made on the run, this move requires the nonthrowing arm to be outstretched (for balance and to provide a directional sighter). The left foot hits the ground at the moment the right hand releases the ball.



NEED2KNOW

- ➔ Gaelic football is an exclusively amateur game played mainly in Ireland. It is also popular in Canada, the United States, and other countries with large populations of Irish descent.
- ➔ Matches are played in two 30-minute halves at club level and for women, and in two 35-minute halves at county level.

SIDELINES

36 The highest number of wins in the annual All-Ireland Gaelic football competition, first held in 1887. The holder of the record is Kerry County.

19 The number of counties (out of 32) that have won the All-Ireland competition. Three—Armagh, Derry, and Donegal—have won it once only. An unlucky 13 have yet to win the trophy.

TROUBLED HISTORY

DURING IRELAND'S TROUBLES, GAELIC FOOTBALL WAS CLOSELY LINKED WITH NATIONALISM. ON NOVEMBER 21, 1920, 14 FANS WERE KILLED WHEN BRITISH TROOPS OPENED FIRE AT A GAME IN CROKE PARK, DUBLIN.

Stitched up
Gaelic footballs are traditionally covered with 18 stitched strips of leather



9–9¼ in (21.6–22.3 cm)

OBJECT OF ATTENTION

The ball is somewhat smaller than a soccer ball, and thus easier to handle. The permitted weight range is 16–17 oz (450–485 g).

PLAYER PROFILE

Gaelic football players need to be fit, athletic, muscular, and tough. They must have good speed and stamina, a sharp turn of pace, and finely honed throwing and kicking skills. Players regularly undertake weight training, sprints, and long-distance runs. Preparation for games involves work on tactics with other members of the team.

GAELIC FOOTBALL



GAME OVERVIEW

Played by both men and women, Gaelic football is a fast-moving, physically punishing cross between soccer and rugby. Two teams of 15 players—and up to 15 substitutes, of whom five may be used—aim to get a round ball under or over the crossbar of their opponents' H-shaped goal. Players may kick or hand pass the ball to each other. In possession of the ball, they may take no more than four steps before either bouncing the ball or kicking it into their own hands in an action known as soloing.

FIELD OF PLAY

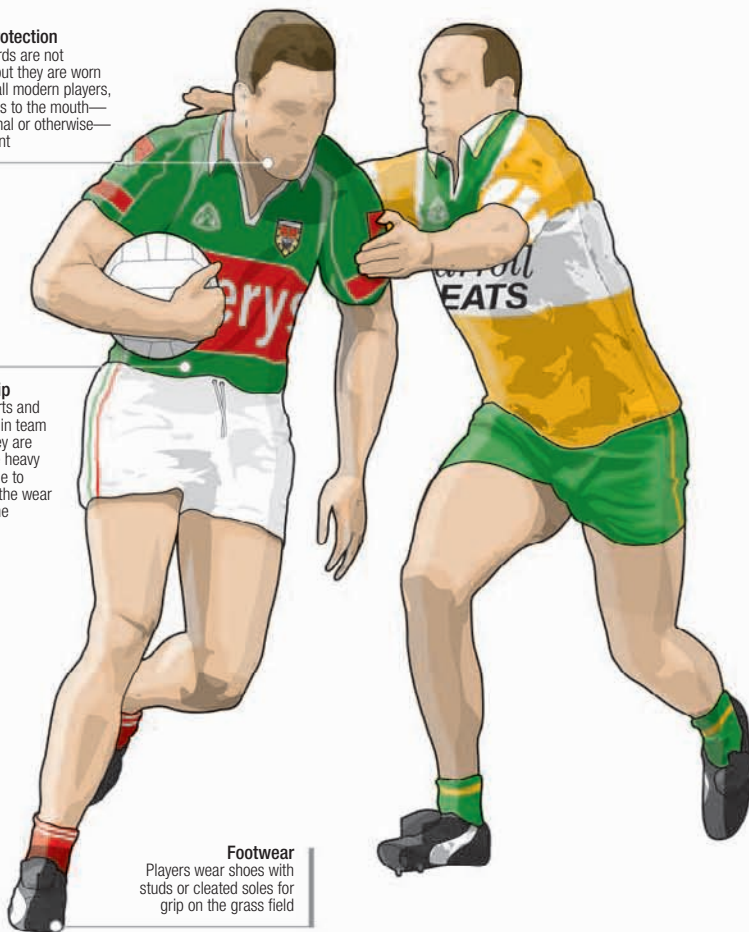
The field and goals are the same as those used in hurling (see p.170), but some of the field markings for hurling are covered over or disregarded during Gaelic football matches. Traditionally, the game was played only on grass, but artificial surfaces were introduced in the second half of the 20th century and are now widespread.

Mouth protection

Mouthguards are not required, but they are worn by nearly all modern players, since blows to the mouth—unintentional or otherwise—are frequent

Team strip

Cotton shirts and shorts are in team colors. They are often quite heavy and durable to withstand the wear of the game

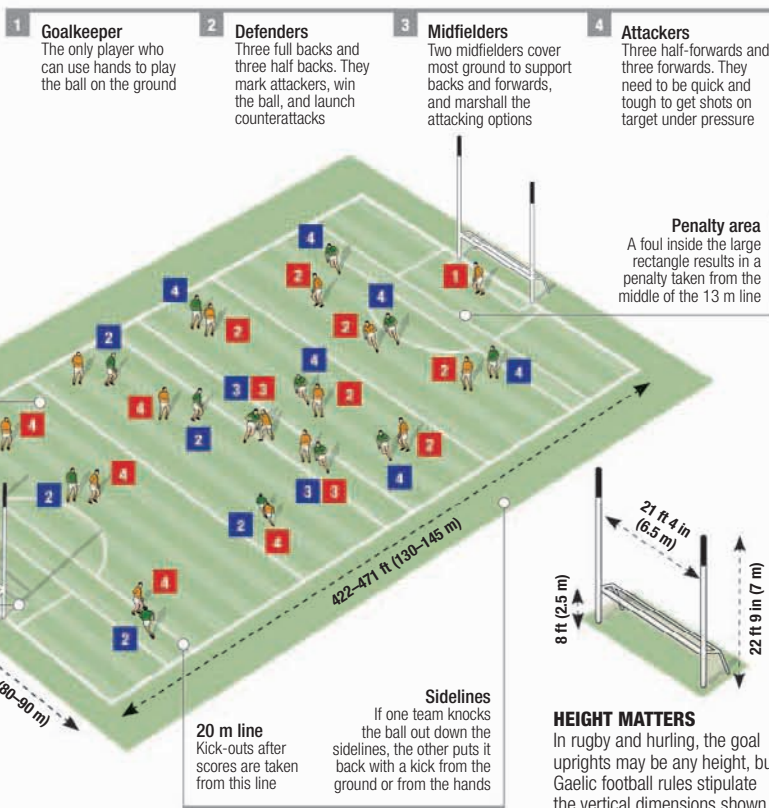


Footwear

Players wear shoes with studs or cleated soles for grip on the grass field

TELLING SCORES

One point is awarded for putting the ball over the opposition's crossbar between the posts; a shot into the net counts as a goal, worth three points. Scores are recorded in two parts: goals scored then points total. For example: the 2010 All-Ireland Senior Final finished Cork 0–16 Down 0–15.

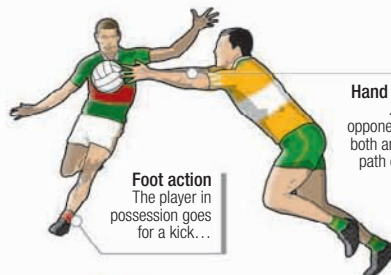


THE BALL IN PLAY

Play begins with the referee throwing the ball up the center of the field between two midfielders from each team. After a goal is scored, the keeper restarts play with a placekick from the edge of his or her area. If a defender knocks the ball out at the end, an attacker takes a kick from the nearest point on the 45 m line.

HANDS AND FEET

Many of the skills are the same as those required in soccer and rugby, but there are three actions in Gaelic football not used in the other sports: crouch lift, hand pass, and solo.

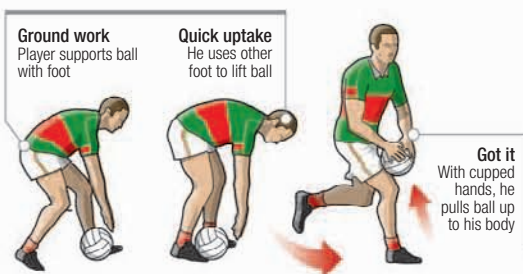


GAINING POSSESSION

The ball may be won by tackling or by using both hands to block a kick.

CROUCH LIFT

Aside from the goalkeeper, no one may play the ball on the ground with the hands. In the crouch lift, the player stoops down and uses a foot to scoop the ball into cupped hands facing backward. The ball can then be pulled up to the body.

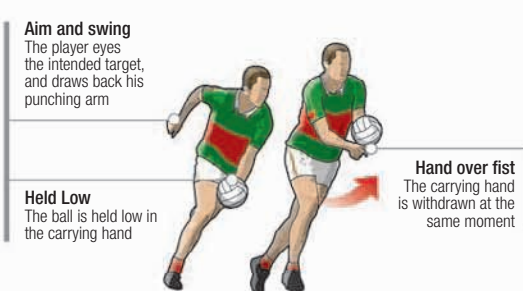


SOLOING

A move unique to Gaelic football, soloing is a way of dribbling without committing a foul by taking more than four consecutive steps in possession of the ball. Players alternately bounce the ball on the ground then "solo," which means dropping the ball onto one foot.

HAND PASS

One of the most common passes is to hit the ball with the side of the closed fist, using the knuckle of the thumb; a regular punch with the knuckles or forefingers is forbidden.



INSIDE STORY

Gaelic football is ancient in origin, but was first codified in 1885. It developed in part as Ireland's rejection of the "English" games of soccer and rugby. Today, the game is played at club and county levels by male and female teams. The men's county final is broadcast live and attracts crowds of up to 80,000.

GOVERNING BODY

The Gaelic Athletic Association (GAA) was founded in 1884. Its main concerns are with the laws of Gaelic football and hurling.

GAME OVERVIEW

One of the fastest-moving of all team games, hurling is virtually a national sport in Ireland. Second only to soccer in popularity among players and spectators, more than half the country's population watch the annual county hurling competition. The 15-man teams aim to get the ball, or sliotar, into the opposition's goal or over the crossbar using a curved stick known as a camán or hurley. Hurling, called iománaíocht or iomáint in Irish, is not quite the free-for-all it may appear: body checks and deliberate obstruction are banned.

HURLING



Headgear

Plastic helmets and faceguards are required at most levels of the game

PLAYER PROFILE

The game of hurling requires immense stamina, great physical strength, and a wide range of ball skills: the best players are often also good at other moving-ball games, such as soccer, and stationary ball games, such as golf.

RULES

A game has two halves of 30 minutes each (35 minutes for senior inter-county matches.) When knock-out matches are drawn, a replay is followed by extra-time of 10 minutes each way. Players use their hurley to pass or shoot, or to dribble the ball by bouncing it off the end of the stick and catching it. They can kick the ball, but they cannot pick it up off the ground, throw it, travel five steps holding it, catch it three times in a row without it touching the ground, or pass it from hand to hand.

OFFICIALS

Hurling has a number of officials: a referee on the field, two linesmen who indicate when the sliotar leaves the field of play, and four umpires to assist the referee and linesmen and to signal the scores.



Axe-shaped stick

A hurley is made of ash wood and is 27–39 in (70–100 cm) long. The hurley a goalkeeper uses is longer than an outfield player's stick

Sliotar

The leather-covered ball is made of cork or composite material; its diameter is 2½ in (6.5 cm)

Shinpads

Hurlers wear protection against blows to the legs

Football boots

Studded football boots are worn to provide grip on the field

FOULS

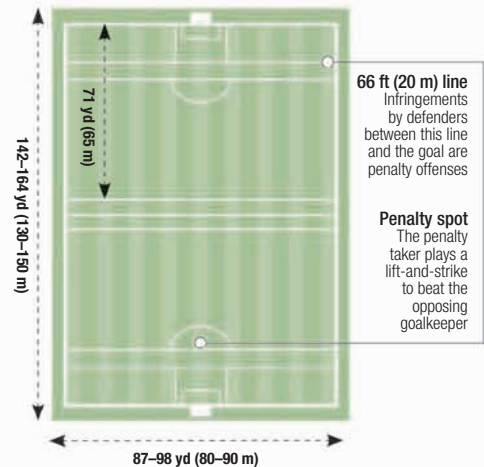
Technical infringements and dangerous tackles are punished by a "free"; a player uses his hurley to lift and strike the ball at the point where the offense occurred. If the referee is unsure of the culprit, he stops play and restarts it by throwing the ball between two opponents on the halfway line. A foul inside the large rectangle in front of the goal is punished with a penalty stroke taken from the 66 ft (20 m) line.

NEED2KNOW

- ➔ The sliotar can be hit as far as 325 ft (100 m) and as fast as 93 mph (150 kph).
- ➔ Hurling is played in some other countries, particularly the United States.
- ➔ There are no hurling internationals. An Irish hurling team regularly plays a Scottish shinty team, using modified rules.
- ➔ The 12-a-side women's version of the game is known as camogie.

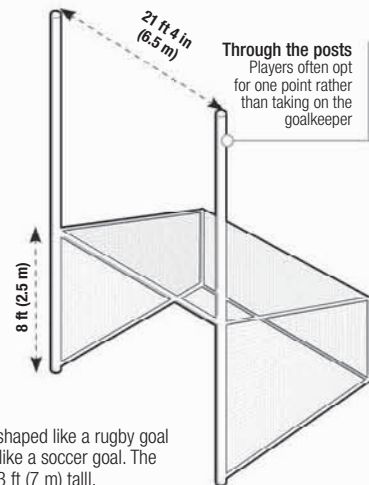
ON THE FIELD

A hurling field is the same as the field for Gaelic football (see pp168–169). The two 15-member teams take up positions on the field of play, although these may change with coaches' tactics. Up to five substitutes are allowed.



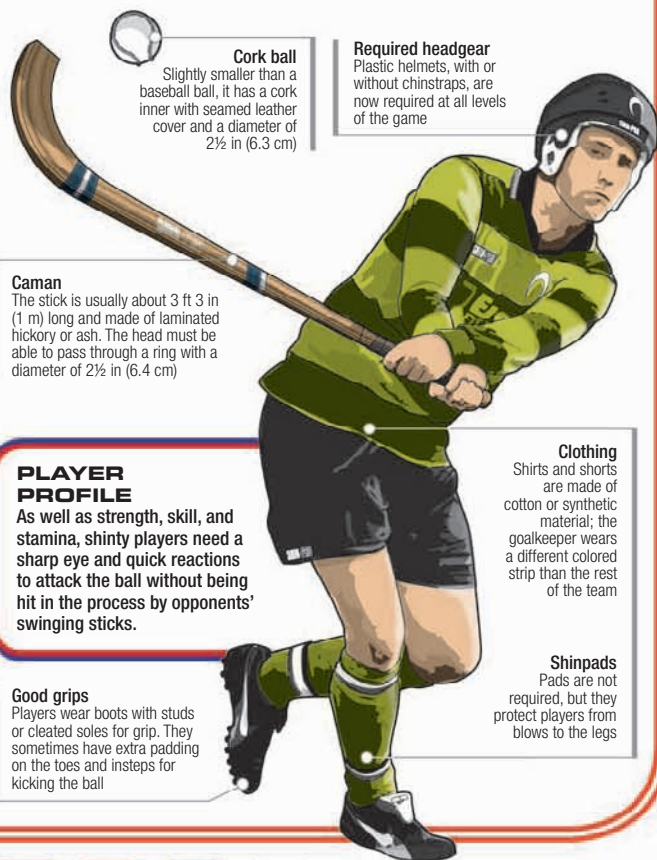
SCORING

Teams score a point for putting the sliotar over the crossbar and three for a goal (into the net). Scores are recorded in two parts: goals scored followed by the points total, so a 3-4 score equals 13 points.



GOAL

The goal is H-shaped like a rugby goal and has a net like a soccer goal. The uprights are 23 ft (7 m) tall.

**Cork ball**

Slightly smaller than a baseball ball, it has a cork inner with sealed leather cover and a diameter of 2½ in (6.3 cm)

Required headgear

Plastic helmets, with or without chinstraps, are now required at all levels of the game

Caman

The stick is usually about 3 ft 3 in (1 m) long and made of laminated hickory or ash. The head must be able to pass through a ring with a diameter of 2½ in (6.4 cm)

PLAYER PROFILE

As well as strength, skill, and stamina, shinty players need a sharp eye and quick reactions to attack the ball without being hit in the process by opponents' swinging sticks.

Good grips

Players wear boots with studs or cleated soles for grip. They sometimes have extra padding on the toes and insteps for kicking the ball

Clothing

Shirts and shorts are made of cotton or synthetic material; the goalkeeper wears a different colored strip than the rest of the team

Shin pads

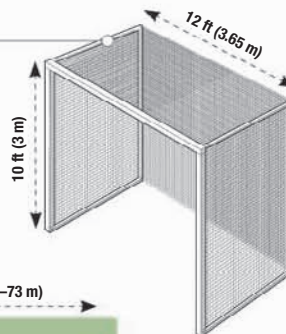
Pads are not required, but they protect players from blows to the legs

ON THE FIELD

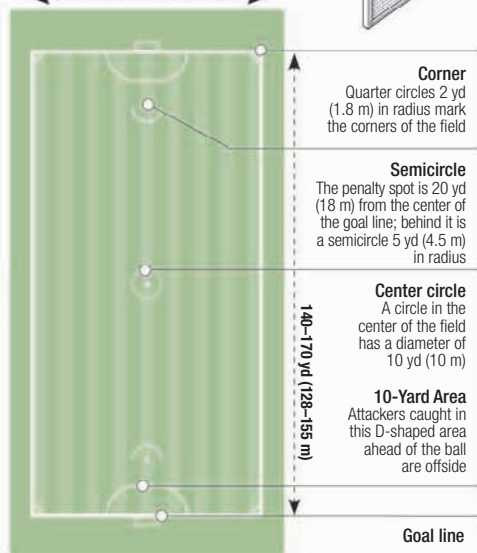
The long edge of the field is called the sideline and the short edge is called the byline. The main on-field features are a center circle, two semicircles, and two D-shaped areas around the goal.

Goal

The crossbar and uprights must be painted white, and made of either wood or metal



70–80 yd (64–73 m)

**Corner**

Quarter circles 2 yd (1.8 m) in radius mark the corners of the field

Semicircle

The penalty spot is 20 yd (18 m) from the center of the goal line; behind it is a semicircle 5 yd (4.5 m) in radius

Center circle

A circle in the center of the field has a diameter of 10 yd (10 m)

10-Yard Area

Attackers caught in this D-shaped area ahead of the ball are offside

Goal line



SHINTY

GAME OVERVIEW

Shinty originated in the Highlands of Scotland, where it is known by Gaelic-speakers as *camanachd* or *iomain*. Two teams of 12 players (men or women) use hooked or curved sticks, called caman, to hit a ball toward and into each other's goal, or hail. Shinty is a rough and lightning-fast game that resembles field hockey and lacrosse (see pp152–157). A shinty match is played in two halves; a 12-a-side game lasts 90 minutes, while a 6-a-side game lasts 30 minutes.

INSIDE STORY

Shinty's major competition, the Camanachd Cup, is a knockout tournament that has been held every year since 1896, except during the two World Wars. There is also a league in Scotland, which is divided into North and South sections: the winners play each other in a grand final playoff for the national championship.

CAMANACHD ASSOCIATION

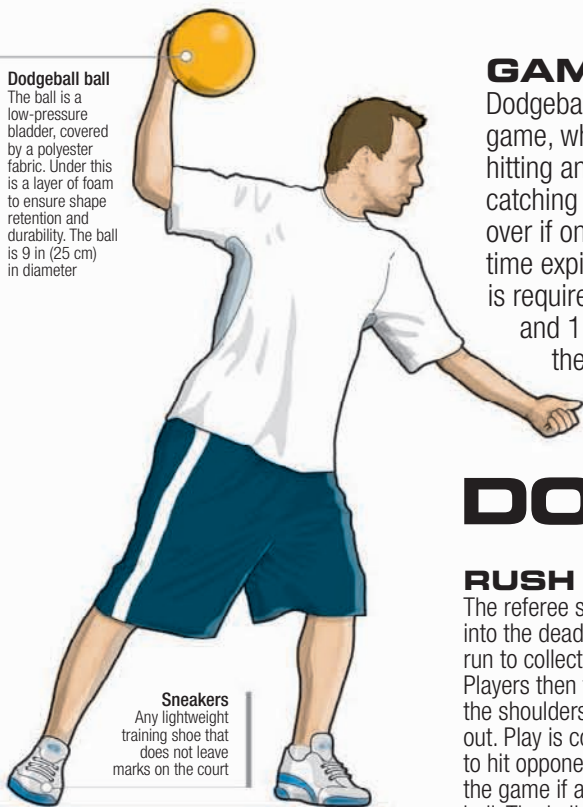
The Camanachd Association was formed as shinty's governing body in 1893. It oversees the game in Scotland and elsewhere, stressing its Celtic traditions, and encouraging indoor versions to bring children into the sport.

NEED2KNOW

- ➔ Shinty is played almost entirely in Scotland. There is one club in England, and a handful in the United States.
- ➔ Traditionally a winter game, in 2003 the shinty clubs of Scotland added a summer season from March to October.
- ➔ Despite the best efforts of the governing body—the Camanachd Association—to codify the game internationally, there are still many local shinty rules.

Dodgeball ball

The ball is a low-pressure bladder, covered by a polyester fabric. Under this is a layer of foam to ensure shape retention and durability. The ball is 9 in (25 cm) in diameter



Sneakers
Any lightweight training shoe that does not leave marks on the court

NEED2KNOW

- ➔ If teams have the same number of players left in after 5 minutes, they play one-minute periods of sudden death overtime.
- ➔ The popularity of the game increased thanks to *Dodgeball: A True Underdog Story*, a 2004 film starring Ben Stiller.

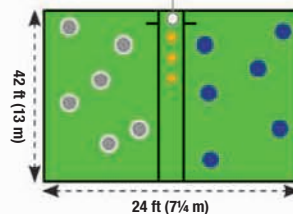
GAME OVERVIEW

Dodgeball is a thrilling 6-a-side mixed or single-sexed ball game, where the object is to get opponents “out” by either hitting an opponent with a ball before it bounces, or by catching a thrown ball cleanly before it bounces. A game is over if one teams’ players are “out” or if the game-playing time expires, and matches consist of five games. If overtime is required, the number of players on each team is equal, and 1 additional minute is played. Overtime continues until there is a winner.

**DODGEBALL****RUSH RULES**

The referee starts play by placing 3 balls into the dead zone. Only three players can run to collect the balls to begin the game. Players then try to hit opponents, below the shoulders, with the ball to get them out. Play is continuous as each team tries to hit opponents, but a player can rejoin the game if a teammate catches a thrown ball. The ball can be passed three times between teammates before being thrown, but it must be thrown within five seconds. The winner is the team with the most hits.

Dead zone
This is 2 ft (0.6 m) wide in the middle of the court

**DOUBLE TEAMING**

Dodgeball players are so good at ducking and weaving that cunning teamwork is needed to get them out. Strategies include the targeting of one opponent by a number of players on the other team to get them out.

TUG-OF-WAR**EVENT OVERVIEW**

In this trial of strength, two teams of eight men or women (and sometimes mixed teams) face each other and pull on opposite ends of a rope. The winner is the side that pulls the other team 13 ft (4 m), so that a central mark on the rope crosses a marked line. All matches are the best of three pulls.

PULLING TOGETHER

The judge gives three commands: “Pick up the rope”; “Take the strain,” and after gesturing clearly that he is about to give the final order: “Pull!” The teams then tug on the rope with all their might, and throw their weight backward as far as they can. But deliberately sitting on the ground, or failure to return immediately to the pulling position results in a caution. Two cautions are given prior to disqualification; however, a team can be disqualified without caution for any offense.

ROPE MARKS

The rope is at least 115 ft (35 m) long. A red mark is in the center, directly above an equivalent line on the ground at the start. On either side of the rope’s midpoint, and 13 ft (4 m) from it, are two white marks: the event is won by the team that pulls the other’s white mark across the center line on the ground. Another 3 ft 3 in (1 m) toward the ends of the rope in both directions are blue marks: these are the first points that the pullers can grip.

THE WEIGH-IN

To ensure even contests, tugs-of-war have strict weight divisions. In men’s events, there are normally five categories: up to 1,234 lb (560 kg), 1,323 lb (600 kg), 1,411 lb (640 kg), 1,500 lb (680 kg), and 1,587 lb (720 kg) per team; for women, the dividing lines are 1,058 lb (480 kg), 1,146 lb (520 kg), and 1,234 lb (560 kg). There is a weigh-in before each contest, and tuggers have their weight stamped on an easily visible part of their bodies—this is to help prevent illicit mid-event substitutions.

NEED2KNOW

- ➔ The discs used in this sport are made by several manufacturers, but the trade name Frisbee® has become generic, in the same way “Kleenex” is used to describe facial tissues.
- ➔ The main governing body is the World Flying Disc Federation (WFDF). In the United States, the most important organization is the Ultimate Players Association (UPA).
- ➔ Ultimate is most popular in the United States but is also played in more than 40 other countries.

GAME OVERVIEW

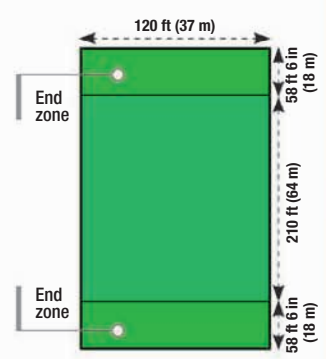
Ultimate is a 7-a-side game in which teams float a plastic disc, known as a Frisbee, to teammates. A team scores a point every time one of them catches the disc inside the end zone that they are attacking—first to 15 points wins. A thrower may pass the disc in any direction to any teammate. Ultimate is self-refereed and the Spirit of the Game™ guides how players referee the game and how the players conduct themselves.



ULTIMATE

FLICKING RULES

One member of a team throwing the disc to the opposition (called the pull) starts the game. To score a point, the frisbee must be caught in the opponent's end zone. Players must establish a pivot foot when in possession of the disc and can only move the disc by passing it to a teammate. Failure to release the disc within 10 seconds, any incomplete pass, or an interception turns the disc over to the opposition.



TO HAVE AND HAVE NOT

Since Ultimate is a noncontact sport, the team in possession has a huge advantage. The best that opponents can hope for is to force an error. To do this, they close down the stronger side of the player with the frisbee, so that he or she can pass it only from the less favored side. Below are three basic grips. Most backhands are mirror images played with bent elbows from the opposite side of the chest.

BASIC BACKHAND

This is the default grip for a right-handed player passing the frisbee from his or her off-side.



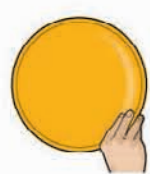
CONTROL FOREHAND

Index and middle fingers make a V-sign; the thumb (hidden) points upward like a hitchhiker's.



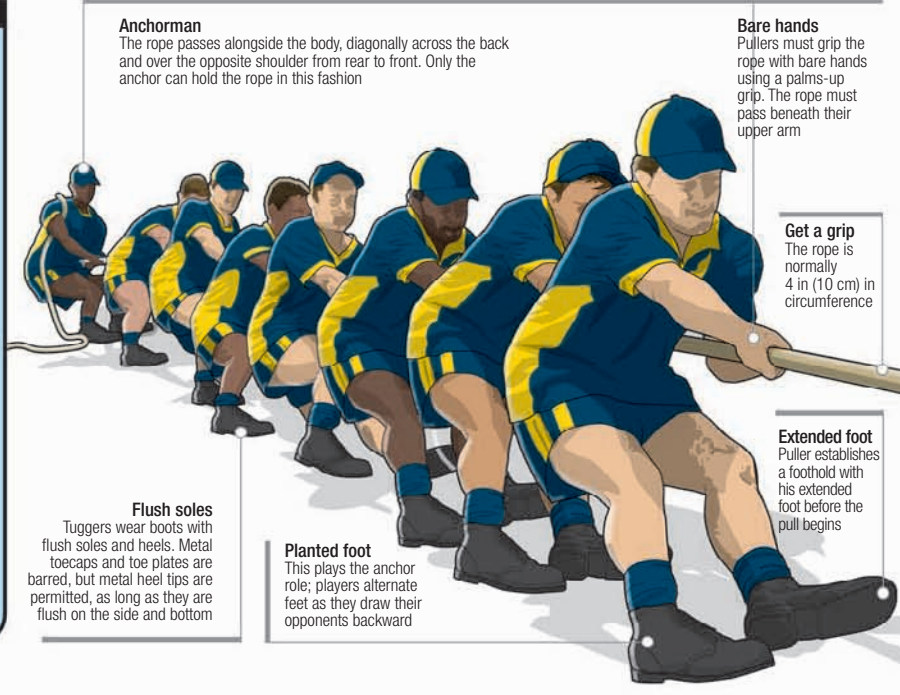
POWER FOREHAND

This is one of the holds used for passes that sacrifice directional control for speed and/or distance.



ARMY AT (TUG OF) WAR

THE TUG-OF-WAR IS HOTLY CONTESTED IN THE BRITISH ARMY, WHICH FIRST HELD INTERREGIMENTAL CONTESTS IN INDIA IN THE MID-19TH CENTURY, AND SINCE THEN VARIOUS PERIODICAL TRIALS OF STRENGTH AGAINST TEAMS FROM THE ROYAL NAVY AND THE ROYAL AIR FORCE. WHILE YOU MIGHT REASONABLY EXPECT THE CHAMPION ARMY TEAM TO BE MADE UP OF PARATROOPERS, IN FACT, THE PARACHUTE SQUADRON IS ONLY THE SECOND-BEST TEAM. PERHAPS SURPRISINGLY, THE TEAMS TO BEAT ARE THE MEDICAL REGIMENTS.



Anchorman

The rope passes alongside the body, diagonally across the back and over the opposite shoulder from rear to front. Only the anchor can hold the rope in this fashion

Bare hands

Pullers must grip the rope with bare hands using a palms-up grip. The rope must pass beneath their upper arm

Get a grip

The rope is normally 4 in (10 cm) in circumference

Extended foot

Puller establishes a foothold with his extended foot before the pull begins

Planted foot

This plays the anchor role; players alternate feet as they draw their opponents backward

Flush soles

Tuggers wear boots with flush soles and heels. Metal toecaps and toe plates are barred, but metal heel tips are permitted, as long as they are flush on the side and bottom



RACKET
SPORTS

04



TENNIS

GAME OVERVIEW

Tennis in its modern form dates from 1874, when the game was codified by Major Walter Clopton Wingfield. Its basic principles, however, date back to the French *jeu de paume* (game of the palm), which came to prominence in the 12th and 13th centuries. It is now strictly known as “lawn tennis” to distinguish it from real (royal) tennis, but because the game is played on a variety of surfaces—grass, clay, cement, coated asphalt, carpet—“tennis” is the term most widely used. Both the men’s and women’s tours are split into different categories. The men’s tour is made up of four categories: Grand Slams, ATP, Challenger Series, and Futures tournaments.

A LOVE GAME

A PLAYER WHO HAS SCORED NO POINTS IN A GAME, OR NO GAME IN A SET IS SAID TO HAVE “LOVE.” THIS MAY BE A CORRUPTION OF THE FRENCH WORD “OEUF” MEANING EGG, WHICH DESCRIBES THE SHAPE OF THE ZERO.

Shoes

Good quality shoes should be reinforced at the toe and at the side of the shoe to compensate for the scraping and sliding that occurs during the course of a match. The soles will differ depending upon the court surface.

Tennis shorts

Men should always wear shorts, although the length is not specified, and women may also wear shorts, instead of a skirt.

Clothing sponsor

Two manufacturer’s logos, each not exceeding 2 sq in (12.9 sq cm), or one logo not exceeding 4 sq in (25.8 sq cm) are allowed on the front of the shirt.

Sun protection

Players often play matches during the day in the summer, therefore visors and sunglasses may be worn on the court to protect against the sun.

Racket grip

The racket handle has eight sides that help the player find the correct grip.

Racket strings

The best players use strings made from animal gut. Synthetic gut strings will offer a combination of good control and durability.



THE COURT

Although a tennis court is made of materials ranging from concrete, which is a fast-playing surface, to clay, which plays slower, its dimensions are invariable. Most courts are laid out for both singles and doubles, as shown below. Some, however, are marked only for singles. Before the start of play, the officials or players must check to see that the net is the correct height and that its tension is acceptable. Many courts have now been fitted with electronic devices and large television screens to determine line calls and net cords, which increases the level of spectator involvement in matches.

NEED2KNOW

- ➔ The Open Era of tennis began in 1968, when most world-class tournaments allowed professional players to enter the most prestigious tournaments.
- ➔ The four Grand Slam competitions are the Australian, French, US Opens, and Wimbledon. They are played on three different surfaces: hardcourts, clay, and grass.
- ➔ Jimmy Connors is the only player to have won the US Open on three different surfaces: grass, clay, and hardcourt.

PLAYER PROFILE

Tennis players need high levels of energy and stamina. Play should be continuous—other than in exceptional circumstances, there should be no more than 90 seconds between games—and matches can last for up to four hours. They also need excellent eye-hand coordination to hit the ball well, strong powers of concentration, the ability to adapt to different court surfaces, and have the nerve either to close out a game or to hang in there when the game is going badly.



SIDELINES

17 Unseeded outsider Boris Becker, aged 17 years, 7 months, became the youngest ever Wimbledon champion. Becker was also the first German ever to win the title, and the first unseeded player to do so.

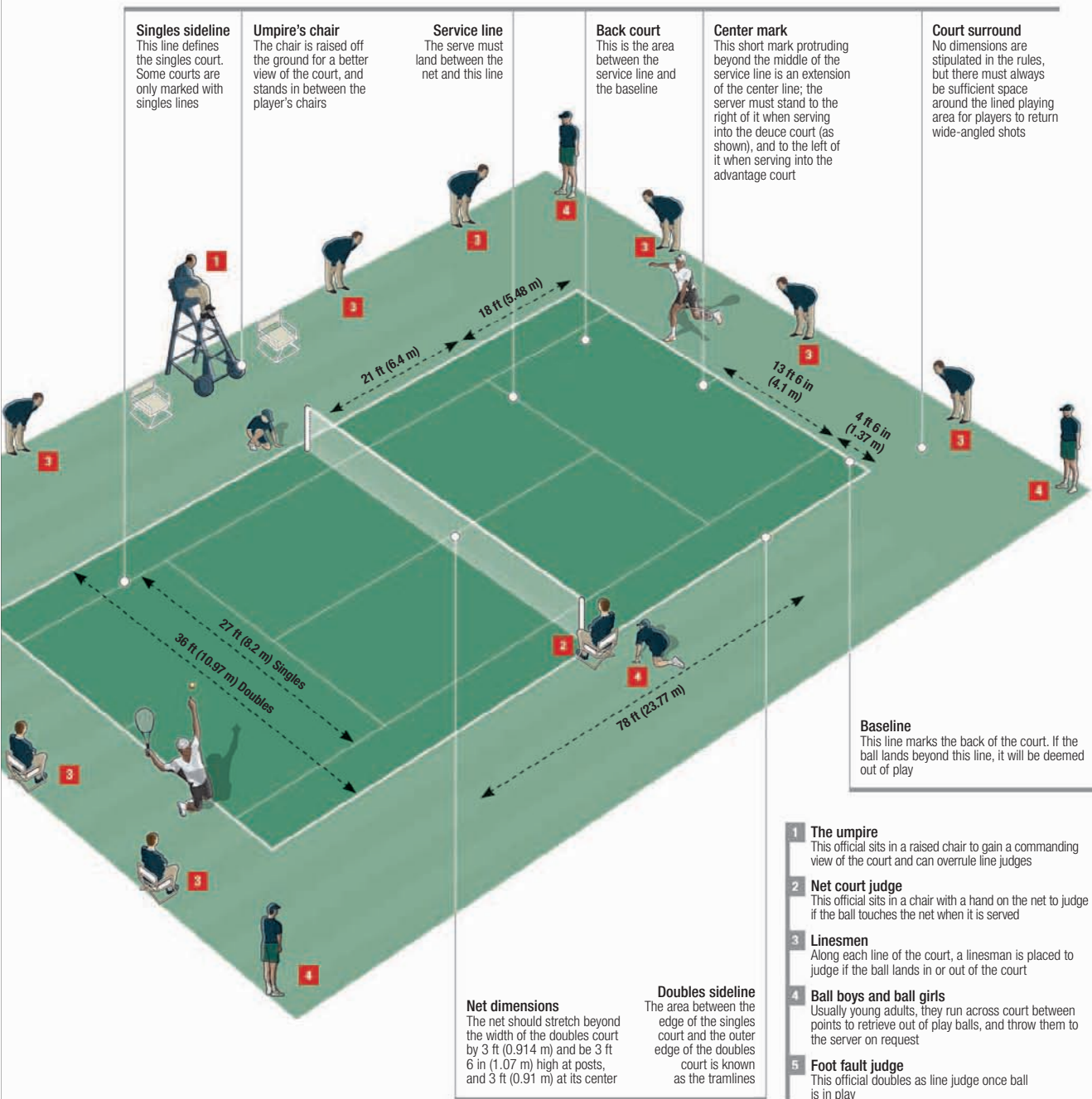
59 The number of Grand Slam titles won by Martina Navratilova during her career. Her titles were made up of 18 Singles, 31 Doubles, and 10 Mixed Doubles titles.

1,337 The number of matches won by Jimmy Connors of the United States between 1972 and 1993, more than any other player in modern times. Of these victories, 109 were in title-winning finals.

155 The fastest recorded serve (miles per hour) was delivered by Andy Roddick, while playing a Davis Cup match against Belarus in June 2004.

665 The duration in minutes of the longest ever top-rank match, more than twice as long as the previous record. John Isner (USA) beat Nicolas Mahut (France) 6-4, 3-6, 6-7, 7-6, 70-68 over three days at Wimbledon in 2010.

81 The number of consecutive matches that Rafael Nadal won on clay between April 2005 and May 2007. Nadal's 81-match winning streak was an all-surface record.



Singles sideline

This line defines the singles court. Some courts are only marked with singles lines

Umpire's chair

The chair is raised off the ground for a better view of the court, and stands in between the player's chairs

Service line

The serve must land between the net and this line

Back court

This is the area between the service line and the baseline

Center mark

This short mark protruding beyond the middle of the service line is an extension of the center line; the server must stand to the right of it when serving into the deuce court (as shown), and to the left of it when serving into the advantage court

Court surround

No dimensions are stipulated in the rules, but there must always be sufficient space around the lined playing area for players to return wide-angled shots

Baseline

This line marks the back of the court. If the ball lands beyond this line, it will be deemed out of play

1 The umpire

This official sits in a raised chair to gain a commanding view of the court and can overrule line judges

2 Net court judge

This official sits in a chair with a hand on the net to judge if the ball touches the net when it is served

3 Linesmen

Along each line of the court, a linesman is placed to judge if the ball lands in or out of the court

4 Ball boys and ball girls

Usually young adults, they run across court between points to retrieve out of play balls, and throw them to the server on request

5 Foot fault judge

This official doubles as line judge once ball is in play

Net dimensions

The net should stretch beyond the width of the doubles court by 3 ft (0.914 m) and be 3 ft 6 in (1.07 m) high at posts, and 3 ft (0.91 m) at its center

Doubles sideline

The area between the edge of the singles court and the outer edge of the doubles court is known as the tramlines



TENNIS ESSENTIALS

The International Tennis Federation (ITF) rules on which balls can be used for competition, and on which surface they can be used. There are three different ball specifications. Type 1 is a fast ball, and must be used on a slow court; the Type 2 is a medium-paced ball, and is used on a medium to fast paced court; and the Type 3 ball is slow, and will be used on a fast-paced court. The altitude also determines the choice of ball. The specifications of the tennis racket are also governed by the ITF, therefore manufacturers must produce rackets to a maximum length, width, and thickness. They must also be free of any device that can change the shape or physical property of the racket during a rally.

TENNIS BALL

Certain specifications must be met before a ball will be judged legal by the ITC. The ball shall have an outer surface of a fabric cover that should be white or yellow in color. The ball's weight and size will also be manufactured to a required specification. During a match the balls are replaced with new ones after an agreed odd number of games, usually after five, and then after seven.

Inner core

The ball should be hollow. Type 3 balls are always pressurized, but Type 1 and 2 balls can be either pressureless or pressurized

Ball weight

Weight (mass): 1.975–2.095 oz (56–59.4 g)



Outer ball surface

Two pieces of hourglass-shaped rubber bonded together and covered with felt

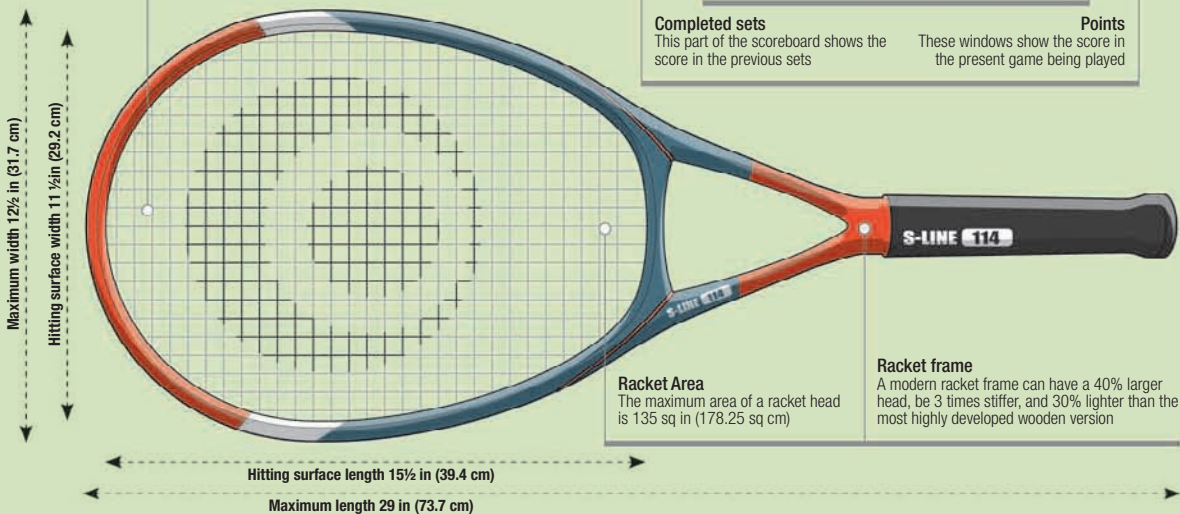
Diameter: 2 $\frac{1}{8}$ –2 $\frac{1}{4}$ in (6.541–7.303 cm)

THE RACKET

Whereas the ITF can govern the overall size of the racket, it cannot determine its construction. Tennis racket frames have changed a lot in recent years, as stiffer carbon materials have replaced wood and metal. Carbon rackets generate a lot of power because they are not flexible, so choosing the right strings and stringing tension is crucial to aid ball control.

The strings

String tension is a matter of individual preference, but in general, the tighter the strings are strung, the greater the player's control over the ball. Most players have their rackets strung at between 50 and 65 psi (pounds per square inch). During a match, if a string breaks, a player will generally discard the racket and play with a new one



RULES & REGULATIONS

Before a match, a coin is tossed and the winner chooses whether to serve or receive first, or the end that they want to start the match from. Players stand on opposite sides of the net; the server (the player who puts the ball into play) begins the rally by hitting the ball over the net, into the service court directly opposite, from the right of the center line, and from behind the baseline. The server plays the ball from alternate sides of the center line throughout the game, starting from the right. The receiver may stand anywhere on their own side of the net, but may not return the ball before it has bounced. After the ball is served, play continues until one player hits the ball out of play.

GAMES

Each player starts with "love" (zero); one point is called "15"; two points are "30," three points are "40." 40-all is known as "deuce." After deuce, the player who wins the next point is said to have "advantage"; if they win the next point, the game is over. If they don't, the score goes back to "deuce." At this point, the game will only be won when one player has won two successive points, the "advantage" point, and the "game" point. Players change ends at the end of every odd-numbered game.

WINNING A SET

Matches are the best of three or five sets. (Women only ever play the best of three sets.) The first player to win six games wins the set, but if the games go to 5-all, the set is extended to see if a two-game margin can be achieved (7-5, for example). If, however, the score reaches six games apiece, a tiebreaker might come into operation.

TIEBREAKER

During a tiebreaker, points are scored "0" to "7." The first player to win seven points, provided there is a margin of two points, wins the game and set. The player whose turn it is to serve, serves the first point, and the following two points are served by the opponent.



Tiebreaker

The second and third sets were decided by tiebreakers

This was the score in the most recently completed game

Completed sets

This part of the scoreboard shows the score in the previous sets

Points

These windows show the score in the present game being played

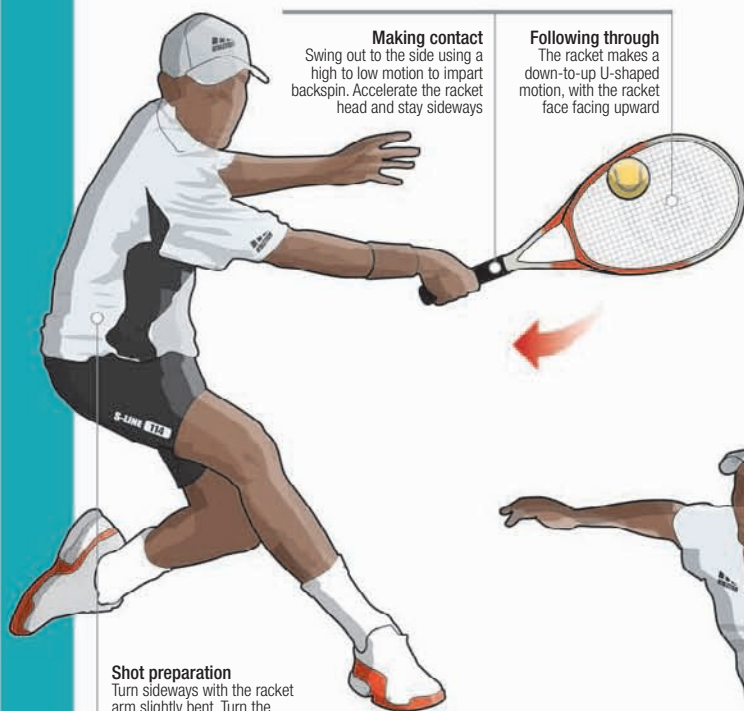


TECHNIQUES

The most important and most used shots in modern tennis are the serve, the forehand, and the backhand, otherwise known as groundstrokes. Until these strokes are mastered, the player will struggle to win points and compete in matches. The serve starts every point in a match, and a good server is considered to have an advantage. This is partly because this player has two chances to get the ball into play, and partly because the opponent doesn't necessarily know where the ball will go. Groundstrokes are the basic shots you make once the point has begun and are usually played from near the baseline and after the ball has bounced. They can be played with different types of spin; topspin and slice being the most used.

SLICE BACKHAND

The backhand can be played with either topspin or slice (backspin). Hitting sliced backhands is most effective when playing matches on fast courts, where the ball skids through at a high speed. It is also used when playing defensive shots on the run, or where the ball is above shoulder height.



Making contact
Swing out to the side using a high to low motion to impart backspin. Accelerate the racket head and stay sideways

Following through
The racket makes a down-to-up U-shaped motion, with the racket face facing upward

Shot preparation

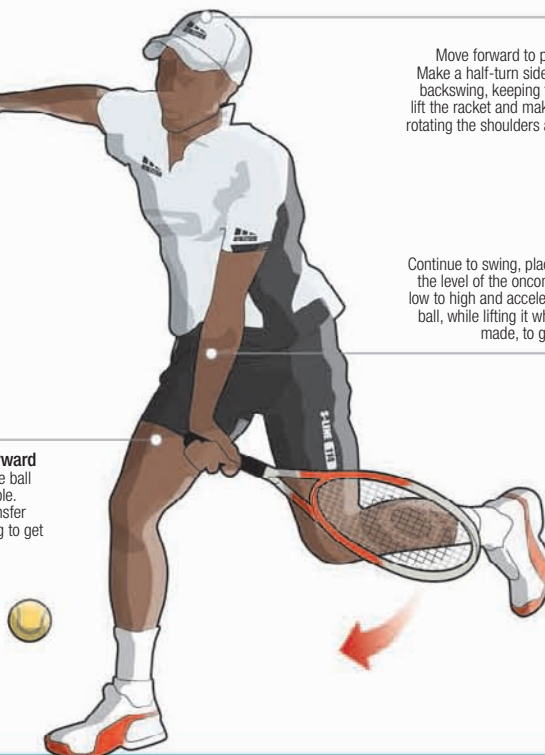
Turn sideways with the racket arm slightly bent. Turn the shoulders while making the backswing. Holding the racket with the free hand helps to turn the shoulders. Raise the racket above the height of the ball

THE FOREHAND

The forehand is the most used shot in tennis, and the one that most people learn first. This major groundstroke, for both the beginner and the advanced player, will allow a player to control a rally from the back of the court. The shot is usually hit with topspin, but backspin and sidespin can both be applied to the ball.

Shifting the weight forward

Bend the knees and hit the ball at the highest point possible. As you swing upward, transfer bodyweight to the front leg to get power into the swing

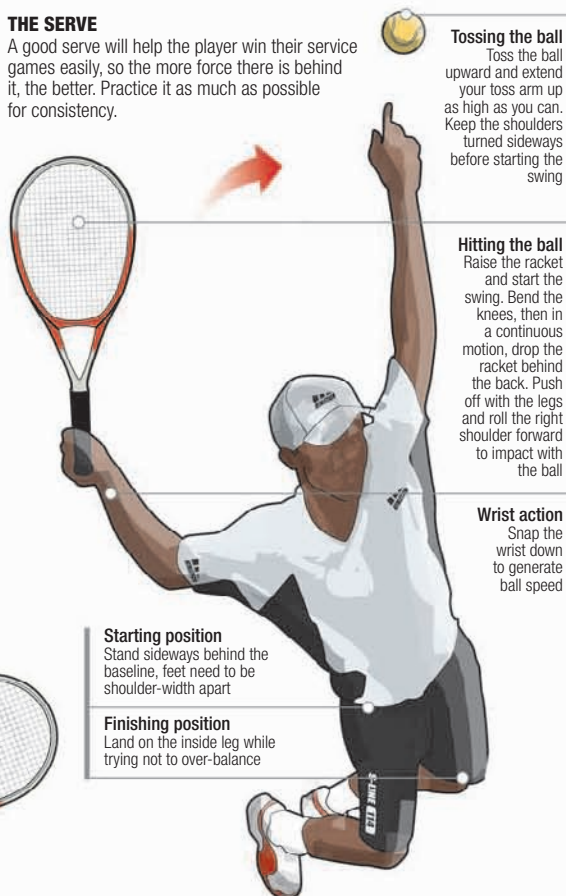


On the move
Move forward to play the low forehand. Make a half-turn sideways, then begin the backswing, keeping the arm bent. Slightly lift the racket and make a circular swing by rotating the shoulders and trunk of the body

Racket speed
Continue to swing, placing the racket below the level of the oncoming ball. Swing from low to high and accelerate the racket to the ball, while lifting it when contact has been made, to get topspin on the ball

THE SERVE

A good serve will help the player win their service games easily, so the more force there is behind it, the better. Practice it as much as possible for consistency.



Tossing the ball
Toss the ball upward and extend your toss arm up as high as you can. Keep the shoulders turned sideways before starting the swing

Hitting the ball
Raise the racket and start the swing. Bend the knees, then in a continuous motion, drop the racket behind the back. Push off with the legs and roll the right shoulder forward to impact with the ball

Wrist action
Snap the wrist down to generate ball speed

Starting position

Stand sideways behind the baseline, feet need to be shoulder-width apart

Finishing position

Land on the inside leg while trying not to over-balance

THE LOB

The lob—a shot that goes high in the air—may be defensively or aggressively played. Offensive lobs are hit with topspin from around the baseline. The more topspin the player is able to get on the ball, the faster the ball will drop in to the court, which means the player can hit a deeper lob. Volleying players often close in after hitting their first volley, and this is an ideal time to use the lob. Defensive lobs are usually hit with backspin or very little spin, as they are used when the ball is low, or wide, when little or no topspin is possible.

JUST A GAME

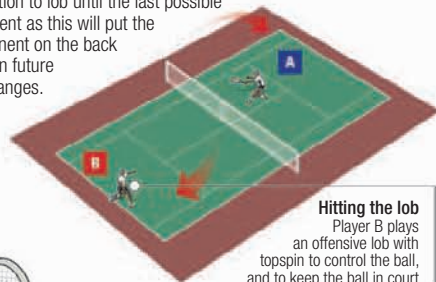
ON APRIL 30, 1993, MONICA SELES WAS STABBED BY GUNTHER PARCHE WHILE SEATED DURING A CHANGEOVER. WHY DID HE DO THIS? PARCHE WANTED TO INJURE SELES SO THAT HIS IDOL, STEFFI GRAF, COULD REGAIN THE TOP SPOT IN THE WORLD RANKINGS.

SMASHING TIME

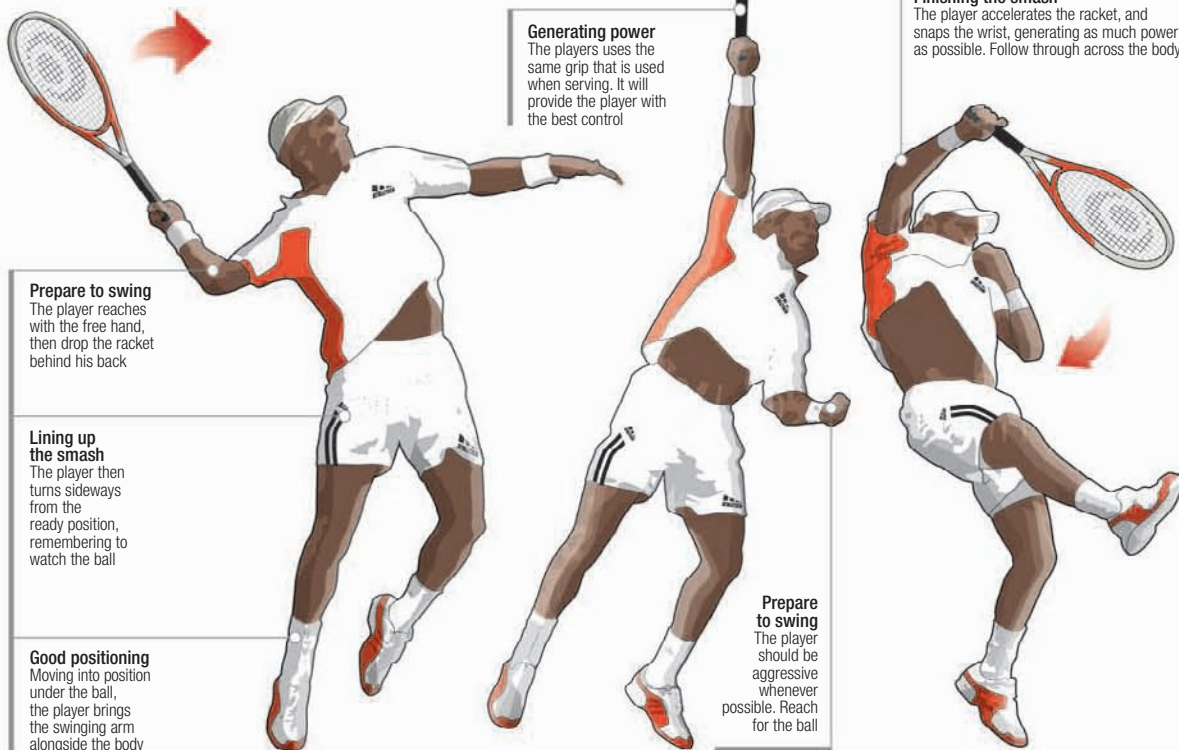
A smash is an aggressive volley played overhead. It is often a response to a lob that has failed to clear the player's head. A smash requires good footwork to ensure that the ball is played down into the opponent's court; any error of judgment may result in an air shot (missing the ball altogether) or a wild hit out of court.

LOB SCENARIO

Player A has advanced to the net but has played the ball too short. Because of this Player B has two options. He can either play a passing shot, or he can play a lob. It is best, whenever possible, to play the lob over the opponent's backhand side, as it produces the weaker shot if attempted. When in control of the rally, hide the intention to lob until the last possible moment as this will put the opponent on the back foot in future exchanges.



Hitting the lob
Player B plays an offensive lob with topspin to control the ball, and to keep the ball in court



Prepare to swing
The player reaches with the free hand, then drop the racket behind his back

Lining up the smash
The player then turns sideways from the ready position, remembering to watch the ball

Good positioning
Moving into position under the ball, the player brings the swinging arm alongside the body

Generating power
The players uses the same grip that is used when serving. It will provide the player with the best control

Prepare to swing
The player should be aggressive whenever possible. Reach for the ball

Finishing the smash
The player accelerates the racket, and snaps the wrist, generating as much power as possible. Follow through across the body

SIDELINES

14 Serena and Venus Williams have both won the US Open title without losing a set. To achieve this feat, they won 14 sets without conceding one, from the first round to the final. This has happened only 24 times in the history of the Open.

9 The number of left-handed players, seven men and two women, to have won a Wimbledon singles title—the most recent being Rafael Nadal in 2010.

209 The speed of the fastest serve by a woman, Brenda Schultz-McCarthy, when she hit a serve at 130 mph (209 kph) in 2006.

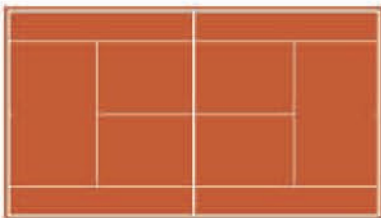
EXHIBITION MATCHES

On May 2, 2007, at the Palma Arena, Majorcan Rafael Nadal, the king of clay, played grass champion Roger Federer on a half-clay half-grass court in an exhibition match dubbed “the battle of the surfaces.” Playing on a court that cost \$1.6 million to construct, the Spaniard Nadal prevailed 7-5, 4-6, 7-6 (12-10). The organizers had to lay a brand new surface on the grass side of the court a few days before the event because an infestation of worms made the original turf unusable. During the match, the changeovers were extended to two minutes to give the players a chance to change their footwear for each surface.



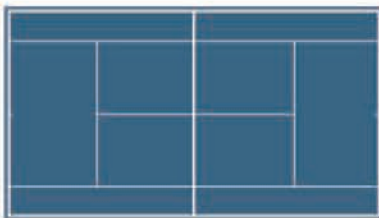
COURT SURFACES

The governing body of tennis, the ITF (International Tennis Federation) has identified three different categories of court surfaces. The categories are based on the speed of the ball after the bounce; the amount of spin on the ball after contact with the surface; the height of the bounce; and the level of traction the court gives the player. Category 1 courts are slow-paced; Category 2 surfaces are medium, or medium-fast-paced hard-courts; and Category 3 courts are fast-paced surfaces.



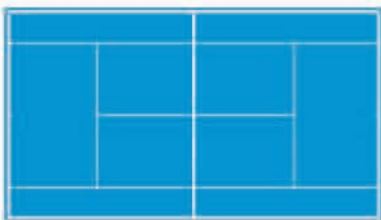
CLAY COURT: CATEGORY 1

Examples include most clay courts. Rallies on this surface tend to last a long time, since the speed of the ball after the bounce is relatively slow. Players can also slide on clay, increasing their reach.



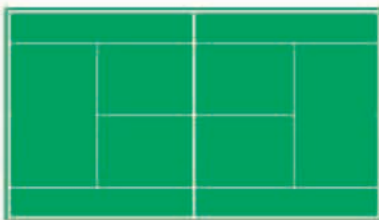
HARD-COURT (DECOTURF): CATEGORY 2

This surface has the same characteristics as the Rebound Ace court. Its top surface uses a different type of sand. Aggressive groundstroke play is the most dominant style of play on category 2 surfaces.



HARD-COURT (REBOUND ACE): CATEGORY 2

These are hard courts, which are concrete or asphalt coated with synthetic rubber. The top layer is reinforced acrylic paint mixed with sand. The ball bounces true, at a medium height.



GRASS COURT: CATEGORY 3

Natural grass and artificial turf surfaces fall into this category and are characterized by their low, skidding, and often irregular, bounce. Players look to finish points as soon as possible.

USING TECHNOLOGY

Electronic review technology, a high-speed multicamera system that tracks the trajectory of a moving ball, was first used in a grand slam during the 2006 US Open at Flushing Meadow. Its success has led other grand slams to adopt this system, with both the Australian Open and Wimbledon first using the system in 2007. At the US and Australian Opens, each player is allowed to make two challenges per set and one during a tiebreaker. If proved right, the player retains their quota of challenges.



HAWK-EYE

An instant replay of the contested point is shown on large screens allowing both the players and the crowd to see whether the ball was judged in or out by review technology, Hawk-Eye.

INSIDE STORY

The most common view is that it was a crude courtyard ball game invented by 11th or 12th century French monks. The name tennis is said to come from the French word "tenez," from the verb *tenir* meaning "to take," It means, "take this," which the monks would yell as they served the ball with their hand.

ITF

The International Tennis Federation (ITF) is the rulemaker and governing body of world tennis. Its membership comprises more than 200 national associations.

ATP

The Association of Tennis Professionals (ATP) was formed in 1972 to protect the interests of male professional tennis players. The Women's Tennis Association (WTA) launched in 1973.

STAT CENTRAL

GRAND SLAM SINGLES WINNERS (MEN)

NAME	WON/LOST
ROGER FEDERER (SUI)	16/6
PETE SAMPRAS (USA)	14/4
ROY EMERSON (AUS)	12/3
BJORN BORG (SWE)	11/5
ROD LAVER (AUS)	11/6
BILL TILDEN (USA)	10/5
RAFAEL NADAL (ESP)	9/2
FRED PERRY (ENG)	8/2
ANDRE AGASSI (USA)	8/7

GRAND SLAM SINGLES WINNERS (WOMEN)

NAME	WON/LOST
MARGARET SMITH COURT (AUS)	25/5
STEFFI GRAF (GER)	22/9
HELEN WILLS MOODY (USA)	19/3
MARTINA NAVRATILOVA (CZE/USA)	18/14
CHRIS EVERT (USA)	18/16
SERENA WILLIAMS (USA)	13/3
SUZANNE LENGLEN (FRA)	12/0
BILLIE JEAN KING (USA)	12/6
MAUREEN CONNOLLY BRINKER (USA)	9/0

GRAND SLAM WINNERS (MEN)

NAME	YEAR
ROD LAVER (AUS)	1962, 1969
DON BUDGE (USA)	1938

GRAND SLAM WINNERS (WOMEN)

NAME	YEAR
STEFFI GRAF (GER)	1988
MARGARET SMITH COURT (AUS)	1970
MAUREEN CONNOLLY (USA)	1953

ATP PRIZE MONEY LEADERS (\$)

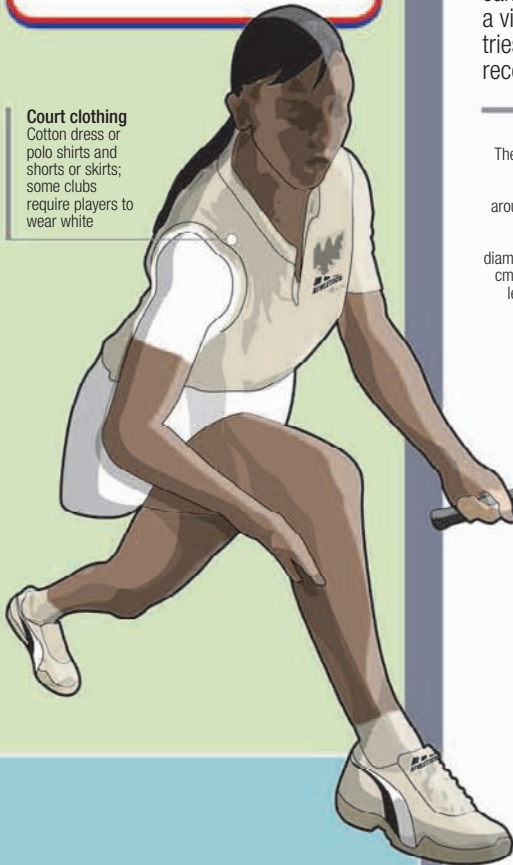
NAME	CAREER EARNINGS
ROGER FEDERER (SUI)	\$57,439,704
PETE SAMPRAS (USA)	\$43,280,489
RAFAEL NADAL (ESP)	\$34,605,902
ANDRE AGASSI (USA)	\$31,152,975
BORIS BECKER (GER)	\$25,080,956
YEVGENY KAFELNIKOV (RUS)	\$23,883,797
IVAN LENDL (USA)	\$21,262,417
STEFAN EDBERG (SWE)	\$20,630,941
GORAN IVANISEVIC (CRO)	\$19,876,579
MICHAEL CHANG (USA)	\$19,145,632
LLEYTON HEWITT (AUS)	\$18,843,702
ANDY RODDICK (USA)	\$18,689,823
NOVAK DJOKOVIC (SRB)	\$18,517,522
GUSTAVO KUERTEN (BRA)	\$14,807,000
JONAS BJORKMAN (SWE)	\$14,600,323

PLAYER PROFILE

Real tennis requires many of the same skills needed to play lawn tennis, although the service depends much more on spin and placement than raw power. The real tennis court is hard, and as many shots involve “digging” low-bouncing balls, the game’s greatest physical demands are on the legs and knees.

Court clothing

Cotton dress or polo shirts and shorts or skirts; some clubs require players to wear white

**THE COURT**

No two real tennis courts are the same, but they all have certain features in common. The playing area is enclosed by four walls and a ceiling. Three of the walls have sloping roofs, known as penthouses. There is a service end and a receiving, or “hazard,” end. The wall on the server’s left has various windows, which are both viewing galleries and openings into which the ball can be played. The wall behind the server has a similar window that is both a viewing point for spectators and the “dedans,” into which the receiver tries to drive shots beyond the server in order to gain the serve. On the receiver’s side of the net are a buttress, known as a “tambour,” and a grille.

Match ball

The ball has a yellow or white covering of hand-sewn felt around a core of cork wrapped in fabric tape, and has a diameter of 2½ in (6.4 cm). It is heavier and less bouncy than a lawn tennis ball

Real racket

This is made of wood and has very tight strings. The head is angled slightly to one side to make it possible to play shots off the floor or in the corners. Its overall length is about 27 in (70 cm)

Winning gallery

Any shot from the service end into these windows is a winner

Service penthouse

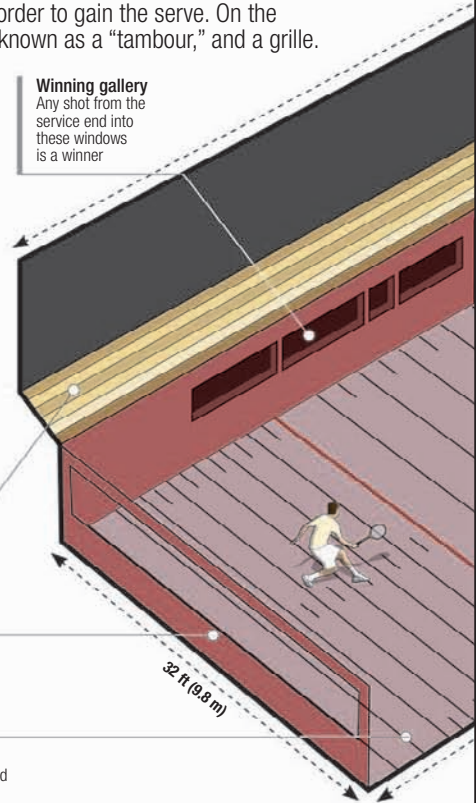
The server must send the ball along this roof to the hazard end

Service end

Spectators viewing through the dedans behind the server are protected by a net

Floor chase line

Lines painted on the playing floor are used to measure where the ball drops during a “chase,” when players strive to gain the service end

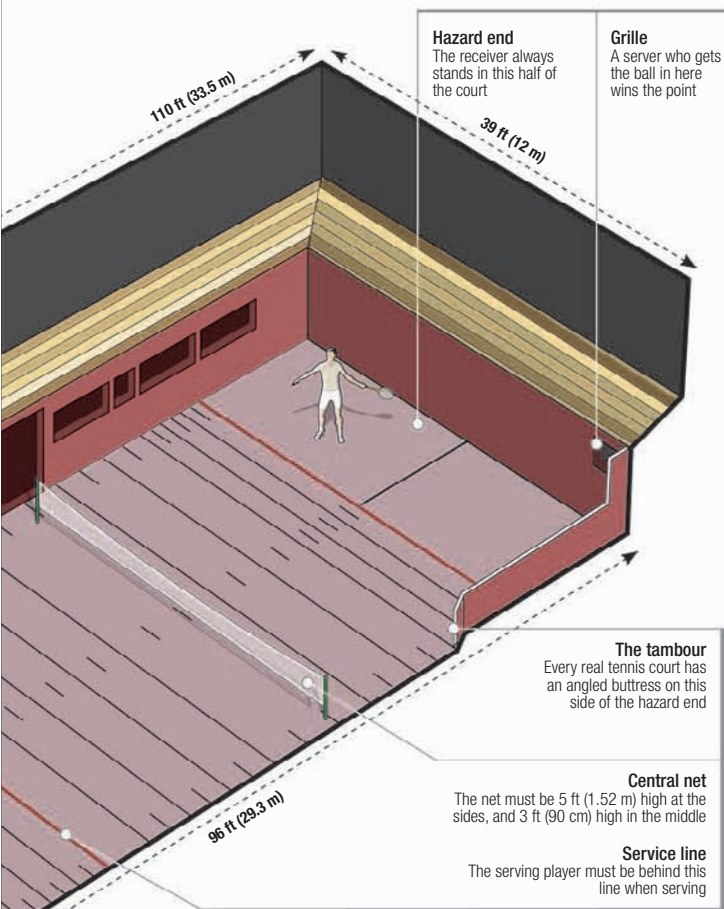
**NEED2KNOW**

- ➔ There are only about 50 courts in the world, so real tennis is one of the most exclusive of all sports.
- ➔ Professionals compete in annual real tennis Grand Slam events—the Australian, British, French, and US Opens—and a biennial World Championship.
- ➔ The outstanding modern player is Robert Fahey of Australia, who in 2006 equalled the record of Pierre Etchebaster of France, who won the world title eight times between 1928 and 1952.

GAME OVERVIEW

The precursor of modern lawn tennis (see pp.176–177), real tennis is an indoor racket sport played by two people (singles) or two teams of two (doubles). The object is to hit the ball over a central net so that it cannot be returned. With a history going back hundreds of years, the game reached the height of its popularity in the 16th and 17th centuries. Although real tennis now has an elitist image, any tennis club with a real tennis court will welcome members who wish to give it a try. Many leading real tennis professionals were formerly lawn tennis players.

REAL TENNIS



CHASING THE GAME

The server (usually chosen by spinning a racket) plays from one end of the court only. In a service, the ball must bounce at least once on the lefthand penthouse on the receiver's side of the court (the hazard end).

Service does not alternate between the players as in lawn tennis; the receiver has to gain the right to serve. It takes four points to win a game, and six games to win a set (even if the score reaches five-all: there is no tiebreaker). Matches are the best of three or five sets.

The server has two areas in which to place the ball to win a point. These are the winning gallery and the grille. The receiver has a large area, called the "dedans," behind the server, into which he or she can hit a clean winner.

Players do not automatically lose a rally if the ball bounces twice in their half of the court. Instead, the score remains the same, but the players change ends and replay the rally. The player who originally failed to get to the ball then has to try and send a shot that bounces twice further back from the net than the first missed shot. This part of the game is known as a "chase" if it results from the server's failure to return the ball, and a "hazard chase" if it stems from the receiver's error.

Measurement of distance is aided by the lines drawn 90 cm (36 in) apart from side to side of the court.

LOOKING FOR ANGLES

Spin is a major feature of real tennis—because of it, some of the slowest shots can be the hardest to return. However, the main aim of the game is to produce forcing strokes off or into the court's architectural features. A shot onto or off the tambour is often hard to reach because the ball rebounds off it unpredictably. Strokes played into the "nick" (the corner of the floor and the wall) and aggressive drives into the dedans, the winning gallery, or the grille are unreturnable, so these areas are often targeted by players.

SOFT TENNIS



GAME OVERVIEW

This is a form of regular lawn tennis that can be played on indoor or outdoor courts. What makes it different is the soft, squishy ball, which means that the game is characterized by long rallies rather than by powerhouse shots.

NEED2KNOW

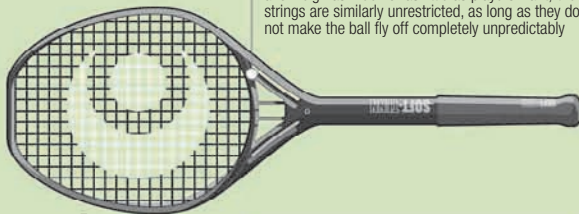
- The game's greatest strongholds are in Japan and Taiwan, but its appeal is spreading among people who have tired of serve-and-volley "big gun" tennis.
- Due to its popularity in Asia, soft tennis has been an official sport at the Asian Games since 1994.

RULE RÉSUMÉ

Serves can be played either underarm or overarm; scoring in games is the same as in lawn tennis. Singles matches are the best of seven games, doubles the best of nine. Tiebreaks come into operation at 3–3 and 4–4. Grunting is expressly forbidden!

Any racket you like

The surface must be the same on both sides, but apart from that, almost anything goes. Rackets can be any shape or size, be made of any material, and weigh as much or as little as players want; the strings are similarly unrestricted, as long as they do not make the ball fly off completely unpredictably.



Ball requirements

Should be made of rubber, filled with air, and be 2 1/2 in (6.6 cm) in diameter. The International Soft Tennis Federation stipulates that the balls should be "white in principle," but in practice they are often yellow, and sometimes red.



TABLE TENNIS

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GAME OVERVIEW

Also known as ping-pong, table tennis is a fast-moving and physically demanding racket game. Players play as individuals or in pairs, and win points by hitting a lightweight ball over a net so that their opponents either cannot return it or are forced into an error. Most matches are short and sharp, and the rules have ways of dealing with games that go on too long.

PLAYER PROFILE

Table tennis players need fast reactions, exceptional hand-eye coordination, and strong and flexible leg muscles. They need to be able to move quickly over short distances, and to change direction in an instant. They must take particular care of their shoulders, lower backs, and knees: these are the areas that are most commonly injured. Away from the table, players typically practice with jumping sessions, squats, short sprints, and at least three 20-minute runs per week.

TABLE TERRAIN

Tables are made of Masonite or a similar manufactured hardwood, and are layered with a smooth, low-friction coating. They are usually dark green. The net should extend 6 in (15.25 cm) beyond the edge of the table on both sides. The white center line indicates where the service must land in doubles: it should bounce in the right-hand courts of both server and receiver (in singles matches, it can land anywhere on the table).

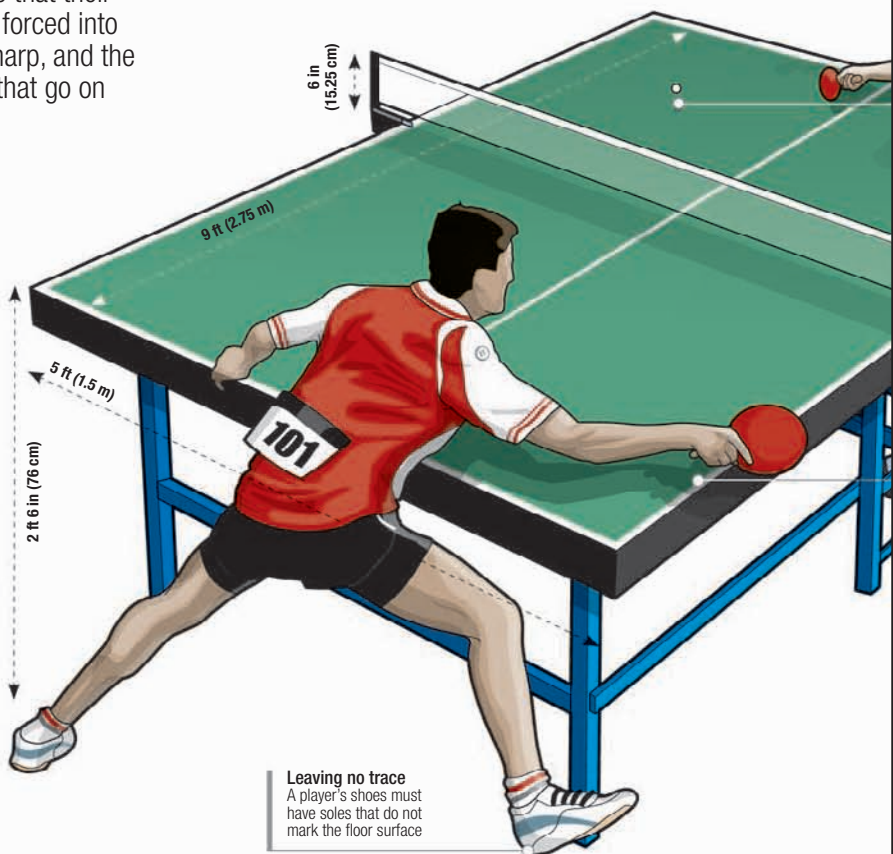
PLAYING A MATCH

Matches are the best of five or seven games. Each game is won by the first side to reach 11 points or, from 10-10, two points. Play begins when one player serves the ball by throwing it up at least as high as the net and then striking it with the racket. The ball must be thrown from an open palm to rule out finger spin. The ball must bounce twice—once on each side of the net—before being returned by the other player. Thereafter, in open play, the ball may bounce only once per shot, on the receiver's side of the net.

If the ball touches the net during service but then lands on the receiver's side, a let is played, and the server serves again. A player serves for two points, after which it is the opponent's turn. Players swap ends after each game.

NEED2KNOW

- ➔ Table tennis became an Olympic event in 1988; the medal table has since been dominated by China.
- ➔ The ball may travel at speeds of more than 100 mph (160 kph).
- ➔ Table tennis claims to be the most played racket sport, with 300 million players worldwide. It is particularly popular in Asian countries such as China and Korea.
- ➔ The game is so fast that in 1973 a women's rally produced 173 hits in only 60 seconds.



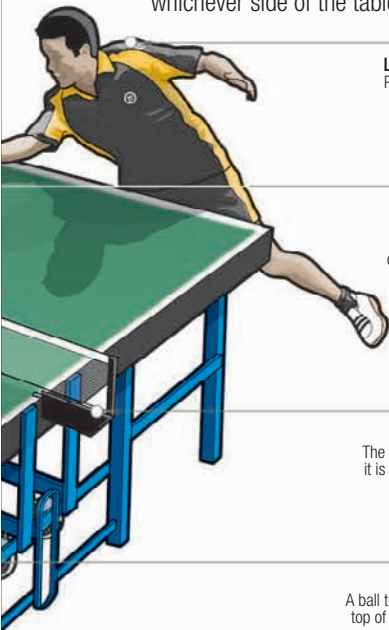
THAT WAY WE CAN ALL GO HOME

THE FINAL OF THE 1936 SWAYTHLING CUP—THE MEN'S TEAM TABLE TENNIS WORLD CHAMPIONSHIP—WAS BETWEEN HUNGARY AND AUSTRIA, AND THE MATCH DEVELOPED INTO A MARATHON THAT LASTED FOR THREE DAYS. IN ORDER TO PREVENT FURTHER STALEMATES, WHICH RISKED KILLING THE GAME AS A SPECTATOR SPORT, THE LAWMAKERS BROUGHT IN WHAT IS KNOWN AS THE EXPEDITE RULE: IF A GAME GOES ON FOR LONGER THAN 10 MINUTES, SERVERS THEN LOSE POINTS IF THEY CANNOT BEAT THEIR OPPONENTS IN LESS THAN 13 SHOTS FOLLOWING EACH SERVICE.

TABLE MANNERS

It is legal to hit the ball around the side of the net to land on the opponent's side. Volleying is not allowed: the ball has to touch the table. A player who touches the playing surface with his or her free hand during a rally loses the point.

In doubles matches, players strike the ball in turn—no one may make two consecutive shots. As a result, doubles players must switch positions quickly so that the next receiver is standing in front of the center line. That location gives the player the best chance of hitting the ball, whichever side of the table it lands on.



Lightweight clothing
Players wear polo shirts and shorts or skirts

Even lighter ball
This is a sphere of white or orange celluloid filled with gas; it has a diameter of 1 1/2 in (4 cm), and weighs 1/16 oz (2.7 g)

Straight net
The net is tightened so that it is the same height all the way across the table

On the edge
A ball touching any part of the top of the table, including the white edges, is "in"

SPEED RESTRICTIONS

One form of table tennis aims to slow the game down. The "hardbat" game is seen as a return to classic table tennis. Sponge-faced bats are not permitted, making it harder to spin the ball. Instead players concentrate on ways to draw their opponents out of position before they can hit a winner.

INSIDE STORY

The game was inspired by 19th-century lawn tennis players, who in bad weather practiced indoors using cigar-box lids as rackets, the rounded tops of champagne corks as balls, and a row of books for a net. This early game had a number of names, including whiff-whaff.

INTERNATIONAL TABLE TENNIS FEDERATION

This was founded in 1926 by Austria, England, Germany, and Hungary. It now has 202 member nations.

GETTING TO GRIPS WITH IT

There are many ways of holding a table tennis paddle, but most grips fall into one of two categories: the orthodox or shakehand grip and the penholder. There is also a V-grip, in which the blade is held between the index and middle fingers.

WOODEN BAT

Also known as a racket or a paddle, the bat has a blade that is made mainly of 5-ply wood. It may be any weight or size, and the shape may be square, oval, or round. The rubber coverings on both sides must be no more than 1/8 in (4 mm) thick.

FRONT VIEW



BACK VIEW



Rubber surface

Table tennis is the only racket sport in which the front and back surfaces of the bat may be different, and so suited to particular shots.



SHAKE HAND GRIP

This is the most natural, and hence the most popular, way of holding a table tennis bat.

PENHOLDER GRIP

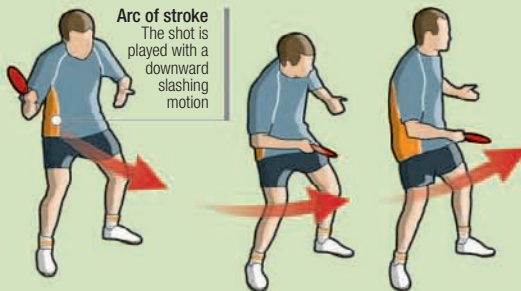
The handle is clasped between thumb and forefinger in the same way as holding a pen.

SHOTS AND SPINS

Strength of shot plays an important role in table tennis, but the key in the modern game is spin. The ball is so light that almost anyone can make it rotate in the air and so bounce in an unpredictable way on the receiver's side; the skill is to conceal the amount and type of spin used.

BACKSPIN

Backspin is applied by hitting through and under the ball with the lower part of the bat angled ahead of the upper section. The aim is to make the ball slow down and "die" (bounce as little as possible) on contact with the table.



Arc of stroke
The shot is played with a downward slashing motion

FOREHAND SMASH

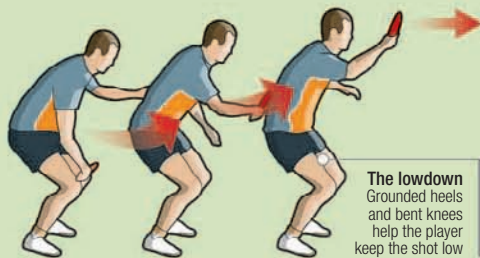
This is one of the most devastating shots in any player's armory, in which the ball is hit at high speed. As well as adding topspin, the player can conceal in which direction the ball will travel by flicking his or her wrist to direct the ball across the table.



Top up
The upper edge of the bat is angled forward

BACKHAND TOPSPIN

The basic technique is the reverse of the backspin shot: the bat is slanted so that the top is further ahead of the player than the bottom. Topspin stops the ball from rising too high into the air. Instead it dips quickly onto the receiver's side and has a low bounce, making it harder to return.



The lowdown
Grounded heels and bent knees help the player keep the shot low

BADMINTON



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GAME OVERVIEW

Badminton is a game for singles and doubles. Players win points by hitting a conical shuttlecock over a high net so that it lands on the other side of the court before the opposition can return it. The shuttlecock's lightness and aerodynamic shape means that badminton can be a game of great delicacy, or sudden bursts of power featuring spectacular smashes.

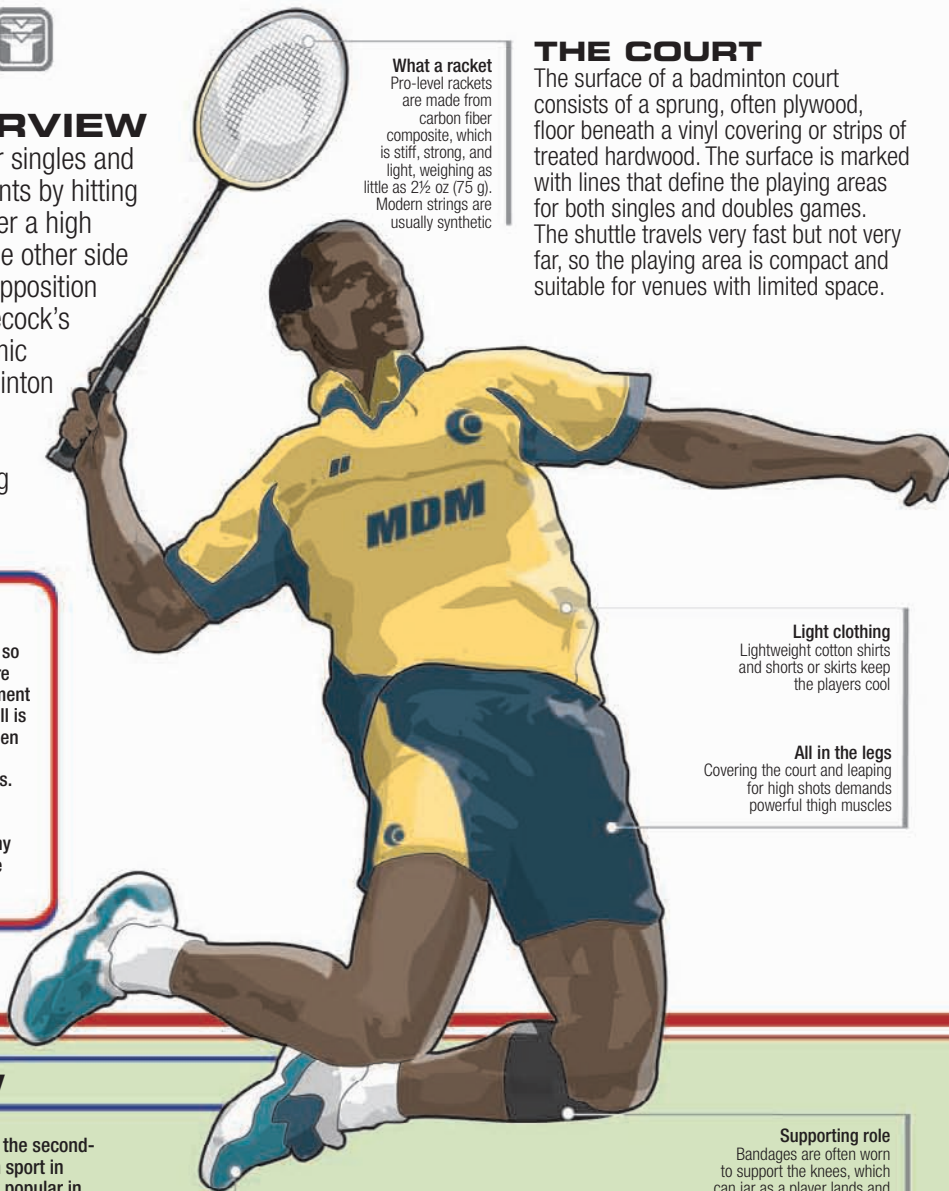
PLAYER PROFILE

A top badminton player covers about 1 mile (1.6 km) per game, so strong thigh and calf muscles are essential. Sprinting is a key element of training. Another essential skill is footwork: athletes practice sudden changes of direction and sharp acceleration over short distances. The shuttle moves through the air quite differently from a ball, so strokeplay is unlike that of any other racket sport. It can only be improved by playing the game.

What a racket
Pro-level rackets are made from carbon fiber composite, which is stiff, strong, and light, weighing as little as 2½ oz (75 g). Modern strings are usually synthetic

THE COURT

The surface of a badminton court consists of a sprung, often plywood, floor beneath a vinyl covering or strips of treated hardwood. The surface is marked with lines that define the playing areas for both singles and doubles games. The shuttle travels very fast but not very far, so the playing area is compact and suitable for venues with limited space.



Light clothing
Lightweight cotton shirts and shorts or skirts keep the players cool

All in the legs
Covering the court and leaping for high shots demands powerful thigh muscles

NEED2KNOW

- ➔ After soccer, badminton is the second-most popular participation sport in the world. It is particularly popular in Malaysia and Indonesia.
- ➔ With the shuttlecock traveling at up to 200 mph (330 kph), badminton is the fastest racket game in the world.

Leave no trace
Badminton players wear nonmarking rubber-soled shoes and almost always have socks to prevent blisters

Supporting role
Bandages are often worn to support the knees, which can jar as a player lands and turns on the court

SIDELINES

16 The number of goose feathers on an Olympic shuttlecock.

332 The highest recorded speed, in kph (206 mph), of a shuttlecock after a smash.

13.5 The average number of shots per rally in a game of badminton. Tennis rallies are comparatively short, with an average of 3.4 shots per rally.

50 The percentage of badminton gold medals won by China—for men's and women's singles and doubles and mixed doubles—since the sport became an Olympic event in 1992.

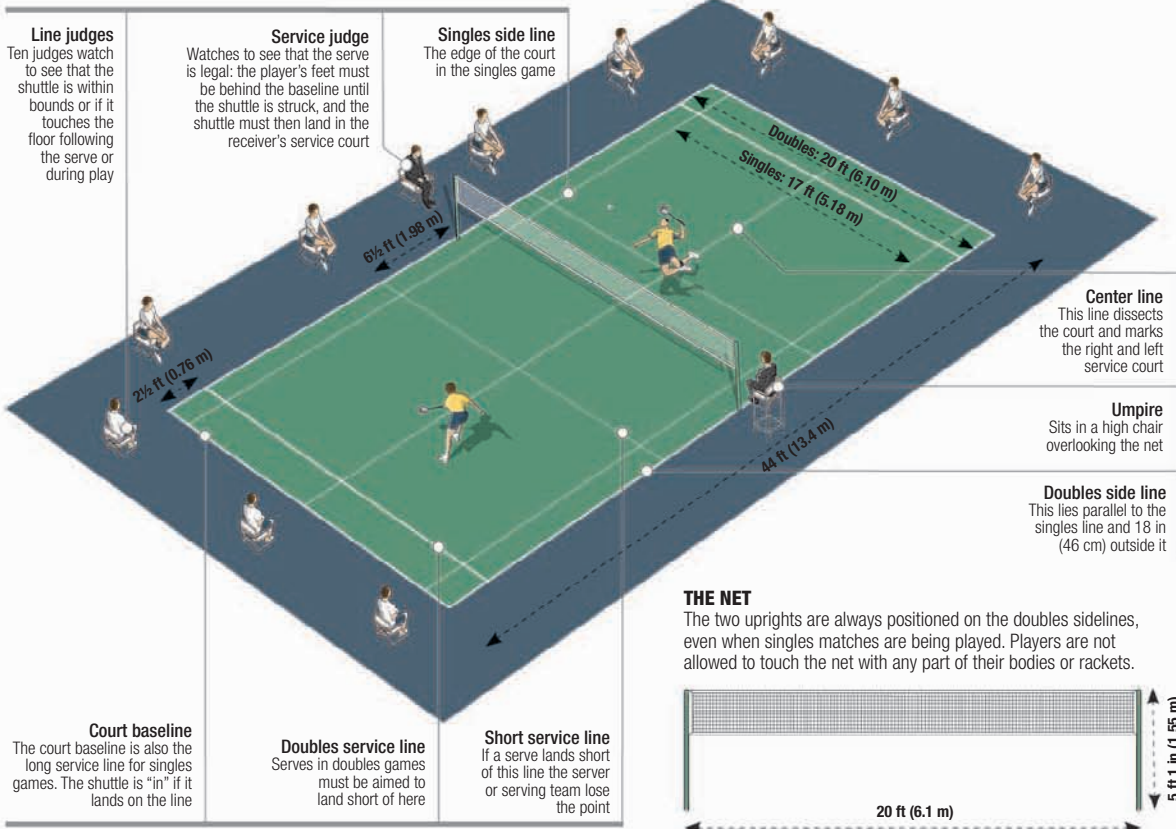


AT YOUR SERVICE

The server and receiver stand in diagonally opposite courts, as defined by the central line. The service must be delivered underhand from beneath the server's waist, and the server must have part of both feet on the floor. Service alternates from the right and left halves of the court, beginning from the right in every game. Players change ends after each of the first two games and midway through the third game.

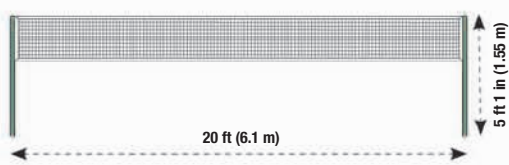
WHAT'S IN A NAME?

IN 1873, THE DUKE OF BEAUFORT BROUGHT THE INDIAN GAME OF *POONA* TO ENGLAND, AND BEGAN TO PLAY IT ON HIS COUNTRY ESTATE IN BADMINTON, GLOUCESTERSHIRE.



THE NET

The two uprights are always positioned on the doubles sidelines, even when singles matches are being played. Players are not allowed to touch the net with any part of their bodies or rackets.



COURTLY CONDUCT

Matches are the best of three games. If the server wins a rally, he or she scores a point and serves again from the other service court. If the serving player or side lose the rally, the opposing player or team scores a point. (This differs from the old system, changed in 2006, where players could only win a point on their own serve). The service then passes to the next player in turn, who in singles would be the opponent, but in doubles could be either the server's partner or, if both players have served, would be one of the opposing players. In badminton, 21 points win a game unless the score reaches 20–20. In that case, the first player or team to gain a two-point advantage wins. If the score reaches 29–29, the winner is the first player or team to get 30.

SCORING POINTS

A point is won by hitting the shuttle over the net so that it lands on the court before the opponent can return it or so that the opponent makes an error in returning it.

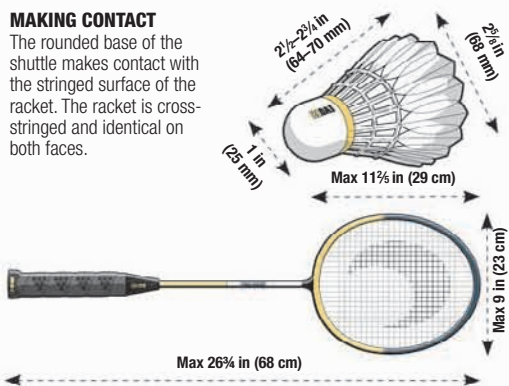
A point is lost if the shuttle is hit into or under the net, if it lands outside the opponent's court, if the shuttle touches a player or his or her clothing, or if a player hits the shuttle before it crosses the net.

SHUTTLE AND RACKET

Top shuttlecocks weigh around ¼ oz (5 g) and have 16 goose feathers in a cork base and are notoriously fragile: top players often get through ten in the course of a match. By contrast, rackets are strong and designed to transfer the maximum energy from the player to the shuttle, giving it greater speed and distance in flight.

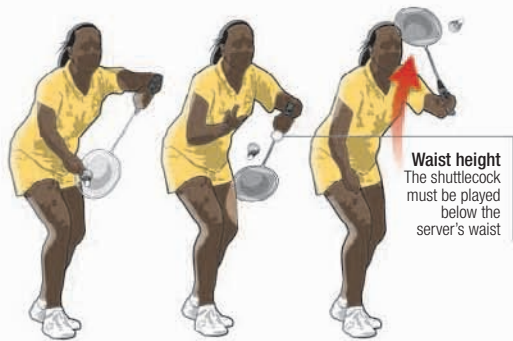
MAKING CONTACT

The rounded base of the shuttle makes contact with the stringed surface of the racket. The racket is cross-stringed and identical on both faces.



SUBTLETY AND STRENGTH

Shots range from drops over the net to high lobs and unreturnable smashes. Players use disguise or power to get their opponent out of position and create an opening. Once a serve has been played from behind the short service line, other shots are made from anywhere on the court or surrounds.

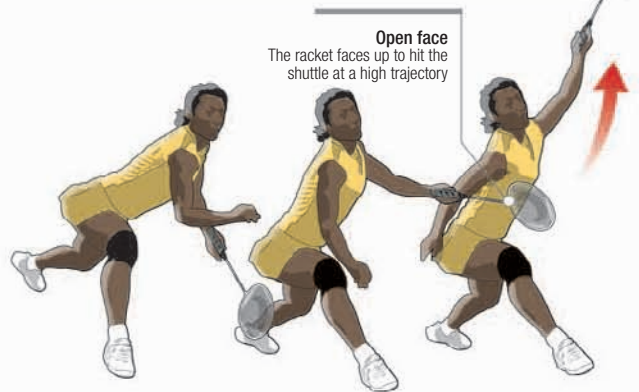


SERVE

The arm must remain below shoulder height and both feet must be on the ground throughout the stroke: overarm "tennis-style" serves are illegal—the racket must remain beneath the server's wrist.

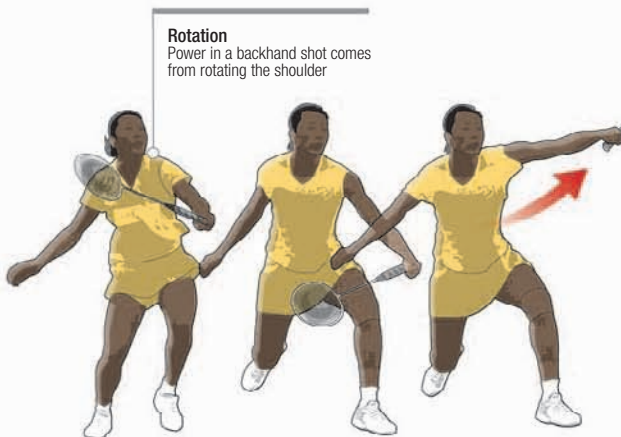
CENTRAL PLAY

The best tactical position is near the center line in the middle of the court, from where players can get to any shot. Players return here between shots, sometimes playing high lobs to give them time to return to the central position.



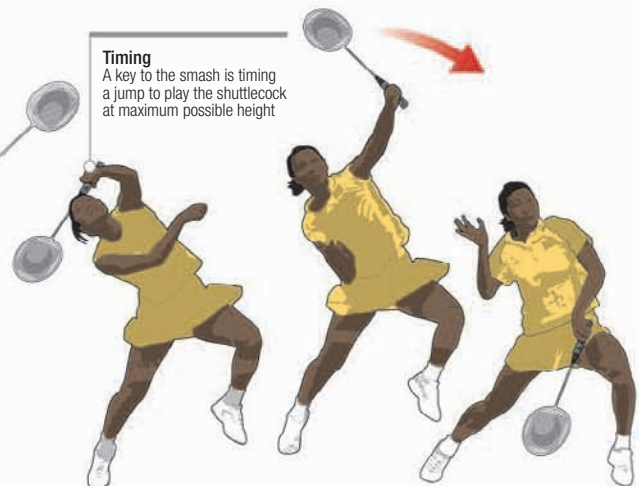
UNDERARM CLEAR

This high lob, played powerfully off the forehand, aims to pass above the opponent and drop steeply inside the back of the court for a winning shot. Clears can also be played off the backhand.



BACKHAND

Backhand strokes tend to be less powerful than shots played off a player's forehand side, so they are often defensive shots to move an opponent out of position. Cross-court drives or drop shots, however, can be winners if they catch an opponent unawares.



SMASH

Badminton's most spectacular stroke is a powerful smash that drives the shuttle steeply down to the opponent's court. It is often played with one or both feet off the ground to get a better angle above the net.

INSIDE STORY

First held in 1977, the World Badminton Championships, became an annual event in 2006. The All-England Championships date from 1899—this prestigious event is widely seen as the unofficial world championship.

GOVERNING BODY

Founded as the International Badminton Federation in 1934, the Badminton World Federation now has 156 members and organizes six major competitions around the world. After more than 70 years in England, the headquarters moved to Malaysia in 2005.

MOST ALL-ENGLAND BADMINTON SINGLES TITLES

PLAYER (COUNTRY)	M/F	YEARS	WINS
ETHEL B THOMSON (GBR)	F	1900–10	10
JUDY HASHMAN (NÉE DEVLIN) (USA)	F	1954–67	10
RUDY HARTONO (INA)	M	1968–76	8
ERLAND KOPS (DEN)	M	1958–67	7
FRANK DEVLIN (IRE)	M	1925–31	6
F G BARRETT (GBR)	F	1926–31	5
RALPH NICHOLLS (GBR)	M	1932–38	5
SUSI SUSANTI (INA)	F	1990–94	4
MORTEN FROST (DEN)	M	1982–87	4

JIANZI



GAME OVERVIEW

Jianzi, or shuttlecock, is played indoors and outdoors by individuals, pairs, or teams of men and women who propel a jianzi or chaptch (shuttle) to each other using any part of their body but their arms or hands. Points are won for successful passes and lost for letting the shuttle touch the ground.

ANY AREA

Some forms of jianzi are played on badminton courts, and competitors have to get the chaptch over the net every time they play it. In other versions there is a line instead of a net. It is also possible to play without a defined playing area. Such casual games, which resemble hacky sack, are a familiar sight in parks in many Asian countries, where they are a popular form of exercise for all ages.

TEAM GAME

In individual matches, players may have two successive hits of the chaptch. In the team game, each side has a total of four hits. Teams may contain any number of players but usually have six, of whom three are on the court at any one time; the others are substitutes. The winning score is usually 21 points.

FANCY FOOTWORK

Players can do anything with the chaptch except touch it with their hands or arms, but in matches they mainly use their feet. A player usually takes a first touch to bring the shuttle under control, and a second to pass to a teammate or hit it back over the net. They most often use their insteps but might also flick the shuttle up with the tops of their toes or slam it over the net with the sole of the foot in a “snake kick.” Receivers sometimes block the chaptch at the net with their chest, playing it down onto the floor on the opponent’s side to win a point.



Jianzi wear
The normal gear is lightweight (usually cotton) shirts and shorts or skirts in uniform color or colors if the match is between two or more teams

Sensitive footwear
Players wear flat-soled shoes with very thin uppers so they can “feel” the chaptch

NEED2KNOW

- ➔ Jianzi is also known as Chinese Hacky Sack, Chaptch, Kinja, Shuttlecock, or Featherball.
- ➔ The first known version of jianzi originated from 5th century BCE in China. The game is believed to have evolved from an ancient military exercise.



Flying feather
The jianzi or chaptch is made from feathers that are attached to a plastic or rubber disc base

PLAYER PROFILE

Excellence at jianzi requires the skills of a juggler—with the feet. High levels of coordination, as well as muscular and aerobic fitness are essential, as is the ability to make long stretches. Top-grade players work out with weights and do circuit training and flexibility exercises as a matter of routine. But jianzi gameplay can only really be improved by hours of practice or actual competition: not even a badminton shuttlecock has the same shape and aerodynamic peculiarities of the chaptch.

INSIDE STORY

Originally from ancient China, jianzi has spread across the world. The leading playing nations are China and Vietnam, but the sport is growing in Europe, especially Finland, France, Germany, Greece, Hungary, the Netherlands, Romania, and Serbia.

GOVERNING BODY

Taking the anglicized name for the sport, the International Shuttlecock Federation (ISF) was founded in 1999 in Vietnam and now has 19 members. The ISF staged the first world championships in Hungary in 2000, where Vietnam took most of the medals. The Shuttlecock Federation of Europe was founded in 2003, and the first European Cup was contested that year in Germany.

Feather ball
In Europe, players may use a badminton shuttlecock rather than a chaptch

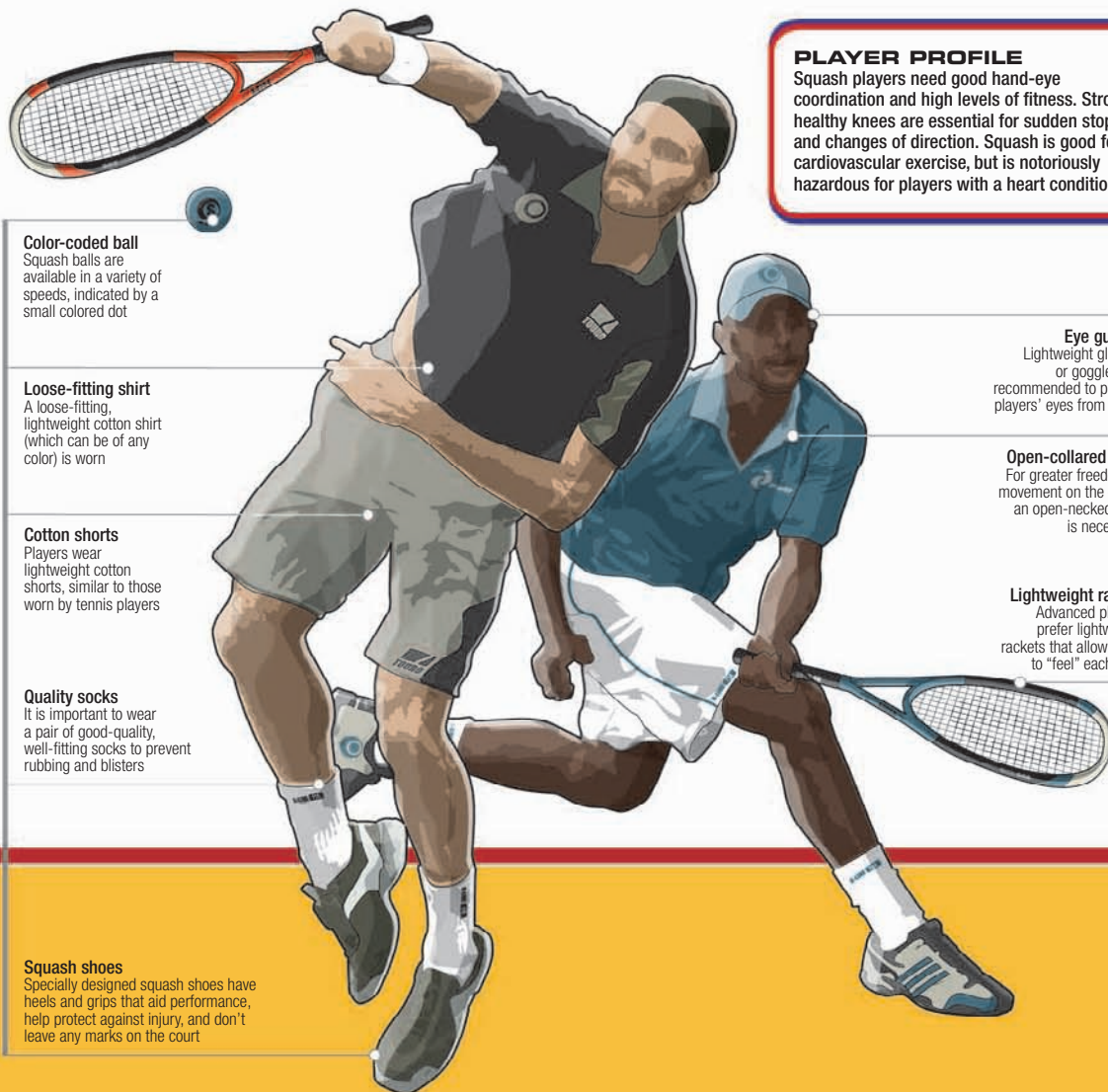


LEOPARD HEAD
The first touch is very important. When the chaptch drops from height, players may use a knee to knock it into the air—a move known as the leopard head—to get the right height for a kicked return.

Joint strength
Many people use jianzi for improving aerobic fitness and flexibility



SITTING TIGER
Playing the chaptch with the instep requires great flexibility and balance. Players practice repeatedly knocking the chaptch up with first one foot and then the other—a basic technique that underlies much match play.

**Color-coded ball**

Squash balls are available in a variety of speeds, indicated by a small colored dot

Loose-fitting shirt

A loose-fitting, lightweight cotton shirt (which can be of any color) is worn

Cotton shorts

Players wear lightweight cotton shorts, similar to those worn by tennis players

Quality socks

It is important to wear a pair of good-quality, well-fitting socks to prevent rubbing and blisters

Squash shoes

Specially designed squash shoes have heels and grips that aid performance, help protect against injury, and don't leave any marks on the court

PLAYER PROFILE

Squash players need good hand-eye coordination and high levels of fitness. Strong, healthy knees are essential for sudden stops and changes of direction. Squash is good for cardiovascular exercise, but is notoriously hazardous for players with a heart condition.

Eye guards

Lightweight glasses or goggles are recommended to protect players' eyes from injury

Open-collared shirt

For greater freedom of movement on the court, an open-necked shirt is necessary

Lightweight racket

Advanced players prefer lightweight rackets that allow them to "feel" each shot

NEED2KNOW

- ➔ Squash—or squash rackets, as it was originally known—was first played at Harrow school, England, in the early 1800s and derived from an earlier game, called rackets.
- ➔ Squash is played in more than 150 nations. There are approximately 125,000 courts worldwide, and at the start of the 21st century their number was increasing by 2,000 a year.
- ➔ Most of the big names in squash have come from relatively few countries: Egypt, Pakistan, Great Britain, Australia, New Zealand, France, and Malaysia.

SQUASH

**GAME OVERVIEW**

Squash is normally a game for two players, although doubles matches are played on larger courts. Matches are the best of three or, at international level, five games. A player wins a game by being the first to score either nine points or 11 points, depending on which scoring system—points or rally—is being played. Opponents take turns hitting the ball, which may touch the ground only once between each stroke. The ball may hit the side and back walls below the out lines, and must bounce off the front wall above a metal strip known as the tin. Because of the small size of the squash court, players often get in each other's way during matches: collisions can happen and lets are commonplace.

SIDELINES

17 The number of times Jahangir Khan of Pakistan beat the same opponent—Australian Chris Dittmar—in the finals of major world squash tournaments. The run began in 1987 and Khan, who retired in 2001, is regarded as one of the greatest squash players of all time.

270 The speed in kph (170 mph) of the highest recorded speed of the ball off the racket. It was achieved by Scottish former World number one John White in 2004.

700-1,000 The number of calories a player can expend during a game of squash, which is one of the healthiest sports.

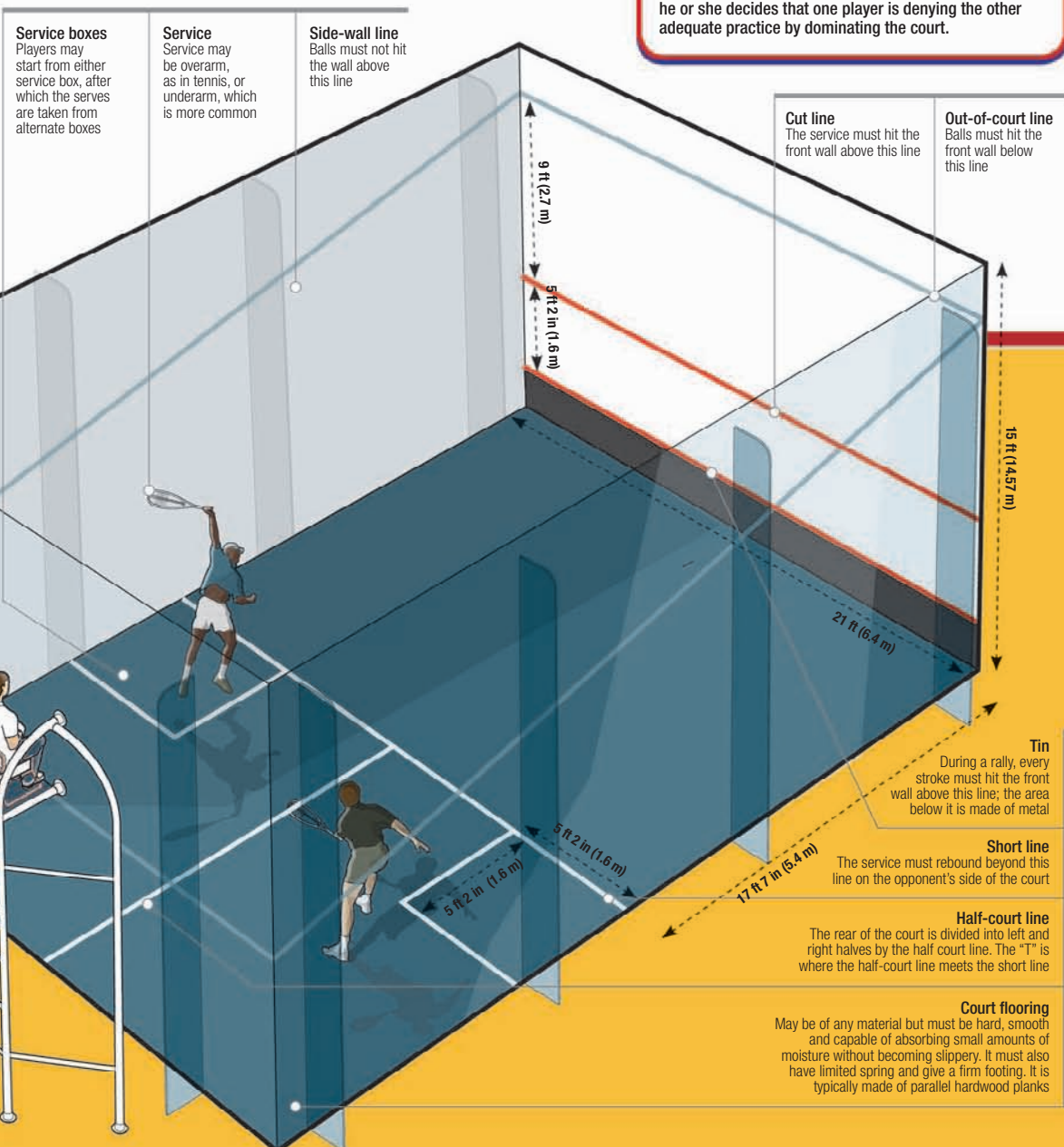
2,666 The highest number of strokes recorded in a single squash rally. The exchange—which took place in 2004 in Jersey, Channel Islands, Great Britain—was a deliberate bid for a world record, rather than part of a competitive game. It ended when the players reached the previously agreed 60-minute time limit: there was no winner, and they could have played on...

COURT PROCEDURE

The diagram below shows the standard dimensions for a singles squash court. At the highest level, clear-sided courts are used to allow for better TV broadcasting. The ball may be bounced off any of the walls below the out-of-court lines, including the back wall. The tin is marked with a metal strip: the noise made when a ball hits it tells the players (and officials, if there are any) that the shot is not “up.”

PREMATCH PREPARATIONS

Before any match, the players warm up themselves and, just as importantly, the ball for five minutes by stroking the ball to each other. The players swap sides after exactly two and a half minutes. If there is a referee, he or she will call “halftime,” and then “time” when the full five minutes have elapsed. The referee carefully observes the warm-up session, and may intervene if he or she decides that one player is denying the other adequate practice by dominating the court.

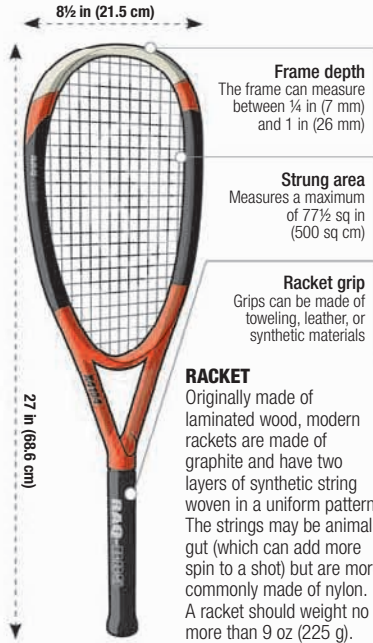


KEY EQUIPMENT

Most squash rackets are made of graphite with the addition of a small amount of another material, such as Kevlar or titanium, which makes them stiff, light, strong, and powerful. String tension is an important factor in producing a good on-court performance. Generally, harder hitters have their rackets strung more tightly than lighter hitters. String width, or gauge, can also vary. Thin strings are more powerful than thick strings, since they stretch more and launch the ball farther. Beginners should use a fast ball with plenty of bounce, while professional players use much slower balls.

EYE PROTECTION

During rallies, squash players risk being hit by their opponent's racket or the ball; many facial injuries are sustained in this way. The World Squash Federation recommends that all players wear appropriate eye guards at every level of the game. Eye protection is essential if a player has a history of medical problems with their eyes, or has had surgery. Few professionals wear eye protection, however, although eye guards are now required in the doubles game and for juniors.



BALL SPEED

A colored dot indicates the level of bounce and speed of a squash ball. The standard competition ball is the yellow.

- Double yellow—extra super slow
- Yellow—super slow
- Green or white—slow
- Red—medium
- Blue—fast

RUBBER BALL

The ball is formed of two hollow hemispheres of rubber compound glued together.



Hollow ball
Air inside the ball expands as it warms up, increasing the level of bounce

SERVING

The right to serve first is determined by a "racket spin." The server continues to serve until he or she loses a rally, after which the opponent takes service and the procedure continues. Part of the server's foot must be completely inside the service box (not touching the box lines) and in contact with the floor when the ball is put in to play. The ball must hit the front wall between the cut line and the out-of-court line and then bounce on the floor in the opposite half of the court beyond the short line. If a serve fails to satisfy these criteria, service immediately passes to the other player.

At the start of each game or after service has passed to an opponent, the server may begin play from either service box. Serves then alternate between the two boxes, regardless of which player is serving, except when a let has been called, in which case the ball is hit back in to play from the same box as the previous serve. If the players are unsure of which box to serve from, the marker (the referee's assistant) announces the correct box.

RALLYING

Alternate players must hit the ball against the front wall between the out-of-court line and the tin. It may be deflected off any of the other three walls, but may hit the floor only once per stroke. The ceiling of the court is out of bounds.

DOMINATING THE "T"

A game of squash revolves around the "T," the point where the half-court line and the short line meet. The player who dominates the "T" also dominates the game, since they are in the best possible position to place winning shots and are perfectly balanced to go in any direction to return their opponent's shots.

USING THE WALLS

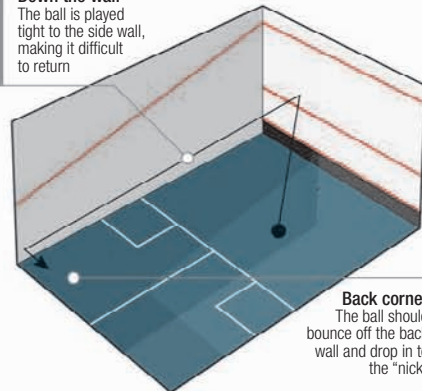
During a rally the striker may play off one or more of the three walls to deceive the opponent through rapid changes of angle or to draw them to the forecourt. With the opponent in a weak position at the front, the attacker may try to win the point with a hard drive in to the vacant back court. Alternatively, a ball played to hug the wall is extremely awkward to return.

STRAIGHT DRIVE

The straight drive or "rail" is one of the most effective shots in the game. The first bounce should land on the front wall above the service line, followed by a second bounce off the back wall near the floor. If left, the ball will drop in to the "nick" between the back wall and the floor—virtually impossible to retrieve. A good drive has length (to reach the back court) and is tight to the wall.

Down the wall

The ball is played tight to the side wall, making it difficult to return

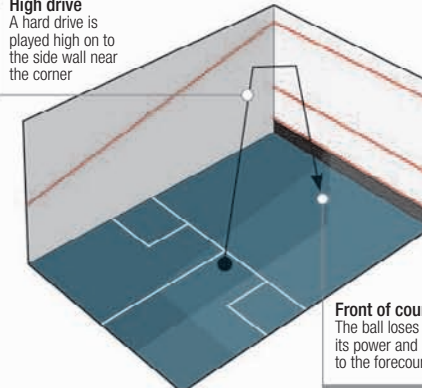


FORECOURT SHOT

Squash players aim to draw their opponents away from the "T" at the center of the court, the most advantageous position. In this diagram, for example, a drive played high on to the side wall near the corner loses most of its power on making contact with the wall, falls on to the front wall and then drops away into the forecourt. The chasing player has to run and fetch to keep the rally alive.

High drive

A hard drive is played high on to the side wall near the corner



SCORING SYSTEM

Points are won at the end of a rally of "good" balls, which occurs either when one player fails to return the opponent's shot or plays a "bad" ball. A good ball is one that reaches the front wall below the out line and above the tin before touching the floor. Bad balls include those that bounce twice on the floor, hit the tin, or hit the wall above the out-of-court-lines.

POINT-A-RALLY (PARS) SYSTEM

In the point-a-rally or PARS system, either the server or receiver may score a point at the end of each rally. The winner of each game is the first to 11 points. However, when the score reaches 10-all the game must be won by two clear points. The rally system is used in international and doubles matches, and also in the men's professional singles tour.

POINT SYSTEM

Only the server can score in the point system, and the winner of each game is normally the first player to reach nine points. An exception is made when the score reaches eight-all for the first time. In this situation, the receiver may choose to continue that game to nine or 10 points. The former is known as "set one"; the latter is called "set two."

PLAYING A LET

A let is played when one player obstructs another during a rally. If the striker hits the ball before it reaches the front wall, or the striker's racket hits the opponent, play is paused, and the referee decides whether the ball would have been good. If the referee decides it would have been good, or if the opponent deliberately intercepted the ball, the stroke is awarded to the striker. If the ball would not have been good, the stroke is awarded to the player who was hit.

OFFENSIVE SHOTS

The volley (hitting the ball before it bounces on the floor) is a key attacking shot that allows a player to interrupt the rhythm of play. A lob that sails over an opponent's head and drops in to the back corner is an equally effective offensive shot.

DEFENSIVE SHOTS

The drop shot, which can be played from anywhere on the court, will force an opponent that is dominating the "T" out of position. The "boast" (a shot played with pace against a side wall first) may be necessary to retrieve a ball played to the back corner.

FOREHAND GROUND STROKE

The forehand is a versatile stroke that is vital for both offensive and defensive play. The stroke allows a player to hit both hard drives and delicate drop shots with accuracy.



Backswing

Keeping the racket back and the arm high on the backswing adds power to the shot

Strike

Swinging the racket through a smooth curve helps ensure the shot is accurate

Follow-through

A proper follow-through means the player is in control of the ball throughout the shot

INSIDE STORY

Squash has its origins in the UK and the British Open Championships was one of the first major squash tournaments. Prior to the creation of the World Open, it was effectively considered to be the world championships. The first women's contest was held in 1922 and the men's in 1930. It is still regarded highly by many on the circuit despite its lower prize money. The World Open Championships has been held since the 1970s, and is played annually by the world's best men and women.

GOVERNING BODY

The World Squash Federation (WSF) has more than 100 member nations. It organizes the sport's world championships for men, women, boys, girls, and masters (over 35s) at individual and team levels in both singles and doubles. The men's professional game is governed by the Professional Squash Association (PSA) and the women's by the Women's International Squash Players Association (WISPA).

STAT CENTRAL

MEN'S WORLD OPEN CHAMPIONS

YEAR	PLAYER (COUNTRY)
2009	AMR SHABANA (EGYPT)
2008	RAMY ASHOUR (EGYPT)
2007	AMR SHABANA (EGYPT)
2006	DAVID PALMER (AUSTRALIA)
2005	AMR SHABANA (EGYPT)
2004	THIERRY LINCOU (FRANCE)
2003	AMR SHABANA (EGYPT)
2002	DAVID PALMER (AUSTRALIA)

WOMEN'S WORLD OPEN CHAMPIONS

YEAR	PLAYER (COUNTRY)
2010	NICOL DAVID (MALAYSIA)
2009	NICOL DAVID (MALAYSIA)
2008	NICOL DAVID (MALAYSIA)
2007	RACHAEL GRINHAM (AUSTRALIA)
2006	NICOL DAVID (MALAYSIA)
2005	NICOL DAVID (MALAYSIA)
2004	VANESSA ATKINSON (NETHERLANDS)

MEN'S BRITISH OPEN CHAMPIONS

YEAR	PLAYER (COUNTRY)
2009	NICK MATTHEW (ENGLAND)
2008	DAVID PALMER (AUSTRALIA)
2007	GRÉGORY GAULTIER (FRANCE)
2006	NICK MATTHEW (ENGLAND)
2005	ANTHONY RICKETTS (AUSTRALIA)
2004	DAVID PALMER (AUSTRALIA)
2003	DAVID PALMER (AUSTRALIA)

WOMEN'S BRITISH OPEN CHAMPIONS

YEAR	PLAYER (COUNTRY)
2009	RACHAEL GRINHAM (AUSTRALIA)
2008	NICOL DAVID (MALAYSIA)
2007	RACHAEL GRINHAM (AUSTRALIA)
2006	NICOL DAVID (MALAYSIA)
2005	NICOL DAVID (MALAYSIA)
2004	RACHAEL GRINHAM (AUSTRALIA)
2003	RACHAEL GRINHAM (AUSTRALIA)
2002	SARAH FITZ-GERALD (AUSTRALIA)

AND KHAN TAKES IT...

BETWEEN 1951 AND 1997, THE WORLD CHAMPIONSHIP WAS WON 30 TIMES BY PLAYERS FROM A SINGLE VILLAGE IN PAKISTAN. THE VICTORS WERE NOT ALL RELATED, BUT THEY WERE ALL NAMED KHAN: AZAM, HASHIM, JAHANGIR, JANSHER, MOHIBULLAH, AND ROSHAN.



- Most sports evolve, but racquetball was invented in 1950 by Joe Sobek, an American handball player who was dissatisfied with the range of indoor games then available.
- Racquetball caught on fast because it could be played on the handball courts that already existed in most US high schools and colleges.
- Confusingly, racketball is not just an alternative spelling, it's a completely different game played on a squash court with a smaller and less bouncy ball.



RACQUETBALL

GAME OVERVIEW

Racquetball is a fast game played on indoor or outdoor courts by two, three, or four players. It is a combination of handball and squash (see pp190–193) with several exciting features that are all its own. At the start of the 21st century, there were 8.5 million racquetball players worldwide.

Arm extension

Small and secured to the wrist, the racket feels much more a part of the player's body than the equipment used in many other racket games



Bouncy rubber

Match balls are made of rubber, are 2¼ in (5.7 cm) in diameter, and weigh about 1½ oz (40 g).



Light and absorbent

Polo or T-shirts and shorts or skirts; given the heat of the indoor court and the strenuous nature of the game, it is important that the clothing is light and breathable

Padded support

Often worn to support the knee joints, which have to withstand great pressure during groundstrokes

PLAYER PROFILE

For top players, a strong heart and physical fitness are vital to sustain the necessary stamina and speed across the court. One of the main reasons for the popularity of racquetball is that almost anyone can play it, and the nature of the sport means it is a good way of keeping fit.

Non-marking

The trainers worn are similar to those used in other court sports; they must not mark the surface

IN PLAY

Players take turns hitting a ball against a wall. Points are scored only by the server, and only if they serve an ace or win a rally. A rally is won when the opposition is unable to prevent the ball from hitting the floor twice, or when they cannot return it so that it touches the front wall before it touches the floor.

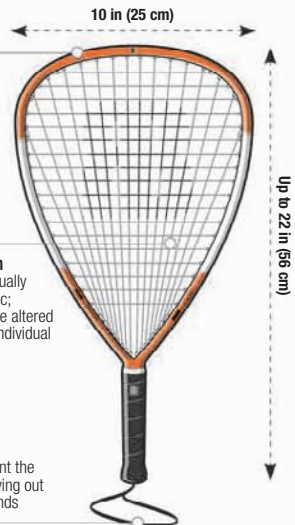
The server must stand in the service zone, bounce the ball on the floor once, and then hit it directly on to the front wall, making it rebound and touch the floor beyond the short line without touching a side wall. In rallies, the ball may hit the side walls or the roof as long as it also hits the front wall and bounces only once between opponents' strokes.

THE GEAR

The racket and ball are similar to those used in squash, but larger. The game is fast-paced and furious and players often wear protective safety goggles.

LIGHT FRAME

Modern rackets are often constructed with a light graphite-titanium composite frame and weigh only about 6 ½ oz (184 g).



Wide frame

Racket frames are a distinctive shape: wide at the end and tapered toward the handle

High tension

Strings are usually made of plastic; tension may be altered according to individual preference

Wrist strap

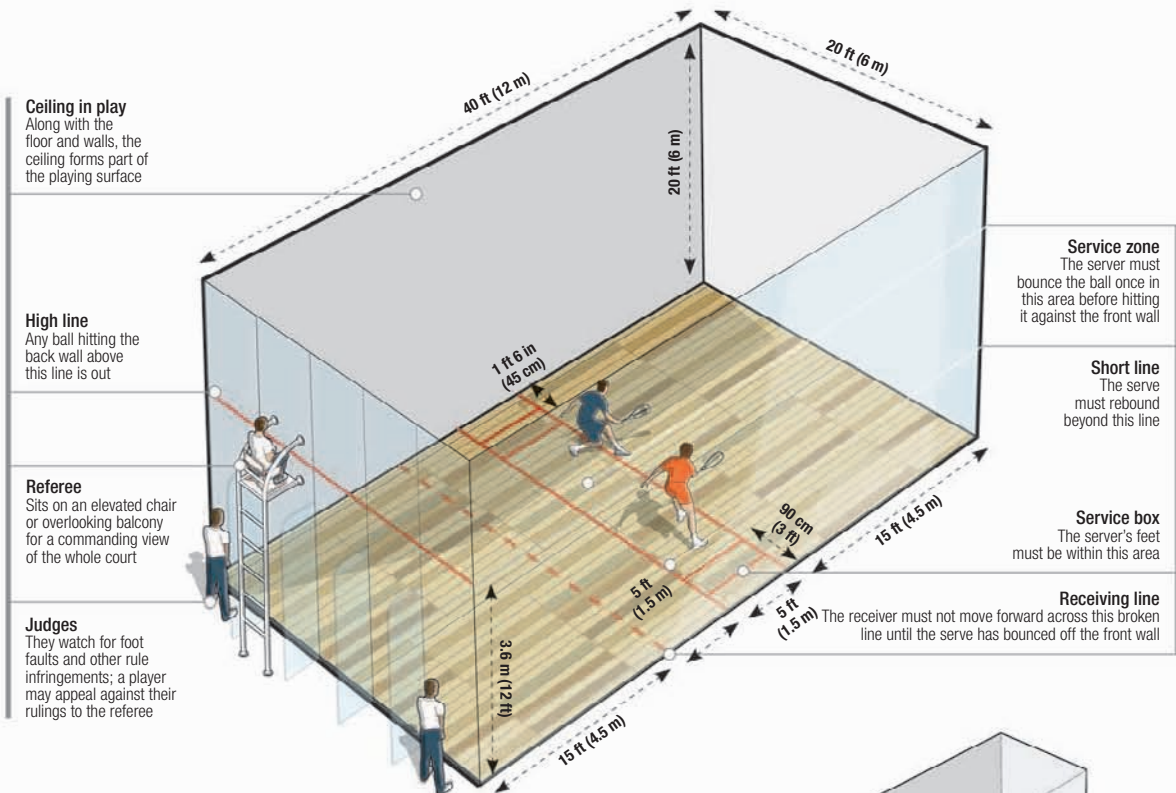
Worn to prevent the racket from flying out of players' hands

COURTSHIP

Apart from the top of the back wall, all surfaces are in play, including the ceiling. The floor surface is usually made of planks of polished wood or similar material. The back wall (and sometimes the side walls) is made of transparent plexiglass. The court is a confined space that retains heat and may quickly render players in need of refreshment.

POINT FOR POINT

Professionals play the best of five games; the winning player or team is the first to reach 11 points with a two-point margin of victory. Amateurs play two games, with the winning player being the first to 15 points. If each player wins one game, a tiebreaker is required. It is not necessary to win by two clear points in amateur racquetball. In addition to singles and doubles, three-player variants include "ironman" (two against one) and "cutthroat," in which players take turns opposing the other two.

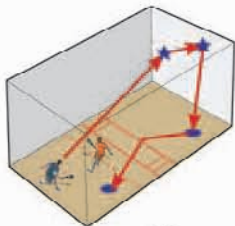


DEFENSE AND ATTACK

If a player does not think they are in a position to finish a rally, they may play a defensive shot to lure their opponent away from the center of the court. If successful, they can go for the kill with their next shot. Some of the key rally strokes are as follows:

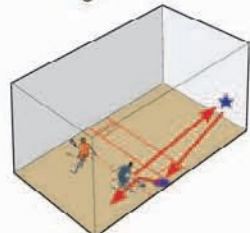
CEILING SHOT

Since the roof is in bounds, players often take advantage of it. This stroke aims to make the ball bounce for the second time in the back court.



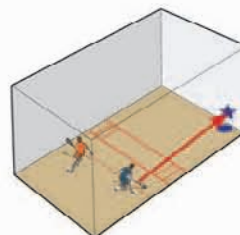
DOWN THE LINE PASS

A player standing near the side wall sends a forcing shot back past him even closer to the side of the court. The strokemaker must be careful not to obstruct the opponent.



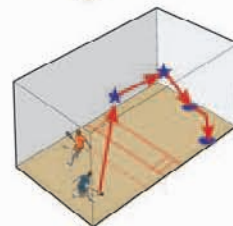
KILL SHOT

This stroke is normally played with bent knees when the ball is already close to the ground; the idea is to keep it as low as possible when it hits the front wall.



PINCH SHOT

This is the name for any stroke that hits the side wall first, then the front wall, and "dies" near the side wall on the opposite side of the court. The aim is to get the ball to bounce twice before it reaches the side.



INSIDE STORY

The International Racquetball Federation organizes World Championships every two years, with competitors from more than 40 countries. The IRF regularly updates the world rankings.

GOVERNING BODIES

Professional racquetball is run by two organizations: the International Racquetball Tournament (IRT), and the Women's Professional Racquetball Association (WPROA).



ETON FIVES

GAME OVERVIEW

This little-known ball game is played by two teams of two men or women on an unusual court that is enclosed on three sides, features a buttress on the left-hand side, and is about 6 in (15 cm) higher at the front than the back. The players can strike the ball only with their hands or wrists and must hit the ball "up" against the front wall to stay in a rally.

NEED2KNOW

→ The game originated at Eton College and spread to other private schools in England, but it is still played by only a few thousand athletes.

→ Although there are a few courts in Europe, Eton fives is played mainly in its native Britain and in Nigeria, where a version of the game flourishes in the northern states and there are at least 30 courts.

Cutter's partner

This player hits the ball if his or her partner cannot reach it

Server's partner

This player tries to return any shots that the server misses

Column

It is difficult to return a shot that hits one of the columns

Buttress

At the base of this feature on the front court side is the "hole." If the ball goes into the hole it is virtually unplayable

Server

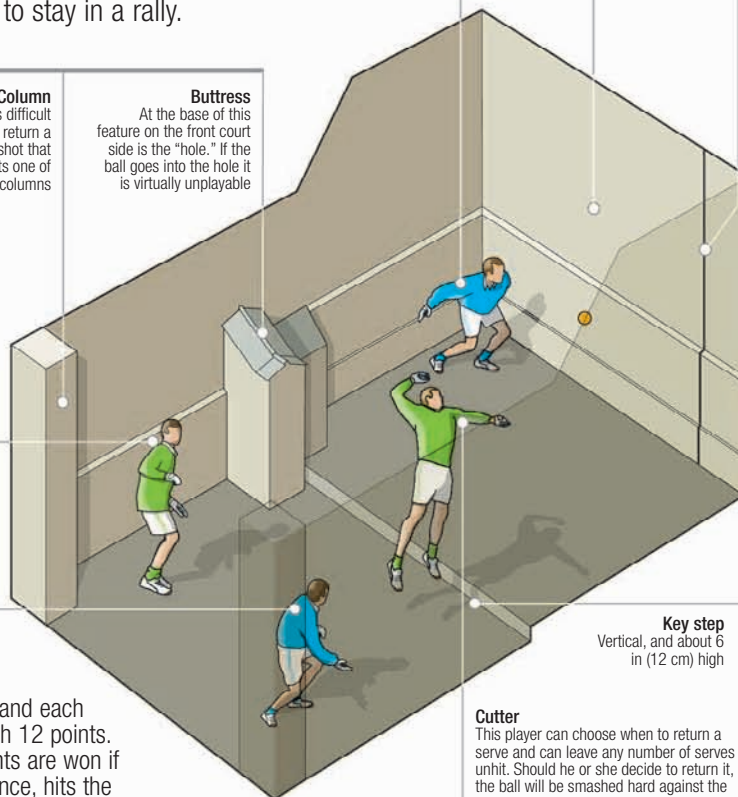
The server throws the ball so that it bounces off the front and right walls, landing roughly in the middle of the lower court

"Up"

The area above the upper ledge on the front wall is known as "up"

Blackguard line

This vertical black line is about 30 in (75 cm) from the right wall



Key step
Vertical, and about 6 in (12 cm) high

Cutter

This player can choose when to return a serve and can leave any number of serves unhit. Should he or she decide to return it, the ball will be smashed hard against the right wall and the front wall to the right of the blackguard line and above the ledge

SCORING

Matches are the best of five games and each game is won by the first pair to reach 12 points. Only the serving pair can score. Points are won if the ball hits the ground more than once, hits the front wall under the line or ledge, or leaves the court completely.

A STRANGE CONVERSION

THE ORGAN ROOM AT THE OPERA HOUSE IN GLYNDEBOURNE, EAST SUSSEX, IS NOW ONE OF ENGLAND'S GRANDEST SITTING ROOMS. STRANGELY, IT BEGAN LIFE AS AN ETON FIVES COURT BEFORE CONVERSION TO A MORE SEDATE USE.

THE COURT

The Eton-fives court is based on an area of the chapel at Eton College where the game was first played. Every court differs slightly, but a number of features are universal. A step divides the court into front and back sections. The court is enclosed on three sides by irregular walls. There is a buttress on the left of the court where the upper and lower courts meet, brick columns on either side of the open end, and a ledge on all three sides. These features ensure that, after hitting a wall, the ball's trajectory is almost impossible to predict. The home team, however, is usually at an advantage as they are familiar with the court's unique elements.

Hard ball

The ball is a little larger than a golf ball and is made of rubber and cork. It loses little of its pace when bouncing off the walls and floor of the court.



Soft gloves

Padded leather gloves protect the hands. Reversed rough leather on the palm side gives added grip. Inner gloves absorb sweat and give further protection.





RACKETS

NEED2KNOW

- ➔ First played in Fleet Prison, London, rackets did not gain respectability until introduced to Harrow School in 1822.
- ➔ English players have dominated world rackets.

SCORING

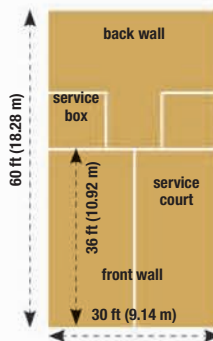
Only the server can score. He or she must serve from the service box so the ball strikes the front wall above the service line and rebounds into the service court on the other side. Players must return the ball before it bounces twice; shots must strike the front wall above the play line. Missing a shot results in the server's side winning a point, or the service switching. The first side to reach 15 points wins the game.

GAME OVERVIEW

Rackets has many similarities with squash, but it is played on a larger court with a harder ball. Rackets can be played as singles or doubles. Play is fast and furious.

THE COURT

The court is enclosed, and the floor and walls are hard and smooth. The front and side walls are 30 ft (9 m) high, and the back wall is half that height. There is a fixed wooden board on the front wall, the upper edge of which is the play line, 2 ft 3 in (0.68 m) from the floor. Another line, 9 ft 6 in (2.93 m) from the floor, is the service line.



Heavy ball
This is heavy, weighing 1 oz (28 g), but small, just 1 in (2.5 cm) in diameter

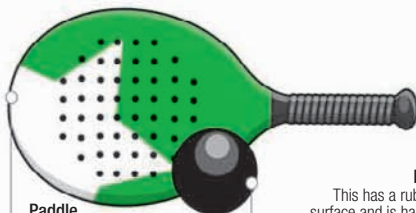
Catgut racket
This averages 27 in (76 cm) long and weighs 9 oz (255 g). It is strung with catgut



Shorts and shirt
Clothing is loose-fitting to allow free movement

NEED2KNOW

- ➔ Paddleball originated in the United States, where it is still most popular.
- ➔ The governing body of one-wall paddleball is the United States Paddleball Association.



Paddle
This is typically wooden and perforated, with no webbing. Maximum size 17½ x 9 in (44.5 x 23 cm)

Ball
This has a rubber surface and is harder and smaller than a tennis ball. Its diameter is 1½ in (5 cm)

TIME-OUTS

For a 15-point game, two one-minute time-outs are allowed. For 21-point and 25-point games, the rules allow for three one-minute breathers. Tournament committees allow substitutes in some competitions. Unusually, a player can switch the paddle from hand to hand during a game.

PADDLEBALL

GAME OVERVIEW

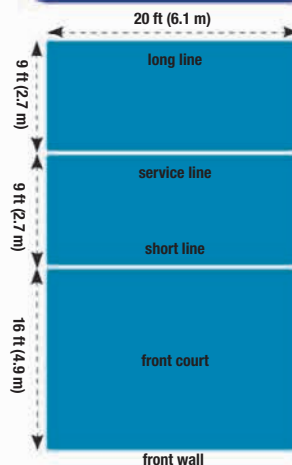
Players hit a ball against the wall or walls of a court with a paddle, while their opponents attempt to hit it on the rebound. There are one-, three-, and four-wall games, both singles and doubles. In one- and three-wall games play is to 11, 15, 21, or 25 points. Four-wall is a 21-point game.

RULES OF SERVICE

The server must remain inside the service zone, between the short and service lines. A serve is illegal if the ball hits the floor before crossing the short line, or if it rebounds from the front wall and hits two or more walls before striking the floor. The server loses the right to serve if he or she makes two illegal serves in a row.

THE COURTS

The most popular version of paddleball is played on a court 20 ft (6.1 m) wide and 34 ft (10.3 m) long, with a single wall, 16 ft (4.9 m) high, topped with a fence. The short line, 16 ft (4.9 m) from the wall, defines the front court. The long line, 18 ft (5.4 m) behind the short line, defines the back court. The front court of a three-wall court has side walls 12–16 ft (3.7–4.9 m) high. A four-wall court has a ceiling, front and side walls 20 ft high (6.1 m) and a back wall at least 12 ft (3.7 m) high.



ONE-WALL COURT

The server must not cross either the service line or the short line. Served balls should hit the wall and rebound to land in the receiving area, which is between the short and long lines.

- Often regarded as a Basque and Catalan sport, pelota is also played in other parts of France and Spain, as well as in Argentina, Ireland, Italy, and Mexico.
- In its native Spain and France, pelota is known as “jai-alai,” which is the Basque for “happy festival.”
- A ball that is well hit by a highly skilled pelota player may reach speeds of 188 mph (300 kph).

PELOTA



GAME OVERVIEW

This is the fastest ball game in the world. Standard pelota, known as “cesta punta,” is a game for two players, but other versions can be played as doubles. Using bizarrely shaped racketlike baskets, which are strapped to their wrists, players aim to sling a ball against a wall in such a way that their opponents cannot return it before it bounces twice. There are numerous variants, including a bare-handed game, “pelota a mano,” that may be single combat or two against one. The form known as “frontenis” is played with tennis rackets with reinforced strings; “xare” also uses tennis rackets, but with loosened strings; “leather paleta” and “pala corta” are played with solid wooden bats.

Cesta

The racket is made of plaited willow twigs mounted on a curved arm of chestnut or ash

On hand

The glove is attached to the cesta and held in place on the player's wrist by a strap (cinta)

PLAYER PROFILE

Pelota players need to be wealthy (or at least have sponsorship) just to afford the rackets, which are handmade and often last less than a single match. The arms, legs, and back must all be in good condition, but the critical area is the hip, which is heavily involved in every stroke. Elderly players often suffer from arthritis in the hip joints.



2 in (5 cm)

Pelota

The ball is hard, with a latex core wrapped in wool and an outer casing of two leather strips sewn together

Safety lid

The helmet is vital safety wear. No pelotari (player) would be seen alive for long without one

Waistband ribbon

May be colored to denote the player's team or status

Court dress

Players wear polo shirts and long pants: shorts are not generally considered suitable attire

Leave no trace

Running shoes with nonmarking soles allow quick movement and prevent damage to the court

DYNAMIC ACTION

The cesta punta player (pelotari) catches the speeding ball, or pelota, with his cesta. Once the ball is safely snared, he will draw back his throwing arm, then whip it forward again, launching the pelota toward the front wall of the court at a blistering speed.

PLAYING PELOTA

The score required to win a match can be anything between 25 and 50 points. In doubles, both players can score, regardless of whether they have the serve. At the start of each point, the server throws the ball in play with the cesta from behind the service line; a legal serve must go straight to the front wall above the low horizontal metal strip, and land on the floor in the area between lines 4 and 7. The side and back walls may be used only once the ball is in play. Rallies continue until the ball goes out or is not returned. If one player obstructs another, a let is normally played unless it is clear what would have happened.

ONE TO WATCH

One of the sport's most important requirements is that rallies should be continuous, and the judges keep a close eye on every stroke to ensure that they are all one fluid movement. If it looks as if the player has cradled the pelota in the cesta—even for a moment—he or she loses the point.

GAME FOR A FLUTTER

IN PELOTA DE GOMA, THE BALL IS PRESSURIZED AND FILLED WITH GAS, MAKING IT FLY EVEN FASTER THROUGH THE AIR THAN THE STANDARD PELOTA. THE GAME IS SO FAST THAT IT'S HARD TO APPRECIATE WITHOUT SLOW-MOTION REPLAYS, BUT DESPITE THIS IT'S STILL A BIG CROWD-PLEASER AND ONE OF THE MOST WAGERED SPORTS IN SPAIN.

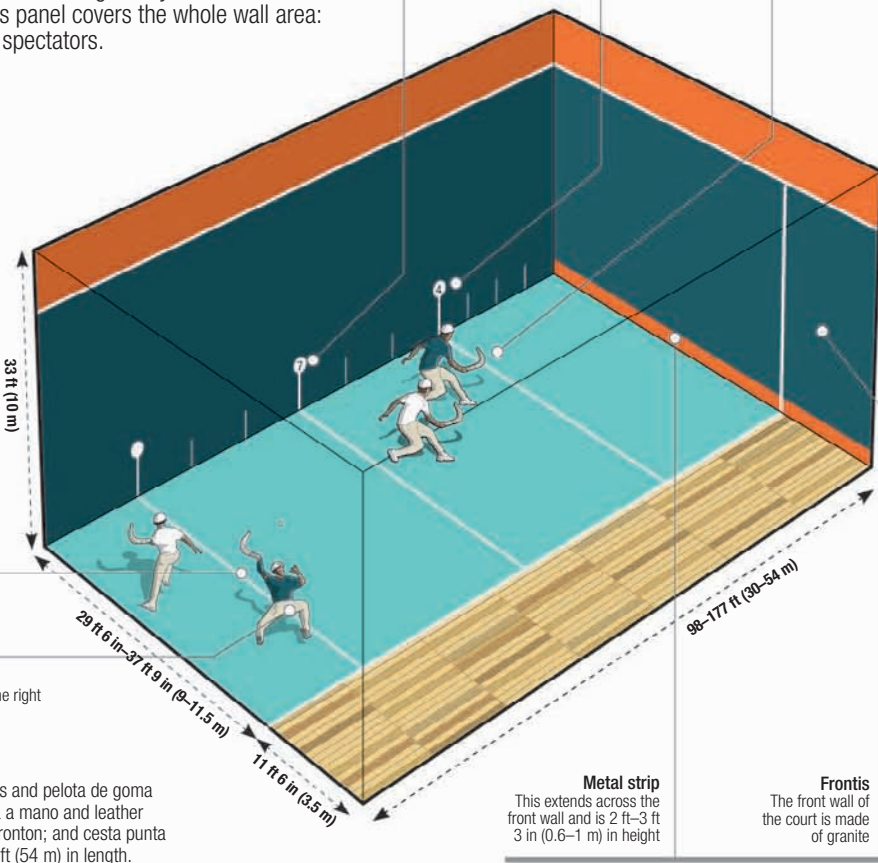


COURTING RITUAL

Most variants of pelota are played on indoor courts known as frontons. The overall length may vary, but the marked areas are always in proportion. The front, back, and left-hand walls are parts of the playing area. The flooring (cancha) is made of polished cement, but beyond the sideline the surface changes to wood, so that any ball that lands on it makes a recognizably different sound. To the right, a glass or plexiglass panel covers the whole wall area; behind it is elevated seating for spectators.

WALLCRAFT

Some players overpower their opponents by force of stroke, but most rely on subtle and deceptive spin. Among the most effective shots are the chula, in which the ball lands in the crack between the back wall and the floor, and the carom, which hits the side wall, front wall, and then floor, falling away toward the right-hand screen. The dejada is a drop shot that hits the front wall just above the foul line. The arrimada is a forcing drive that goes as close as possible to the side wall, making it almost unplayable.



Pasa line
Marked with the number 7 on the wall; any serve must hit the frontis and then bounce before it reaches this mark

Falta line
Marked with the number 4 on the wall; any serve must bounce beyond this mark

Front court players
Try to intercept the pelota during rallies

Service line

The server (left) must put the pelota in play from behind this mark

Back court players

Note how in doubles the nonservice covers the right of the court, leaving the left to his teammate

FRONTONS

There are three standard courts. Frontenis and pelota de goma are played on a 98 ft (30 m) court; pelota a mano and leather pelota are contested on a 118 ft (36 m) fronton; and cesta punta is a game for a court that measures 177 ft (54 m) in length.

Metal strip
This extends across the front wall and is 2 ft-3 ft 3 in (0.6-1 m) in height

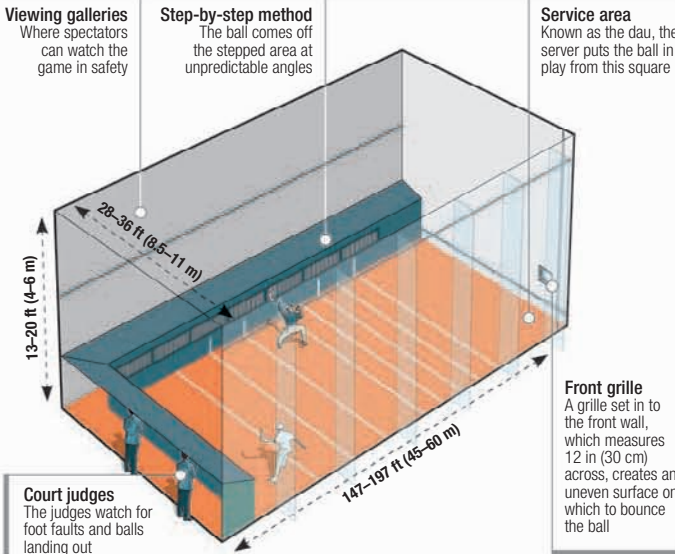
Frontis
The front wall of the court is made of granite

TRINQUET COURT

The most unusual pelota court is called the trinquet, and this gives a whole new meaning to the term "spectator sport." The steps on the side are part of the playing area, but members of the audience can sit on them at their own risk. (There are also upstairs viewing galleries for those who value their safety.)

KNOWING THE ROPES

In the traditional Valencian trinquet game known as "pelota vasca," opponents face each other on either side of a rope hung across the middle of the fronton. Other variant forms of pelota contested on a trinquet are played off the front wall, using cestas or gloved hands. These include leather and rubber pelota, pelota a mano, and xare. The ball—known as pilota de vaqueta ("little cow ball")—is 1 3/4 in (4.2 cm) in diameter.



Viewing galleries
Where spectators can watch the game in safety

Step-by-step method
The ball comes off the stepped area at unpredictable angles

Service area
Known as the dau, the server puts the ball in play from this square

Court judges
The judges watch for foot faults and balls landing out

Front grille
A grille set in to the front wall, which measures 12 in (30 cm) across, creates an uneven surface on which to bounce the ball

The image features a stylized graphic design. On the left side, there is a vertical red bar with a white outline that curves at the bottom. The rest of the background is a solid light blue color. Centered in the blue area is the text "COMBAT SPORTS".

COMBAT
SPORTS

05



BOXING

202

SPORT OVERVIEW

Boxing is a sport of great skill and physical toughness. Two combatants endeavor to punch one other to score points from the judges or referee, while avoiding being hit themselves. Almost all areas of the head and body above the waist are designated scoring areas. Contests are won on points or by knockout.

There is a major disparity between the amateur and professional ranks in boxing. Leading professional fighters are among the biggest earners in world sport.

FIGHTER PROFILE

Boxers require good upper body strength—particularly a strong punch—and a high resilience to being hit (a “good chin”). Boxing is a really tough aerobic workout so fighters need to display a fanatical training ethic and great stamina. Speed, agility, and quick reflexes are beneficial, particularly for those fighting at lower weight levels.

Bob and weave

Head movement is vitally important for fighters; it is more difficult for opponents to hit a moving target

Trunks

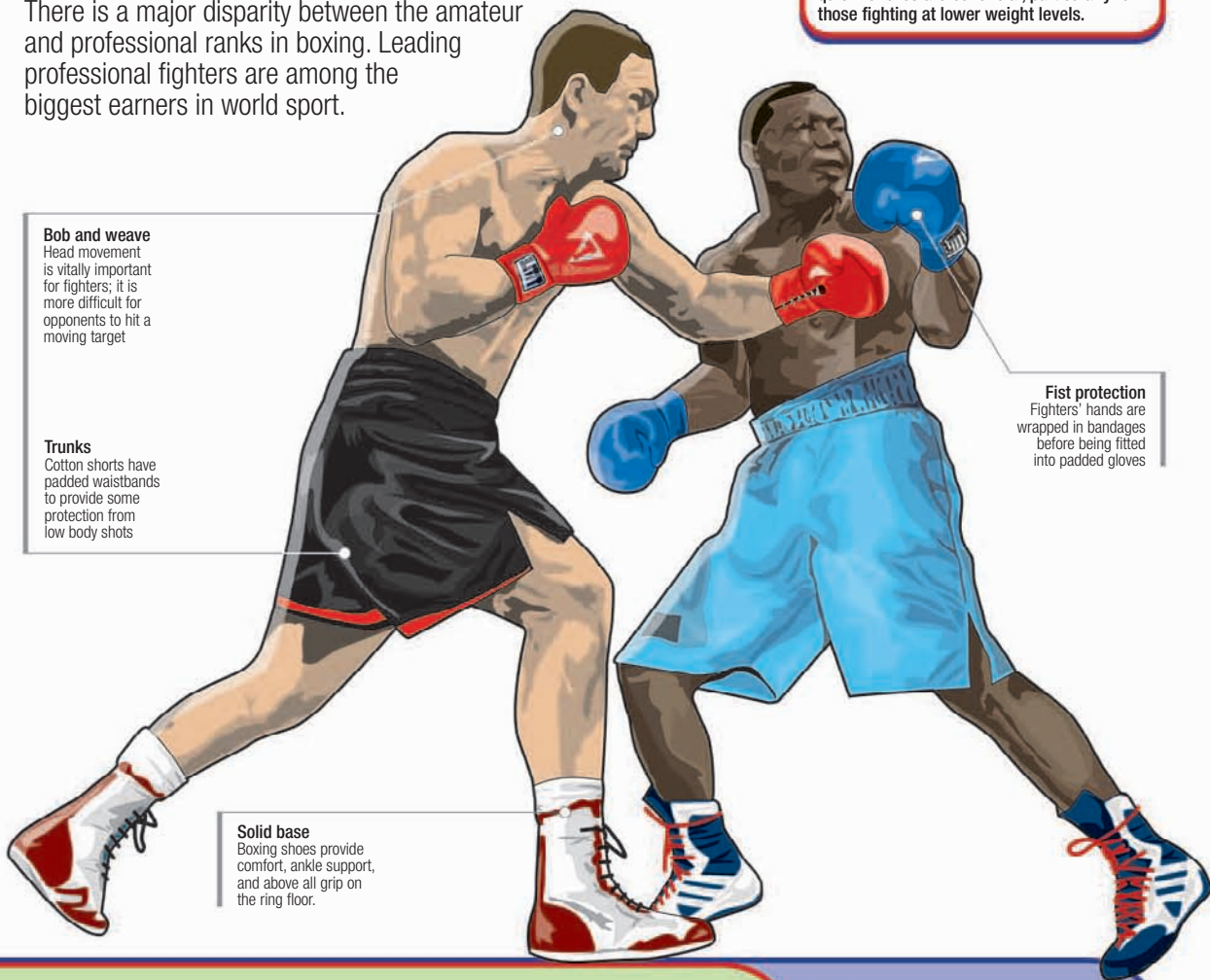
Cotton shorts have padded waistbands to provide some protection from low body shots

Solid base

Boxing shoes provide comfort, ankle support, and above all grip on the ring floor.

Fist protection

Fighters' hands are wrapped in bandages before being fitted into padded gloves



SIDELINES

107

The total amount, in millions of dollars, generated from pay-per-view sales of the heavyweight world title fight between Lennox Lewis and Mike Tyson in June 2002.

135, 132

The highest live attendance for a boxing contest—Tony Zale versus Billy Pryor in August 1941.

45

The age of George Foreman when he regained the world heavyweight title—knocking out Michael Moorer for the IBF and WBA titles in November 1994. Foreman had first won the world heavyweight title in 1973.

242

Number of fights fought by American featherweight Willie Pep during a 26-year career (1940–1966).

NEED2KNOW

- Modern boxing was first codified in 1867 by a set of 12 rules written by John Graham Chambers and endorsed by the 9th Marquis of Queensberry.
- Amateur boxing differs in various ways from the professional arm of the sport.



THE RING

The name boxing 'ring' is an atavism that dates from when contests were fought in a roughly drawn circle on the ground. A modern boxing ring is set on a raised platform. It is square, with a post at each corner to which four parallel rows of ropes are attached with a turnbuckle. Each side of a standard ring is 16–25 ft (4.88–7.32 m) between the ropes, with another 2 ft (60 cm) outside known as the apron. The platform is 3–4 ft (1–1.2 m) from the ground with the posts rising around 5 ft (1.5 m).

Rope-a-dope

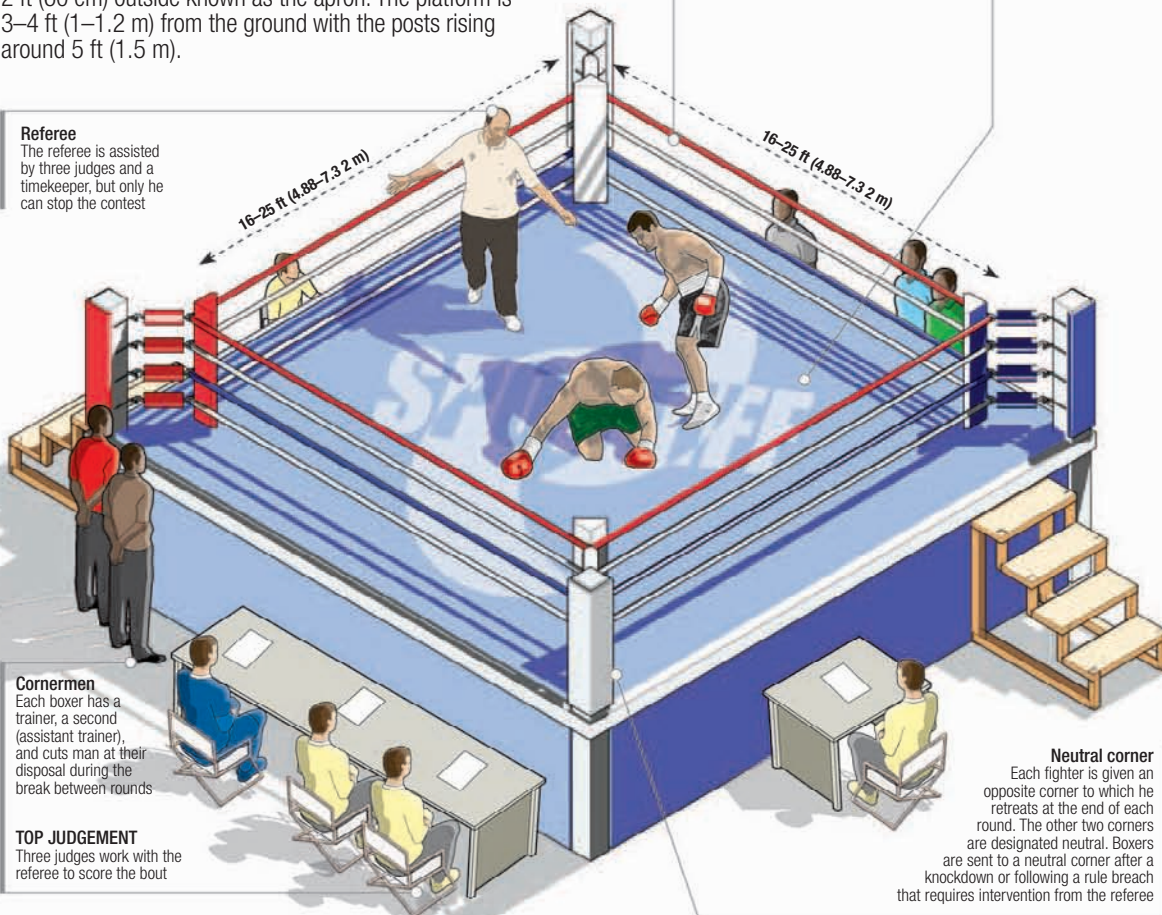
Ropes are about 2.54 cm (1 in) in diameter and held up on posts at heights of 18 in, 30 in, 42 in, and 54 in (46 cm, 76 cm, 1 m, and 1.37 m)

Hit the deck

The ring floor has about 2.54 cm (1 in) of padding covered by stretched canvas. The canvas commonly features advertising from the promoter or sponsors

Referee

The referee is assisted by three judges and a timekeeper, but only he can stop the contest



Cornermen

Each boxer has a trainer, a second (assistant trainer), and cuts man at their disposal during the break between rounds

TOP JUDGEMENT

Three judges work with the referee to score the bout

Neutral corner

Each fighter is given an opposite corner to which he retreats at the end of each round. The other two corners are designated neutral. Boxers are sent to a neutral corner after a knockdown or following a rule breach that requires intervention from the referee

EQUIPMENT

Fighters wear shorts, boxing shoes, and padded gloves which come in two sizes—8 oz (227 g) and 10 oz (283 g)—depending on the weight of the boxer. Mouth guards are required and groin guards optional in professional boxing. In amateur bouts fighters additionally wear headguards and vests and have larger, softer gloves. This is the only equipment fighters wear and use in the ring, but in training boxers additionally use free weights, punching bags, jump ropes, speed bags, and other items to hone themselves into fighting shape.

AMBLING ALP

ITALIAN BOXER PRIMO CARNERA, HEAVYWEIGHT CHAMPION IN 1933 WAS A GIANT OF A MAN—STANDING 6 FT 5 IN (197 CM) TALL AND WEIGHING 276 LB (125 KG). HE HAD A PRODIGIOUS APPETITE. FOR BREAKFAST, IT IS CLAIMED HE ATE NINETEEN PIECES OF TOAST, FOURTEEN EGGS, A LOAF OF BREAD, HALF A POUND OF VIRGINIA HAM, A QUART OF ORANGE JUICE, AND TWO QUARTS OF MILK.



GROIN GUARD

Protects fighters' groins from injuries resulting from illegal low blows.



MOUTH GUARD

Plastic gumshields guard the top teeth from being knocked out.



GLOVE

Gloves are specially padded to protect only the wearer.

Cushions blows

Usually made of leather with a foam interior

Side holes

The headwear does not fully cover ears to enable fighter to hear referee's instructions

HEAD GUARD

Worn for amateur contests and professional sparring only, they offer protection but limit peripheral vision.



RULES AND REGULATIONS

The basic rules of boxing are that two fighters of a similar weight, under the supervision of a referee, attempt to strike one another above the waist with clenched fists with the intention of scoring more points than the opponent (to win rounds) or by knocking the opponent to the canvas for a period of 10 seconds. Blows to the back of the head or kidneys are illegal, as are blows with the open, laced part of the gloves. Beyond that, rules differ between the amateur and professional arms of the sport.

AMATEUR

Amateur fighters wear shorts, tank tops, and shoes. For protection, they wear a mouthguard, groin guard, and leather headguard. Contests are held over three, two-minute rounds. Points are scored for every legal punch landed with the knuckle portion of the glove (painted white) and the totals run for the whole fight, not for individual rounds.

PROFESSIONAL

Pro fighters, in contrast, fight stripped to the waist and without headguards. Contests are much longer, too—world championship fights consist of 10 three-minute rounds, with a one-minute break in between. Individual rounds are scored out of 10 by a panel of three judges. The fighter that wins the round is awarded 10 points, the loser nine. If a round is particularly one-sided—i.e., a knockdown occurs—the scores are given as 10/8. Points are deducted by the referee for indiscretions.

THE COUNT

Following a knockdown, the referee first escorts the aggressor to a neutral corner and then starts counting to 10. The prostrate fighter has 10 seconds to both regain his feet and present himself in an acceptable condition to continue or the fight is over.

STAT CENTRAL

WEIGHT LIMITS (10 oz GLOVES)

TITLE	WEIGHT
HEAVYWEIGHT	201+ lb (91+ kg)
CRUISERWEIGHT	176–200 lb (79.7–90.6 kg)
LT. HEAVYWEIGHT	169–175 lb (76.5–79.2 kg)
SPR. MIDDLEWEIGHT	161–168 lb (72.9–76.1 kg)
MIDDLEWEIGHT	155–160 lb (70.2–72.5 kg)
SPR. WELTERWEIGHT	148–154 lb (67–69.7 kg)

WEIGHT LIMITS (8 oz GLOVES)

TITLE	WEIGHT
WELTERWEIGHT	141–147 lb (63.8–66.6 kg)
SPR. LIGHTWEIGHT	136–140 lb (61.6–63.4 kg)
SPR. FEATHERWEIGHT	127–130 lb (57.5–58.9 kg)
FEATHERWEIGHT	123–126 lb (55.7–57 kg)
SPR. BANTAMWEIGHT	119–122 lb (53.9–55.2 kg)
BANTAMWEIGHT	116–118 lb (52.5–53.4 kg)
SPR. FLYWEIGHT	113–115 lb (51.2–52.1 kg)
FLYWEIGHT	109–112 lb (49.3–50.7 kg)

TECHNIQUES AND TACTICS

Basic boxing training centers around physical fitness, speed of movement, throwing jabs, and footwork. Good punches can only be thrown from a solid base. The techniques of throwing different punches is taught later. Top boxers work with their trainers for weeks at a time leading up to championship fights working on their overall conditioning and on a fighting style tailored to their upcoming opponent. They will practice key punches and spar with fighters of a similar build and fighting style to their opponent in an attempt to gain some advantage.

ATTACK

Boxers must show aggression and throw punches in order to win fights so attacks—either as single punches or more usually two or three punch combinations—are essential. In order to launch a flurry of punches the boxer must first contain their opponent—a moving target is hard to strike. Therefore, good quick footwork, with the intention of cutting off the ring and trapping the opponent in a corner is important.

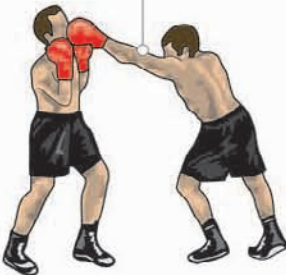


SOUTHPAW

A boxer's stance and method of fighting is either described as orthodox (left arm and foot forward) or southpaw (right arm and foot forward). A southpaw is usually someone who is left-handed, using their right hand for jabs and their left for power punches and hooks. Some particularly dextrous fighters are able to switch between styles during bouts. Because most fighters are orthodox, a southpaw opponent can be a tricky proposition, requiring an altered set of tactics.

Perfect punch

A fully extended arm makes for a textbook jab



JAB

The staple punch of any boxer, a stiff jab keeps an opponent at bay and sets up attacks. Jabs are usually the first punch in any combination.

Feel the pain

Hooks to the body greatly weaken a fighter's resilience

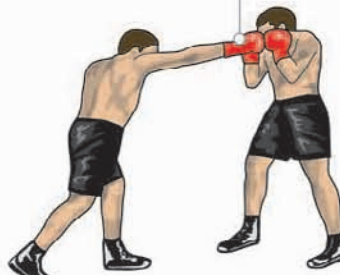


HOOK

Hooks are delivered to the side of the head or body. Because of the angle of delivery the receiving fighter will often not see a hook coming.

Block

This straight has been blocked by a good defense



STRAIGHT

Thrown with the "second" arm (right arm for orthodox boxers) the straight has a greater distance to travel, leaving the aggressor open to a counterpunch.

Knockout

A tight defense is sometimes no equal to an uppercut



UPPERCUT

The most devastating punch in boxing, the uppercut is delivered from a crouching position onto the opponent's chin from below with great force.



DEFENSE

The ability to keep from being hit, something the great Muhammad Ali was a master at, is probably more important than landing your own punches. The sheer speed of movement of some fighters can make them difficult to hit. However, the best means of repelling an attack is by covering up the head and body with the arms and hands with elbows tucked into the waist.

COMBINATIONS

A series of punches thrown in quick succession with both hands and from different angles is far more likely to achieve results than single shots, however hard they are thrown. These attacks often cause the opponent to lower or raise his guard, enabling the oncoming boxer to score hits in unprotected areas. A typical sequence might start with a 1-2 combination to the head. When the opponent raises his hands to defend, use the opportunity to sidestep and throw hooks to the body to finish off.

TYPES OF FIGHTERS

The style of fighting that a boxer chooses will be designed around his physical stature and strengths and weaknesses. For instance, former heavyweight champion Mike Tyson had a bullying, forward style and a fearsome punch. Floyd Mayweather Jr.'s style, in contrast, is about grace and poise. He is often able to outclass opponents with guile rather than brute force.

OUT-FIGHTER

Boxers who fight at a distance are usually tall with a long reach. They do not need to get close to an opponent to inflict damage and will resist all attempts to be drawn into a brawl. Top out-fighters, such as former heavyweight champion Lennox Lewis, typically have a strong jab, too.

IN-FIGHTER

Conversely, in-fighters are often shorter in height and with a short reach. Since they cannot win contests from a distance, they use their lower center of gravity to muscle in close, spoiling the work of their opponent and inflicting their own damaging punches. A fight between two in-fighters is always dramatic, since neither will back down.

BRAWLER

Also known as the "slugger," or "one puncher," the brawler often stands for everything that's most brutal in the sport. Sluggers tend to lack finesse in the ring, but make up for it in raw power, often able to knock almost any opponent out with a single punch. This makes them exciting to watch.

Angled attack
The cross strikes the opponent at an angle



CROSS

Thrown with the "second" hand, the cross punch is delivered right-to-left or left-to-right across the opponent's head or body.

ROPE-A-DOPE

A phrase coined by Muhammad Ali, the rope-a-dope is the technique of willingly lying on the ropes in a tight defensive stance and inviting the opponent to throw punches until they tire. Although considered a sin in boxing circles, Ali used this style to great effect on several occasions, most notably during the Rumble in the Jungle in Zaire in 1974. Reigning champion George Foreman threw hundreds of punches at his apparently helpless opponent before, in the eighth round, Ali came off the ropes and knocked out a visibly exhausted Foreman.

STAT CENTRAL

BEST FIGHTERS 2010

NAME	WEIGHT
MANNY PACQUIAO	JR. LIGHTWEIGHT
FLOYD MAYWEATHER	WELTERWEIGHT
JUAN MANUEL MARQUEZ	JR. LIGHTWEIGHT
NONITO DONAIRE	SPR. FLYWEIGHT
PAUL WILLIAMS	MIDDLEWEIGHT
SERGIO MARTINEZ	MIDDLEWEIGHT
PONGSAKLEK WONJONGKAM	FLYWEIGHT
FERNANDO MONTIEL	BANTAMWEIGHT
WLADIMIR KLITSCHKO	HEAVYWEIGHT
TIMOTHY BRADLEY	LT. WELTERWEIGHT

OLYMPIC HEAVYWEIGHT GOLDS

YEAR	NAME	COUNTRY
2008	RAKHIM CHAKKHIEV	RUS
2004	ODLANDIER SOLIS FONTE	CUB
2000	FELIX SAVON	CUB
1996	FELIX SAVON	CUB
1992	FELIX SAVON	CUB
1988	RAY MERCER	US
1984	HENRY TILLMAN	US
1980	TEOFILO STEVENSON	CUB
1976	TEOFILO STEVENSON	CUB
1972	TEOFILO STEVENSON	CUB

MOST CAREER FIGHTS

NAME	WEIGHT	FIGHTS
LEN WICKWAR	LT. HEAVY	463
JACK BRITTON	WELTER	350
JOHNNY DUNDEE	FEATHER	333
BILLY BIRD	WELTER	318
GEORGE MARSDEN	N/A	311
MAXIE ROSENBLUM	LT. HEAVY	299
HARRY GREB	MIDDLE	298
YOUNG STRIBLING	LT. HEAVY	286
BATTLING LEVINSKY	LT. HEAVY	282
TED (KID) LEWIS	WELTER	279

BIRTH NAMES OF SOME GREATS

BIRTH NAME	FIGHTING NAME
WALKER SMITH	SUGAR RAY ROBINSON
ANTHONY ZESKI	TONY ZALE
ROCCO BARBELLA	ROCKY GRAZIANO
ARNOLD CREAM	JERSEY JOE WALCOTT
JOSEPH BARROW	JOE LOUIS
ROCCO MARCHEGIANO	ROCKY MARCIANO
GERARDO GONZALEZ	KID GAVILAN
JUDAH BERGMAN	JACKIE (KID) BERG
WILLIAM GUIGLERMO PAPALEO	WILLIE PEP
ELIGIO SARDINIAS MONTALBO	KID CHOCOLATE
ARCHIBALD LEEWRIGHT	ARCHIE MOORE
RICHARD IHETU	DICK TIGER

INSIDE STORY

Amateur boxing has been governed around the world since 1946 by the Association Internationale de Boxe Amateur (AIBA). The organization oversees the rules and regulations of the sport, governs boxing at the Olympic Games, and has organized a world championship since 1974. The professional sport is marred by disagreement and corruption at governing level. A series of governing bodies recognizes their own world champions at different weights. It is rare in modern professional boxing for a fighter to be acknowledged as an undisputed world champion.

PROFESSIONAL GOVERNING BODIES

In the complex world of professional boxing there are currently more than 10 organizations that purport to be world governing bodies. The four most credible are as follows: The World Boxing Association (WBA) dates from 1921 and is the longest-standing professional governing body, but did not have global coverage. In 1963, the World Boxing Council (WBC) was created in the interests of achieving the first truly international body to control the sport. In 1983, the International Boxing Federation (IBF)—formerly the United States Boxing Association—was formed by breakaway members of the WBA. It is based in New Jersey. Then, in 1988, the World Boxing Organization (WBO) was created in Puerto Rico by further disillusioned members of the WBA.



Face mask

Fencers wear a mask that covers the head and neck. The face is protected by a fine metallic mesh, and the neck is covered by a fabric bib

Protective jacket

Competitors wear a padded long-sleeved cotton jacket and, for added safety, a protective undergarment, or plastron, on the sword-arm side

White breeches

Fencers traditionally wear white cotton knee-length breeches. The legs are not padded

ATHLETE PROFILE

Speed, fast responses, agility, and quick footwork are important skills for fencing champions, who tend to be lightly built and lithe. Poise, balance, and hand-eye coordination are also necessary attributes. Mental skills are as crucial as physical ones: concentration, quick thinking, and tactical ability are all important.

Hand guard

A metal guard at the sword's hilt protects the fencer's fingers from injury

Flexible blade

The shape and stiffness of the blade depends on the weapon

Socks

The fencer wears black or white knee-length socks

Shoes

Nimble footwork is a key fencing skill, and competitors wear light, flat-soled trainers with a good grip

NEED2KNOW

- ➔ The term "fencing" is derived from the word "defense," which recalls the time when sword fighting was a vital skill on the battlefield.
- ➔ There are three types of fencing distinguished by the type of sword used in contests: the foil, the épée, and the sabre.
- ➔ Fencing is primarily a European tradition. It was particularly associated with France and Italy, which is why so many fencing terms still in use are French.

SIDELINES

25 Number of fencers competing in the 1896 Olympic Games. Fencing is one of only four sports to have appeared in every modern Olympic Games.

5 Fencing is one of the five modern pentathlon events in the Olympics, along with shooting, swimming, equestrian show jumping, and running.

13 Number of Olympic medals (including six gold) won by Italy's Edoardo Mangiarotti. He holds the record for winning the most fencing medals.

7 Number of hours a Masters Championship bout lasted in New York in the 1930s—after which bouts were limited to 30 minutes. Today, a bout lasts for just three minutes.



FENCING

SPORT OVERVIEW

Fencing matches consist of bouts between two opponents armed with lightweight, blunt-tipped swords. Points are scored by hitting target areas on the opponent's body with the tip of the weapon. The target areas are determined by the type of weapon being used. Modern fencing developed from the centuries-old tradition of sword fighting in warfare. Swordplay developed during the sixteenth century as a sport rather than as a means of survival. Fencing featured in the first modern Olympic Games of 1896 and has appeared ever since.

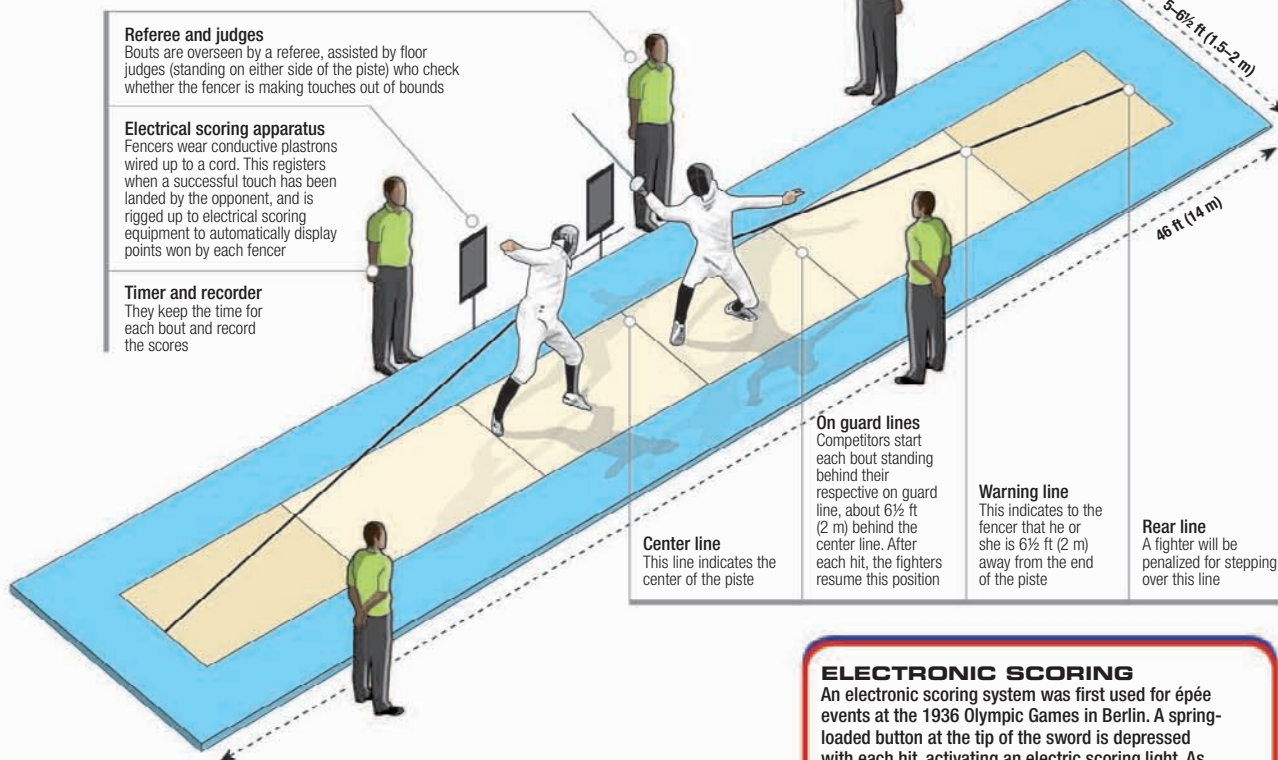
"DISONISCHENKO"

DURING THE 1976 OLYMPICS (AT THE HEIGHT OF THE COLD WAR), SCANDAL ROCKED THE GAMES. BORIS ONISCHENKO OF THE USSR WAS COMPETING AGAINST BRITAIN'S JIM FOX. FOX SUSPECTED FOUL PLAY AND IT WAS DISCOVERED THAT ONISCHENKO'S ÉPÉE HAD BEEN RIGGED, ALLOWING HIM TO FALSELY RECORD HITS. DUBBED "DISONISCHENKO" BY THE PRESS, HE WAS DISQUALIFIED, ALONG WITH THE WHOLE SOVIET PENTATHLON TEAM.



ON THE PISTE

Fencing bouts are conducted on a narrow, raised platform known as a piste. There is a runback, or extension, at either end of the fighting area of the piste. The height of the platform may vary; the piste is raised to allow spectators a better view of the contest. The fighting area is covered with nonslip conductive mesh, which neutralizes any floor touches.



Referee and judges

Bouts are overseen by a referee, assisted by floor judges (standing on either side of the piste) who check whether the fencer is making touches out of bounds

Electrical scoring apparatus

Fencers wear conductive plastrons wired up to a cord. This registers when a successful touch has been landed by the opponent, and is rigged up to electrical scoring equipment to automatically display points won by each fencer

Timer and recorder

They keep the time for each bout and record the scores

Center line
This line indicates the center of the piste

On guard lines
Competitors start each bout standing behind their respective on guard line, about 6½ ft (2 m) behind the center line. After each hit, the fighters resume this position

Warning line
This indicates to the fencer that he or she is 6½ ft (2 m) away from the end of the piste

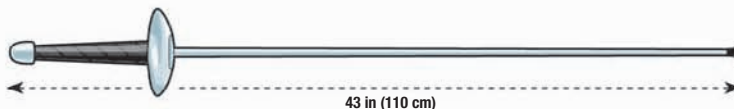
Rear line
A fighter will be penalized for stepping over this line

EQUIPMENT

There are three different weapons used in fencing: the foil (the sword with which novices usually learn how to fence), the épée, and the sabre. Each has its own associated scoring zone on the opponent's body, and is played to a unique set of rules. Elite fencers usually prefer to specialize in one of these disciplines rather than attempt to master all three.

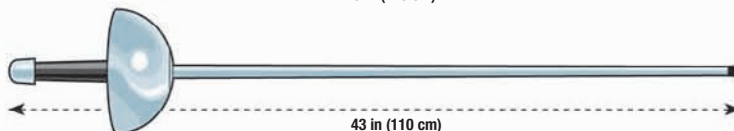
FOIL

A lightweight weapon with a flexible blade, the foil has a push-button at its tip that must be depressed with a pressure of at least 1.1 lb (500 g) to register a hit.



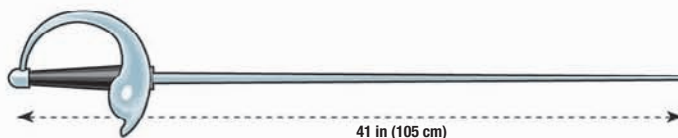
ÉPÉE

The épée is heavier and stiffer than the foil, requiring a pressure of 1.6 lb (750 g) on the push-button to register a hit. The whole body is a valid target.



SABRE

With the sabre, points can be scored using the edge of the blade as well as the tip. There is no push-button: for safety, the sharp point is folded back.



GRIPS

The grip is where the fencer holds the weapon, and there are four main types: French, Italian, Spanish, and pistol. The French grip (shown here) is popular with both novices and advanced fencers.



FOIL



ÉPÉE



SABRE

ELECTRONIC SCORING

An electronic scoring system was first used for épée events at the 1936 Olympic Games in Berlin. A spring-loaded button at the tip of the sword is depressed with each hit, activating an electric scoring light. As the whole body is a target in épée, a reliable scoring system was relatively easy to introduce. It wasn't until the 1956 Olympics in Melbourne that an electric system was first used for foil. It required the use of an electric jacket to cover the target areas, enabling the device to differentiate between "on-target" and "off-target" hits.

RULES AND REGULATIONS

A fencing match consists of three three-minute bouts with one minute's rest between each bout. The winner is the first competitor to score fifteen points, or whoever has the higher score at the end of regulation time. A competitor scores a point by making a legitimate touch to a target area on the opponent's body. Each of the three disciplines within fencing has its own associated target area. If a fencer steps behind the rear limit of his or her side of the piste, their opponent is awarded a point. At Olympic events, there are no preliminary rounds, only elimination contests.

FENCING TERMS

Fencing was a popular pursuit in France, Italy, and Spain, and many of the technical terms are French:

- ATTACK AU FER** An attack on the opponent's blade
CORPS A CORPS Literally translated as "body to body," this is when two fencers come into bodily contact (an illegal move)
COUP SEC A meeting of blades that is both crisp and firm (literally, a "dry" blow)
DEROBEMENT An evasive slide off an opponent's blade
DESSOUS The low line
DESSUS The high line
FINALÉ The last part of an offensive action
JOUR An opening into which an attack can be launched
REPARTÉE Making repeated jabbing motions with the sword arm
TOUCHÉ A touch with the weapon

BASIC TARGET AREAS

The torso is the main target area (and the only target area in foil fencing). For assault purposes, the torso is divided into four quarters: areas on the upper half are known as the high lines; those on the lower half are called the low lines.

INSIDE AND OUTSIDE LINES

The four quarters of the torso can also be described as inside and outside lines. The two quarters of the target area facing the palm side of the sword hand are known as the inside lines. The two quarters facing the back of the sword hand are referred to as the outside lines.

HIGH LINES

The two quarters of the high lines are each divided into two further areas. Quarte and sixte touches (four and six) are made with the sword hand in supination (nails up). Tierce and quinte (three and five) are made with the sword hand in pronation (nails down).

ALL WHITE ON THE NIGHT

The uniform worn during a fencing bout is traditionally white (although the International Fencing Federation now permits the use of other light colors). It is thought that the white jacket and breeches is a throwback to the days before electronic scoring systems were introduced: the blade would often be covered in soot or ink so that a touch would show up clearly on the opponent's jacket.

PLAYING THE GAME

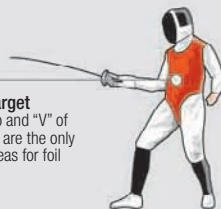
Fencing matches begin with the fencers taking up their positions behind their respective on guard lines. The referee signals the start of a bout by shouting "on guard!" Play is athletic and fast (making an electronic scoring system a necessity), consisting of a series of attacks, parries, and ripostes (counterattacks). In foil and sabre fencing, a "right of way" rule determines who receives the point if both players land a hit simultaneously. This generally means the attacking player wins the point. In épée, both players receive a point.

FOIL

Foil fighting offers the smallest target area, concentrated on the opponent's torso. The electronic scoring system will only register a hit landed in this area.

Torso target

The torso and "V" of the groin are the only target areas for foil



ÉPÉE

In épée fighting, a touch can be registered anywhere on the body. However, most attacks are made on the closest part of the competitor, such as the hand, arm, or front foot.

Access all areas

A valid hit is scored anywhere on the opponent's body



SABRE

The whole of the upper body is a target area in sabre fighting, including the arms and the head. Sabre fencing is lightning fast and usually consists of attacks and feints (false attacks).

Upper body

A point is scored for every hit landed above the waist



THE EIGHT TARGET AREAS

The four quarters of the torso are each divided into two sections. These sections are known as: prime, seconde, tierce, quarte, quinte, sixte, septime, and octave (this means simply one to eight).



- 1 Prime**
The first target area—on the low line
- 2 Seconde**
The second target area—on the low line
- 3 Tierce**
The third target area—on the high line
- 4 Quarte**
The fourth target area—on the high line
- 5 Quinte**
The fifth target area—on the high line
- 6 Sixte**
The sixth target area—on the high line
- 7 Septime**
The seventh target area—on the low line
- 8 Octave**
The eighth target area—on the low line

THE SALUTE

Fencing is a sport that takes its tradition seriously, and players adhere to a strict code of courtesy, etiquette, and honor. An important part of this is the ritual of the salute. The opponents salute each other before the bout by standing with their weapon held vertically in front of their face. They also salute the referees and spectators. After the bout, the opponents will salute each other again, and shake hands with their unarmed hand.





TECHNIQUES AND TACTICS

Fencing techniques focus on scoring successful touches on the legitimate target areas of the opponent's body. Attacking and defending moves are of equal importance in contests, and a skillful fencer can parry an attack to turn it into an opportunity to launch a counterattack. In contrast to the dramatic gestures and daring attacks often seen in swashbuckling movies, small, precise movements are generally required to avoid (or land) a hit—a surreptitious attack is more difficult to anticipate than a dramatic one.

ATTACK

An attack involves extending the sword toward the opponent. The arm is extended from the shoulder completely straight, and the attack is made in one fluid movement. A lunge forward will add force to the attack.

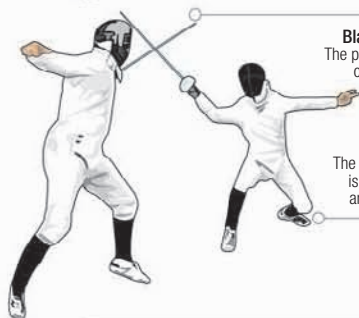


In position
The "on guard" position is the starting point for both offensive and defensive moves

Lunge forward
The opening attack is often accompanied by a lunge forward

PARRY

The parry is a defensive action. This move is designed to deflect or block the opponent's weapon from its intended attacking course. Parries are named after the target position at which they take place, such as a "quarte" parry.

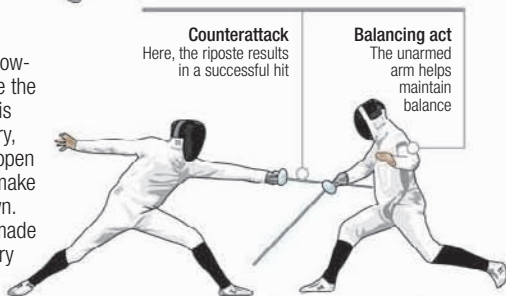


Blade deflection
The parry deflects the opponent's blade

Overexposure
The attacking fencer is now exposed to any counterattack

RIPOSTE

The riposte is the counterattacking follow-up to the parry. Once the opponent's weapon is deflected by the parry, this leaves a space open for the defender to make an attack of their own. The riposte can be made directly after the parry or can be delayed.



Counterattack
Here, the riposte results in a successful hit

Balancing act
The unarmed arm helps maintain balance

INSIDE STORY

Fencing evolved from an ancient form of combat practiced by the ancient Egyptians and Romans, although the current rules and regulations are loosely based on the conventions developed in Europe in the 18th and 19th centuries. Fencing's governing body is the Fédération Internationale d'Escrime (FIE), which was established in Paris in 1913 to standardize the rules that made international fencing tournaments possible. The FIE organizes World Championships that take place every year apart from Olympic years. Fencing has been an Olympic sport since the first modern Olympics in 1896, with the first women's event appearing in 1924.

FIE

Founded in 1913 and with headquarters in Lausanne, Switzerland, the Fédération Internationale d'Escrime (International Fencing Federation) is the organization responsible for setting the rules and regulations for international contests. There are currently 122 affiliated national fencing federations.

FOILED AGAIN

TENSIONS RAN SO HIGH AT THE 1924 OLYMPICS THAT AN ACTUAL DUEL WAS FOUGHT BETWEEN SPARRING COMPETITORS. AFTER JUST TWO MINUTES, BLOOD WAS DRAWN—AND HONOR RESTORED.

STAT CENTRAL

OLYMPIC MEN'S FOIL CHAMPIONS

YEAR	NAME	COUNTRY
2008	BENJAMIN KLEIBRINK	(GER)
2004	BRICE GUYART	(FRA)
2000	KIM YOUNG-HO	(KOR)
1996	ALESSANDRO PUCCINI	(ITA)
1992	PHILIPPE OMNÈS	(FRA)

OLYMPIC WOMEN'S FOIL CHAMPIONS

YEAR	NAME	COUNTRY
2008	VALENTINA VEZZALI	(ITA)
2004	VALENTINA VEZZALI	(ITA)
2000	VALENTINA VEZZALI	(ITA)
1996	LAURA BADEA	(ROM)
1992	GIOVANNA TRILLINI	(ITA)

OLYMPIC MEN'S ÉPÉE CHAMPIONS

YEAR	NAME	COUNTRY
2008	MATTEO TAGLIARIOL	(SUI)
2004	MARCEL FISCHER	(SUI)
2000	PAVEL KOLOBKOV	(RUS)
1996	ALEKSANDR BEKETOV	(RUS)
1992	ERIC SRECKI	(FRA)

OLYMPIC WOMEN'S ÉPÉE CHAMPIONS

YEAR	NAME	COUNTRY
2008	BRITTA HEIDEMANN	(GER)
2004	TIMEA NAGY	(HUN)
2000	TIMEA NAGY	(HUN)
1996	LAURA FLESSEL	(FRA)
1992	COMPETITION NOT HELD	

OLYMPIC MEN'S SABRE CHAMPIONS

YEAR	NAME	COUNTRY
2008	ZHONG MAN	(CHI)
2004	ALDO MONTANO	(ITA)
2000	MIHAI CLAUDIU COVALIU	(ROM)
1996	STANISLAV POZDNIAKOV	(RUS)
1992	BENCE SZABÓ	(HUN)

OLYMPIC WOMEN'S SABRE CHAMPIONS

YEAR	NAME	COUNTRY
2008	MARIEL ZAGUNIS	(US)
2004	MARIEL ZAGUNIS	(US)
2000	COMPETITION NOT HELD	
1996	COMPETITION NOT HELD	
1992	COMPETITION NOT HELD	

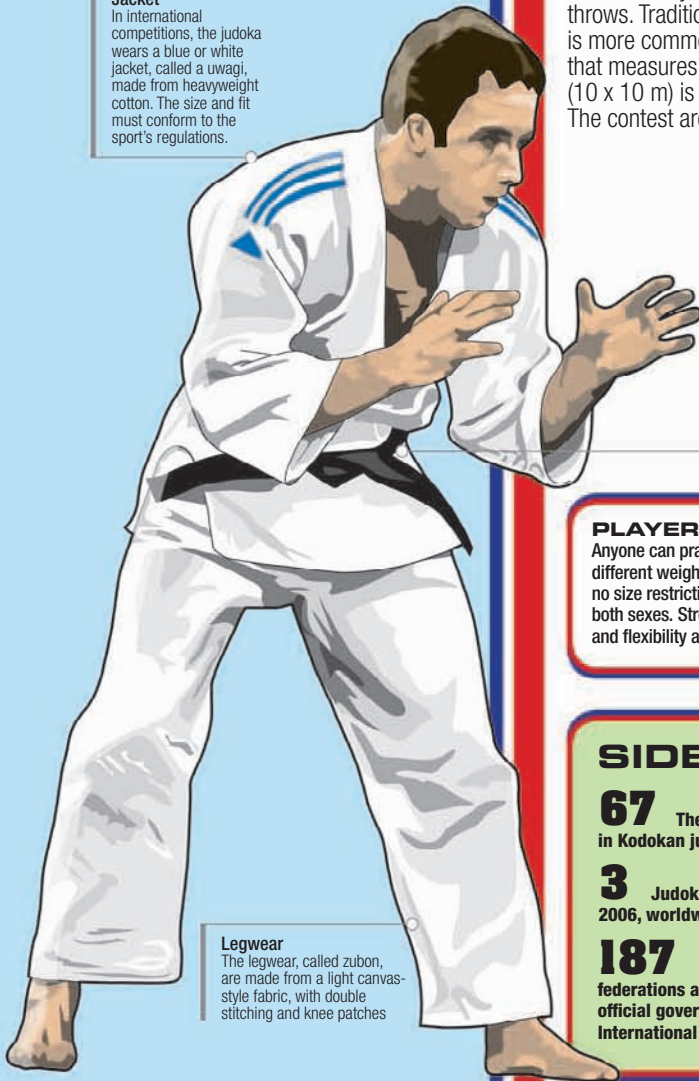
NEED2KNOW

210

- Freestyle sparring, or randori, is the best way to learn the techniques and tactics of judo. This form of training is considered to be the most effective way to improve muscle strength and cardiovascular fitness, speed up reaction time, and hone the skills needed to resist an opponent's attack.
- Strangulation and choking are some of the most effective techniques in judo. Strangulation cuts off the blood supply to the brain at the carotid arteries at the sides neck, while choking blocks the passage of air at the front of the neck. Both may render an opponent unconscious in seconds.
- The Kodokan Judo Institute in Tokyo, Japan, is the spiritual home of judo. It was founded by Jigoro Kano (1860–1938), creator of judo, in 1882.

Jacket

In international competitions, the judoka wears a blue or white jacket, called a uwagi, made from heavyweight cotton. The size and fit must conform to the sport's regulations.



Legwear

The legwear, called zubon, are made from a light canvas-style fabric, with double stitching and knee patches



JUDO

GAME OVERVIEW

Judo developed in the nineteenth century from the teachings of Jigoro Kano of Japan. Based on the centuries-old techniques of ju-jitsu, this unarmed combat sport forbids any form of punching or kicking. Instead, the aim is to score an ippon—the equivalent of a knockout punch—by throwing an opponent to the ground, pinning an opponent down, or forcing a submission using an armlock or choke.

FIELD OF PLAY

The size of the competition area conforms to the rules of the International Judo Federation (IJF). The floor is covered with protective mats called tatami, which usually measure 6 ft 6 in x (3 ft 2 x 1 m) and cushion the impact of throws. Traditionally, tatami are made from pressed straw but pressed foam is more common today. Most competitions take place within a contest area that measures 26 x 26 ft (8 x 8 m), although an area up to 33 x 33 ft (10 x 10 m) is allowed. IJF rules also require a safety area of 10 ft (3 m). The contest area and safety area are together known as the field of play.

Referee

The referee stands within the contest area and shouts "Hajime!" to start the fight. The referee judges the fight and signals his scores to the scorers. If there is a dispute, the referee will consult with the two corner judges to come to a decision

Identifying colors

In competition, the color of the tatami that make up the contest area is different from those that make up the safety area. Any color combination can be used

Safety Area

The safety area is a 10 ft (3 m) wide border that encloses the danger area. The safety area is not completely out of bounds. A judoka may throw his or her opponent into the safety area and still score points if a step is taken into the safety area after the throw. But an automatic penalty is given if a judoka intentionally steps out of the competition area

Belt
The belt is 10 ft (3 m) long, and the color indicates the judoka's rank

PLAYER PROFILE

Anyone can practice judo. There are different weight classes, so there are no size restrictions, and it is open to both sexes. Strength is vital but agility and flexibility are equally important.

SIDELINES

67 The official number of throws in Kodokan judo.

3 Judoka ranked at 10th dan in 2006, worldwide.

187 The number of national federations affiliated to the sport's official governing body, the International Judo Federation.

77 The age of Jigoro Kano when he died in 1938.

7 The number of judo weight categories in the Olympics.

10 The average number of seconds it takes a person to fall unconscious when placed in a chokehold.





BELT SYSTEM

The color of a judoka's belt corresponds to his or her rank within the kyu-dan grading system. Traditionally, there are six student grades (or dan), or kyu. In western judo, they have the following belt colors: sixth kyu (white), fifth kyu (yellow), fourth kyu (orange), third kyu (green), second kyu (blue), and first kyu (brown). Some countries have extra kyu and belt colors, while in Japan judoka usually wear a white belt up to the rank of first kyu. The belt colors of the 12 advanced grades are much more consistent. Judoka from the first five dan wear a black belt. Judoka from sixth dan to eighth dan wear belts with alternating white and red (or black) panels. Solid red (or black) belts are accorded to judoka up to eleventh dan, while the belt for the highest rank, twelfth dan, is a wider version of the simple white belt of a beginner.

SCOREBOARD

The scoreboard displays the stopclock and the points and penalties accumulated by each judoka during the fight. Judo has four scores (see p.212), which are shown at the top of the scoreboard below (from left to right): "I" stands for ippon, "W" stands for waza-ari, "Y" stands for yuko, and "K" stands for koka. Judo has two penalties, which are shown by the red light next to the letters in the center of the scoreboard. "H" stands for hansokumake (immediate disqualification), and "S" stands for shido. If a judoka is awarded four shidos, the result is a hansokumake and the judoka is disqualified.

Timers

There are two timekeepers. One records the time for the contest. The other specializes in "osaekomi", the referee's command to begin timing a hold

Scorers

The scorer and contest recorder keep a written record of the score and the overall course of each fight

White

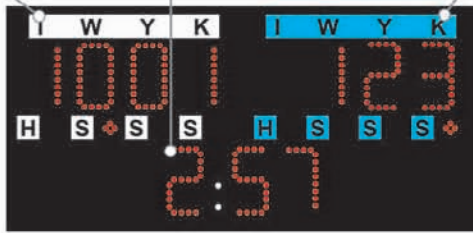
The judoka in white scored an ippon to win the match. The scoreboard shows three penalties (shido) against white

Stopclock

The time limit for international competition is five minutes for men and four minutes for women

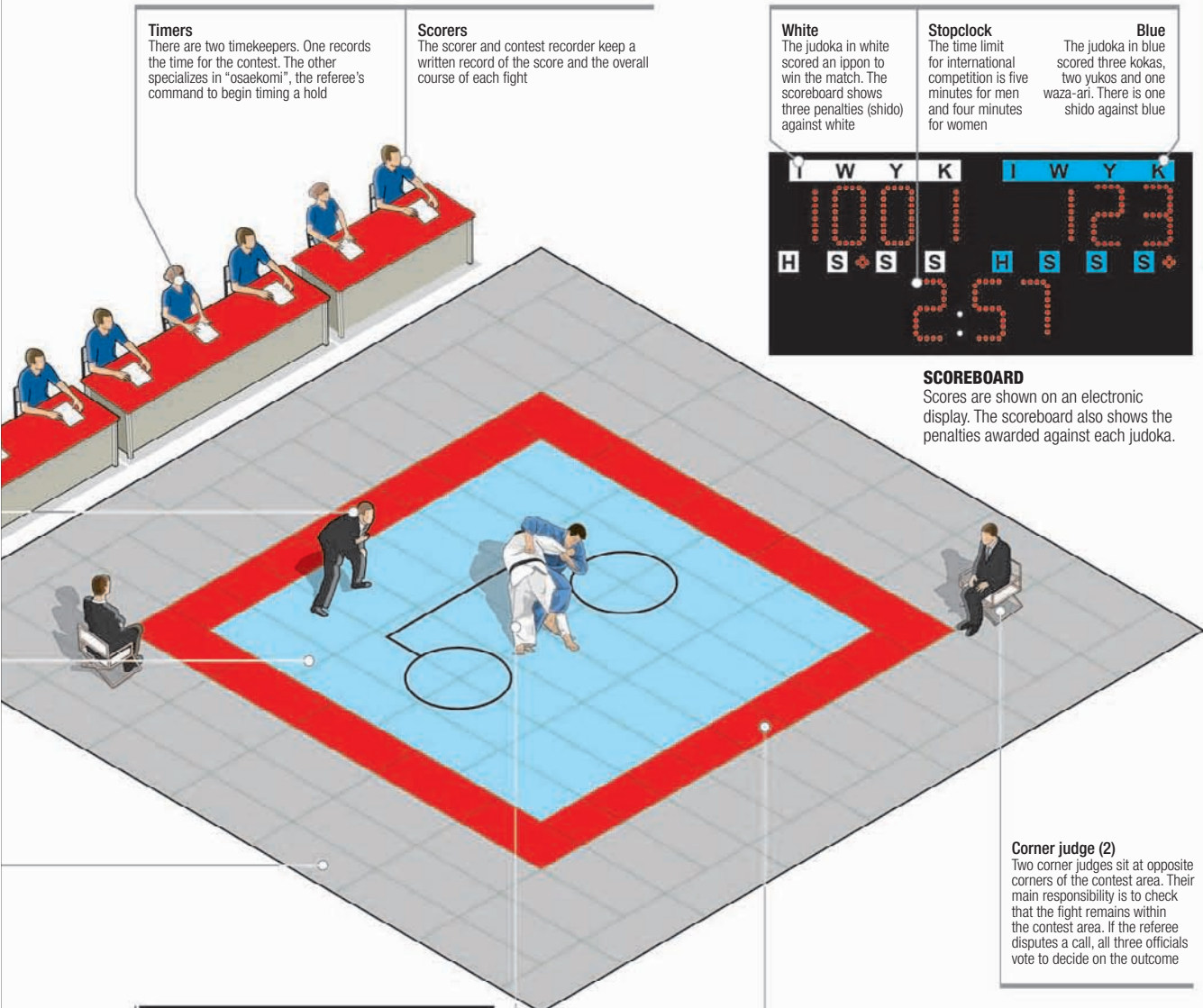
Blue

The judoka in blue scored three kokas, two yukos and one waza-ari. There is one shido against blue



SCOREBOARD

Scores are shown on an electronic display. The scoreboard also shows the penalties awarded against each judoka.



Corner judge (2)

Two corner judges sit at opposite corners of the contest area. Their main responsibility is to check that the fight remains within the contest area. If the referee disputes a call, all three officials vote to decide on the outcome

THE GENTLE WAY

JUDO IS JAPANESE FOR "GENTLE WAY," AND REFERS TO THE AIM OF TURNING AN OPPONENT'S STRENGTH TO YOUR OWN ADVANTAGE. THE GOAL OF A JUDOKA IS TO UPSET THE OPPONENT'S BALANCE AND MOMENTUM TO ACHIEVE FORCEFUL THROWS WITH MINIMUM EFFORT.

Judoka

In competition, the first judoka called to fight wears a blue judogi. His or her opponent wears a white judogi. At the beginning and end of the contest, each contestant stands on the mark that corresponds to the color of his or her judogi and bows as a sign of respect. Both contestants return to their marks if the referee shouts "Matte!" during a fight

Danger Zone

The danger zone is a border 3 ft (1 m) wide that encloses the contest area. The danger zone forms part of the contest area, but there is a penalty for spending too long in this part of the competition area. Red tatami are used to make up the danger zone. In 2006, a trial rule change did away with the danger zone. It looks likely that the IJF will make the rule change permanent in 2007



BASIC JUDO GRIP

The basic judo grip is the sleeve and lapel grip. This involves gripping the lapel of the opponent's uwagi with the right hand and using the left hand to grip the opponent's right sleeve under the elbow. The basic grip is an excellent starting point for throws.



Gripping the lapel
The lapel is used in a number of moves to get hold of the opponent

Elbow grip
The judoka grips their opponent's right sleeve under the elbow

RULES AND REGULATIONS

Judo is governed by the rules of the International Judo Federation (IJF). Recent rule books show a trend toward a dynamic style of judo—a defensive style is heavily penalized.

IPPON, WAZA-ARI, YOKO, KOKA

There are four ways to score in a judo contest. A judoka can win the fight outright by scoring an ippon or by scoring two waza-aris, which is the equivalent of an ippon. Lesser scores include the yoko and koka. If the time limit passes before an ippon is scored, the number of lesser scores are taken into consideration.

PENALTIES

Judoka are expected to fight fairly and in the spirit of the sport. Foul play is heavily penalized. The four levels of punishment are: first shido (known simply as shido), second shido (chui), third shido (keikoku), and hansokukame (disqualification). Penalties are cumulative and result in the next higher penalty, so a judoka who commits four relatively minor violations may be disqualified.

TECHNIQUES AND TACTICS

There are two main phases of combat in judo. During the standing phase (tachi-waza), the goal is to throw your opponent on to their back using control, force, and speed. During the ground phase (ne-waza), the goal is to pin your opponent on to the ground or force a submission.

THROWS

A judoka uses a variety of throwing techniques (nage-waza) to force an opponent onto the ground. A judoka can score an ippon and win the fight outright by executing a powerful and controlled throw to force the opponent onto his or her back. In competition, however, judoka are evenly matched so a throw will usually score a koka, yuko, or waza-ari.

O-GOSHI

The o-goshi is one of the traditional throws developed by judo's founding father, Jigoro Kano (1860–1938). It is classified as a hip-throwing technique, or koshi-waza. A hip throw uses the hip as a pivot point to throw the opponent to the floor. There are several types of hip throws. O-goshi is one of the first throws a judoka will learn.



Pivot point
The hip is the pivot point for the throw

Floor contact
The opponent is thrown off balance once contact with the floor is lost

IPPON SEOINAGE

The ippon seoinage is the most common throw encountered in elite judo competition. It is classified as a hand-throwing technique, or te-waza. Ippon seoinage involves throwing an opponent over the shoulder and onto the floor. It has been likened to throwing a sack of rice over the shoulder.



Sack of rice
Gripping the elbow sleeve, the opponent is thrown over the shoulder and then forced to the floor

Flexible knees
The thrower's knees are bent and flexible to add momentum to the throw

TOMOE NAGE

Some throwing techniques, called sacrifice throws, or sutemi-waza, are dangerous to execute because the thrower is positioned on the ground. One of these is the tomoe nage, or circle throw, which uses a foot planted on the stomach or thigh to throw the opponent over the head or shoulders.



High flying
The opponent is launched in to the air over the thrower, who is on the floor

Foot to stomach
The thrower plants their foot into the opponent's stomach as leverage for the throw

OSOTO GARI

The osoto gari is another of the original judo throws used by Jigoro Kano. It is classified as a foot-throwing technique, or ashi-waza. This type of throw involves using one of the legs to sweep away one of the opponent's legs. An effective osoto gari pinpoints the load-bearing leg so that the opponent falls over.



Getting a grip
The thrower grasps the sleeve at the elbow and the jacket

Leg sweep
The opponent's leg is swept up, throwing them off balance



STAT CENTRAL

WEIGHT CATEGORIES

FEMALE	MALE
+172 lb (+78 kg)	+220 lb (+100 kg)
172 lb (78 kg)	220 lb (100 kg)
154 lb (70 kg)	198 lb (90 kg)
139 lb (63 kg)	179 lb (81 kg)
126 lb (57 kg)	161 lb (73 kg)
114 lb (52 kg)	146 lb (66 kg)
106 lb (48 kg)	132 lb (60 kg)

MEN'S HEAVYWEIGHT OLYMPIC CHAMPIONS

YEAR	WINNER (NATIONALITY)
2008	SATOSHI ISHII (JAP)
2004	KEIJI SUZUKI (JAP)
2000	DAVID DOUILLET (FRA)
1996	DAVID DOUILLET (FRA)
1992	DAVID KHAKALESHVILI (UNI)
1988	HITOSHI SAITO (JAP)
1984	HITOSHI SAITO (JAP)
1980	ANGELO PARISI (FRA)
1976	SERGEI NOVIKOV (USSR)
1972	WILLEM RUSKA (NED)
1968	NO COMPETITION

WOMEN'S HEAVYWEIGHT OLYMPIC CHAMPIONS

YEAR	WINNER (NATIONALITY)
2008	TONG WEN (CHI)
2004	MAKI TSUKABA (JAP)
2000	HUA YUAN (CHI)
1996	SUN FU MING (CHI)

SIDELINES

7 The number of points awarded for throwing an opponent on their back without control and force.

2 The number of main phases of combat: the standing (tachi-waza) and the ground (ne-waza) phase.

4 The number of phases in throwing technique: off-balancing; body positioning; execution; and finish.

25 The number of seconds an opponent must be held or pinned down to the floor in order to win a match.

PINS

A pinning hold (osaekomi-waza) is a grappling technique that aims to hold the opponent on the ground. Osaekomi, in which both shoulders touch the ground for more than 25 seconds, results in an ippon. For holds of shorter durations, a judoka may score a waza-ari (20–24 seconds), yoko (15–19 seconds), or koka (10–14 seconds).

SAMURAI SPORT

JUDO IS DERIVED PARTLY FROM JUJITSU, THE HAND-TO-HAND COMBAT TECHNIQUE USED BY SAMURAI WARRIORS. IT IS THE ONLY OLYMPIC SPORT WHERE SUBMISSION HOLDS ALLOW CHOKING AN OPPONENT OR BREAKING THEIR ARM.

Around the neck

The judoka wraps his arm around the opponent's neck



Hip to chest

The judoka's hip is against his opponent's chest

Secure hold

One hand holds the neck

Grip the belt

The other hand passes through legs and grips the belt



KESA GATAME

Many judo throws end with kesa gatame in the ground phase, since the basic judo grip already has one hand on the opponent's lapel and one hand near the opponent's elbow.

YOKO-SHIHO GATAME

This osaekomi holds the opponent's neck and leg while laying on their chest. One hand wraps around the neck and grips the lapel. The other passes through the legs and grips the belt at the back.

SUBMISSIONS

A submission is achieved through a joint lock (kansetsu-waza) or strangulation (shime-waza). For reasons of safety, arm locks are the only kansetsu-waza allowed in competition. Strangulations are equally dangerous, and the use of shime-waza is usually restricted to age and rank in competitive judo.



Strangle hold
The judoka grips the opponent under the chin and straightens his arms to exert a chokehold

Thigh hold
The opponent's lower body is held between the judoka's thighs



Put pressure on
Leaning back, the judoka places huge pressure on the opponent's elbow

Over the chest
The judoka's legs extend over the opponent's chest

OKURI-ERI-JIME

The judoka slides one hand under the opponent's armpit and grips the opposite lapel. At the same time the judoka wraps the other arm around the neck and slides the hand up the free lapel.

JUJI GATAME

A powerful joint lock, here the legs end up across the opponent's chest, the arm locked between the thighs. The arm is held with the wrist to the chest. Leaning back places huge pressure on the elbow.

INSIDE STORY

Judo was first seen at the Olympics in the 1964 Tokyo Games. It has been a regular Olympic sport for men since the 1972 Munich Games. Women's judo was included as a demonstration sport in the 1988 Seoul Olympics and became an official Olympic event at the 1992 Barcelona Games. World Championships for men, women, and juniors are held every two years.

GOVERNING BODY

The International Judo Federation (IJF) is the world's governing body for judo. Founded in 1951, the IJF comprises five unions representing Africa, Asia, the Americas, Europe, and Oceania.

SUMO



- Wrestlers are known formally as *sumotoris*, informally as *rikishi*.
- From the first bout in Japan in 453 CE until the 1990s, sumo wrestling was a men-only sport, but the International Sumo Federation (IFS) now actively encourages female participation.
- The elaborate ceremonies surrounding a sumo contest are derived from Shinto religious practices: the prefight sprinkling of salt on the *dohyo*, for example, is to ward off evil spirits.

SPORT OVERVIEW

Sumo wrestlers attempt to throw their opponent either out of the ring or off balance so that he has to touch the ground with some other part of the body than his feet. Many matches last no longer than a few seconds, but the techniques, tactics, and rituals are endlessly fascinating to millions. Sumo originated in China in the 3rd century BCE, and was practiced almost exclusively in Japan until the 20th century, when its popularity spread worldwide.

Four corners
The four corners may be decorated to symbolize the seasons of the year

Gable roof
The structure is oriented. *Rikishi* always enter from east or west

In suspense
The *tsuriyane* is hung from the roof on ropes, wires, or poles



TSURIYANE CANOPY

The overhead structure above the *dais* on which the combat takes place is known as a "tsuriyane" (canopy). It traditionally resembles the roof of a Shinto shrine, but in some modern arenas it may be no more than a sheet of plexiglass.

COMBAT ZONE

Sumo bouts are played on a *dohyo*, a raised square platform within which a circular combat area is marked. The area is regarded as sacred to the spirits of the Shinto religion. A new *dohyo* is built for every major tournament. The edges of the circle are sprinkled with sand to help the referee see when a wrestler touches the perimeter.

Chon-mage

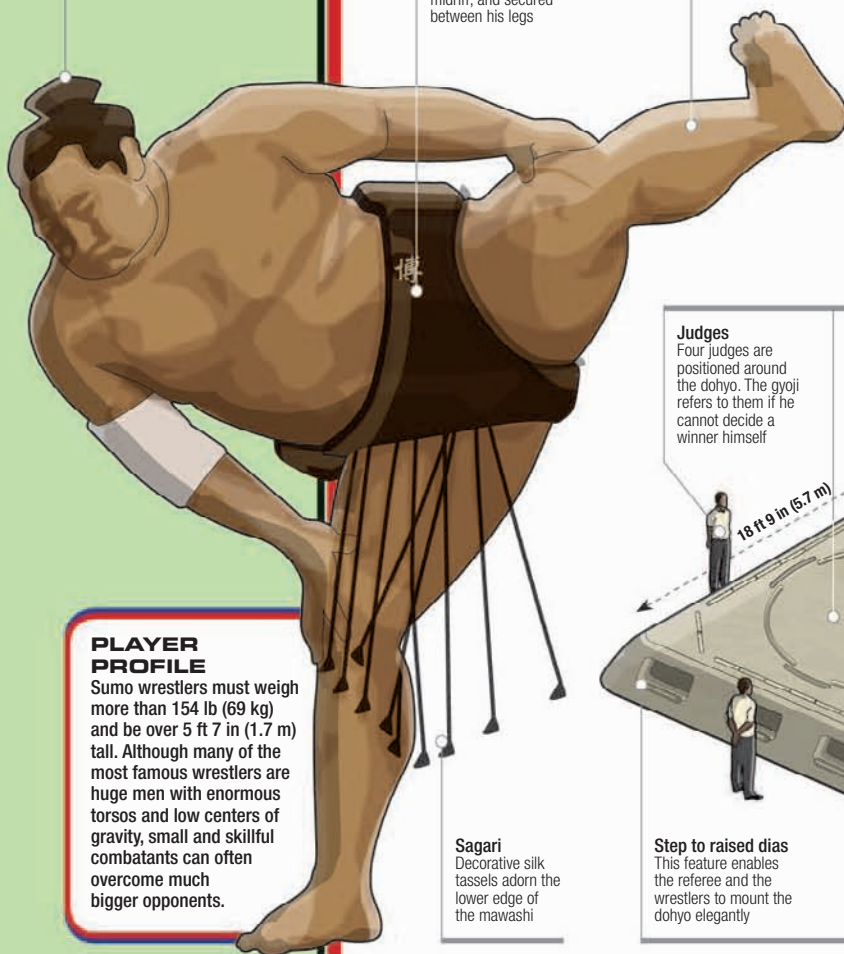
Japanese term for the sumo topknot and hair slicked with oil. The hair is tied to denote rank: the greater the wrestler, the more complex the knot

Mawashi

This thick belt is made of a band of silk about 32 ft (10 m) long, wound repeatedly around the wrestler's midriff, and secured between his legs

Raised leg

This ritual precombat gesture is a show of strength



PLAYER PROFILE

Sumo wrestlers must weigh more than 154 lb (69 kg) and be over 5 ft 7 in (1.7 m) tall. Although many of the most famous wrestlers are huge men with enormous torsos and low centers of gravity, small and skillful combatants can often overcome much bigger opponents.

Sagari

Decorative silk tassels adorn the lower edge of the mawashi

Judges

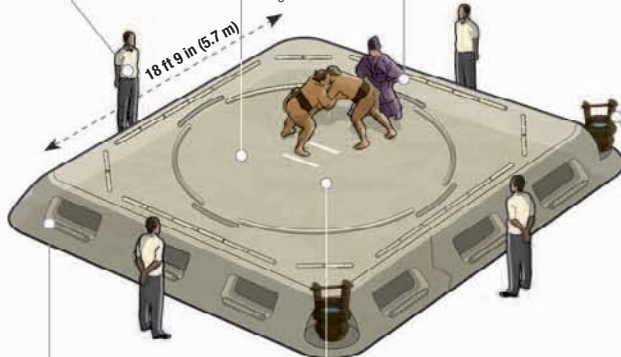
Four judges are positioned around the *dohyo*. The *gyoji* refers to them if he cannot decide a winner himself

Combat area

A circular clay surface is covered with sand; it is set on a raised platform 13–24 in (34–60 cm) above the ground

Gyoji

The Japanese term for referee. He wears a samurai kimono and a hat similar to that worn by medieval Shinto priests. He also carries the battle fan of Japanese generals



Step to raised dias

This feature enables the referee and the wrestlers to mount the *dohyo* elegantly

Parallel lines

Combatants square up behind these marks before the initial clinch

Water

For refreshment before the bout and at breaks during it

LAWS

At the start of a bout, each wrestler claps his hands to show that he is not holding anything. Once battle commences, the first wrestler to go down is the loser, but, if both wrestlers fall simultaneously, the referee or the judges may award the bout to either fighter if, in their view, the other had no chance of winning. Punching, kicking, choking, going for the eyes or stomach, pulling hair, and hitting below the belt are all prohibited and punishable by disqualification.

SUMO STYLES

There are two main styles of sumo wrestling: oshi-zumo and yotsu-zumo. In the former, also known as "fighting apart," the aim is to push the opponent out of the ring, often by using his own weight to his disadvantage. In yotsu-zumo, the objective is to get ahold of the opponent's belt, and then carry him out or throw him down. Specific techniques are shown below.

Handling charge
Grab the mawashi and start moving



Low grip
Attacker grasps bottom of belt



Ground force
Heavy pressure to prevent recovery



Shoo off
The push is best aimed at the rear



YORIKI

This move involves seizing the opponent's belt and attempting to march him out of the ring.

UWATENAGE

Gripping the mawashi, the sumotori pulls his opponent down while turning his own upper body.

YORITAOSHI

The frontal crush-out: the opponent is driven backward and collapses under the force of the attack.

OKURIDASHI

The rear push-out: wrestlers often become victims of this move after an attack of their own has gone wrong.

Turning tables
The right arm turns defense into attack



Flip over
The aim is to force a fall within the circle



Upper hand
The thrust is at the face and upper body



Top to bottom
The attacker pushes in order to get the opponent back on to his heels



HATAKIKOMI

As one wrestler charges, the other sidesteps and slaps the opponent's back or arm, pushing him over.

OKURITAOSHI

The rear push-down: the wrestler attacks from behind and forces the opponent to the ground.

OSHDASHI

Frontal push-out: the attacker shoves the opponent out of the ring without gripping the mawashi.

TSUKIDASHI

The attacker drives his opponent out of the ring with a rhythmic thrusting motion.

SIDELINES

625 The weight, in pounds, of Konishiki, the heaviest wrestler in sumo history. Born in Hawaii in 1963, he became an ozeki in 1987. He became famous worldwide under the nickname "The Dump Truck."

700 The approximate number of full-time professional sumo wrestlers at the start of 2007. Most are Japanese, although several other nationalities are also represented.

34,000,000 The annual fight money, in Japanese yen, earned by leading sumotori (about \$284,000). Some sumo stars supplement these basic earnings by sponsoring commercial products and making personal appearances.

INSIDE STORY

In the modern sport of sumo wrestling, the most prestigious events are the Grand Sumo tournaments. Six of them are held each year—three in Tokyo, and one each in Osaka, Nagoya, and Fukuoka. Each of the tournaments lasts 15 days and is watched by millions of television viewers. Wrestlers may be promoted or demoted from one rank to another as a result of their performances at these events. From its historical stronghold in Japan, sumo wrestling spread to many other parts of the world during the second half of the 20th century: it is now firmly established in 76 other countries, including the United States and 24 European nations.

INTERNATIONAL SUMO FEDERATION

The world governing body is still based in Tokyo, and most of the administrators are Japanese.



WRESTLING

NEED2KNOW

- ➔ Wrestling is enjoyed around the world, and is particularly popular in the United States, southeastern Europe, and West and Central Asia.
- ➔ As well as Greco-Roman and freestyle wrestling many local forms exist, such as glima in Iceland, kushti in Iran, schwingen in Switzerland, yaglı in Turkey, and sombo (see p233) in Russia.
- ➔ A women's freestyle world championship was introduced in 1987.

EVENT OVERVIEW

Wrestling is a combat sport in which players try to grapple their opponents to the ground using a variety of holds. It demands concentration and strategy, in addition to strength. The two main variations are freestyle, the more popular form, and Greco-Roman wrestling. Women's wrestling is also popular in some countries, such as the United States.

COMPETITOR PROFILE

Wrestlers must be physically strong and quick on their feet. Training involves weights and distance running to build up strength and stamina. Wrestlers also spend long periods rehearsing moves with sparring partners.

Color coded

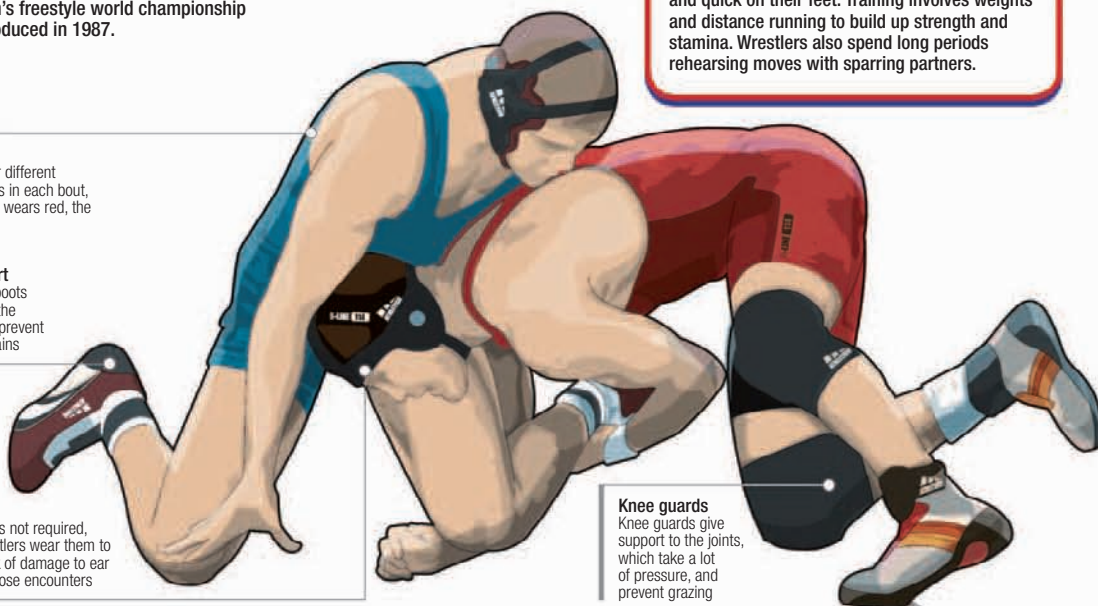
Wrestlers wear different colored singlets in each bout, one contestant wears red, the other blue

Ankle support

Rubber soled boots come up over the ankles to help prevent twists and sprains

Skull cap

A head guard is not required, but many wrestlers wear them to reduce the risk of damage to ear lobes during close encounters



Knee guards

Knee guards give support to the joints, which take a lot of pressure, and prevent grazing

COMBAT AREA

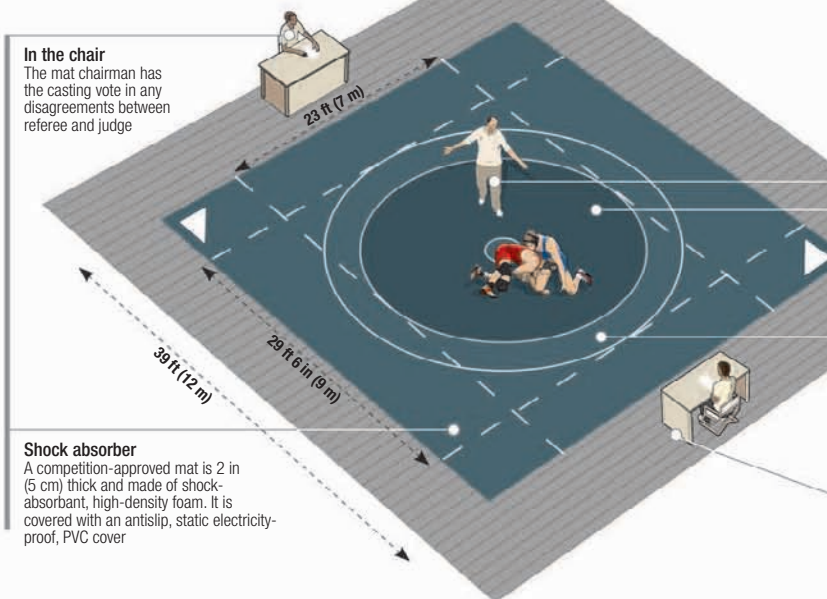
The wrestling area must be marked as shown. The surface, made of rubber, should be raised no more than 3 ft 7 in (1.1 m) above the floor. In opposite corners are red and blue triangles that mark the wrestlers' bases at the start of the bout. Matches are observed by a referee, who joins the wrestlers on the mat, so that he can study every move at close proximity. On the sidelines sit a judge and a third official known as the mat chairman: they may stop the bout if they notice an infringement that the referee has missed.

MARKING TIME

In freestyle wrestling, a pin (fall) ends a match. It must be held for about a second to score—the time it takes the referee to count “21, 22,” which he does in French (“vingt-et-un, vingt-deux”). A wrestler with a six-point lead is awarded that period of the bout.

In the chair

The mat chairman has the casting vote in any disagreements between referee and judge



Shock absorber

A competition-approved mat is 2 in (5 cm) thick and made of shock-absorbant, high-density foam. It is covered with an antislip, static electricity-proof, PVC cover

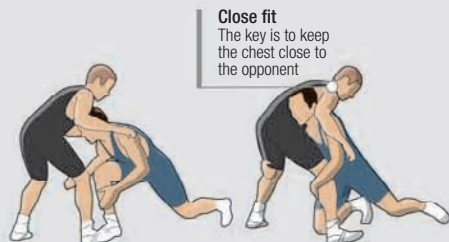


RULES OF ENGAGEMENT

Bouts are divided into two 3-minute periods, with a third period—known as the clinch—to settle ties. If a wrestler pins both his opponent's shoulders to the ground, he wins outright. More often the bout goes to the wrestler with the higher score. Points—from 1 to 5, according to the move—are awarded by the officials for throws and getting an opponent to the floor, particularly in the "danger position," with his back close to the mat, from where a pin may be easily possible.

FREESTYLE TAKEDOWN

Although the arms play a significant role in freestyle wrestling, both during and after the initial grapple, leg holds normally dominate. Most of a bout is fought with both players on the mat. The double-leg takedown is a common way to get an opponent to the floor.



Close fit

The key is to keep the chest close to the opponent

ATTACK

The wrestler starts the move by going down on one knee as he advances towards his opponent.

GRASP

He then drops on to both knees, and grabs the opponent's legs behind the knees for leverage.



TWIST

Maintaining his grip, the attacker then twists and begins to get his legs around those of the other wrestler.

Constrictor

The attacker may also use his or her arms to hold down the opponent's legs



DROP

The attacker keeps hold of the opponent after he hits the floor and should be in the better position.

GRECO-ROMAN GRAPPLE

There are two categories of Greco-Roman holds: standing holds and mat holds. One exciting move is the shoulder throw, shown here. Also dramatic are head and hip tosses, which require strength, timing, and the agility to get out of the other wrestler's way as he or she falls.



START

Approaching from the side, the attacker grabs his opponent around the chest.



LIFT-OFF

Having gained a hold, the attacker lifts the other wrestler up, using his thighs and back.



PITCH

Keeping his feet on the floor, the attacker leans back and pulls the opponent over.

Possible pin
It's tough to exert enough pressure to pin an opponent from this position, but the attacking wrestler has the advantageous position



LAND LOCK

The attacker maintains his chest hold until the other wrestler is doubled up on the mat.

Protection area

The bout is stopped if a wrestler touches this zone with any part of his body

Wristy ref

The referee wears a red cuff on one arm and a blue cuff on the other; he shows points awarded to each wrestler by raising fingers on the appropriate hand

Wrestling area

The bout begins with the wrestlers facing each other on opposite sides of the inner circle

Passivity zone

A 3 ft 3 in (1 m) circle warns wrestlers that they are near the edge of the wrestling zone. They can fight here, but not begin moves

Judge

The judge records the scores he awards and also those signaled by the referee

INSIDE STORY

Wrestling has been a medal sport at every modern Olympic Games since 1896. Women first competed at the Olympics in 2004. Professional wrestling emerged in the United States in the early 20th century. The eventual result was the creation in 1963 of what became the World Wrestling Federation, or WWF (now World Wrestling Entertainment, WWE). The WWF oversaw the 1980s' and 1990s' heyday of events such as Wrestlemania, theatrical star-studded bouts that owed as much to entertainment as to sport.

GOVERNING BODY

The Fédération Internationale des Luttes Associées (FILA) was set up shortly before the opening of the Stockholm Olympics in 1912. In 1946 it relocated to France. In 1965, it moved to its current home in Lausanne, Switzerland. The organization currently has 160 affiliated national federations.

STAT CENTRAL

WEIGHT DIVISIONS (MEN)

DIVISION	WEIGHT (MAX. WEIGHT)
SUPER HEAVYWEIGHT	211–264 LB (96–120 KG)
HEAVYWEIGHT	211 LB (96 KG)
MIDDLEWEIGHT	185 LB (84 KG)
WELTERWEIGHT	163 LB (74 KG)
LIGHTWEIGHT	145 LB (66 KG)
BANTAMWEIGHT	132 LB (60 KG)
FLYWEIGHT	121 LB (55 KG)

TV TIMES

THE 1970S AND 80S SAW BRITISH WRESTLING AT ITS PEAK, WITH MILLIONS TUNING IN EVERY SATURDAY.

NEED2KNOW

218

- Karate is the most widely practiced of all the Asian martial arts. There are more than 70 different styles.
- Karate and kickboxing are quite closely related and for many years the same governing bodies oversaw both sports.
- Karate began in Okinawa in the 17th century. Funakoshi Gichin, who created the Shotokan style in the 20th century, is considered the father of modern karate.

Foot strikes

Kicks should strike the opponent using the ball of the foot or the instep. First extending the knee and then snapping through the lower leg generates extra power

Loose fit

The uniform must be light and loose fitting to give a full range of movement, including high kicks and low sweeps

FIGHTER PROFILE

Karateka are toned, athletic individuals with strong upper bodies and leg muscles. For kumite, karateka require a relatively high pain threshold. All leading karateka must have a high level of self-discipline and live their life according to the karate code (dojo kun).

SIDELINES

178 The number of competitors taking part in the 1st World Championships held in Tokyo in 1970. The competitors at the 2004 World Championships in Monterrey, Mexico, numbered 582.

15 The number of cement slabs broken by Bruce Haynes, a 8th-dan black belt and champion of tamashiwari. This karate art literally means "trial by wood" but has become the art of breaking objects with a single blow from a bare hand.

50,000,000

The estimated total number of individual members belonging to clubs, associations and groups affiliated to the World Karate Federation (WKF).

SPORT OVERVIEW

Karate is a Japanese martial art that literally means "empty hand." Derived from Chinese combat techniques karate uses the arms, hands, elbows, knees, feet, and head. Its key tenets are self-defense, physical fitness, and spiritual awareness, which karate practitioners, known as karateka, traditionally use for self-development. As pupils, they learn the basic techniques of breathing, kicking, punching, and blocking, and the various stances that provide a platform for stability or mobility. Karate's three main elements are kata (a series of moves), kumite (sparring with a partner), and kobudo (weapons forms). In the 1970s and 80s, karate became competitive and eventually evolved into a sport with world championships.



KARATE



Eye contact

As a sign of respect for their opponent, karateka never take their eye off their rival, even when bowing before the contest begins

Colored belt

The color of the karateka's belt indicates the level of proficiency he or she has reached

Balancing act

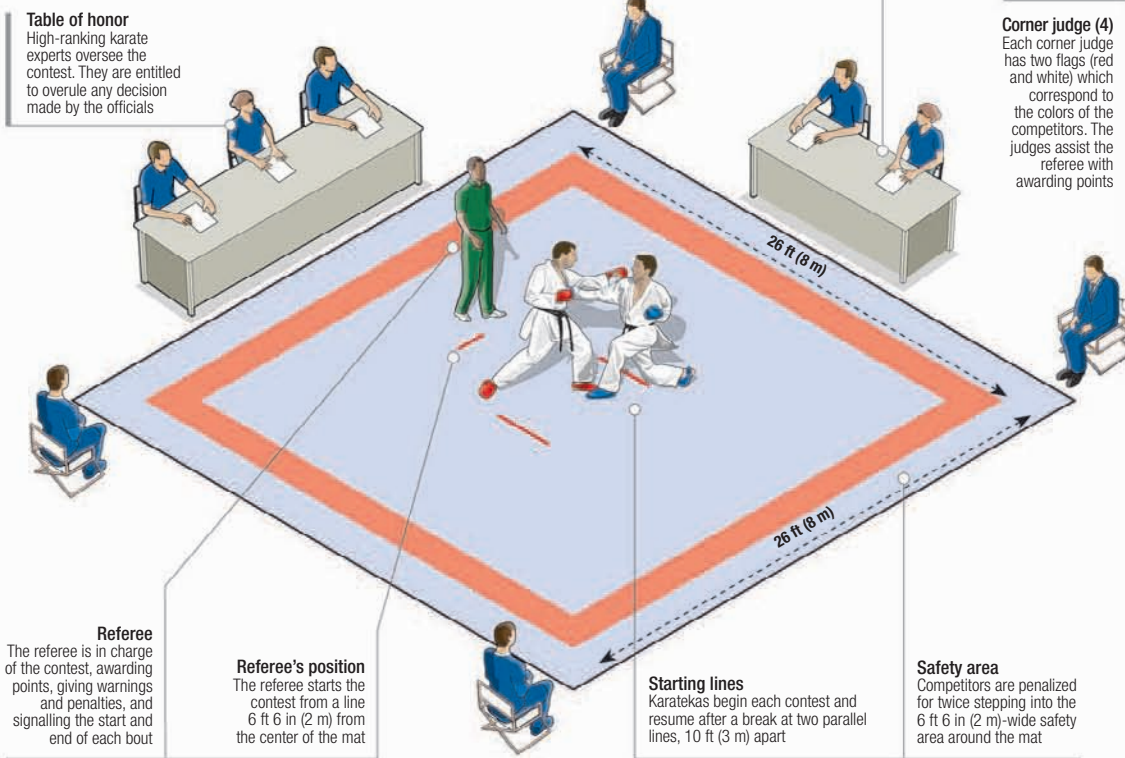
Achieving good balance is fundamental to all martial arts. If a karateka's stance is poor and not well rooted he or she will be easy to knock down or throw

SUPERFOOT

BILL "SUPERFOOT" WALLACE WAS ONE OF THE WORLD'S LEADING EXPONENTS OF KARATE AND KICKBOXING IN THE 1970S, WINNING 23 CONSECUTIVE FIGHTS BETWEEN 1974 AND 1980. WALLACE FOCUSED ON BUILDING MUSCLE IN HIS LEFT LEG AFTER A JUDO INJURY TO HIS RIGHT KNEE. HIS NICKNAME DERIVED FROM THE PRODIGIOUS POWER OF HIS LEFT LEG AND THE SPEED WITH WHICH HE COULD STRIKE. DURING TRIALS THIS WAS CLOCKED AT 60 MPH (90 KP/H).

AREA OF COMBAT

Kumite (sparring) matches are held on a square mat surrounded by a number of officials who ensure the contestants do not break the rules and are awarded the points for displaying the correct techniques. The karate rules of etiquette and respect are followed: for example, contestants bow to each other before the start of a bout by bending forward from the waist but always keeping alert and looking ahead.



KARATE GEAR

A karateka wears a white uniform, or gi, made up of a jacket, trousers, and belt (see pp. 218). Like the judo uniform, the karate gi is cut from a canvas-style cloth which can stand up to a considerable amount of wear and does not restrict the mobility of the karateka. The gi may be light, medium, or heavy. Karateka usually wear protective gear—men wear an athletic cup to protect their groin and women use a bust protector. Other kit, such as padded mitts, gloves, shin guards, foot protectors, shoes, and gumshields are also permitted.



Karate gloves
Some kumite competitions allow the use of gloves with closed finger design for semi-contact sparring



Karate shoes
Beginners and intermediates may benefit from using soft footwear that provide good traction with the floor

COLORED BELTS

Levels of proficiency in karate are normally indicated by the color of the karateka's belt, or obi. Several elements in the student's abilities are evaluated when progressing from one grade to the next, including knowledge and mastery of techniques, as well as kata and kumite. The higher the grade, the more extensive the requirements. The number and color of gradings vary between karate styles, but white is always the most basic grading and brown the highest kyu (pupil). Black belt is the highest karate grade. Upon attaining black, the pupil becomes a dan (master), although there are up to 10 levels of dan.

Black 1st–10th Dan	
Brown 1st Kyu	
Blue 2nd Kyu	
Green 3rd Kyu	
Red 4th Kyu	
Yellow 5th Kyu	
White 9th–6th Kyu	

THE KARATE CODE

Karate has a *dojo kun*, a set of guidelines which karatekas follow in their everyday lives and in the room, or *dojo*, in which karate is taught. This karate code can be summarized by five commands • Seek perfection of character • Be faithful • Endeavor • Respect others • Refrain from violent behavior.



KARATE STYLES

The Federation of All Japan Karate-do Organizations recognizes four main karate styles—Goju-ryu, Shito-ryu, Shotokan, and Wado-ryu—although there are more than 70 different ones, including Shorin-ryu, Uechi-ryu, and Kyokushinkai. Styles that do not belong to one of these schools are not considered to be illegitimate. Most schools are affiliated with or heavily influenced by one or more of these traditional styles.

SHOTOKAN

Shotokan is a school of karate, developed from various martial arts by master Gichin Funakoshi (1868–1957). Techniques in kata are characterized by long, deep stances which provide stable, powerful movements and also help strengthen the legs. Strength and power are demonstrated instead of slower, more flowing motions.

WADO-RYU

After receiving tutelage from Funakoshi and other Okinawan masters, Hironori Ohtsuka set off to merge Shindo Yoshin Ryu with Okinawan karate and formed Wado-ryu. The name is translated literally as “harmony.”

SHITO-RYU

This was developed in 1931 by Kenwa Mabuni. It is a combination style, which attempts to unite the diverse roots of karate.

GOJU-RYU

Using a combination of hard and soft techniques, this style's specialty is close-quarters combat. Major emphasis is given to correct breathing and body conditioning.

RULES OF CONTACT

In kumite, the level of contact varies according to the style and the standard of the karatekas. All techniques must be controlled and executed without excessive force, especially to the head and neck. Attacks to the throat, groin, temples, spine, instep, and back of the head are not allowed and the referee may award penalties for any foul.

KUMITE

Kumite matches are organized by age, gender, weight, and experience. Each bout is two or three minutes long. Two competitors stand on the starting lines on the mat, bow, and at the referee's signal begin fighting. Kumite bouts feature punching, kicking, knee/elbow strikes, open handed techniques, locks, throws, and grappling. Karateka issue a loud kiai, or “spirit shout,” as they execute a technique. A perfectly delivered strike, blow, or throw receives an ippon, or point. If the strike is slightly flawed, the judge may award a waza-ari, or half point. The first karateka to score three points is the winner of the contest.

NEVER ATTACK FIRST

GICHIN FUNAKOSHI, THE FOUNDER OF SHOTOKAN KARATE, BELIEVED KARATE SHOULD BE A FORM OF DEFENSE ONLY. HE DECLARED “THERE IS NO FIRST ATTACK IN KARATE” BECAUSE IT IS AN ART OF DEFENDING IN WHICH THE ATTACKER ALWAYS LOSES.

SCORING CRITERIA

Scoring in kumite depends on the personal assessment of the referee, who needs to evaluate whether a particular move was delivered from the right distance as well as being perfect in form, timing, and attitude. The referee also decides if a technique would have been effective in a real combat.

REFEREE SIGNALS

During a bout the referee may use various hand signals as a way of communicating to the karateka and the judges. These include signals for starting, stopping, and resuming the contest, as well as for points awarded, techniques executed simultaneously, fouls committed, and warnings for excessive contact.



AWARDING A POINT

A referee signals that a point (ippon) has been awarded by placing a hand on the opposite shoulder and extending the arm downward at 45 degrees on the side of the scorer.

KATA

In kata, a competitor executes a series of choreographed combat techniques, such as kicks, blocks, punches, and strikes (see right), against an imaginary opponent. Officials evaluate competence by various criteria—precision, breathing, strength, coordination, rhythm, balance, concentration, and comprehension of movement. As well as individual events, pairs of karateka demonstrate synchronized movements.



Toes back
The toes are pulled back so the kick is made with the ball of the foot.

FRONT KICK

In this front kick (Mae geri) the right leg lifts and the foot kicks forward. The right hand stays on the hip, with the elbow in.



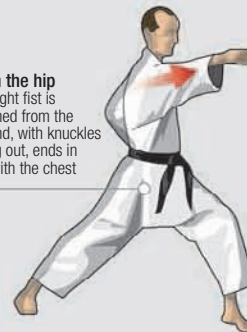
Knuckles out
The knuckles of the right fist face out; the left fist is under the right elbow with the knuckles uppermost.

BACK FIST BLOCK

The back fist block (Uraken gamae) in the front stance position ends with the right fist forward at chest height.

From the hip

The right fist is punched from the hip and, with knuckles facing out, ends in line with the chest.



REVERSE PUNCH

In the reverse punch (Gyaku zuki) in the front stance position one fist punches forward as the other goes back to the hip.

PUNCH TO MID

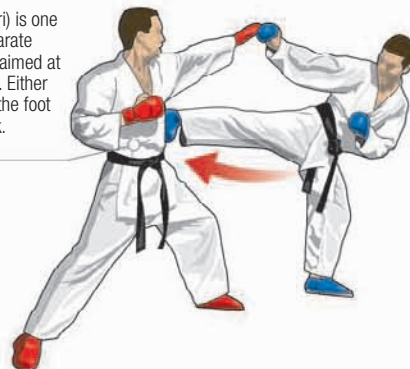
A key characteristic of punching in karate is the art of rotating the wrist so the palms go from facing upward at the start of the punch, to facing downward at impact.



Maximum impact
Wearing gloves lessens the power of the strike, which would usually be with the knuckles of the index and middle fingers

SIDE KICK

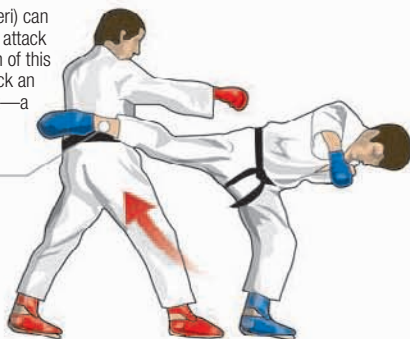
The side kick (Yoko Geri) is one of the most powerful karate kicks, especially when aimed at the ribs or solar plexus. Either the side or the heel of the foot can be used in the kick.



Counter punch
A kick to the middle, if properly evaded, can be efficiently countered with a punch to the opponent's midriff

BACK KICK

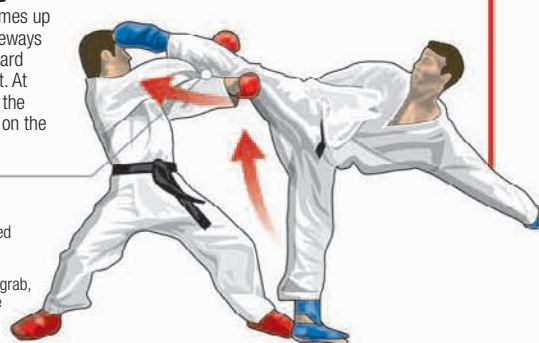
The back kick (Ushiro Geri) can be used when facing an attack from the rear. A variation of this is to spin around to attack an opponent who is in front—a spinning back kick.



Heel first
The strike when performing the back kick should be made with the heel of the foot, with the toes pointing downward

KICK TO HEAD

As the knee comes up it is twisted sideways and thrust forward at the opponent. At the same time, the body is rotated on the supporting leg.



Leg grab
The high kick, unless executed very quickly, is prone to a retaliatory leg grab, as shown here



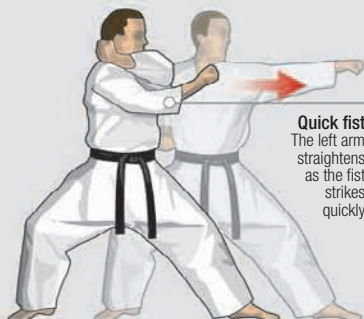
Fists together
The fists are held together with the knuckles facing outward and the thumbs at the top



Open palm
The palm of the right hand is open, the left fist is kept on the left hip, and the breath is slowly and strongly exhaled

DOUBLE PUNCH

The double punch (Heiko tate zuki) in the front stance position has both fists forward and the arms fully extended at chest height.



Quick fist
The left arm straightens as the fist strikes quickly

KNIFE HAND BLOCK

This hand block (Tate shuko uke) is performed in the rooted stance position and the open right hand is pushed slowly forward at shoulder height.



Fists aloft
The right fist is at eye level, the left in front of the forehead; the knuckles of both hands face backward

ARM STRIKE

In the back stance the crossed arm strike with the right fist (Ura zuki) moves to the side fist strike with the left fist (Mawashi tetsui uchi).

DOUBLE-HANDED BLOCK

This block (Jodan haiwan uke) in the back stance position starts with both fists beside the left hip and ends with both arms raised and forming a rectangle.

INSIDE STORY

The World Karate Federation (WKF) organizes the World Karate Championship every two years. Individual men's events are held in kumite at various weights (-60 kg, -65 kg, -70 kg, -75 kg, -80 kg, and +80 kg) and in kata. Individual women's events are held in kumite at various weights (-53 kg, -60 kg, and +60 kg) and kata. There are also men's and women's team events in both kumite and kata. In addition, the World Union of Karate-do Organizations (WUKO) organizes a World Karate Championships for seniors (between 18 and 35 years of age) and veterans (36 and over), and the World Children, Cadets and Juniors Karate Championships.

WKF

The World Karate Federation was formed in 1990. It is the largest international governing body of sport karate with over 130 member countries and is the only one recognized by the International Olympic Committee.

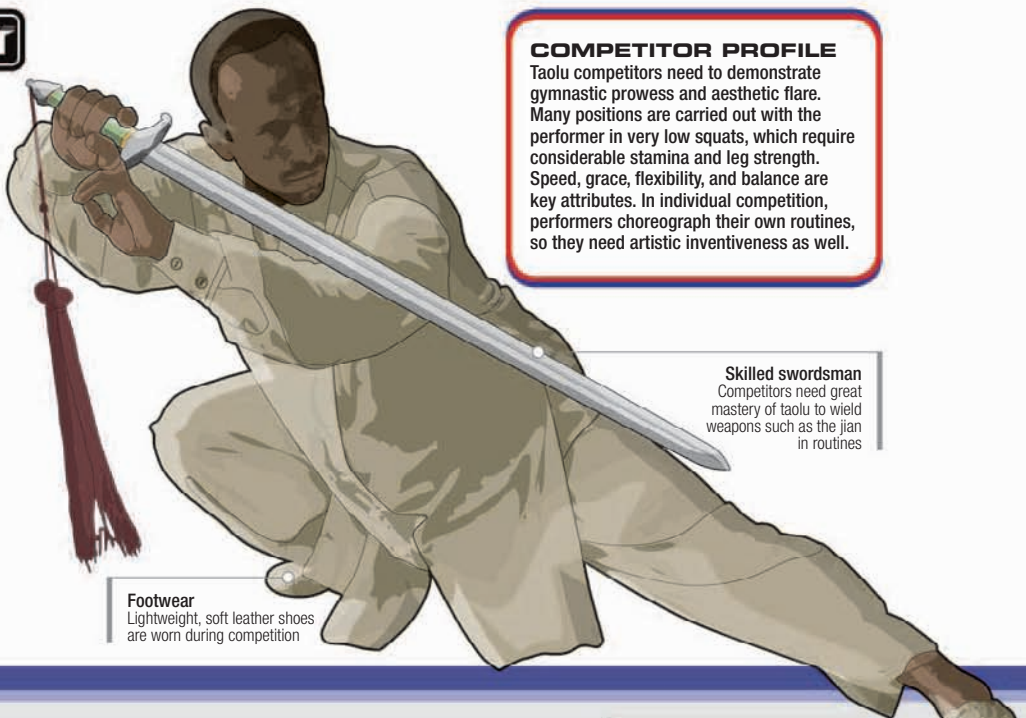
KUNG FU: TAOLU



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NEED2KNOW

- In China, kung fu is generally known by the term “wushu” and is the country’s national sport. Wushu literally means “military arts” or “martial arts.”
- The International Wushu Federation (IWUF) is the governing body for competition taolu as well as the full-contact sport of sanshou (see pp224–225).
- The types of taolu seen in competition are known as “external” forms. “Internal” forms of taolu are more meditative and reflective. Taiji (tai chi) is a well-known type.



COMPETITOR PROFILE

Taolu competitors need to demonstrate gymnastic prowess and aesthetic flare. Many positions are carried out with the performer in very low squats, which require considerable stamina and leg strength. Speed, grace, flexibility, and balance are key attributes. In individual competition, performers choreograph their own routines, so they need artistic inventiveness as well.

Skilled swordsman

Competitors need great mastery of taolu to wield weapons such as the jian in routines

Footwear

Lightweight, soft leather shoes are worn during competition

EVENT OVERVIEW

The Chinese art of taolu (forms) was born in 1958 with the establishment of the All-China Wushu Federation. It is a style of kung fu in which competitors perform choreographed routines comprised of basic movements (stances, kicks, punches, balances, jumps, sweeps, and throws) on a padded mat. Performances are judged for artistic merit, much like ice-skating routines or rhythmic gymnastics. Some categories of taolu are performed without weapons (so-called “empty-hand” styles) and some with weapons. Most categories are for solo performers, but some are for pairs or groups.

TAOLU ON FILM

HOLLYWOOD ACTOR JET LI, STAR OF *ROMEO MUST DIE*, IS THE WORLD’S MOST FAMOUS TAOLU PRACTITIONER. HE WON THE NATIONAL WUSHU CHAMPION OF CHINA TITLE FIVE TIMES.

THE FIELD OF PLAY

Taolu competitors perform on a padded mat much like the ones gymnasts use to perform floor exercises. Performances by individual competitors take place on a mat measuring 46 by 26 ft 3 in (14 by 8 m). The edge of the mat is marked out by a white border 2 in (5 cm) wide. The mat is surrounded by a 6 ft 6 in (2 m) safety area. Events for pairs or groups of performers are carried out on a larger mat, 52 ft 6 in by 46 ft (16 by 14 m), which is surrounded by a 3 ft (1 m) safety area. The competition area is often set on a raised platform that is 1 ft 6 in–2 ft (50–60 cm) high.

Judges

Taolu routines are assessed by a panel of ten judges. They are divided into three groups who assess quality of movement, overall performance, and level of difficulty of the routine. There is an additional head judge

Safety area

The safety area surrounding the performance mat is 6½ ft (2 m) deep

Boundary line

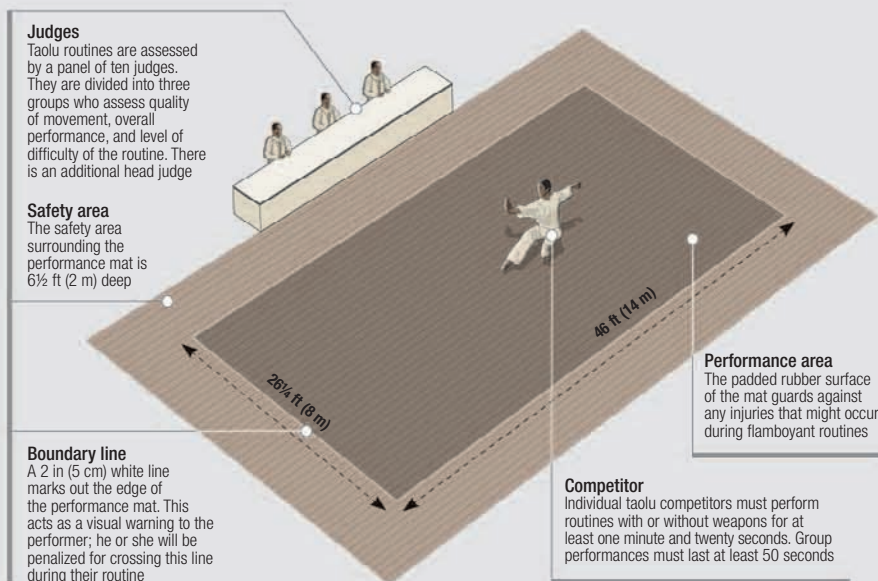
A 2 in (5 cm) white line marks out the edge of the performance mat. This acts as a visual warning to the performer; he or she will be penalized for crossing this line during their routine

Performance area

The padded rubber surface of the mat guards against any injuries that might occur during flamboyant routines

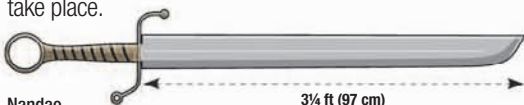
Competitor

Individual taolu competitors must perform routines with or without weapons for at least one minute and twenty seconds. Group performances must last at least 50 seconds



THE WEAPONS

Many of the forms of taolu focus on showing off the dexterity with which the performer handles one of a number of traditional weapons. Choreographed contests between two performers also take place.



Nandao
This type of sword is the Southern broadsword.

3¼ ft (97 cm)



Dao
This is a single-edged sword described as willow-leaf-shaped.

3¼ ft (98 cm)



Jian
The jian is a double-edged straight sword.

3½ ft (103 cm)



Taijijian
This sword is used in traditional taiji events.

3½ ft (110 cm)



6 ft (180 cm)



7 ft (210 cm)

PERFORMING TAOLU

The main taolu events for individuals and groups, performed with and without weapons, are explained below:

CHANGQUAN Long fist; a type of "empty-handed" solo contest derived from northern Shaolin boxing.

NANQUAN Southern fist; solo contest derived from southern boxing.

TAIJIQUAN Shadow boxing; form of "empty-handed" solo contest.

DAOSHU Routine performed with a broadsword.

JIANSHU Performance with double-edged sword.

NANDAOSHU Southern-style broadsword.

TAIJIJIANSHU Taiji sword.

QIANGSHU Spear.

GUNSHU Staff or cudgel.

NANGUNSHU Southern-style staff or cudgel routine. This event was created in 1992.

DUILIAN Choreographed routines for two performers; these may be performed with or without weapons.

JITI Choreographed routines performed by a group, often to music.

Gun

The gun is a type of staff or cudgel made of wax wood. This is often practiced along with the nandao (the broadsword)

Qiang

The qiang is a type of spear made of wax wood. This weapon is often practiced in conjunction with the jian (sword)

OTHER WEAPONS

Taolu routines are sometimes performed with more exotic and esoteric weapons than those illustrated, including a three-sectioned staff, a rope dart, and a nine-sectioned whip.

SCORING SYSTEM

Each individual taolu performer starts their routine with ten points. Five of these points are allocated to quality of movement, three for overall performance, and two for the degree of difficulty of the routine. Each error—whether a divergence from the routine, a stumble, or poor technique—is penalized by the deduction of a point. Group performers are also scored on a ten point system, split equally between quality of movement and overall performance.

TECHNIQUES

Taolu contestants are awarded points for performing moves and maneuvers to a regulated standard; these might include somersaults, kicks, jumps, and balances. Competitions are either in the form of set compulsory routines that all contestants perform, or individually choreographed routines. Changquan is considered to be the foundation of taolu and is often the first taolu form that new practitioners learn. Some fundamental changquan stances are described below.

Posture

The head and torso are kept in perfect vertical alignment during this stance

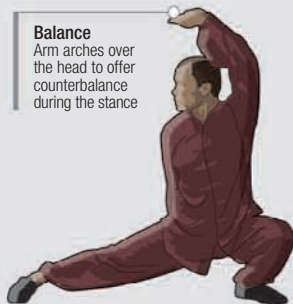


SEATED STANCE

Also known as the Sitting stance (or chi bu). One thigh is wrapped over the other. The front foot is flat on the floor, while the ball of the back foot is in contact with the floor.

Balance

Arm arches over the head to offer counterbalance during the stance



CROUCH STANCE

In Chinese this is the pu bu, also known as the Drop or Arrow stance. This is a very low squat where the crouching thigh of the back foot is in contact with the calf.

Finger point

Hand is flat and points forward



HORSE STANCE

Also known as the Horse riding stance (ma bu in Chinese). The tops of the thighs are parallel to the floor, and the knees are turned outward while the feet point forward.

Endurance

This provides great strengthening for the back and leg muscles

INSIDE STORY

The governing body of taolu is the International Wushu Federation (IWUF), which was set up in China in 1990. IWUF is currently campaigning to have wushu (both sanshou and taolu) recognized as an official Olympic sport.

CHINESE WUSHU ASSOCIATION

The Chinese Wushu Association was set up in 1958. It is one of 106 national associations under the aegis of the IWUF, and is influential because of the art's Chinese origins.

COMPETITOR PROFILE

Sanshou fighters need strength to land blows forcefully on their opponents; speed and agility to move quickly around the fighting area and dodge attacks; and flexibility to execute kicks and leg sweeps.



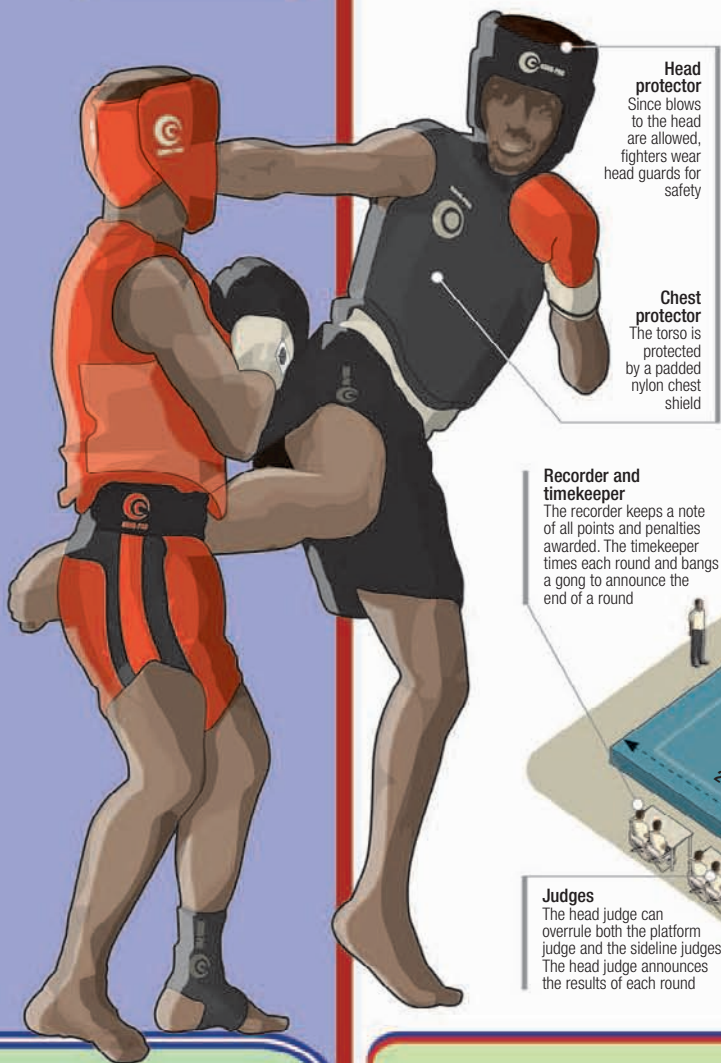
KUNG FU: SANSHOU

SPORT OVERVIEW

Sanshou is a Chinese martial art that resembles kickboxing (see pp230–231). Bouts feature two fighters who score points by landing blows on their opponent or knocking them out. Unlike taolu (see pp222–223), sanshou is never practiced with weapons.

COMBAT AREA

Sanshou matches take place on a square raised platform called a leitai, surrounded by padded mats. The leitai was traditionally 5 ft (1.5 m) above ground level, but lower heights are now more common. It is legitimate to try to force or throw an opponent off the platform. Fighters are penalized if any part of their body crosses the boundary line, which forms a square 3 ft 3 in (1 m) inside the edge of the platform.

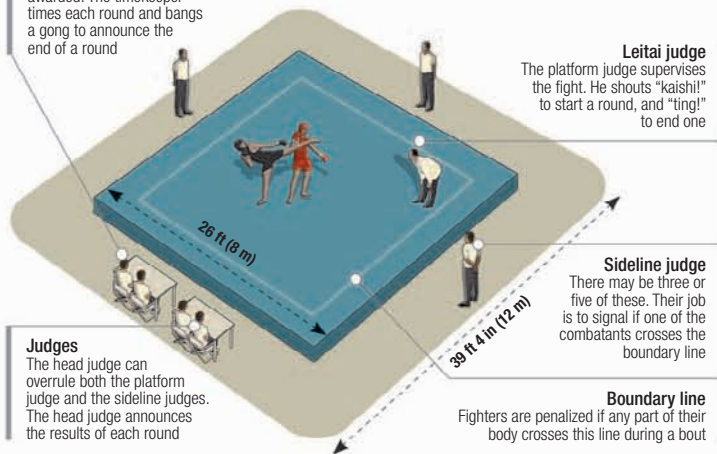


Head protector
Since blows to the head are allowed, fighters wear head guards for safety

Chest protector
The torso is protected by a padded nylon chest shield

Recorder and timekeeper
The recorder keeps a note of all points and penalties awarded. The timekeeper times each round and bangs a gong to announce the end of a round

Judges
The head judge can overrule both the platform judge and the sideline judges. The head judge announces the results of each round



Leitai judge
The platform judge supervises the fight. He shouts "kaishi!" to start a round, and "ting!" to end one

Sideline judge
There may be three or five of these. Their job is to signal if one of the combatants crosses the boundary line

Boundary line
Fighters are penalized if any part of their body crosses this line during a bout

NEED2KNOW

- ➔ Sanshou (which translates as "loose hands") was developed by the Chinese army after the Korean War (1950–1953) to improve soldiers' hand-to-hand combat skills.
- ➔ Sanshou is not so much a sport as a way of life that demands self-discipline on and off the leitai.

SIDELINES

12 The number of fighters who were banned from the National Chinese lei tai tournament at Nanking in 1928 for fear of killing other competitors. Lei tai combat was the ancestor of modern sanshou.

92 The number of Chinese provinces represented by martial arts masters to discuss the new fighting style which would become sanshou.

70 The number of participants at the 2004 World Championships in Guangzhou, China. They came from the host nation and 12 other countries: Azerbaijan, Belarus, Brazil, Egypt, Iran, Korea, Lebanon, Poland, Romania, Russia, the United States, and Vietnam.

10,000 The prize money, in Chinese Yuan, awarded to the winner of the 2006 World Cup in Xi'an. That's equivalent to \$1,200: Sanshou may be a way of life, but it is not a good way to earn a living.

SANSHOU CAN DO

Competitors fight in one of 10 weight categories. Matches consist of a maximum of three two-minute rounds with one minute's rest in between (if a fighter wins the first two rounds, he wins outright, and the third round is not competed). Points can be scored by landing blows with the fists or the feet to the opponent's torso or head, by kicks to the thigh, by knockout, or by making the opponent fall over. Double points are awarded if a fighter makes the opponent fall over while remaining standing himself. Leg sweeps, flying jumps, and grappling are all legitimate moves. Three points are also awarded if the opponent falls off the *leitai*.

ILLEGAL MOVES

Blows may not be made with the knees or the elbows or by headbutting. Fighters cannot hit opponents in the back of the head, the neck, or the groin. Punches are not allowed below the belt, although blows with the feet can be made to the opponent's upper leg. Groundfighting is not allowed.

METHODOLOGY

Sanshou fighting features many of the tactics and techniques used in other kickboxing-style martial arts, such as punches and kicks, but with the addition of throws and sweeps.

THE KICKING CRAFT

There are several dramatic ways of getting an opponent to the floor. These include the flying scissor-kick, in which one fighter jumps at his opponent, wraps his legs on either side of the opponent's waist, and knocks him to the ground. Leg sweeps are also an effective way of felling an opponent, as shown right. They also allow the fighter to keep his head and torso out of his opponent's reach.

Evasive techniques are also important; combatants must be on their toes at all times other than when they are actually kicking. A sanshou fighter is never more vulnerable than when he just launched an attack into thin air.

FOUR SKILLS

During the Korean War, the Chinese divided the basic skills that exponents should master into four groups: *da* (striking), which encompasses all blows with the fist, open hand, elbows, fingers, and head; *ti* (kicking), including sweeping, kneeling, and stomping; *shuai* (wrestling, throwing, and takedowns); and *na* (joint locks, chokes, and other submission grips). After the war, some of the more extreme elements were toned down in recognition of the fact that sanshou was now a sport rather than combat, but the broad principles remain central to modern practice.

COLOR-CODED

During bouts sanshou fighters wear boxing-style vests and shorts. Boxing gloves soften hard blows from the fist, but fighters are barefoot, affording no protection from kicks. One contestant wears black clothing and the other wears red so the judges can easily distinguish between them. Combatants also wear gum shields or mouth guards.

BLOW SOFTENERS

Combatants protect their fists with standard boxing gloves strapped around the wrists.

Hard-wearing leather

Gloves are made of an outer layer of leather, stitched with nylon thread, and padded with high-density polyurethane



COMBAT GEAR

Sanshou is a high-impact, often violent sport, so fighters are required to wear protection for the chest, head, hands, groin, and mouth.

Gum shield

A mouth guard reduces the risk of damage from a kick to the face



Chest protector

The front of the torso is protected against hard blows. The neck is left unguarded to allow the head to move freely



Groin protector

Blows to the groin are forbidden but groin guards are still essential



Head sway

This fighter's attempt to get his head out of the way is futile because his feet are flat on the mat

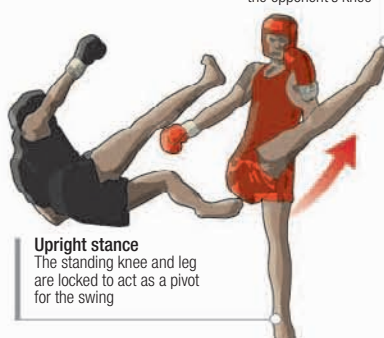


Heel spin

As the kick follows through, this leg moves clockwise

Point of contact

This flailing kick found its target below the opponent's knee



Upright stance

The standing knee and leg are locked to act as a pivot for the swing

BACK SWEEP KICK

The fighter rotates on his front foot so his back faces his opponent. His back leg sweeps up to his opponent making contact at chest height with the back of the leg. Unless the opponent anticipates this attack he will be knocked off balance.

HOOKEK-LEG KICK

In this attacking move, the fighter balances on his left foot, extends his back leg behind him and sweeps it around in a circular movement, kicking his opponent's front leg from under him and knocking him off balance.

INSIDE STORY

Sanshou's governing body, the International Wushu Federation (IWUF), was established in 1990. It organizes the World Championships of Wushu (covering both sanshou and taolu) every two years. First held in 1991 in Beijing, the championships circled the globe (stopping at, among other places, Baltimore, Hanoi, Rome, and Yerevan), before returning to the Chinese capital in 2007. The first Sanshou World Cup was held in Shanghai in 2002 and is now organized in alternate years to the World Championships of Wushu.

IWUF

The International Wushu Federation was recognized by the International Olympic Committee (IOC) in 2002, but the sport has yet to make its debut as an Olympic event. The headquarters of the IWUF are in Beijing. The IWUF has 106 member nations around the world.

JU-JITSU



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SPORT OVERVIEW

Ju-jitsu is an ancient Japanese martial art whose popularity has spread worldwide and developed into different forms. The two versions currently sanctioned by the JJIF, the world governing body, are the fighting system and the duo system. The object of the former is to score points. This can be done by striking them, and—after getting them off balance and on to the mat—forcing a submission. In the duo system, fighters spar using various prearranged moves.

COMPETITOR PROFILE

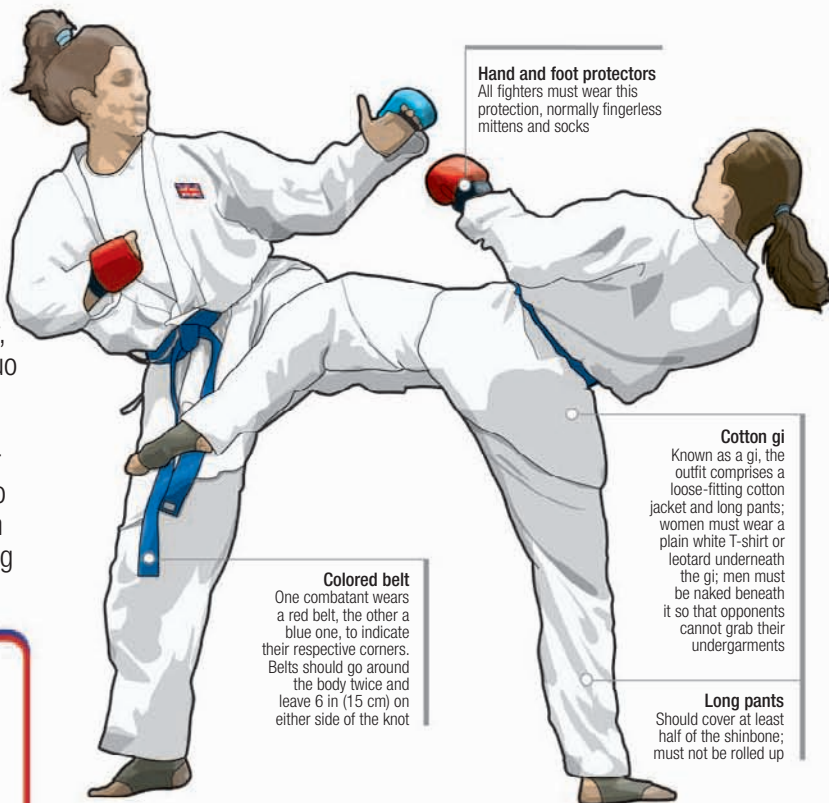
Fighters must have speed of movement, good balance, and strength, especially in the grip. Joints need to be as flexible as possible, both to deliver attacks and—since many of the blows are directed at the shoulders, elbows, and knees—to receive them. And, of course, technical ability is crucial.

COMBAT AREA

The whole of the combat zone, including the warning area, is known as the competition area. It is usually 32 ft 6 in (10 m) square, although some national and international tournaments take place on smaller fighting areas measuring 19 ft 6 in (6 m) square. In major competitions, the surface is made of traditional woven straw mats known as tatami.

NEED2KNOW

- ➔ Ju-jitsu comes from two Japanese words: “ju” means “gentleness,” and “jitsu” is “art.”
- ➔ As the sport spread across the world, teachers developed their own schools, known as “ryu.”
- ➔ Telling someone that you practice ju-jitsu is too vague to be very helpful: there are so many different varieties of the art that you need to be more specific.



Hand and foot protectors

All fighters must wear this protection, normally fingerless mittens and socks

Cotton gi

Known as a gi, the outfit comprises a loose-fitting cotton jacket and long pants; women must wear a plain white T-shirt or leotard underneath the gi; men must be naked beneath it so that opponents cannot grab their undergarments

Colored belt

One combatant wears a red belt, the other a blue one, to indicate their respective corners. Belts should go around the body twice and leave 6 in (15 cm) on either side of the knot

Long pants

Should cover at least half of the shinbone; must not be rolled up

Table referee
One judge is seated alongside the mat, accompanied by a scorer and a timekeeper

Side referees

Two; move around the safety area to maintain the best view of the bout

Fighting area

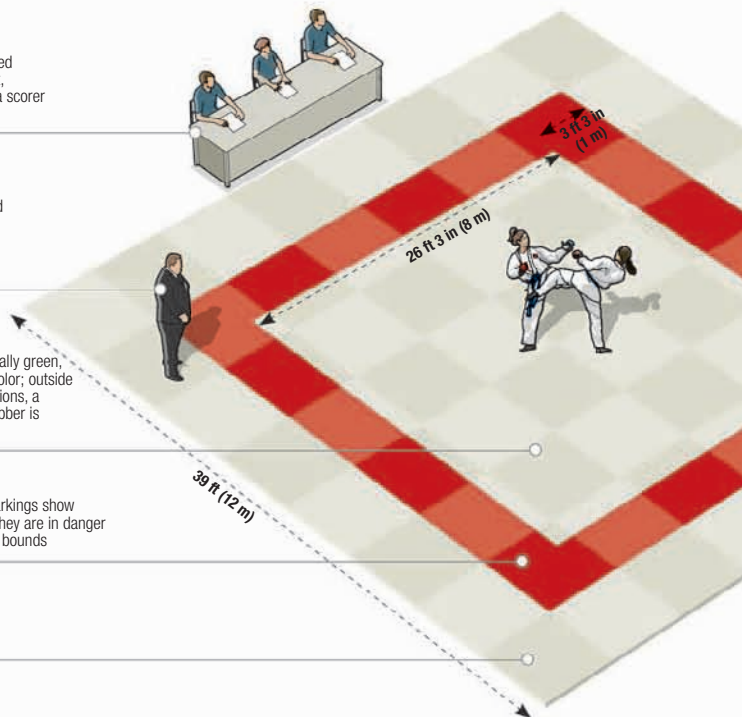
The mats are usually green, but may be any color; outside of major competitions, a single sheet of rubber is sometimes used

Warning area

Red perimeter markings show combatants that they are in danger of stepping out of bounds

Safety area

Surrounds the warning area



SIDELINES

3 The number of basic states of mind that are traditionally regarded as essential for excellence at the art of ju-jitsu. They are zanshin (power), fudoshin (preparation), and mushin (potential).

77 The total number of national bodies affiliated with the Ju-jitsu International Federation.

130 The period, in years, since the first Japanese ju-jitsu school was founded by Prince Teijun.

RULES OF ENGAGEMENT

The requirements for victory vary according to the ryu, or school of ju-jitsu. In IJJF competitions there are two main sets of rules, as follows.

FIGHTING SYSTEM

The winner is the combatant who first scores an ippon (point) in each of three categories: in the striking section, a clean punch or kick; in the throwing section, a clean takedown; and in the groundwork section, a submission.

DUO SYSTEM

In this modified form of ju-jitsu, before each stage of the contest the referee calls out a number that corresponds to one of 20 authorized moves. One competitor attacks, the other defends. For example, the offensive player may be called on to attempt a stranglehold; meanwhile the defender is given the objective of countering with a throw (avoiding the attack is not enough). Marks are awarded for technique and speed.

DUO THROW

When the referee calls the number that corresponds to the shoulder throw, the designated attacker moves in from behind and puts his or her arm around the opponent's neck. That the defender counterattacks is not in doubt; what counts is the way he or she does it. Here, the defender throws the attacker in the manner shown.

Mat referee
Observes the fight from close quarters, and awards points

3 ft 3 in
(1 m)

Engagement

The combatants allow each other to take up the starting position; they do not have to fight to get it



Push and pull

The defender on the left bends his knees; when he straightens them again he will lift the attacker off the mat



Pivotal moment

Having lifted the opponent off the mat, the defender bends forward to complete the throw; note how he keeps hold of the other fighter's arm throughout the move



Happy landings

The ability to land gracefully and without injury is every bit as important in ju-jitsu as the art of throwing



SHERLOCK HOLMES

IN ARTHUR CONAN DOYLE'S 1893 THRILLER "THE ADVENTURE OF THE EMPTY HOUSE," SHERLOCK HOLMES USES JU-JITSU TO SAVE HIMSELF FROM CERTAIN DEATH AT THE HANDS OF HIS ARCHENEMY, PROFESSOR MORIARTY. DOYLE HAD PROBABLY BEEN INFLUENCED BY THE RECENT ESTABLISHMENT OF THE BRITISH JU-JITSU SOCIETY.

POINTED MANOEUVRES

Ju-jitsu originated as a philosophy and a way of life; it has only comparatively recently become a sport. Hence, many of the point-scoring techniques have been contrived so that they can be judged by set criteria.

FIGHTING SKILLS

The illustrations below show one possible way of scoring an ippon in each of the categories under the fighting system. Ju-jitsu is classified as a martial art, but injuring the opponent has no part of it. Fighters who have gained an advantage need not—indeed, must not—drive it home; they have already proved their point and scored their ippon.

STRIKE

The fighter on the left aims to land a foot or hand on the body of the opponent, who takes evasive measures and aims to turn defense into counterattack.

Pivotal moment
The standing leg must be braced, with the foot firmly grounded and balanced on the mat



TAKEDOWN

The attacker puts one hand around the opponent's shoulder, the other around his torso, then swivels his own upper body to push him across his thigh and onto the mat.

Role reversal

The man on top may appear to be in control, but he is about to be thrown onto the mat



SUBMISSION

One fighter puts the other in an armlock; when the latter can stand the pain no longer, he or she will tap on the mat with the free hand to indicate submission.

Double jeopardy
The assailant uses both hands to twist the opponent's arm to the limit



INSIDE STORY

At the start of the 21st century, ju-jitsu's biggest growth area was in Brazil, where there were three types of contests: sport ju-jitsu, in which no strikes are allowed; submission wrestling, which is similar except that the fighters wear shorts rather than conventional gi; and, most popular of all, vale tudo contests (straight fights with few rules). These forms of the sport are outside the control of the JJIF.

JU-JITSU INTERNATIONAL FEDERATION

Largely through the efforts of the JJIF (founded in 1972), in 1994 ju-jitsu was added to the list of sports at the World Games. The JJIF controls every aspect of the study and teaching of all styles of the sport, and divides them into two broad categories: koryu (classical) and goshin (modern).

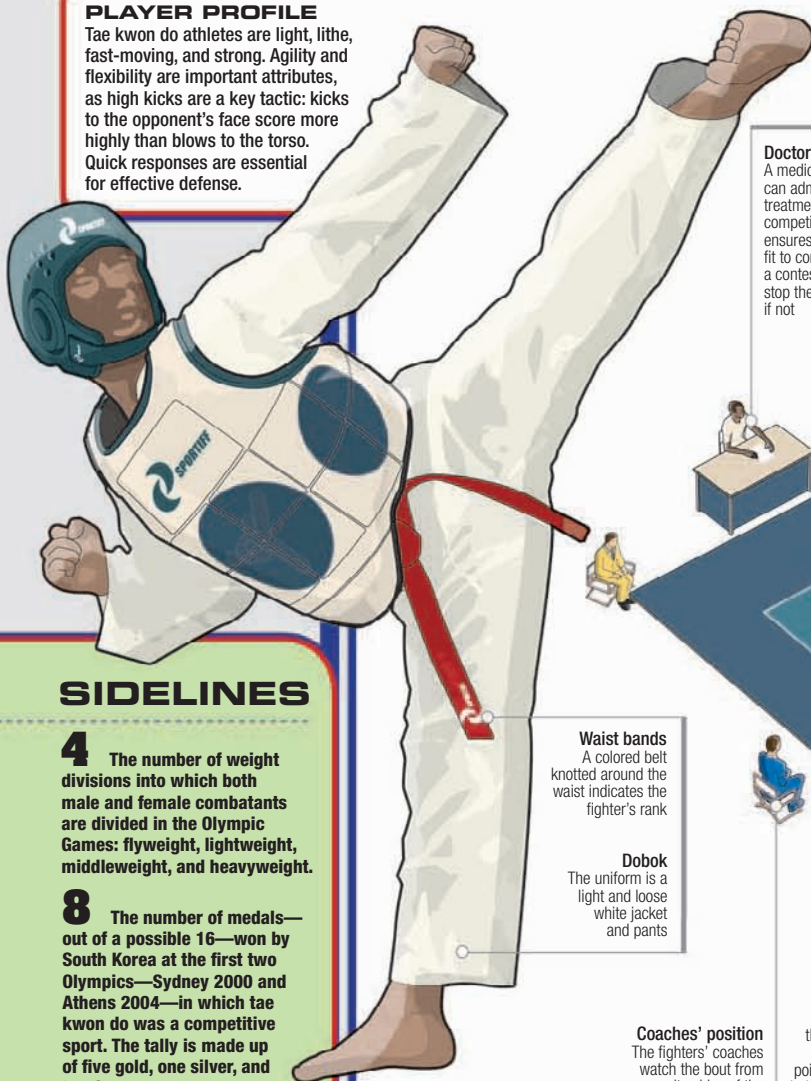
TAE KWON DO



- The word “Tae kwon do” is variously translated as “the way of hand and foot” or “the way of kicking and striking.”
- Tae kwon do originated in Korea, where it remains the national martial art. In other parts of the world, it is also popular as a form of exercise.

PLAYER PROFILE

Tae kwon do athletes are light, lithe, fast-moving, and strong. Agility and flexibility are important attributes, as high kicks are a key tactic: kicks to the opponent’s face score more highly than blows to the torso. Quick responses are essential for effective defense.



SIDELINES

4 The number of weight divisions into which both male and female combatants are divided in the Olympic Games: flyweight, lightweight, middleweight, and heavyweight.

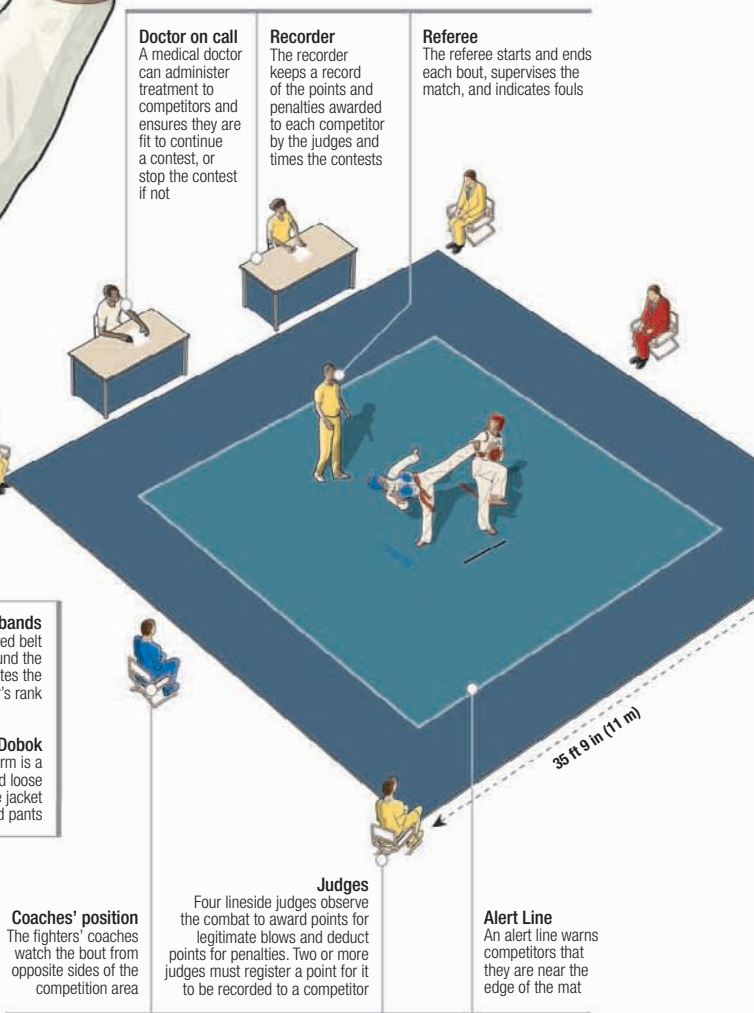
8 The number of medals—out of a possible 16—won by South Korea at the first two Olympics—Sydney 2000 and Athens 2004—in which tae kwon do was a competitive sport. The tally is made up of five gold, one silver, and two bronze.

10 The number of student ranks, from 10th (beginner) to first. Ranks are known as dans.

191 The number of member nations in the World Tae kwon do Federation.

EVENT OVERVIEW

Tae kwon do is an exciting combat sport between two men or women who score points by striking their opponent, often with a rapid combination of kicks—including jumping or flying kicks—and punches. The fighter with the greater number of points at the end of the timed bout is the winner, unless one is knocked down for a count of 10.



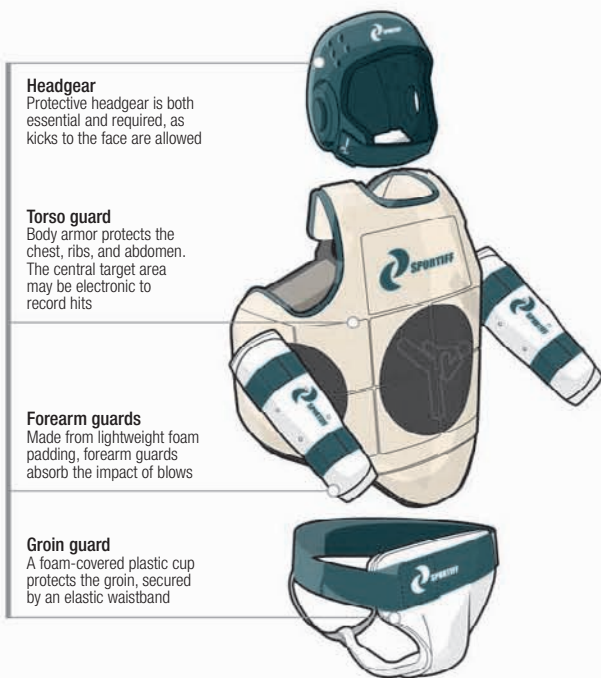
COMPETITION AREA

Contests take place on a square rubber mat at least 1 in (2 cm) thick. The competition area may be raised by 19½–23½ in (50–60 cm), with a shallow slope (around 30 degrees) to floor level. The officials take up position around the outside of the competition area.



REQUIRED CLOTHING

Fighters wear full protective clothing when they take up position on the mat. To make each combatant distinct, one wears blue and one wears red markings on the chest guard or helmet, or on hand and foot protectors if they are worn. Only the chest guard is worn over the loose-fitting white uniform.



Headgear

Protective headgear is both essential and required, as kicks to the face are allowed

Torso guard

Body armor protects the chest, ribs, and abdomen. The central target area may be electronic to record hits

Forearm guards

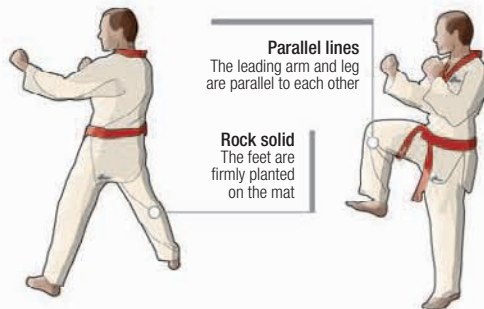
Made from lightweight foam padding, forearm guards absorb the impact of blows

Groin guard

A foam-covered plastic cup protects the groin, secured by an elastic waistband

KICKING OUT

Tae kwon do places more emphasis on kicks than most martial arts, and takes advantage of the legs' ability to deliver blows with more force and from a greater distance than punches. Two of the most effective kicks are the hook kick and the side kick (below).



Parallel lines
The leading arm and leg are parallel to each other

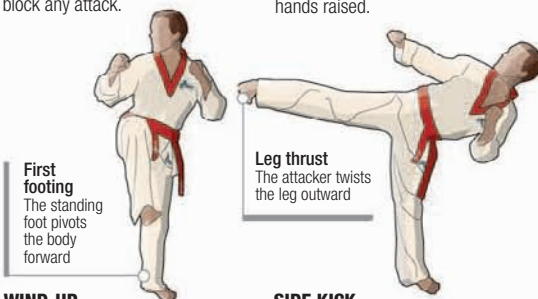
Rock solid
The feet are firmly planted on the mat

STARTING POSE

The fighter is in regular defensive pose, with his hands raised to block any attack.

INTO MOTION

The fighter raises his knee to hip level and keeps his hands raised.



First footing
The standing foot pivots the body forward

Leg thrust
The attacker twists the leg outward

WIND-UP

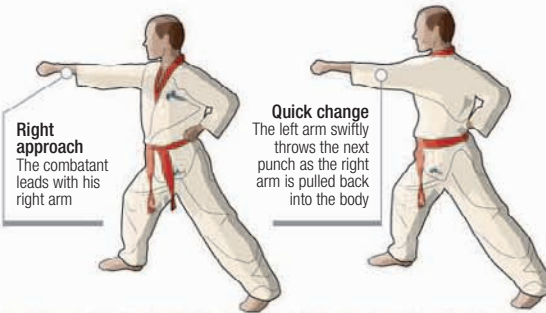
The fighter pivots to face forwards to come into an attacking position.

SIDE KICK

The leg is fully extended to the side, and the hip twisted for extra power.

STRAIGHT PUNCH

In the straight punch-pull combination, the nonstriking hand is kept low with the fist palm upward as the striking hand punches straight with the fist palm down.



Right approach
The combatant leads with his right arm

Quick change
The left arm swiftly throws the next punch as the right arm is pulled back into the body

ESSENTIAL VOCABULARY

Tae kwon do retains its Korean origins in much of the language associated with the sport. Referees begin bouts by shouting "Shi-jak!" ("Start") and end bouts by shouting "Keu-man" ("Stop"). Combatants often scream "Kiai!" (which means "working with ki") when delivering a blow to their opponent; the shout releases energy (ki) and helps them to strike a blow with greater strength and force. As with boxing, a knockout is concluded by the referee counting to 10—announced by the referee declaring "Yeol" (the Korean word for "10").

SCORING POINTS

Points are earned by landing blows on the opponent or, in sparring competitions, by stopping blows 1 in (2 cm) from an opponent. A blow to the torso with the hand or foot earns one point, a kick to the neck or head earns two, and knocking the opponent down earns three. Under World Tae kwon do Federation rules, if a fighter reaches 12 points or gets 7 points ahead, he or she wins the match. A match can also be won by knockout. Points are deducted for fouls such as hitting below the belt, hitting the back, and hitting behind the head. In the case of a tie, a sudden-death bout is played.

HAIR-RAISING ROOTS

TAE KWON DO EVOLVED SOME 2,000 YEARS AGO FROM A NUMBER OF KOREAN MARTIAL ARTS. ONE FIGHTING TECHNIQUE, AT A TIME WHEN IT WAS FASHIONABLE FOR MEN TO WEAR A LONG PONYTAIL, WAS TO TIE A SHARP COMB OR METAL WEIGHT TO THE END OF THE BRAID AND SWING IT TO STRIKE AN OPPONENT IN THE EYES.

INSIDE STORY

Tae kwon do was internationalized by US troops returning home after the Korean War in the early 1950s. Korean lobbying led to the founding in 1973 of the World Tae kwon do Federation (WTF) as the sport's governing body. The first world championships were held the same year. Tae kwon do became an Olympic sport in 2000.

GOVERNING BODY

The World Tae kwon do Federation was recognized by the International Olympic Committee in 1980 and today has over 180 member nations around the world.

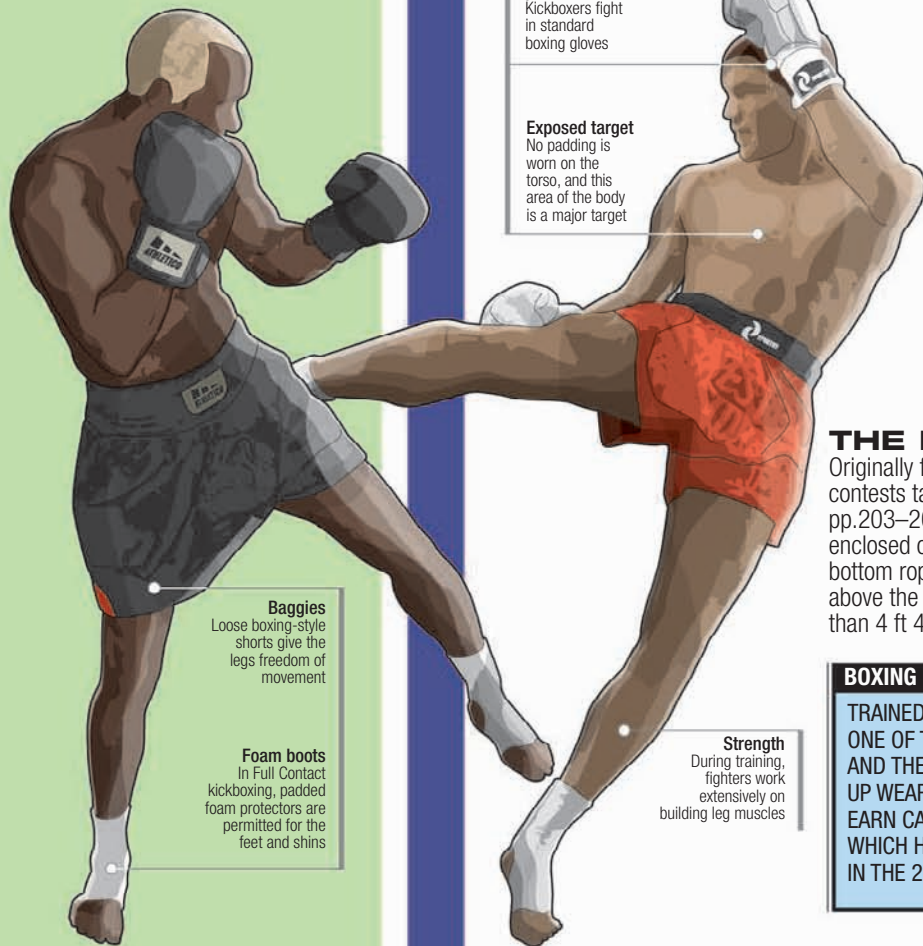
KICKBOXING



230

NEED2KNOW

- Kickboxing is a professional sport for both men and women. Top bouts draw huge audiences in southeast Asia and Japan, where kickboxers enjoy superstar status.
- In the West, kickboxing has become a popular form of exercise, due to its high fitness demands and challenging moves.
- The rules of kickboxing are complicated by the fact that there is no one governing body, but a number of rival organizations.



FIGHTER PROFILE
Kickboxers need the strength, speed, resilience, and endurance of boxers, combined with the agility and flexibility required to execute the extended high kicks. A high level of resistance to pain is necessary, particularly when competing under rules that allow kicks to the fighters' legs.

Hand protection
Kickboxers fight in standard boxing gloves

Exposed target
No padding is worn on the torso, and this area of the body is a major target

Baggies
Loose boxing-style shorts give the legs freedom of movement

Foam boots
In Full Contact kickboxing, padded foam protectors are permitted for the feet and shins

Strength
During training, fighters work extensively on building leg muscles

SPORT OVERVIEW

Kickboxing is a fast-moving combat sport that combines boxing techniques with kicks derived from martial arts, mainly karate. Although it resembles traditional Thai boxing and Full Contact (see box opposite) it was developed by martial arts experts in the United States in the 1970s. Professional bouts are up to 12 rounds long, and each round lasts two minutes. Fights are decided by knockout or, more usually, by points scored for blows landed on the opponent.

Referee
The referee stands in the ring with the fighters, starting and ending each bout and overseeing the contest

Starting positions
The fighters line up on two white lines, marked 3 ft (1 m) from the center of the ring on opposite sides

Corner team
Each fighter has a trainer, who discusses tactics, and two seconds, who tend to injuries, between rounds

Timekeeper
He times each bout, ringing a bell to start and end each round

Scorekeeper
Seated alongside the third judge for convenience, he records all points and penalties scored



THE RING

Originally fought on mats, modern kickboxing contests take place in standard boxing (see pp.203–205) rings—sprung canvas squares enclosed on all four sides by four ropes. The bottom rope must be a minimum of 13 in (33 cm) above the canvas floor; the top rope no more than 4 ft 4 in (1.32 m).

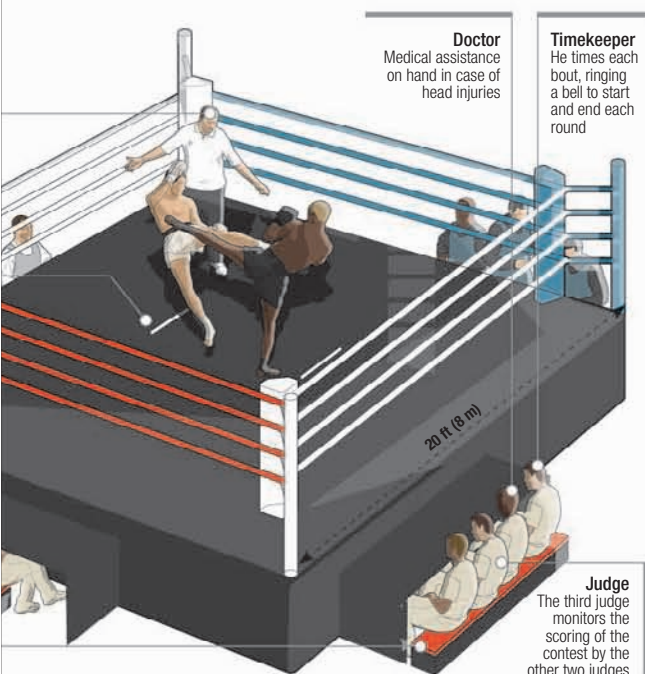
BOXING BEAUTY

TRAINED AS A MONK, NONG TOOM BECAME ONE OF THAILAND'S LEADING KICKBOXERS—AND THE MOST NOTORIOUS. HE WAS A MAKE-UP WEARING TRANSSEXUAL, WHO FOUGHT TO EARN CASH FOR A SEX CHANGE OPERATION, WHICH HE HAD IN 1999. HIS STORY WAS TOLD IN THE 2005 MOVIE *BEAUTIFUL BOXER*.

KICKBOXING, FULL CONTACT, AND MUAY THAI

The pure form of kickboxing is often confused with Thai boxing (Muay Thai) and the European sport of Full Contact. All are closely related and it is important to understand the key differences. Fighters in all three sports wear mouthguards, gloves, and groin protection.

- In kickboxing, combatants are permitted to punch according to the rules of professional boxing—i.e., no blows below the belt—and kick any part of the body.
- In Full Contact, fighters wear long trousers and T-shirts, protective foam boots, and optional shin pads and headguards. Normal boxing rules apply, but fighters are prohibited from kicking below the waist.
- Muay Thai is the oldest and most violent form of “kickboxing.” The rules regarding punching and kicking are more relaxed, and fighters are permitted to strike using their hands, shins, elbows, and knees.



Doctor
Medical assistance on hand in case of head injuries

Timekeeper
He times each bout, ringing a bell to start and end each round

Judge
The third judge monitors the scoring of the contest by the other two judges

PROTECTIVE GEAR

Most protective equipment is mandatory for Full Contact combat. Shin guards and footpads are not allowed in Oriental, Muay Thai, and sanshou bouts, but are optional, or even recommended, in other forms of the sport—and certainly for amateur bouts.



Helmet
Protects the vulnerable temples and head from blows or punches



Shin guards
In Full Contact, shin guards offer protection from illegal kicks



Foot pads
Cushions the impact of kicks for both fighters

SCORING SYSTEM

Contests are won either through knockouts or accumulation of points. In some contests winners are decided on the number of rounds won, not overall points. The scoring areas are the front, back, and side of the head; the front and side of the body; and all areas of the leg. Points are awarded as follows:

One point is awarded for all successful punches. Footsweeps and kicks to the body also score one point. Two points are awarded for a kick to the head. A jumpkick that lands on the body is awarded two points, and one that connects with the head is awarded three points.

FIGHTING STYLES

Kickboxers can target the opponent's torso and head with punches such as jabs, hooks, crosses, and uppercuts. There is also a variety of kicks, including front and side kicks and the swinging roundhouse kick. A roundhouse kick is one when the fighter swings his or her leg in a circular motion to gain momentum for a blow to the opponent's lower leg, torso, or head. There is very little difference between the punching styles of kickboxing and traditional boxing—indeed, many fighters move between one or the other discipline. A well executed punch is often less destructive than a kick, however, owing to the padded gloves used.

KNEE STRIKE

Low kicks to the leg are often most effective, as they slow the opponent down and prevent him or her from preparing a retaliatory kick. Low kicks (excluding sweeps) are not permitted in Full Contact.



No advance
A low kick to the knee stalls any forward movement by the opponent

MID-LEVEL KICK

The world's leading aerialists perform triple back flips with as many as five twists; quadruple back flips are even more spectacular, but they are banned in competition.



Soft spot
The attacker aims to connect with the opponent's unprotected ribs

AIM HIGH

High kicks to the head are potentially the most risky, as they leave the attacker most open to counterattack, but are spectacular—and can potentially win a bout with a single blow.



Knockout
The attacker swings his leg high, aiming for the opponent's head

INSIDE STORY

The first governing body associated with kickboxing when the sport emerged in the 1970s was the Professional Karate Association (PKA). Today the governance of the sport is fragmented, with several different organizations each hosting regular events and world championships. The World Kickboxing Association (WKA), which was established in the late 1970s and has 129 offices worldwide, is the best known of this group of rival federations.



SOMBO

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FIGHTER PROFILE

Strength and resilience are essential. Fighters need endurance to withstand attacks, together with the fighting spirit and tactical awareness to overcome their opponents. Speed and agility are also important qualities that help combatants to outmaneuver the opposition.

SPORT OVERVIEW

Sombo is a Russian combat discipline featuring many wrestling techniques, such as throws, pins, and locks. There are two types of sombo (which is also known as sambo): sport sombo and combat sombo. Sport sombo includes many moves, such as leg locks, that are illegal in judo. Combat sombo also includes punches and kicks.

Top layer

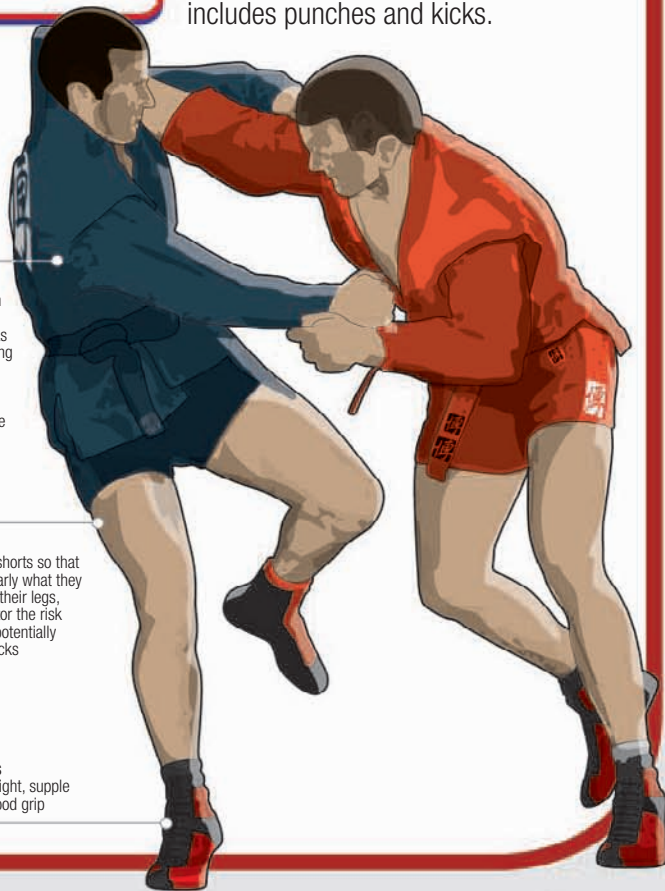
This is a cotton karate-style jacket known as a kurtki. Gripping and pulling on the opponent's jacket is a legitimate move

Bare legs

Fighters wear shorts so that judges see clearly what they are doing with their legs, and thus monitor the risk of injury from potentially crippling leg locks

Supple boots

Fighters wear light, supple boots with a good grip



NEED2KNOW

- ➔ Sombo was developed in the Soviet Union in the 1920s when Josef Stalin wanted his army to improve its hand-to-hand combat skills. Military leaders combined disciplines including karate and judo with traditional wrestling styles from Armenia, Georgia, Moldova, Mongolia, and Russia.
- ➔ The International Amateur Sambo Federation (FIAS) is the sport's governing body. Sambo is an acronym that stands for "self-defense without a weapon."

SCORING SOMBO

Sombo matches usually last 5 minutes and are supervised by a center referee (who gestures when points have been awarded), a mat judge, and a mat chairman. Points are awarded for hold downs: a fighter who holds his opponent's back to the mat for 10 seconds gains 2 points and for 20 seconds gains 4 points. Whoever is first to achieve a 12-point margin wins the match.

OUTRIGHT VICTORY

A fighter can win outright without the necessary points margin if he can throw his opponent on to his back while remaining standing. He also wins outright by forcing his opponent into a successful submission hold. This kind involves getting the opponent in an arm or leg lock while on the floor. Choke holds and holds to feet and hands are illegal. When the grip is so strong and the opponent can no longer stand the pain he calls out or hits the mat, prompting the referee to end the match.

Leg lock

This fighter is executing a leg lock and stretching the opponent's Achilles heel

Out of the loop

The victim cannot use his right leg to resist because of the pressure on his left thigh



FIELD OF COMBAT

Sombo contests take place on a circular area in the middle of a hexagonal or square mat. The bout begins in the inner circle, marked with a white boundary line. This is where sombo fighters begin their bout. Around the mat is the protection area, which is colored pale blue. This is padded to help prevent injury if a fighter is thrown out of the main wrestling area.

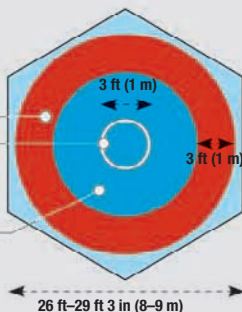
Passivity zone

This red ring warns fighters of the mat's edge

Inner ring

The action starts here

Most of the fight take place in this ring



THE BEST POLICY?

VASIL OSHCHEPKOV'S DECLARATION THAT HE HAD BEEN INSPIRED TO DEVELOP SOMBO BY JIGARO KANO, THE JAPANESE FOUNDER OF JUDO, ANGERED STALIN, WHO WANTED THE SOVIET UNION TO BE THE SOURCE OF EVERYTHING GOOD IN THE WORLD. OSHCHEPKOV PAID FOR HIS HONESTY WITH HIS LIFE.

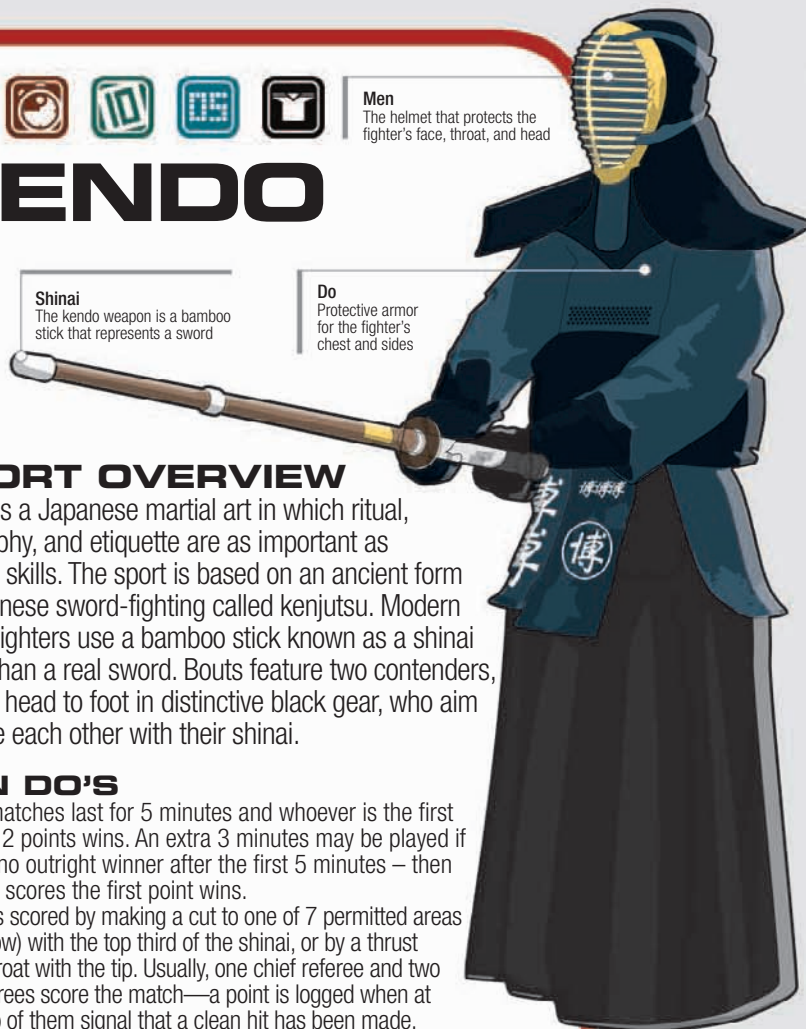


KENDO

Men
The helmet that protects the fighter's face, throat, and head

Shinai
The kendo weapon is a bamboo stick that represents a sword

Do
Protective armor for the fighter's chest and sides



SPORT OVERVIEW

Kendo is a Japanese martial art in which ritual, philosophy, and etiquette are as important as fighting skills. The sport is based on an ancient form of Japanese sword-fighting called kenjutsu. Modern kendo fighters use a bamboo stick known as a shinai rather than a real sword. Bouts feature two contenders, clothed head to foot in distinctive black gear, who aim to strike each other with their shinai.

CAN DO'S

Kendo matches last for 5 minutes and whoever is the first to score 2 points wins. An extra 3 minutes may be played if there is no outright winner after the first 5 minutes – then whoever scores the first point wins.

A point is scored by making a cut to one of 7 permitted areas (see below) with the top third of the shinai, or by a thrust to the throat with the tip. Usually, one chief referee and two sub-referees score the match—a point is logged when at least two of them signal that a clean hit has been made.

Men

A cut can be made to the top center of the opponent's head

Hidari-Men

Cuts are allowed to the left side of the head

Migi-Men

A fighter can make a cut to the right side of the head

Chudan tsuki

A thrust can be made with the tip of the shinai to the opponent's throat

Hidari-Do

A cut can be made to the left side of the body

Migi-Do

A cut can be made to the right side of the body

Kote

A cut can be made to the opponent's right wrist

Hidari-Kote

A fighter can make a cut to the left wrist



LEGITIMATE TARGETS

There are eight legitimate areas for a kendo fighter to cut or strike an opponent with the shinai: three on the head, one on the throat, two on either wrist, and two on any part of the side of the body.

NEED2KNOW

- Kenjutsu, from which kendo is derived, dates back to the 11th century. It was the martial art favored by the samurai warriors. Today's kendo gear resembles samurai armor.
- Kendo translates as “the way of the sword,” while kenjutsu means “the art of swordsmanship.”
- A number of bodies promote kendo as a modern sport, including the International Kendo Federation (IKF), which organizes the World Kendo Championships that take place every 3 years.

FIGHTER PROFILE

Kendo fighters train their minds as well as their bodies: mental discipline is as important as physical fitness, and calmness and concentration are vital. The cuts and thrusts require precision and skill to execute, and fighters need quick reactions to defend themselves from attack.

ON THE SQUARE

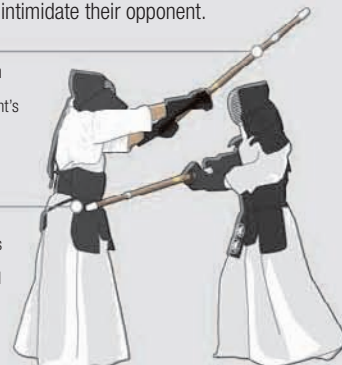
Kendo contests, known as shiai, are fought on a wooden floor in a court known as a shiajo that has a cross marked in the center. Fighters must remain on the shiajo during a contest. Traditional etiquette is observed, and fighters bow to one another at the beginning and end of the match.

BREACHING THE DEFENSE

A key offensive technique is to draw the opponent out of position with a feint, then land a blow on one of the other target areas thus exposed. When landing a blow, the fighter calls out the part of the body he has struck; for example, “do!” for the side. Fighters shout “kiai!” before launching an attack to try to intimidate their opponent.

Attempting a men

One fighter aims his shinai at his opponent's headguard



Scoring a do

The opponent strikes the armor on the side of the body, and scores a do

The image features a graphic design with a light blue background. On the left side, there is a large, stylized letter 'L' shape. The top vertical bar of the 'L' is orange, and the bottom horizontal bar is also orange. A thin yellow line runs along the inner edge of the 'L' shape. The text 'WATER SPORTS' is centered in the upper half of the light blue area. 'WATER' is in a bold, black, sans-serif font, and 'SPORTS' is in a white, outlined, sans-serif font.

WATER
SPORTS

06

Hi-tech swimsuit

Swimsuit technology is now tightly regulated by FINA, with limits on fabric width, weave, and buoyancy

Swimming cap

Long-haired swimmers usually wear a cap, but it is not required to do so

Body shaven

Some swimmers remove as much of their body hair as possible in order to prevent it from slowing them down in the water; however, this is a choice, not a requirement or a necessity

COMPETITOR PROFILE

The arms and legs must be strong, since endurance is essential for both sprinters and long-distance swimmers. Swimmers are recognizable by the shape of their upper bodies, which develop broad shoulders and taper to narrow waists and hips.

Plastic goggles

Goggles can be worn to reduce irritation that the chemicals in the pool water can cause. They must fit tightly to be effective

Bounds of decency

Swimsuits must be tasteful, discreet, and—above all—never transparent when dry or wet

Ear plugs

They are not essential, but ear plugs are used by competitors who find water in the ears uncomfortable

NEED2KNOW

- ➔ There are four main competitive swimming styles: backstroke, breaststroke, butterfly, and crawl.
- ➔ There are currently 34 officially recognized Olympic swimming race events, 17 for each sex.
- ➔ Olympic Games competitions, prior to 1908, included a variety of unusual events such as underwater swimming, 200 m obstacle swimming, and the plunge, for vertical distance.

SIDELINES

20.91 The number of seconds it took Brazilian freestyle swimmer César Cielo to achieve a world record for completing one length of a 164 ft (50 m) pool on December 18, 2009.

8 The number of gold medals won by American swimmer Michael Phelps at the 2008 Olympic Games in Beijing.

15 Age at which Australian Ian Thorpe, nicknamed "Thorpedo," became the youngest ever individual World Champion, in 1998.

24.51 The time in seconds it took China's Jingye Le to swim 164 ft (50 m), the first female to break 25 seconds for this distance.

SWIMMING

**EVENT OVERVIEW**

No matter what the distance—and the length of events varies from 164 ft (50 m) to 4,921 ft (1,500 m)—the object of any swimming race is to complete the course in the shortest possible time. Each race requires a particular stroke, or combination of four swimming styles: breaststroke, backstroke, butterfly, and freestyle. There are both individual and team races; the team races include four swimmers from each country that compete against each other, and they usually take place at the end of a meet.

THE POOL

The pools used in top-class competitions are 164 ft (50 m) long, and 82 ft (25 m) wide. They are divided into eight lanes, each 9 ft (2.75 m) in width; there is an extra 1 ft 3 in (40 cm) of water outside lanes one and eight. The water should be a uniform 6 ft (1.8 m) deep throughout, and maintained at a constant temperature of 75–84°F (25–28°C). When lanes are used, the color of the lane ropes should be as follows; two green ropes for lanes 1 and 8; four blue ropes for lanes 2, 3, 6, and 7; and three yellow ropes for lanes 4 and 5. The floats extending for a distance of 16½ ft (5 m) from each end of the pool are red, and at the 49 ft (15 m) mark from each end of the wall of the pool, the floats should be distinct in color from the surrounding floats.

In other events, such as diving, pools with sloping bottoms may be used, as long as they are no less than 4 ft (1.2 m) deep at the start, and at least 3 ft 6 in (1 m) deep at the other end; they may be divided into as many as 10 lanes, each about 7 ft (2 m) across.

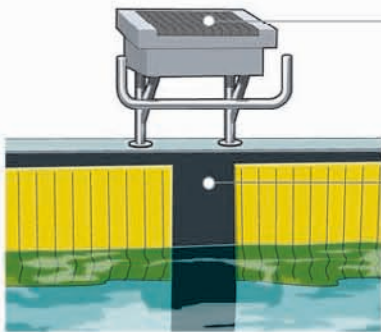


IN THE SWIM

There are several different swimming styles and the rules of competition are tailored to take account of each discipline. However, the configuration of the pool, starting and finishing regulations, and the way in which races are timed and judged are common to all types of races, and rules for international events are laid down by Fédération Internationale de Natation Amateur (FINA), the world governing body for the sport.

STARTING BLOCK

For many competitive events, each swimmer mounts a starting block, which is a small platform situated on the end of the pool, above the racing lane. When the start of a race is signaled, swimmers dive from the starting block into their lane and begin swimming.



Block construction

The starting block is built of stainless steel and the top of the platform is covered with slide-free rubber.

Wall touch pad

This is the area that must be touched when a swimmer turns, or at the end of a race. Pressure closes an external electric circuit when contacted, so that races can be timed.

WHAT THEY WEAR

Traditional-style swimsuits have largely been replaced by hi-tech swimwear. Suits fit tightly and reduce drag, although regulations were tightened by FINA in 2010 amid fears that the suits lent athletes an unfair advantage.

SWIMSUIT DESIGN

The full-body skinsuits used to great effect at the 2000 and 2004 Olympics were limited to leg and torso coverage only for Beijing 2008, then banned altogether from 2010.

Hi-tech material

Modern bodysuits are made of a combination of materials, including Nylon, Spandex, and Lycra®.

Strict regulations

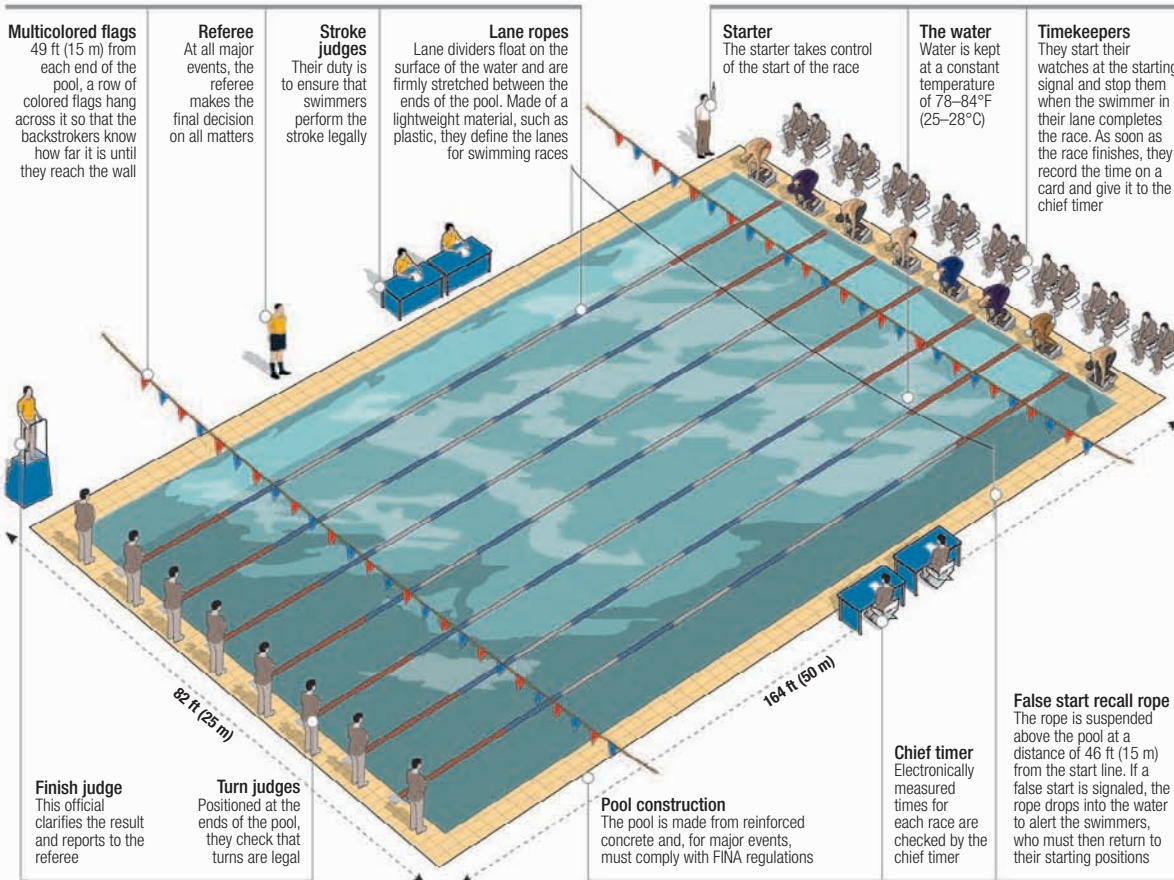
FINA rules state that women's suits must not cover the neck, shoulders, or knees, while men's suits must leave knees and navel bare.

GOGGLES

Anti-fog, scratch-resistant lenses in a flexible PVC frame are an essential aid for improving the visibility of competition swimmers.

No leaks

Some goggles have silicone seals for improved water proofing.



Multicolored flags

49 ft (15 m) from each end of the pool, a row of colored flags hang across it so that the backstrokers know how far it is until they reach the wall.

Referee

At all major events, the referee makes the final decision on all matters.

Stroke judges

Their duty is to ensure that swimmers perform the stroke legally.

Lane ropes

Lane dividers float on the surface of the water and are firmly stretched between the ends of the pool. Made of a lightweight material, such as plastic, they define the lanes for swimming races.

Starter

The starter takes control of the start of the race.

The water

Water is kept at a constant temperature of 78–84°F (25–28°C).

Timekeepers

They start their watches at the starting signal and stop them when the swimmer in their lane completes the race. As soon as the race finishes, they record the time on a card and give it to the chief timer.

Finish judge

This official clarifies the result and reports to the referee.

Turn judges

Positioned at the ends of the pool, they check that turns are legal.

Pool construction

The pool is made from reinforced concrete and, for major events, must comply with FINA regulations.

Chief timer

Electronically measured times for each race are checked by the chief timer.

False start recall rope

The rope is suspended above the pool at a distance of 46 ft (15 m) from the start line. If a false start is signaled, the rope drops into the water to alert the swimmers, who must then return to their starting positions.

STAT CENTRAL

LONG COURSE WORLD RECORDS (MEN)

EVENT	TIME
SWIMMER	
50 M FREESTYLE CÉSAR CIELO	20:91
100 M FREESTYLE CÉSAR CIELO	46:91
200 M FREESTYLE PAUL BIEDERMANN	1:42:00
400 M FREESTYLE PAUL BIEDERMANN	3:40:07
800 M FREESTYLE ZHANG LIN	7:32:12
1,500 M FREESTYLE GRANT HACKETT	14:34:56
100 M BACKSTROKE AARON PEIRSOL	51:94
200 M BACKSTROKE AARON PEIRSOL	1:51:92
100 M BREASTSTROKE BRENTON RICKARD	58:58
200 M BREASTSTROKE CHRISTIAN SPRENGER	2:07:31
100 M BUTTERFLY MICHAEL PHELPS	49:82
200 M BUTTERFLY MICHAEL PHELPS	1:51:51

LONG COURSE WORLD RECORDS (WOMEN)

EVENT	TIME
SWIMMER	
50 M FREESTYLE BRITTA STEFFEN	23:73
100 M FREESTYLE BRITTA STEFFEN	52:07
200 M FREESTYLE FEDERICA PELLEGRINI	1:52:98
400 M FREESTYLE FEDERICA PELLEGRINI	3:59:15
800 M FREESTYLE REBECCA ADLINGTON	8:14:10
1,500 M FREESTYLE KATE KIEGLER	15:42:54
100 M BACKSTROKE GEMMA SPOFFORTH	58:12
200 M BACKSTROKE KIRSTY COVENTRY	2:04:81
100 M BREASTSTROKE JESSICA HARDY	1:04:45
200 M BREASTSTROKE ANNAMAY PIERSE	2:20:12
100 M BUTTERFLY SARAH SJÖSTRÖM	56:06
200 M BUTTERFLY LIU ZIGE	2:01:81

RACE STARTS

The start of competition races are governed by an official starter, who reports to the event referee. Once the referee gives permission for an event to start, the starter assumes authority to begin the race. At the starter's first signal, swimmers assume their starting positions. For a backstroke event, this is in the water; for other races, the competitors will mount their starting block and face down their respective lanes.

RACE TIMING

In major swim meets, such as the World Championships and the Olympics, races are electronically timed to the nearest one-hundredth of a second. Electronic touch pads are affixed to the walls of the pool at the end of each lane. Their upper edge must be at least 12 in (30 cm) above the water level. Touch pads are linked to an electronic timing system and respond to the slightest pressure from the swimmer at the end of the race. Individual timekeepers are also used and each one takes the time of the swimmers in the lane assigned them. After the race they record the times on a card which is passed to the chief timekeeper.



Diving in
The start block is a nonslip platform

STARTING FROM THE BLOCKS

Almost all competitive events begin from the starting blocks. When the starting signal sounds, swimmers dive from their block into the water to begin swimming. A block is usually 20 x 20 in (0.5 x 0.5 m), and stands 20–30 in (0.5–0.75 m) above the water. Blocks have a maximum downslope of 10° from back to front.

QUICK TURNS

A vital part of any race is the turn, which takes place when a swimmer reaches the end of the pool and needs to begin another length in the quickest possible time. A smooth turning technique can shave vital seconds from a competitor's overall event time. Each swim stroke requires a slightly different turning method, but the tumble turn forms the base for freestyle and backstroke turns, but butterfly and breaststroke turns do not require a tumble.

THE TUMBLE TURN

Illustrated on the right, the tumble turn is used in freestyle and backstroke events. While the butterfly and breaststroke require that the swimmer touches the pool wall with both hands when turning, in freestyle and backstroke, the turn can be executed using just the feet. Swimmers racing backstroke events are allowed to turn on to their front (while gliding only) just before executing the turn. As with the start of the race, swimmers are only to be underwater for 49 ft (15 m) before breaking the surface and using the event stroke.

FALSE STARTS

These occur when a swimmer attempts to begin a race before the official signal to do so. Fédération Internationale de Natation Amateur (FINA) rules state that anyone causing a false start will be disqualified. When a false start happens, the starter gives a second signal (identical to the start signal), and the false start rope also falls into the pool to alert the swimmers.



STARTING IN THE POOL

Backstroke and medley relay events begin with each swimmer in the pool gripping the starting block. Swimmers brace their legs against the pool wall, and when the start signal is given, use this leverage to power in a backward direction to begin racing.



Approach

The head goes down and the legs go over the top, in a somersault-like motion



Contact

The feet make contact with the pool wall



Push

The feet push against the wall, while arms are stretched forward



Twist

The swimmer twists into a downward-facing position when racing freestyle, or remains on their back for the backstroke

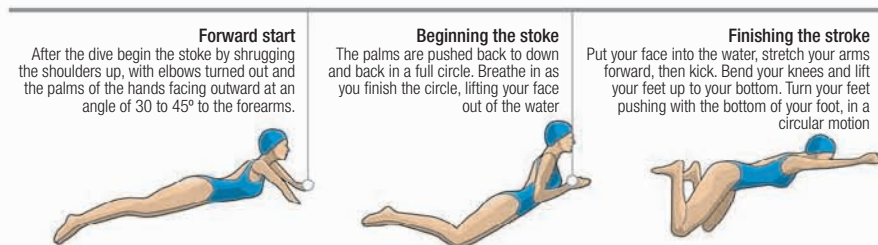


TECHNIQUES

Swimming styles have been developed, based around a number of basic principles. To achieve maximum speed, for example, the torso and legs should be kept parallel to the surface of the water, to reduce the amount of drag acting on the swimmer. The arms and hands should extend in front of the head as much as possible. A longer stroke generates more forward thrust, as the arm spends more time moving through the water.

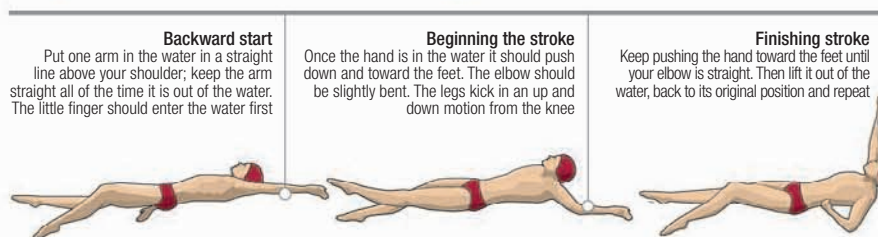
BREASTSTROKE

To execute the breaststroke, good coordination is needed. The arm movements must be made simultaneously, as should the leg movements. The arm cycle comes first, and is followed by a kick, then a brief glide. The event starts with the swimmer diving from the blocks.



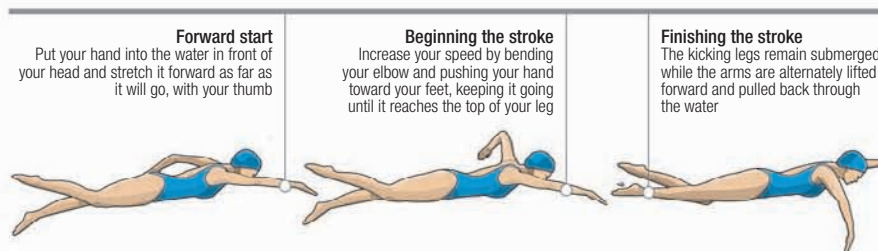
BACKSTROKE

Also known as the back crawl, the swimmer counts the number of strokes to work out when the end of the pool will be reached. When using this stroke, the swimmer should remain close to the surface of the water. The race begins in the pool, not on top of the block. The technique is shown on the opposite page



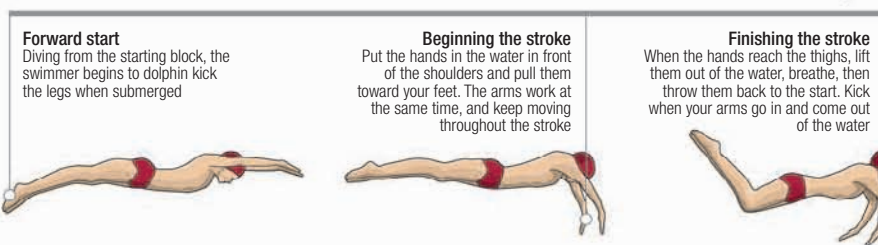
FRONT CRAWL

The fastest swimming stroke, the front crawl requires the swimmer to move face-down through the water, and breathing after every two or three strokes by turning the head up through the surface. Movements should be as smooth as possible, and the legs should be kicking continuously.



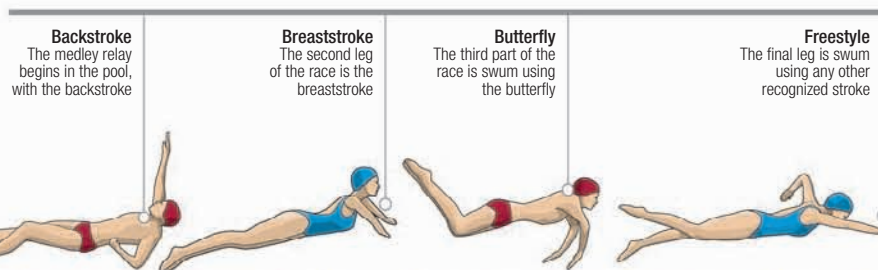
BUTTERFLY

This stroke requires a high degree of stamina and strength, particularly in the upper body. The arms must leave the water, then power back down through the water, at the same time. It can be difficult getting the right order, right: kick the legs as the hands go in; kick the legs as the hands come out; When the arms are near the thighs, lift up the torso and breathe.



MEDLEY

The medley relay involves individuals or teams of four, each member swimming at least 164 ft (50 m), before handing over to a teammate. Four different strokes are used for each "leg" of the race, in a prescribed order: backstroke; breaststroke; butterfly; freestyle.



INSIDE STORY

Representations of swimmers date from the Stone Age, but competitive swimming began in Europe in approximately 1800, and modern styles have evolved since that time. Swimming events were included in the first modern Summer Olympic games in Athens, Greece, in 1896. Women were not eligible to compete until the Stockholm Games of 1912.

SEVEN UP

AT THE 2007 LONG COURSE CHAMPIONSHIPS IN MELBOURNE, AMERICAN MICHAEL PHELPS PROVED HIS DOMINANCE IN THE SPORT BY WINNING 7 GOLD MEDALS, 5 OF THEM IN NEW WORLD RECORD TIMES.

GOVERNING SWIMMING

The international governing body for swimming is the Fédération Internationale de Natation Amateur (FINA), established in 1908. FINA oversees and runs all world championship and Olympic events, as well as diving, water polo, open water marathon, and synchronized swimming events.

NEED2KNOW

- The four main diving events are the men's and women's 3 m springboard and 10 m platform. The World Championships also feature a 1 m springboard event.
- The Fédération Internationale de Natation (FINA) governs the rules for diving in the Olympic Games, the World Championships, the World Junior Championships, and the World Diving Cup.

ATHLETE PROFILE

Divers are supple yet strong enough to hold or alter their position in midair. Legs, arms, and joints must be in peak condition. Divers often emerge at the top level between about 14 and 16 years of age.

Water dressing

Divers wear a one-piece swimsuit that must not be transparent, even when wet

Shaping up

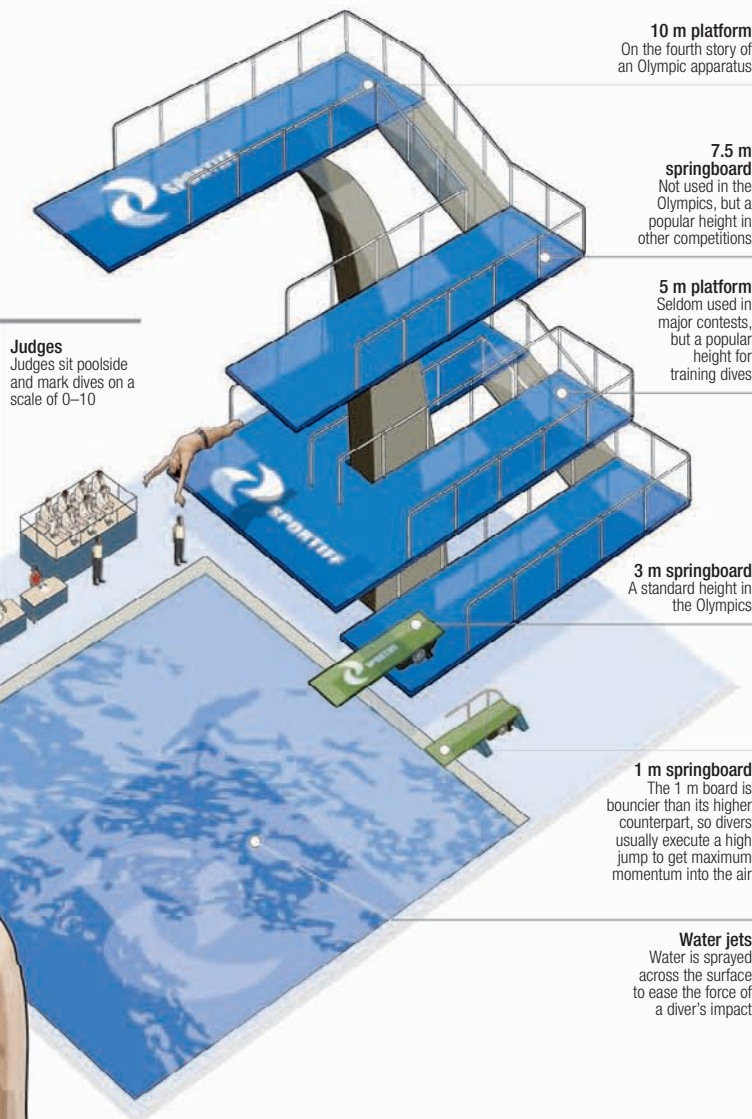
Judges award marks for the lines formed by the diver's body during the descent: the more shapely the silhouette, the higher the score

Arm shape

The hands and arms are brought together above the head in a single, sweeping, symmetrical motion: any failure incurs a point penalty

THE POOL

Diving events take place from platforms and springboards in a diving pool or swimming pool. The length and breadth of the pool are variable; some competitions are held in the deep end of regular pools. The platforms and springboards have non-slip surfaces and are reached by suitable stairs not ladders. The minimum depth of water beneath a 10 m platform is 11 ft 6 in (3.5 m). For other platforms and springboards, it should be at least 6 ft (1.8 m) deep.



Judges
Judges sit poolside and mark dives on a scale of 0–10

10 m platform
On the fourth story of an Olympic apparatus

7.5 m springboard
Not used in the Olympics, but a popular height in other competitions

5 m platform
Seldom used in major contests, but a popular height for training dives

3 m springboard
A standard height in the Olympics

1 m springboard
The 1 m board is bouncier than its higher counterpart, so divers usually execute a high jump to get maximum momentum into the air

Water jets
Water is sprayed across the surface to ease the force of a diver's impact

EVENT OVERVIEW

Diving is the art of jumping acrobatically into the water of a swimming or diving pool from platforms or springboards of different heights. Competitors are judged on the degree of difficulty of their dives and the technical proficiency with which they execute them.



DIVING

SIDELINES

3 The number of consecutive Olympic diving gold medals—a record—won by Klaus Dibiasi, an Austrian-born Italian, who won the 10 m platform diving events at Tokyo in 1968, Munich in 1972, and Montreal in 1976.

13 The age of China's Fu Mingxia when she became the youngest ever champion in the women's 10 m platform event at the 1992 Olympics. Four years later she took gold in both 10 m and 3 m dives.

5 The number of World Championship competitions won by American diver Greg Louganis. He also won Olympic golds in 1984 and 1988 in the 3 m springboard and 10 m platform events.

67 The number of Olympic medals won by US male divers between 1904 and 2008. The total comprises 12 gold, 10 silver, and 8 bronze in the 10 m platform, and 15 gold, 10 silver, and 12 bronze in the 3 m springboard. The United States has been the world's leading nation in diving, but it failed to win any medals at the 2008 Beijing Olympics.

BOARD MANEUVERS

There are 91 officially recognized platform dives and 70 springboard dives. They are divided into six groups: forward, backward, reverse, inward, twist, and handspring (or armstand). Handsprings are permitted only from the 10 m platform; all other dives must be launched by the feet.

SYNCHRONICITY

In synchronized competitions, two teammates jump simultaneously from platforms or springboards of the same height and try to perform either exactly the same dive or two different dives that complement or mirror one another. One peculiarity of this event is that divers who have jumped badly may score highly—as long as they both made the same mistakes. Synchronized diving became an Olympic event in 2000.

TUCK

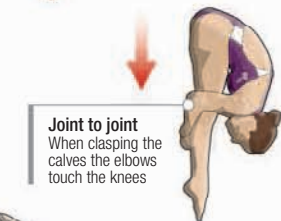
In the perfect tuck, the body is compact and bent at the hips, with the knees bent and held together. The diver tucks the calves against the backs of the thighs, holding them in position with the hands clasped on the shins. The feet are close together and the toes are pointed throughout the movement. In a tuck dive that contains a twist, the diver needs to clearly show the tuck position.



Fetal position
Straight backs incur penalties so divers aim for a kind of fetal position

PIKE

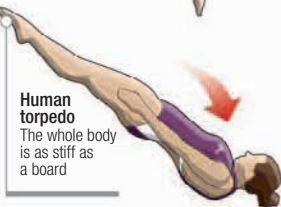
In a pike, both legs are straight, with the body bent at the hips, the feet together, and the toes pointed. The position of the arms is at the diver's discretion—the arms may be clasped around the calves or the back of the knees, as shown, or held out at the sides. If a pike dive contains a twist, it is important for the diver to clearly show the pike position in order to prevent the judges from deducting points.



Joint to joint
When clasping the calves the elbows touch the knees

STRAIGHT

Also known as the layout, the straight dive calls for an absolutely rigid and fully stretched body, with straight legs, feet together and pointed toes; the arms may be stretched above the head or held tight against the side of the body. If a straight dive contains a twist, the twist must not be initiated from the platform or springboard.



Human torpedo
The whole body is as stiff as a board

PLUNGE FOR DISTANCE

IN THIS ONE-TIME-ONLY OLYMPIC EVENT, HELD IN 1904 IN ST. LOUIS, COMPETITORS MADE STANDING DIVES FROM THE POOLSIDE TO SEE HOW FAR THEY COULD GO UNDER WATER. THEY WERE NOT ALLOWED TO MOVE THEIR BODIES IN THE WATER AND HAD TO RELY ON THEIR PRE-ENTRY MOMENTUM. GOLD WENT TO WILLIAM DICKEY OF THE UNITED STATES, WHO REMAINED SUBMERGED OVER 62½ FT (19.05 M).

KEEPING SCORE

Divers are allowed a certain number of attempts per round, usually 6 for men and 5 for women. Every dive must feature various elements, such as somersaults and twists: the exact requirements are notified by the organizers before the competition. Contestants are marked not only on the way they perform these compulsory moves but also on the way they hit the water: top marks are awarded to splashless entries, known as “rips.”

SCORING

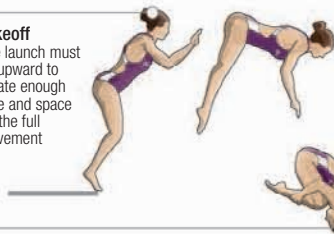
There are 7 judges in Olympic and world events, 5 in most other competitions. Each judge awards every dive a mark out of 10: 3 for takeoff, 3 for flight, and 3 for entry (they award the 10th point at their discretion). After logging the scores they eliminate the highest and lowest and multiply the remainder by a previously agreed on degree of difficulty (DD) factor to determine the final score for the dive.

FORWARD TWO-AND-A-HALF SOMERSAULTS WITH TUCK

One of the most popular and spectacular dives, this demanding move packs the maximum of athleticism into a total flight time of less than two seconds.

Takeoff

The launch must be upward to create enough time and space for the full movement



Tuck up

The diver must be fully tucked before her head first points directly downward



Revolution number one

By the time the diver's head returns to the upright position, she has held the tuck through a 180 degree spin



One complete cycle

As the diver's head points directly downward she has completed one somersault



The second somersault

After the second somersault, the diver will prepare for the final half-somersault



Moment of release

The diver unclasps her legs and holds her thighs in readiness to adopt the entry position



Line-up and final approach

One last half turn as the diver straightens the whole body and points the toes



Perpendicular entry

Divers aim for a 90 degree angle and lose points for deviations



- ➔ Water polo originated in England around the 1860s, when swimming was combined with field-based sports. The earliest version of water polo was based on rugby and was notoriously violent and lawless.
- ➔ Water polo first appeared at the Olympics in 1900. The men's event has taken place at every Olympics since 1908. The women's event was introduced in 2000.
- ➔ Water polo is popular in the US and Europe, particularly Hungary, Italy, and Spain.

SIDELINES

19 The number of goals shared by Serbia-Montenegro and Hungary in the final of the men's World Cup in Budapest in 2006. The Serbia-Montenegro team won the game 10-9.

6 The number of gold medals shared by the women's teams of the United States, Italy, and Hungary in World Championships.

WATER POLO



GAME OVERVIEW

Water polo is a water-based sport played by two teams of seven players (six outfield players and one goalkeeper). The object of the sport is to propel the ball into the opposing team's goal; each goal scores one point, and the winning team is the one with the highest number of goals. Matches are made up of four quarters lasting seven minutes each; two 3-minute phases of extra time may be played if necessary. Water polo is a particularly challenging and fiercely competitive sport; the action is fast and fouls are very common, particularly underwater—referees have to be extra alert to spot them all. The sport has been likened to a mixture of swimming, volleyball, rugby, and wrestling.

THE POLO POOL

The dimensions for the water polo pool at the Olympic Games are as shown here. The water should be at least 5 ft 9 in (1.8 m) deep. Matches in other competitions may take place in areas of different dimensions. Conventional swimming pools may be used, but they have shallow ends, which are undesirable in a game where field players are not allowed to touch the bottom. Whatever the type of pool, the playing area is marked out by buoys. The field of play is divided by goal lines, 2-meter lines, 4-meter lines, and 7-meter lines on either side of a midline.

Swimming cap

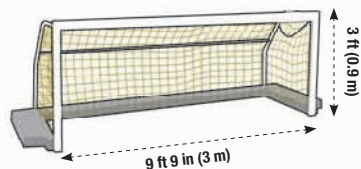
The competitors wear swimming caps in team colors; the home team wears dark-colored caps and the away team wears light-colored caps. The goalkeepers wear a red cap marked with a number 1.

Ear protectors

The caps feature ear protectors designed to keep water out but allow the players to hear their teammates and the referees.

GOAL AREA

The goals are either fixed to the side of the pool or attached by cables. A limp net encloses the entire goal area. The goalkeeper for each team guards the goal area by trying to deflect or catch the ball when the opponents attempt to shoot the ball through the goal mouth.



PLAYER PROFILE

Players need strong swimming skills, including the ability to sprint. Accurate ball-handling is essential; this is particularly difficult as throws are made while treading water and the player has to propel his or her body out of the water. Players need to be strong to tackle opponents and withstand attacks. Team skills and strategic thinking are also key.





WHO PLAYS WHERE?

The goalkeepers are not allowed to move over the midline into the other half of the pool. The field players (all the players except the goalie) can move anywhere and they play both offense and defense. The center forward, who leads the attack, will generally take up a position directly in front of the opponent's goal. The other five field players are known as perimeter players. They tend not to keep to one position but rotate around the perimeter of the offense to find goal-scoring opportunities or keep an eye on their opponents.

STARTING PLAY

Water polo matches are divided into four quarters. Each quarter begins with the two teams lined up on opposite sides of the pool, on their respective goal line. The referee will blow a whistle to indicate the start of the quarter, and then drops the ball on the midline. The players will sprint towards the ball and whoever reaches it first wins possession. That team now takes the offense. Whenever a team takes possession of a ball, they have 35 seconds to shoot at the goal or surrender possession—a shot clock starts counting down the time.

- 1 First winger**
The two wingers are offensive players positioned on the 2-meter line
- 2 Second winger**
The second winger sets up attacks on the other side of the pool
- 3 First driver**
The drivers' role is to move the ball into a goal-scoring position. The drivers position themselves either side of the center forward
- 4 Second driver**
The second driver backs up the first driver to set up goal-scoring chances
- 5 Point man**
On offense, the point man is the player who is farthest away from the opponent's goal area
- 6 Center forward/center back**
The center forward is usually positioned in front of the opponent's goal between the 2-meter and 4-meter line. He or she is guarded by the opposing center back
- 7 Goalkeeper**
Defends the goal area and deflects opponents' attacks on the goal

Referees

There are two referees, one on each side of the pool, and they do not enter the water



Midline

Each quarter begins when the referee drops the ball on the midline, which is marked by white buoys

98 ft 6 in (30 m)

65 ft 6 in (20 m)

Goal area

The goal area is 9 ft 9 in x 3 ft (3 m x 1 m) above the surface of the water

5-meter line

A penalty is awarded to the offensive team if a foul is committed by a defending player within the 4-meter zone

2-meter line

This marks offside; a player on the offense is deemed offside if she or he enters the 2-meter zone while the ball is behind them

Goal line

Players line up on the goal line at the beginning of each quarter of the match

POLO WITHOUT HORSES

WATER POLO NOW BEARS LITTLE RESEMBLANCE TO FIELD POLO, PLAYED ON HORSEBACK. IT TOOK THE NAME WATER POLO, BECAUSE ORIGINALLY, PLAYERS RODE ASTRIDE FLOATING BARRELS TO SIMULATE HORSES AND HIT THE BALL WITH STICKS.

WET GEAR

All competitors must wear swimsuits and colored, numbered caps, which are the key feature to identify players. Athletes are not allowed to play with grease or oil on their body.

BALL

The ball has to comply with strict regulations. It is spherical and has a waterproof rubber outer cover, an air chamber, and a self-closing valve. Competition balls weight 14–15 oz (400–450 g) and are usually yellow with black lines.



8 7/8–9 in (21.6–22.6 cm)

LIGHT AND TIGHT

The swimsuit should be tight-fitting but allow ease of movement through the water. Items that may cause injury are not permitted.

No see-throughs

Only nontransparent one-piece or two-piece swimsuits are allowed



POOL RULES

Matches consist of four quarters of seven minutes, with a two-minute break between each quarter. Each team is allowed a timeout of two minutes during each match. In case of a draw, two further three-minute sessions are played, followed, if necessary, by three minutes decided by a golden goal.

Field players may touch the ball with only one hand and cannot use their fists to hit the ball. They must not touch the bottom or side of the pool.

Goalkeepers may handle the ball with both hands, may hit the ball with their fists, and may touch the bottom of the pool. However, they are not allowed past the halfway line. Players cannot push the ball underwater when being tackled, or push or hold an opponent unless that player is holding the ball. If an attacker's shot goes out of play at the end of the pool, the game is restarted by the defense. If the defense touched the ball last, the attacking side is awarded a free throw from the two meter line.

SCORING

A goal is counted if the whole of the ball crosses the line between the goal posts and the crossbar. Although goals can be scored with any part of the body other than the fist, in practice they nearly all come from attacking throws.

FROM DEFENSE TO ATTACK

In addition to preventing the opposing team from scoring, the goalkeeper has a key part to play in launching team-members on the offensive. Accurate passing is a vital skill.

Two hands good

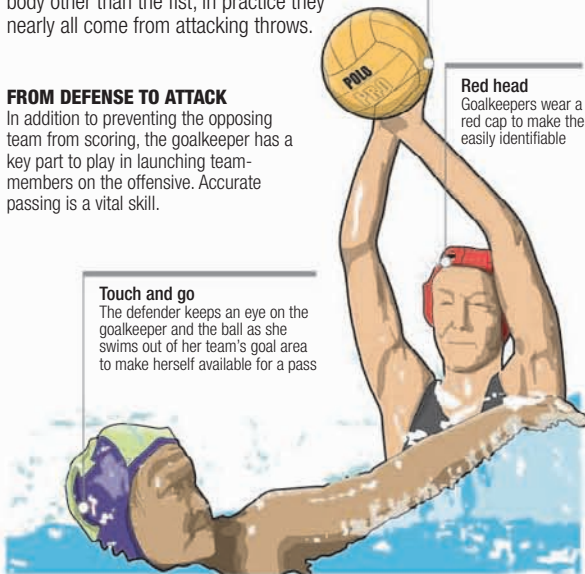
The goalkeeper is the only player permitted to catch the ball with both hands

Red head

Goalkeepers wear a red cap to make them easily identifiable

Touch and go

The defender keeps an eye on the goalkeeper and the ball as she swims out of her team's goal area to make herself available for a pass



WATER SKILLS

Outstanding swimming skills and stamina are essential for water polo players, who may swim 1¾–3 miles (3–5 km) during a typical match. There is a lot of physical contact, and resilience is needed to withstand robust opposition challenges. Players must be constantly aware of their surroundings—the rapidly changing range of opportunities and threats in every part of the pool. That is why water polo features some swimming styles that look different from those employed in swimming races. Players always swim with their heads out of the water to observe the action, and a type of backstroke where the player is almost upright in the water is frequently used. Swimming is combined with ball-handling skills to shoot goals or advance the ball to teammates, as discussed below.

SHOOTING

There are several ways to shoot. The lob is a high, arching overhead shot, often taken from an angle either side of the goal. The skip shot involves bouncing the ball off the water with enough force to propel it into the goal. The power shot is made by a player propelling her body out of the water and throwing the ball at the goal. The diagram below shows an attacker faking a shot in one direction and then, having made the keeper dive, throwing the ball into the unguarded other side of the goal.

DRIBBLING

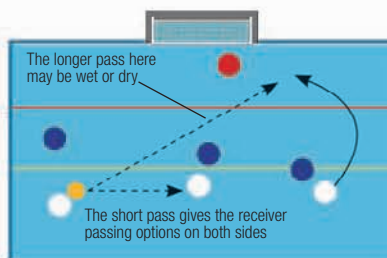
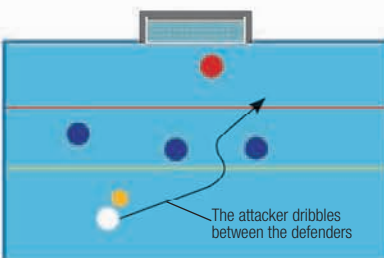
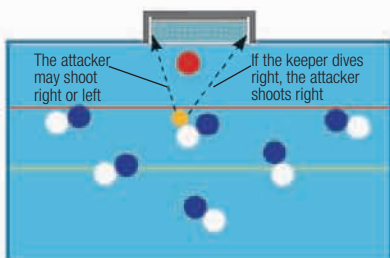
Players can advance the ball up the pool by swimming while pushing the ball in front of them. They must neither hold the ball while pushing nor push it beneath the surface of the water. Any player attempting to dribble the ball will almost certainly be challenged, and he or she will need to fend off tackles from the opposing side. Here, the attacker has made her way through the last line of defense to create a shooting opportunity in an advanced position. A pass to that position would have been offside.

TREADING WATER

Outfield players cannot touch the bottom or the side of the pool; shots and passes must be made while treading water. To power their shots, players propel their bodies out of the water; some can lift themselves out to thigh level. The popular “eggbeater” method of treading water involves rotating the legs rather than using a scissor kick to maintain a constant position.

PASSING

All but the simplest passes require great skill, as the ball must be thrown and caught accurately with one hand only. A dry pass is a high-speed pass made to an outfield player without the ball touching the water. A wet pass is made by bouncing the ball off the surface of the water to an attacking teammate. In the diagram below, the player in possession has several passing options, including the simple one to the player on his right, and a more ambitious through ball for a teammate swimming quickly into space.





EXCLUSIONS

Players are excluded from the game if they commit major fouls, and are sent to a specially demarcated penalty area for a maximum of 20 seconds. Major fouls include sinking a player (holding him or her underwater); interfering with a free throw; pulling back on a player; holding on to an offensive player; or intentionally coming into contact with a defensive player. An excluded player cannot be substituted with another player.

BLOOD IN THE WATER

HUNGARY BEAT THE SOVIET UNION 4-0 IN A FAMOUS GRUDGE MATCH SHORTLY AFTER THE RED ARMY HAD SUPPRESSED THE 1956 HUNGARIAN UPRISING. IN THE POOL, VERBAL ABUSE SOON TURNED TO PHYSICAL VIOLENCE. THE WORST OF THE NUMEROUS PUNCHES THAT WERE TRADED THROUGHOUT THE MATCH FORCED HUNGARY'S ERVIN ZÁDOR TO LEAVE THE POOL WITH BLOOD GUSHING FROM BELOW HIS EYE.

POLO SPEAK

The following are some of the most commonly used specialized terms that relate to water polo tactics and techniques:

DRIVER An attacking player, usually a fast swimmer, whose main duty is to advance the ball into a goal-scoring position.

HOLE GUARD A defensive player who takes position in front of his or her goal and marks the center forward.

HOLE MAN Alternative term for a center forward; also called a hole set.

PRESS DEFENSE A form of man-marking; the defense plays very tight to the attackers in an effort to prevent or impede their passing or driving movements.

PUMP FAKING When a player gets in position to shoot but stops halfway, causing the defending keeper to commit too early to block the shot, thus leaving the goal at the attacker's mercy.

STALLING Failure to shoot within 30 seconds of gaining possession, which is penalized by a free throw to the opposition.

SWIM-OFF The sprint for the ball in the center of the field of play that starts each quarter of the match.

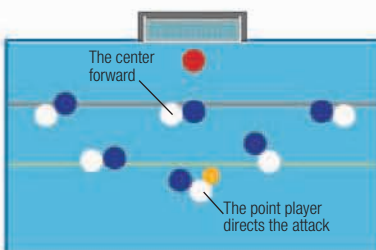
STAT CENTRAL

OLYMPIC CHAMPIONS

YEAR	TEAM
2008	HUNGARY (MEN)
2008	NETHERLANDS (WOMEN)
2004	HUNGARY (MEN)
2004	ITALY (WOMEN)
2000	HUNGARY (MEN)
2000	AUSTRALIA (WOMEN)
1996	SPAIN
1992	ITALY
1988	YUGOSLAVIA
1984	YUGOSLAVIA
1980	SOVIET UNION
1976	HUNGARY
1972	SOVIET UNION
1968	YUGOSLAVIA
1964	HUNGARY
1960	ITALY
1956	HUNGARY
1952	HUNGARY
1948	ITALY

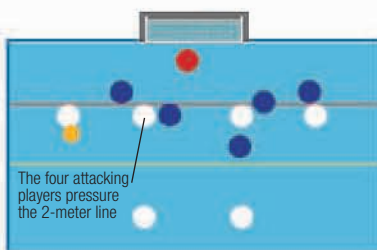
TEAM FORMATIONS

Defense positions in water polo can either be man-to-man or zone-based. The most common formation is a 3-3 formation, with two lines of three players. The 4-2 formation is a useful attacking formation when the opposing team has a player excluded (they are sent off for 20 seconds for a major foul), while the 1-4 is a formation used when the defending team is a man down.



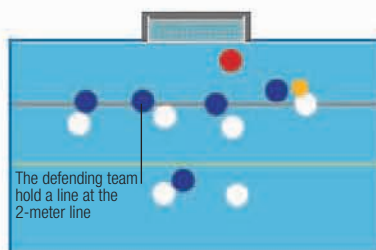
STANDARD "UMBRELLA" ATTACK

The standard "umbrella" attack is an offensive formation adopted by high-level teams. The point man sits at the apex of the umbrella, while the center forward sits inside it, in front of the goal.



4-2 ATTACK (6 ON 5)

If one team has a player excluded, the opposing team will press the advantage by playing in the 4-2 formation. Four players are placed on the 2 meter line and two on the 5 meter line.



1-4 DEFENSE

When playing with one player down, the defending team will often adopt the 1-4 defense, with four players positioned on the 2 meter line and one on the 4 meter line.

SIDELINES

9 The number of Olympic gold medals won by Hungary, the most successful water polo team in the history of the modern Olympic Games. The second-most successful nation—with gold medals in 1900, 1908, 1912, and 1920—is Great Britain. Hungary has won the water polo world championship twice since the event began in 1973, a feat matched by Italy, Spain, the Soviet Union, and Yugoslavia.

14 The number of nations that participated in the 2008 Olympic water polo events for men and women.

13 The highest number of goals scored by an individual player in an international. This was achieved by Debbie Handley, playing for Australia against Canada at the 1982 World Championships. Australia won 16-10.

INSIDE STORY

Aside from the Olympics, the main international competitions are the World Water Polo League, which have been contested in July and August each year since 2002, and the World Championships, which have taken place every two years since 2001. Both contests are organized by the Fédération Internationale de Natation (FINA), the world ruling body for aquatic sports.

NEED2KNOW

246

➔ Originally known as water ballet, the sport began in Canada in the 1920s. It spread to the United States in the early 1930s, where a display at the 1934 Chicago World's Fair drew rave reviews.

➔ Synchronized swimming has been an Olympic sport since 1984; the two medal events are altered from time to time, but most recently have been for duets and teams of eight.

TECHNIQUES

Maintaining a pleasing body shape is the most important requirement in both the artistic and free sections of any synchronized swimming event. There are heavy penalties for any visible unsteadiness in the water. Teams must ensure that all their movements are made in unison or are complementary, and are performed in perfect time to their chosen music.

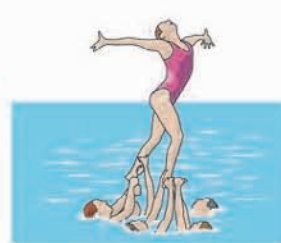
BARRACUDA (A BIG PIKE)

This move begins with a bottom-first downward thrust with the legs together and pointing straight up; this position must be maintained while the trunk is straightened below the surface.



PLATFORM POSITION

One person is supported at or above the surface by the rest of the team. They must all rise and descend once, with the person being lifted rising head first.



SYNCHRONIZED SWIMMING



EVENT OVERVIEW

This pool sport is a unique combination of dance, gymnastics, and swimming. Competitors perform graceful movements to a musical accompaniment while out of their depth in water. Judges award them marks out of 10 for technical merit and artistic effect. The term “synchronized” implies multiple participants, and most contests involve teams of two or more, however, there are individual competitions.

TECHNICAL MERIT

Both team and solo events consist of a technical routine and a free routine, each performed to music within a time limit. In the technical routine, swimmers perform specific moves in a set order, including boosts, rockets, thrusts, and twirls. In the free routine, there are no restrictions on music or choreography. Judges of each routine look for a high degree of difficulty and risk, flawless execution, innovative choreography, pool coverage, patterns, synchronization with another and with the music, and a seemingly effortless performance.

SWIMMER PROFILE

Besides demanding strength, endurance, flexibility, grace, and artistry, it also requires exceptional breath control, as routines can last up to five minutes. Good musical sense is necessary to keep time with the beat of the music.

Underwater love

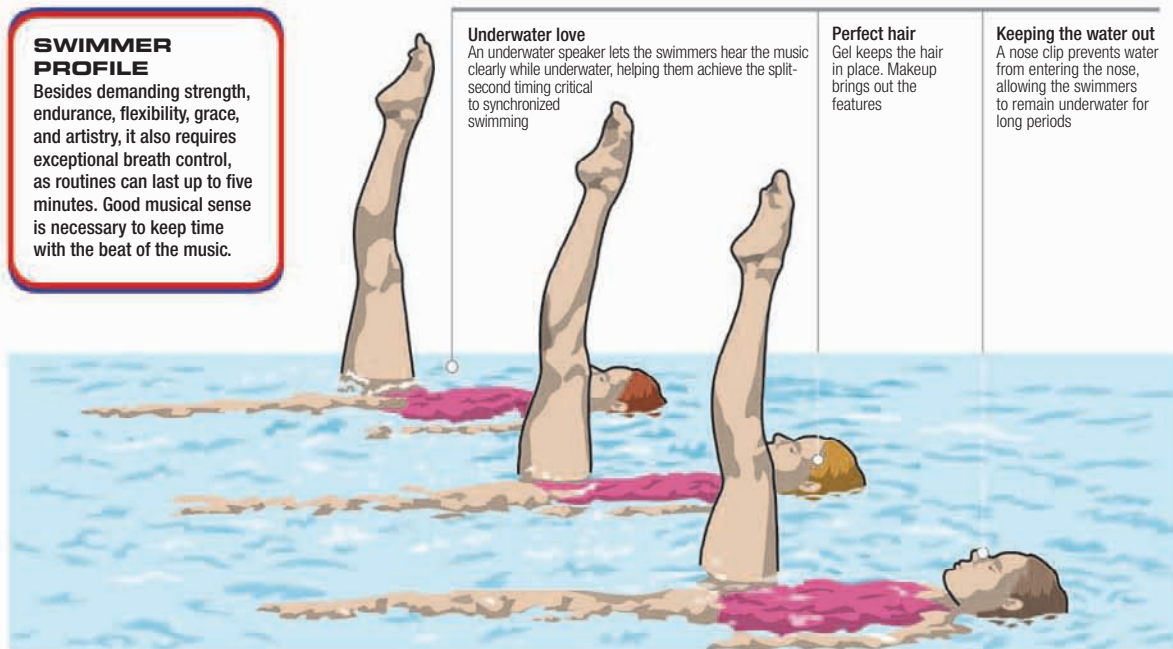
An underwater speaker lets the swimmers hear the music clearly while underwater, helping them achieve the split-second timing critical to synchronized swimming

Perfect hair

Gel keeps the hair in place. Makeup brings out the features

Keeping the water out

A nose clip prevents water from entering the nose, allowing the swimmers to remain underwater for long periods



UNDERWATER SPORTS



EVENT OVERVIEW

The three most popular underwater team activities are hockey, rugby, and soccer. They have fewer players than their on-land counterparts, and since nearly all the action takes place beneath the surface, these strenuous subaqua sports are naturally not big spectator attractions. However, they have an enthusiastic and growing band of participants in Australia, Europe, and North America, and many scuba divers use the games as a form of combined recreation and training.

I LOVE WATER HOCKEY

This is a fast moving game played competitively by some and for fun by others, often as a means of keeping fit for another underwater pursuit. It is a non-contact sport in which size and strength are not important, so it is often played at local level by mixed teams.

UNDERWATER HOCKEY

Games are contested between two teams of six players that are chosen from a squad of 12. Games are 33 minutes long, each half lasting for 15 minutes, with a three minute break at which teams change ends. The object of the game is to outscore the opposing team. A goal is scored by hitting a puck into a 9¾ x ¾ ft (3 m x 25 cm) wide goal using a plain white or black wooden or plywood stick. Players take turns at being under the water. If there is no winner at full time, a period of overtime (two 5-minute periods) will be played. If there is still no winner, the team who scores the next goal is declared the winner.

UNDERWATER RUGBY

Usually played with a round, rather than an oval-shaped 10 in (25 cm) ball, this six-a-side game for men and women is known as rugby because opponents may be grabbed and tackled as long as they are in possession of the ball. A tackled player must release the ball, which is filled with dissolved salt, when tackled. The goals are metal buckets 16 in (40 cm) wide and situated on each end of the floor of the pool. A foul is called if the ball leaves the water.

Agile and fast

As maneuverability and speed are important, softer, free diving fins are often used

Ear protection

A blow to the ear can easily burst an eardrum, so ear protectors are required in tournament games

Touch or no touch?

The wooden hockey stick must not be more than 14 in (35 cm) long, including the handle

Deep puck

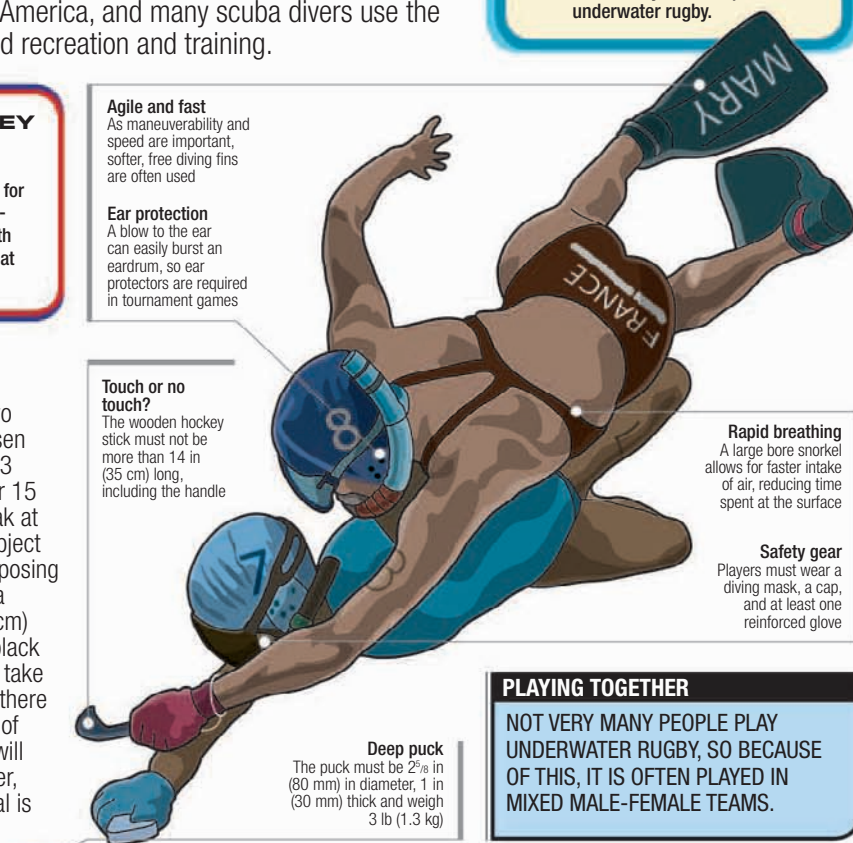
The puck must be 2⅞ in (80 mm) in diameter, 1 in (30 mm) thick and weigh 3 lb (1.3 kg)

Rapid breathing

A large bore snorkel allows for faster intake of air, reducing time spent at the surface

Safety gear

Players must wear a diving mask, a cap, and at least one reinforced glove



NEED2KNOW

- ➔ Swimming costume, mask, snorkel, and fins are worn—wetsuits and weight belts are not allowed.
- ➔ The first underwater rugby world championship took place in 1980 in Mülheim an der Ruhr in Germany, the birthplace of underwater rugby.

PLAYING TOGETHER

NOT VERY MANY PEOPLE PLAY UNDERWATER RUGBY, SO BECAUSE OF THIS, IT IS OFTEN PLAYED IN MIXED MALE-FEMALE TEAMS.

INSIDE STORY

Underwater hockey emerged in the 1950s, and was followed 20 years later by soccer and rugby. The 2006 Underwater Hockey World Championships were contested by 17 nations. The first world underwater rugby championship was held in Germany in 1980.

GOVERNING BODY

World tournaments are run by the Confédération Mondiale des Activités Subaquatiques (CMAS), which was established in 1959.

NEED2KNOW

- There were 11 Olympic class boats selected for the 2008 Games.
- The boats selected for the 2012 Olympics are six male classes (Sailboard, Laser, 470, Star, Finn, 49er), and four female classes (Sailboard, Laser, 470, and Yngling).
- At the 2008 Olympics, three classes (Finn, 49er, and Tornado) were open to either sex. Open classes were discontinued for 2012.

COMPETITOR PROFILE

For racing sailors, physical fitness and strength are important, but mental skills and attitude are the key to success. Upper-body strength is needed for hoisting and trimming (adjusting) sails, plus leg strength to move around the boat quickly, and a strong trunk to hike or lean out. Quick thinking and fast reaction time are essential, as racing is all about tactics and using the ever-shifting elements to maximum advantage. Racing can start young: children race tiny dinghies, many Olympic athletes are in their mid-twenties, and around-the-world racers are often much older than sportsmen competing at international levels in other sports.



BUILT FOR SPEED

Boats raced in the Olympics are small, with between one and three crewmembers. A typical Olympic boat will have a large sail area for such a small, light boat, and a planing hull, which allows it to skim over the water and minimizes drag.

Physical agility

The crew hikes out as far as possible, using a trapeze, to balance the weight of the wind in the sails. Quick reflexes are needed to react to wind shifts and avoid tipping

Luffing the mainsail

The luff (front edge) of the mainsail should not flutter, or speed will be reduced

The slot

A slot between mainsail and jib, with sides as parallel as possible, gives a clean wind flow over both sails

Avoiding a flutter

The leech (back edge) of the jib should not flutter, or speed will be reduced

Steering

The helm steers as steady a course as possible, and controls the mainsail, working with the wind

Foresail

The crew adjusts the foresail to work efficiently with the mainsail

Smooth sailing

Keeping the hull level in the water maximizes hydrodynamics and is the fastest way to sail

SIDELINES

1851 The year in which the yacht *America* challenged English boats to race around the Isle of Wight, England, for a trophy that has since become known as the America's Cup.

67 The age of the oldest competitor to date in the Velux 5 Oceans Single-Handed Race (Sir Robin Knox-Johnson).

16 The VHF Radio channel dedicated for use in an emergency at sea, to request help from coast guard or other vessels.

1,852 The number of meters (6,076 ft) in a nautical mile—a standardization of the measurement of 1' (minute) of latitude.

5,000 The number of sailors competing in the annual Kiel Week regatta, in northern Germany, in 2,000 boats.

SAILING



EVENT OVERVIEW

Sailing has been described unjustly as akin to standing under a shower ripping up money while someone is throwing buckets of cold water at you. It is an exhilarating and demanding sport, both physically and mentally. There are many different types of racing, governed by strict international rules as well as local regulations. Racing may be on lakes or coastal bays and estuaries, around courses defined by temporary marks; in coastal waters, using fixed navigational marks to define the course; or far offshore across entire oceans. Sailors may race single-handed, in a small crew, or in a crew of more than 20 athletes.



WHERE THEY RACE

Offshore races usually follow a route delineated by fixed navigational buoys. Shorter coastal and inland races have temporary race marks laid, in such a way as to provide the best test of sailing ability for the conditions of the day.

OLYMPIC COURSES

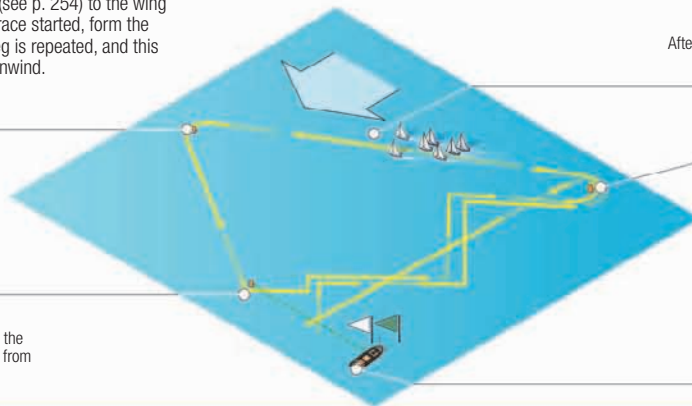
Racing is based on short events of 30–75 minutes. A classic Olympic course has a distance of 1 mile (1.6 km) between race marks, which are set to provide a variety of different sailing angles (see p. 254). Beating (sailing toward the wind, or windward) provides the best test of ability, and the windward leg is the most important part of the course. On an Olympic course, such as the triangle course below, the windward leg will be sailed twice, and there will be at least one leg downwind (sailing away from the wind). Reaching (sailing between 45 and 135 degrees to the wind) is the easiest and fastest point of sailing, and usually there will be one reaching leg in each direction relative to the wind. The Start line is ideally set square (at right angles) to the wind, to provide a fair, unbiased start for all the boats (see p. 253).

TRIANGLE COURSE

From the start, boats race directly toward the wind to the windward mark. Reaches (see p. 254) to the wing mark, and back to where the race started, form the triangle. Then the windward leg is repeated, and this time the return is directly downwind.

Wing mark
This should form an equilateral triangle with the upwind and downwind marks

Leeward mark
This is set directly downwind of the spreader mark, and is separate from the Finish line



WINDWARD/LEEWARD COURSE

The emphasis of this course is on direct upwind and downwind sailing, provided by several laps of two separate marks at the downwind end of the course.

Start line
The line between this buoy and the Committee Boat is ideally set at right angles to the wind

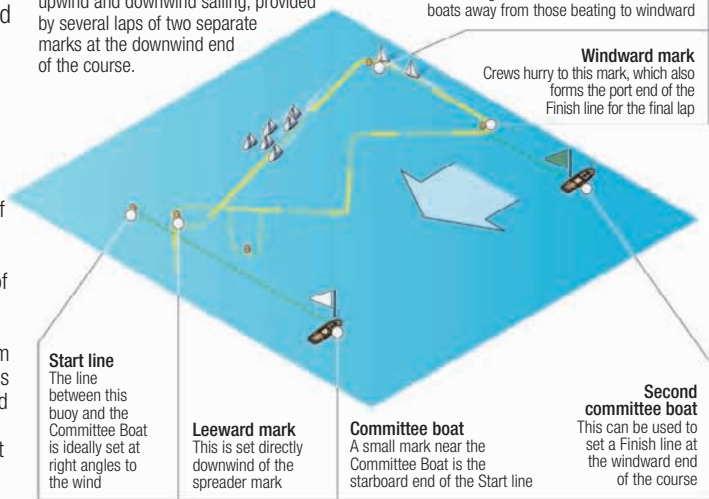
Leeward mark
This is set directly downwind of the spreader mark

Committee boat
A small mark near the Committee Boat is the starboard end of the Start line

Spreader mark
Reaching around this takes the downwind boats away from those beating to windward

Windward mark
Crews hurry to this mark, which also forms the port end of the Finish line for the final lap

Second committee boat
This can be used to set a Finish line at the windward end of the course



On a reach
After rounding the first mark, crews sail on a starboard reach across to the wing mark

Windward mark
This is set directly upwind of the Start line, and crews sail toward it in a series of zigzags as boats cannot sail directly into the wind

Committee boat
A mark near the Committee Boat forms the starboard end of the Start line, which is also the Finish line

OCEAN RACING

Ocean racing is the pinnacle of yachting challenges, the ultimate test of both boats and sailors. These races are long, often lasting many months, and grueling, taking competitors far from the shelter of home waters.

All ocean races are held under the Racing Rules of the International Sailing Federation (ISAF). Some are raced single-handed, testing the endurance of a single yachtsman or woman. They face extreme loneliness and tough challenges, but most do endure and are recognized for their skill and resilience in adversity. Other races are sailed with a large crew, where the skill of the skipper is in leading a team that can work and live together at close quarters through storms and calms. Interestingly, it is often the calms that produce severe psychological difficulty; the phenomenon of drifting aimlessly through the ocean, far off the planned course because there is no wind to drive the boat, creates frustrations that many sailors find difficult to deal with.

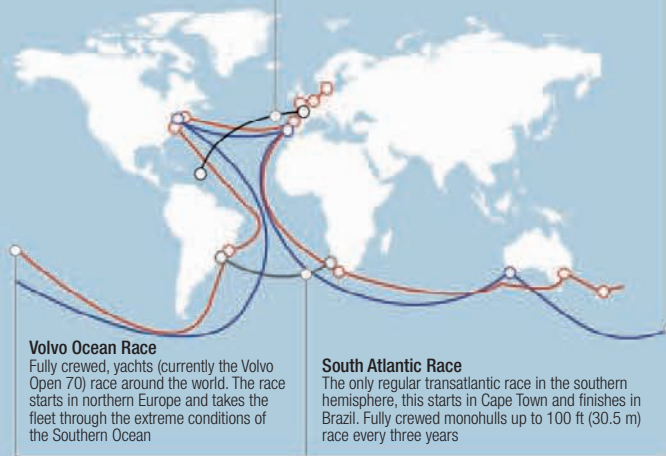
Ocean racers must be resourceful. They must know how to achieve the best sailing speeds from their boats, and be able to navigate safely through unmarked oceans. They must also deal with breakages of equipment that occur in stressful conditions, improvising repairs to complex equipment with only the most basic of materials or tools on hand.

Route du Rhum

This single-handed transatlantic race, from France to Guadeloupe, has a mainly downwind course. It is sailed every four years by mono- and multihulls, 40–60 ft (12–18 m) long

Velux 5 Oceans

In this extreme challenge, solitary sailors race around the world in Open 60 class yachts. The race takes place every four years



Volvo Ocean Race

Fully crewed, yachts (currently the Volvo Open 70) race around the world. The race starts in northern Europe and takes the fleet through the extreme conditions of the Southern Ocean

South Atlantic Race

The only regular transatlantic race in the southern hemisphere, this starts in Cape Town and finishes in Brazil. Fully crewed monohulls up to 100 ft (30.5 m) race every three years

WHAT THEY RACE

Boats of all sizes may have one hull (monohulls), or two or three parallel hulls (multihulls). A boat with two hulls is a catamaran, while a boat with three hulls is a trimaran. Racing boats have a large sail area for the size of boat, and underwater foils (the fins and rudder) to minimize leeward drift (the sideways force of the wind). Designers constantly strive to find ways to construct boats with even lighter materials, and are always looking for ways to improve the balance between speed and safety.

OLYMPIC CLASSES

Boats sailed for Olympic events are measured to precise formulas, so that craft in any one class are as nearly identical as possible. The test is then of the athlete's skill, not that of the boat-builder. Classes are chosen by the International Sailing Federation (ISAF), and occasionally changes are made to the list, to reflect developments in boat design and greater athleticism of sailors.

The Laser, Laser Radial, and 470 dinghies are very popular, and commonly sailed in club racing throughout the world, both inland and in coastal waters. The Tornado catamaran, high-performance 49er skiff, and the Yngling and Star keelboats are less commonly seen outside elite racing circles. The Tornado was not selected for the 2012 Olympics.

GETTING THE EDGE

Racers work hard to find ways to "tune" or "tweak" their boats to achieve a technical edge over competitors. The measurement rules are strict, so everyone is using the same equipment, but even very small adjustments to rigging or sails might produce a tiny advantage that could lead to a big medal.

OCEAN RACERS

Some ocean racing events are open to any type of boat, often grouped into classes of different-sized yachts handicapped according to criteria such as weight and sail area. Other events are for "one-design" classes.

Yacht designers are constantly searching for ways to combine lightweight materials such as carbon fiber with the strength needed to deal with huge forces and potentially heavy seas. Those boats destined for around-the-world racing are extremely robust, yet also sleek and hydrodynamic. They have strong mechanisms for handling huge sails, and up-to-date electronic navigation and communications equipment—safety is a serious consideration in this dangerous sport. There also has to be some living accommodations; the crew must be able to sleep and eat in order to maintain their ability to perform under arduous conditions, but space and weight are at a premium so there are no frills and the crew will be expected to "hot bunk" (alternate in bunks) to save space.

LASER

This 14 ft (4.2 m) monohull dinghy is popular worldwide. It is simply designed, mainly for single-handed sailing, with basic rigging.

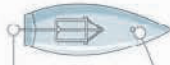


Sleeved sail

The single sail has a "sleeve" that slides over the mast

Control lines

All controls must be rope, with no high-tensile strength materials such as Kevlar



Within the rules

Design is governed by class standards

Unstayed mast

The tall mast is supported through a slot in the deck

470

The single hull is 15 ft 5 in (4.7 m) long, designed for a crew of two. A trapeze helps crew keep the planing hull level in the water.



Stayed mast

The mast is supported by stainless-steel wire rigging

"Bermuda" rig

Conventional mainsail and jib give a large sail area, with a spinnaker for downwind sailing



Adjustable foils

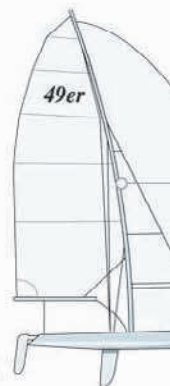
As on all dinghies, the centerboard and rudder can be raised as required

Self-buoyant

The lightweight hull includes integral buoyancy tanks

49er

Designed as a high-performance skiff for two crew, the hull is 16 ft (4.9 m) long, with twin trapezes. This is the fastest of the "one-design" dinghies.

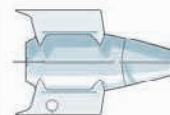


Mast bend

Tapering top mast bends to keep the sail flat in strong wind

Asymmetric spinnaker

The huge downwind sail launches straight out of the bow, quickly and easily



Winging it

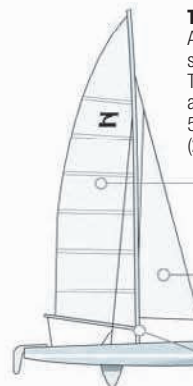
This extends to allow crew farther out

Innovative

Unusual forward end design improves efficiency by reducing drag

TORNADO

A 20 ft (6.1 m) catamaran sailed by a crew of two, the Tornado is capable of speeds above 30 knots (35 mph/56 kph), and 18 knots (20 mph/33 kph) upwind.

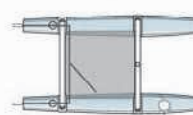


Large sails

Large mainsail and jib are augmented by a spinnaker for downwind sailing

Fast tack

A self-tacking jib makes for quick direction changes

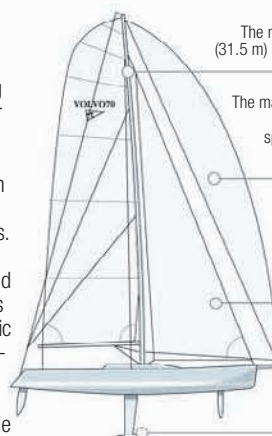


Adjusting mast

A rotating mast improves aerodynamics and sail shape

Flying high

The Tornado is typically sailed with one hull "flying" (out of the water)



Mast

The mast extends 103 ft (31.5 m) above the waterline

Sail power

The mainsail is 223 sq yd (186 sq m) and the spinnaker 598 sq yd (500 sq m)

Light and fast

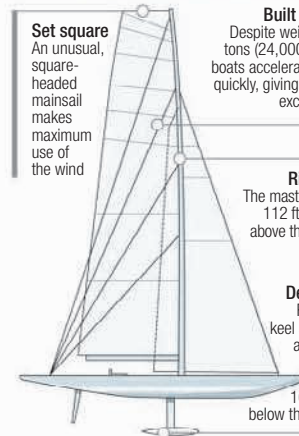
The yacht weighs 13.8–15.4 tons (12,500–14,000 kg), yet is capable of great speeds

Canting keel

The 7.7 ton (7,000 kg) ballast bulb on the keel can be rotated to increase stability

OCEAN RACER (VOLVO 70)

This 70 ft (21.3 m) monohull yacht was designed for the 2005–6 Volvo Ocean Race. A core crew of nine sails the boat (11 for an all-female crew), with 11 different sails (excluding storm sails) to choose from.



Set square

An unusual, square-headed mainsail makes maximum use of the wind

Built for speed

Despite weighing 26.5 tons (24,000 kg), these boats accelerate and turn quickly, giving very close, exciting racing

Rising high

The mast rises 105–112 ft (32–34 m) above the waterline

Deep water

Rudder and keel are slender and deep—the boat extends 16.5 ft (5 m) below the waterline

AMERICA'S CUP CLASS

This is a design-restricted class that is newly developed for each series of challenges. The boats are 79 ft (24 m) long and only 13.5 ft (4.1 m) wide. A crew of 17 is stipulated, with an optional 18th non-racing crew.



PARTS OF A BOAT

All sailing boats consist of a hull; a rig with spars such as mast and boom; sails; and underwater foils for steering and to resist leeway (sideways drift). Fittings and control systems vary in size and complexity, but are recognizable from boat to boat. Many sailing boats are at least partially decked.

KEELBOAT

A keelboat falls midway between a dinghy and a yacht—larger than most dinghies but with a ballasted keel or centerplate instead of the dinghy's adjustable centerboard. Keelboats are considerably more stable than dinghies and less likely to capsize. Below decks accommodation is usually either absent or rather cramped, but an open cockpit may have room for several crew members.

Mainsail

Most racing boats have a triangular mainsail, extending right up to the top of the mast

Mainsheet

A rope-and-pulley system attached to the main boom is used to control the mainsail

Sheets to the wind

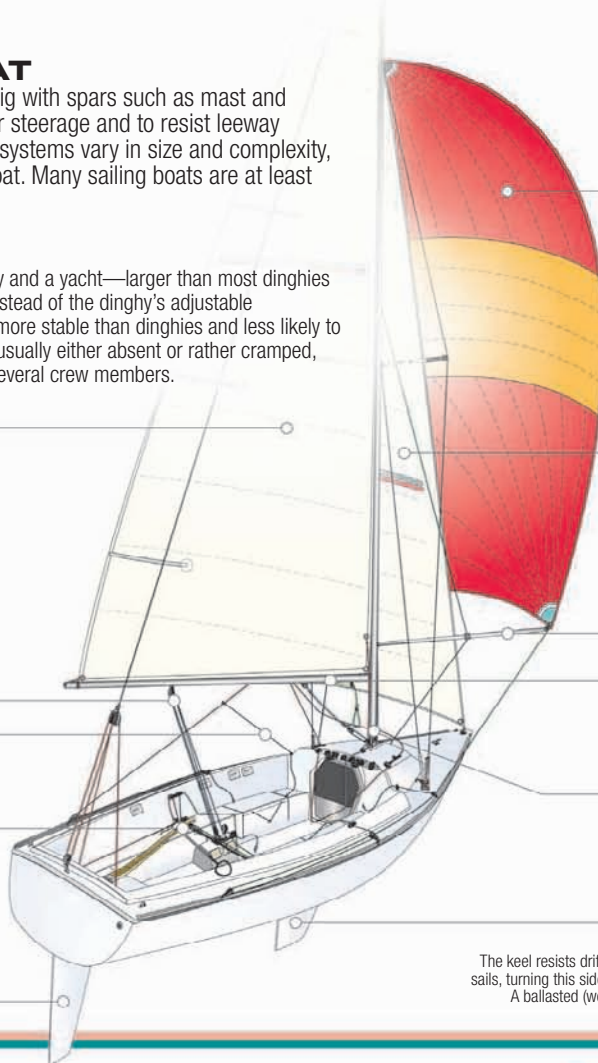
The ropes used to control the sails are known as sheets

On course

In smaller keelboats and dinghies, the rudder is controlled via the tiller in the cockpit; larger yachts use a wheel

Steerage

Turning the rudder from one side to another changes the direction of the boat



Spinnaker

The bellying downwind sail is set on a spinnaker pole. Modern asymmetric spinnakers are set off a bowsprit

Foresail

A standard foresail is a jib that reaches from the bow (front) of the boat back to the mast. A larger foresail, which overlaps the mainsail and sweeps the deck, is known as a genoa

Strong spars

Mast and booms may be made of aluminum, fiber-reinforced plastic, or lightweight modern composites reinforced with carbon fiber

Boom

While the mast supports the sails vertically, the boom supports the mainsail laterally

Halyards

Ropes used to raise and lower the sails are called halyards and are usually fastened close to the mast

Keel

The keel resists drift caused by pressure of wind on the sails, turning this sideways pressure into forward motion. A ballasted (weighted) keel makes capsizing unlikely

WHAT THEY WEAR

Keeping warm, comfortable, and dry is part of safety on the water. Specialized fabrics and specially designed clothing are an important part of successful racing.

DINGHY

Buoyancy aids must be worn by all racing dinghy crews, and wet suits are worn by most racers. There is a choice between a full suit—covering from neck, to wrist, to ankle—and a shortie, which leaves lower legs and arms bare.

Buoyancy aid

Helps flotation without impeding swimming—essential in a craft liable to capsize



Wet suit

Tight-fitting neoprene traps a layer of water against the skin, where it warms quickly



Sailing gloves

With or without finger-ends, gloves with reinforced palms protect hands from rope-burn and aid grip on the ropes



Dinghy shoes

Wet suit shoes keep feet warm, and grip the side decks firmly and safely



Life jacket

An inflatable life jacket is worn folded flat, to be inflated only if the wearer falls into the water. It is designed to turn the wearer face up in the water



Overalls

Chest-high waterproof pants, which can also be worn over warm fleece layers, are heavily reinforced at seat and knees



Jacket

A wind- and waterproof jacket with tightly fitting cuffs is essential. A high collar helps keep the wind and water out



OFFSHORE/OCEAN

There are times when a yacht crew can strip to shorts and T-shirts in the sunshine, but foul-weather clothing is usually essential. Clothing systems are based on layering for warmth, with the top layer as waterproof as possible.

Full gloves

Waterproof gloves protect from the elements and from rope-burn, while also giving better grip



Yachting boots

Knee-high boots with soft rubber, non-slip soles are worn underneath the pants



RACING RULES

All yacht and dinghy racing is governed by rules established by the International Sailing Federation (ISAF), with local rules applying if circumstances demand. The rules are complex and, to race successfully, competitors must know them all in detail, and be able to apply them tactically.

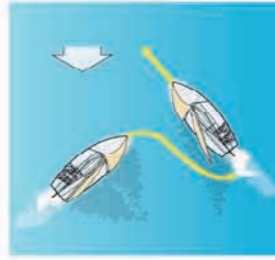
TACTICAL RACING

Sail racing is about tactics. To the uninitiated, some of the maneuvers undertaken during racing may look like sharp practice; but when both helms know the rules thoroughly, each should use the rules to the fullest extent possible in order to gain an advantage. This is most noticeable to spectators in match racing—such as the America's Cup races—where two evenly matched yachts race boat-for-boat over a short course.

The Race Committee is not responsible for making sure that rules are not infringed. Sometimes it is possible to have referee boats out on the water, watching all competitors, especially at the turning marks. Otherwise, one boat can "protest" another for infringing rules, by raising a red flag. If the protest is disputed, the Protest Committee will take evidence from both boats after the race, to adjudicate.

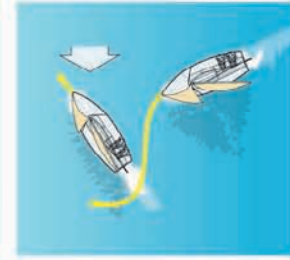
WINNING ISN'T EVERYTHING

RACING RULES STATE: "A BOAT OR COMPETITOR SHALL GIVE ALL POSSIBLE HELP TO ANY PERSON OR VESSEL IN DANGER." IN 2006, SAILORS IN THE VELUX 5 OCEANS RACE (SINGLE-HANDED) RAN INTO SEVERE STORMS. ALEX THOMSON'S YACHT *HUGO BOSS* LOST HER KEEL AND HE WAS FORCED TO TAKE TO HIS LIFEBOAT. MIKE GOLDING IN *ECOVER* WAS SEVERAL HOURS AHEAD, IN SECOND PLACE, BUT TURNED BACK TO RESCUE HIS FRIEND. "THAT IS THE GAME," HE WROTE. "THAT IS WHAT WE DO." SOON AFTER, *ECOVER*'S MAST BROKE AND SHE TOO WAS FORCED OUT OF THE RACE.



STARBOARD RIGHT OF WAY

If two boats are approaching each other on opposite tacks, the boat on port tack (with the wind coming from the left side of the boat) must always keep clear of the boat on starboard tack (with the wind coming from the right side of the boat).



WINDWARD BOAT KEEPS CLEAR

When two boats are on the same tack (both have the wind on the same side of the boat), the windward boat (the one closest to the side the wind is coming from) must keep clear of the other boat.



OVERTAKING BOAT KEEPS CLEAR

A boat overtaking another on the same tack must keep clear until the masts are level. The boat being overtaken can "luff" (sail closer to the direction the wind is coming from) to force the overtaking boat off course, but only until their masts are level.



OVERLAP AT A MARK

When two boats are on the same tack at a mark, the outside boat must give the boat overlapping her on the inside room to round or pass the mark without touching it, including room to tack or jibe if necessary.

TACTICS AND TACKS

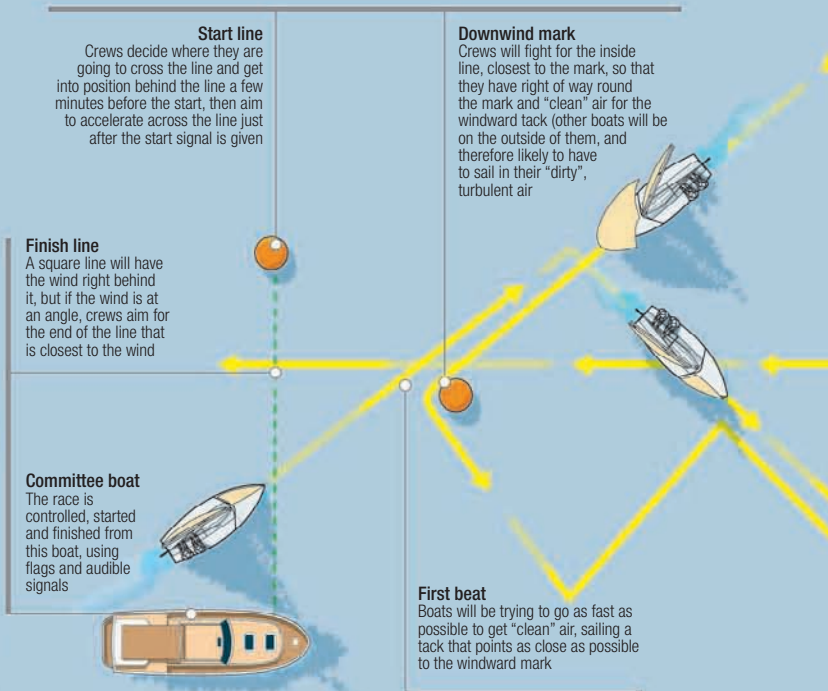
The course shown on the right is the standard Olympic course, involving all points of sailing (see p254). Racing requires not just technical skill but also clever use of tactics to exploit any advantage possible and to disadvantage the opposition.

BEATING TO WIN

Sailing directly into the wind requires a zigzag course, known as "beating." Each time the boat changes course so that the wind passes across the bow (front) of the boat, it is said to "tack" (see p254). If the wind comes from the side of the boat, the sails are not hauled in so tightly, and the boat is said to be "reaching." With the wind directly behind, the boat is "running." A turn so that the wind passes across the stern (back) of the boat is called a "jibe" (see pp.254).

STRATEGIC STARTS

Approaching the Start line, starboard tack is the safest tack since it confers right of way. A skilled helm (helmsperson) may judge there is room to approach the line and cross it on port tack before meeting a starboard tack boat. If that judgment is wrong, the port tack boat can be forced early over the line by a boat approaching fast on starboard tack. The penalty for that infringement is a detour around the end of the Start line and back over it from the correct side—behind most of the fleet.





ON THE START

Sail races are usually set to start directly into the wind. A Race Committee Boat marks the Start line, anchoring in the starting area, and a mark buoy is laid close to it. An outer distance mark is then anchored in position to make a line that is directly at right angles to the wind (in shifting winds this line may have to be laid and relaid several times). The first mark is then laid directly upwind, at right angles to the Start line. If several classes are racing, scheduled so that starts are spread over time, the wind may shift so that the line is no longer square to the wind. This can give an advantage to boats starting at one end of the line or the other—yet another tactical element to add to the skippers' calculations.



PORT-END BIAS

If the wind shifts so that the outer distance mark lies at less than 90 degrees to the wind, boats at the port (left-hand) end of the line will have a shorter distance to sail to the first mark. This creates crowding at that end of the line, as boats jockey for position.



SQUARE LINE—NO BIAS

With a Start line that is properly square to the wind, boats should be evenly spread along its length, giving all an equal distance to sail to the first mark.



STARBOARD-END BIAS

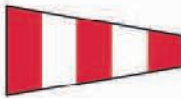
If the wind shifts so that the outer distance lies at more than 90 degrees to the wind, boats at the starboard (right-hand) end of the line will have the shorter distance to sail to the first mark. With the extra obstruction caused by the Committee Boat, this can become a tricky Start.

COUNTDOWN

Each class racing is identified by a separate code flag. An audible signal is given each time a flag is hoisted or lowered. The class flag is raised five minutes before the start; the preparatory signal (P) at four minutes. The preparatory signal is then lowered one minute before the start; the class flag at the point of go. Referees check that no boat is over the line at the Start; if a boat is over, the Committee will signal that the boat is over and it must return via the outer distance mark and start again; an "over" boat that does not restart will be disqualified.

FLAGS

Races are controlled by visual signals, supported by audible signals. Internationally recognized racing signals use maritime code flags. Audible signals are also given—such as gun, whistle, or hooter, but it is the visual signal that counts for timing.



ANSWERING PENNANT

Race is postponed (numeral signals tell how long the postponement will last).



ANSWERING PENNANT OVER "A" FLAG

No more racing today.



"N" FLAG

Race is abandoned.



"P" FLAG

Preparatory signal (four minutes before Start); competitors are now under Racing Rules.



"X" FLAG

Indicates there are boats over the Start line at the start gun.



FIRST SUBSTITUTE

General recall due to several yachts infringing the Start line—too many to identify individuals.



"S" FLAG

The course has been shortened.



"C" FLAG

The position of the next mark has been changed.



"L" FLAG

Come within hailing distance.



"M" FLAG

An object displaying this signal is replacing a missing mark.



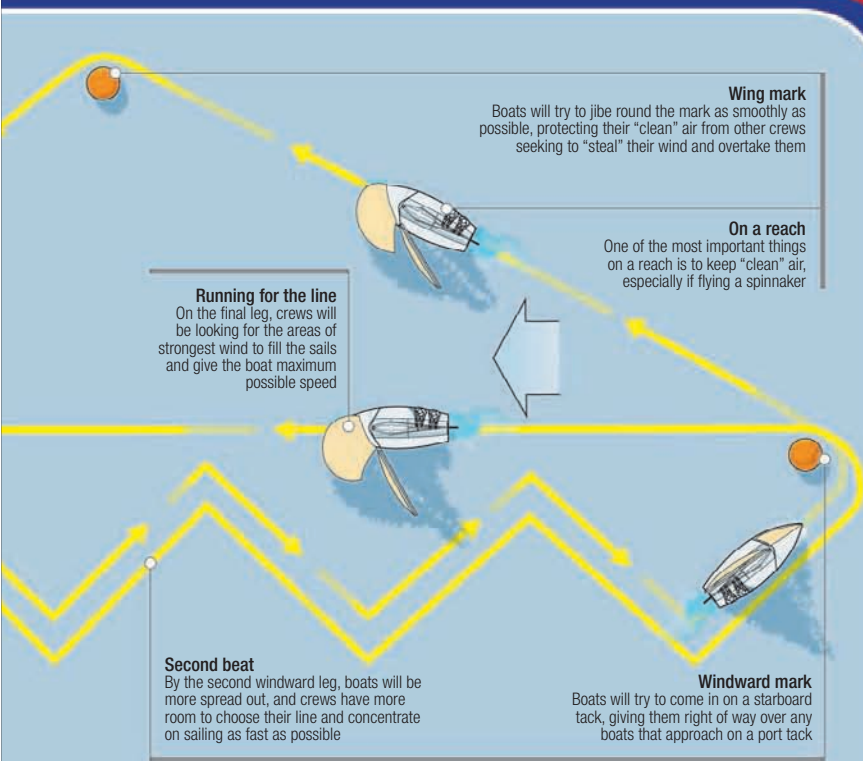
"R" FLAG

Sail the course in the reverse direction to the sailing instructions.



BLUE FLAG

This Race Committee Boat is on station on the Finish line.



SAILING TECHNIQUES

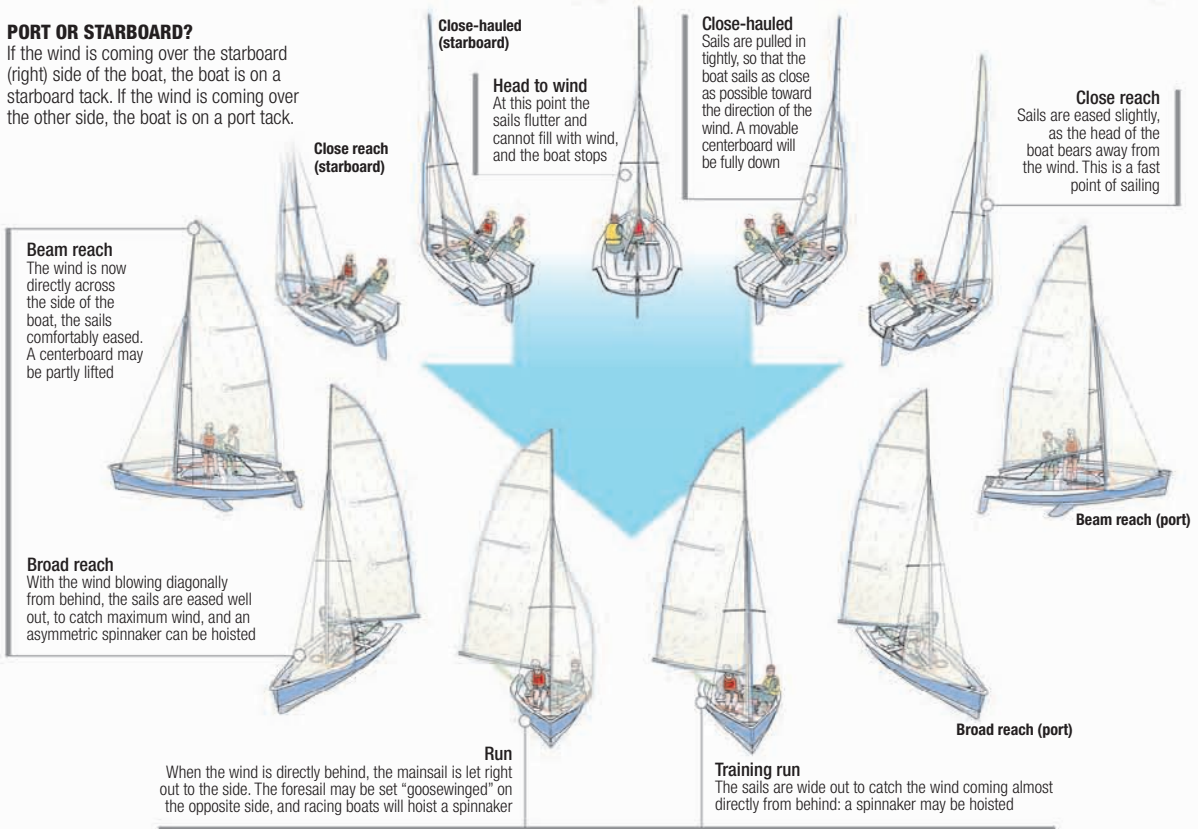
Sailing is all about using the wind to best advantage, to gain speed and reach a specified destination. This involves the set of the sails, and the hydrodynamics of the hull in the water. It all starts with boat design; but how the sails are adjusted, and how the boat is balanced by the crew, are the techniques that sailors must learn.

POINTS OF SAIL

Each time a boat alters its angle to the wind, the set of the sails must be altered. In a dinghy, the crew's weight must be adjusted to trim the balance of the boat fore and aft, and from side to side. Each different point of sailing has a technical name.

PORT OR STARBOARD?

If the wind is coming over the starboard (right) side of the boat, the boat is on a starboard tack. If the wind is coming over the other side, the boat is on a port tack.



Beam reach

The wind is now directly across the side of the boat, the sails comfortably eased. A centerboard may be partly lifted

Broad reach

With the wind blowing diagonally from behind, the sails are eased well out, to catch maximum wind, and an asymmetric spinnaker can be hoisted

Run
When the wind is directly behind, the mainsail is let right out to the side. The foresail may be set "goosewinged" on the opposite side, and racing boats will hoist a spinnaker

Training run
The sails are wide out to catch the wind coming almost directly from behind: a spinnaker may be hoisted

SIDELINES

18 This number of nations shared 33 sailing medals in Olympic sailing events in Beijing 2008.

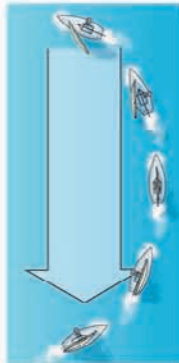
2 The number, in billions, of TV viewers who are estimated to have watched the 2005/6 Volvo Ocean Race.

181,000
The number of adult single-handed Laser dinghies sailed in 120 countries.

22,500
The number of nautical miles (25,892 miles/41,670 km) sailed in the longest nonstop yacht race, the Vendée Global Challenge.

TURNING THE BOAT

To change the direction of the boat, both sails and rudder need to be adjusted. Sails provide most of the power: pulling in the mainsail ("luffing") turns the boat toward the wind; letting it out turns it away from the wind. At the same time, the tiller or wheel is turned to move the rudder, and the jib is adjusted to work efficiently with the new mainsail position. If the boat is racing, tacking and jibing are critical maneuvers that need to be carried out with complete crew coordination. Lack of precision can cost vital seconds, and crews will spend hours practicing tacking and jibing to ensure the turns are as quick as possible.



TACKING

If the wind direction across the bow is changed, the sails "tack" to the other side of the boat. To change tack, the crew pulls in both sails and adjusts the rudder. As the boat moves through the head-to-wind position and onto the new tack, the sails flip onto the other side of the boat. The idea is to do this as quickly and smoothly as possible, without losing any forward momentum.



JIBING

Changing direction with wind crossing behind the boat is less easy to control than a tack: on a broad reach or run the sails will be far out to one side. To "jibe" the sails, they are first brought in as far as possible without altering course, then, as the tiller or wheel is turned hard, the boom and mainsail jibe across the boat on to the new side. Sails are adjusted quickly to keep the boat sailing smoothly.

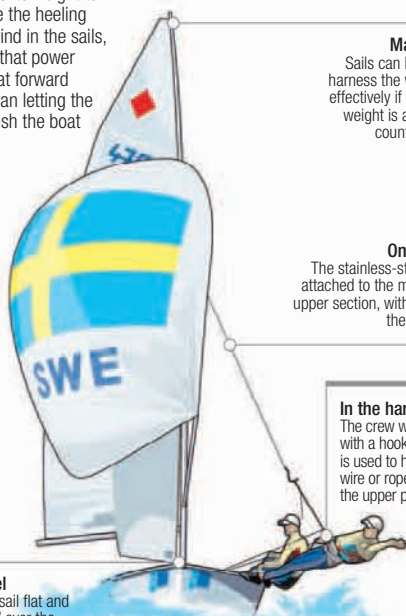


HEELING AND HIKING OUT

The force of the wind on sails naturally makes a boat heel over to one side, but it sails faster if level in the water. In a dinghy or small keelboat, the crew balances the tendency to heel by moving their weight toward, and then beyond, the outer edge of the hull. In conventional dinghies, this means sitting on the gunwale (the side of the boat), tucking toes under the toe straps for grip, and leaning backward over the water. This effect can be enhanced by use of a trapeze—the crew hooks onto a wire attached to the upper mast, and stands on the gunwale to lean out over the water. Some modern, extreme boats such as the 49ers have wings that dramatically extend the distance the crew can hike out.

HIKING OUT

If the crew uses its weight to counterbalance the heeling power of the wind in the sails, it can harness that power to drive the boat forward faster rather than letting the wind simply push the boat over sideways.



Max power

Sails can be used to harness the wind more effectively if the crew's weight is acting as a counterbalance

On the wire

The stainless-steel wire is attached to the mast, in the upper section, with a loop on the lower end

In the harness

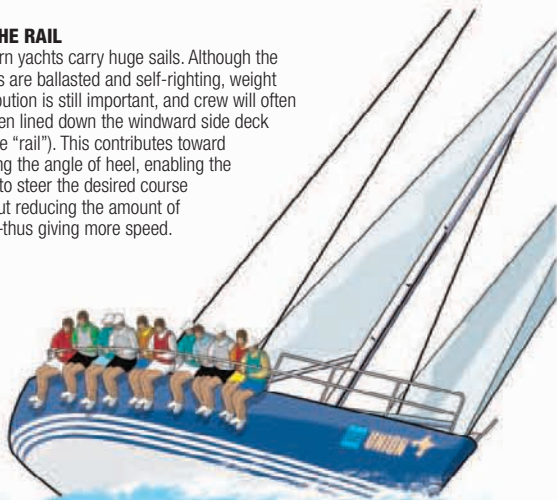
The crew wears a harness with a hook attached. This is used to hook on to a wire or rope attached to the upper part of the mast

An even keel

Modern hulls sail flat and rise to "plane" over the water when well balanced

ON THE RAIL

Modern yachts carry huge sails. Although the yachts are ballasted and self-righting, weight distribution is still important, and crew will often be seen lined down the windward side deck (on the "rail"). This contributes toward leveling the angle of heel, enabling the helm to steer the desired course without reducing the amount of sail—thus giving more speed.



STAT CENTRAL

AROUND THE WORLD (ONE-HANDED/VELUX 5 OCEANS)

YEAR	BOAT/SAILOR	COUNTRY
2006-07	CHEMINEES POUJOLATI BERNARD STAMM	SUI
2002-03	BOBST GROUP ARMOR LUXI BERNARD STAMM	SUI
1998-99	FILA/ GIOVANNI SOLDINI	ITA
1994-95	SCETA/ CHRISTOPHE AUGUIN	FRA

AROUND THE WORLD (CREWED/VOLVO OCEAN RACE*)

YEAR	BOAT/SKIPPER	COUNTRY
2008-09	ERICSSON 4/ TORBEN GRAEL (BRZ)	SWE
2005-06	ABN AMRO ONE/ MIKE SANDERSON (NZL)	NED
2001-02	ILLBRUCK CHALLENGE/ JOHN KOSTECKI (USA)	GER
1997-98	EF LANGUAGE/ PAUL CAYARD (USA)	SWE
1993-94	NZ ENDEAVOUR/ GRANT DALTON (NZL)	NZL

*FORMERLY WHITBREAD AROUND THE WORLD RACE

OLYMPIC GAMES BEIJING 2008

COUNTRY	GOLD	SILVER	BRONZE	TOTAL
GBR	4	1	1	6
AUS	2	1	0	3
ESP	1	1	0	2
USA	1	1	0	2
CHN	1	0	1	2

INSIDE STORY

The International Sailing Federation (ISAF) is descended from an organization dating back to 1907, when the International Yacht Racing Union (IYRU) was formed in Paris, France. Yachting authorities were included from France, Austria-Hungary, Holland and Belgium, Finland, Denmark, Germany, Great Britain, Italy, Norway, Sweden, Switzerland, and Spain. They devised a code for measuring racing yachts, and rules for racing in Europe. In 1929, the North American Yacht Racing Union aligned its rules with Europe, and in 1960 a worldwide code was adopted. The IYRU became the ISAF in 1996. Some of the rules devised in 1907 are still in use today.



NEED2KNOW

- ➔ Rowing is governed by the International Rowing Federation (FISA). Founded in 1892, FISA is the oldest federation in the Olympic Games.
- ➔ Rowing with one oar in both hands is called sweep or sweep-oar rowing, while rowing with one oar in each hand is called sculling.
- ➔ Rowers speak in terms of numbers of strokes per minute, with the rating being the number of strokes the crew completes during one minute.

SIDELINES

6,000 The average number of calories consumed each day by an Olympic oarsman to give him enough energy to complete his training program.

5:19 The current Olympic record time, in minutes and seconds, set by the US heavyweight men's eight in the 2004 Athens Games.

67 The record number of nations that participated in the 2007 World Rowing Championships.

130 The number of national federations affiliated to rowing's governing body, the International Rowing Federation (FISA).

10,000 The average distance rowed each year (in kilometres, equivalent to more than 6,200 miles) by an Olympic oarsman during training.



ROWING

EVENT OVERVIEW

Rowing can be described as hurtling backward as fast as possible in an unstable craft while ignoring burning lungs and screaming muscles. One of the few athletic disciplines that actually involves all of the body's major muscle groups, rowing demands high fitness and power levels for racing. Many different disciplines have evolved within the sport—heavyweight or lightweight events, for example, and sprints or long-distance races—for both individuals and for teams of up to eight crew.

“SHOOT ME”

ONE OF THE MOST SUCCESSFUL OLYMPIC ATHLETES EVER IS BRITISH ROWER SIR STEVEN REDGRAVE—THE ONLY ATHLETE EVER TO HAVE WON FIVE CONSECUTIVE OLYMPIC GOLD MEDALS IN AN ENDURANCE EVENT. IMMEDIATELY AFTER HIS FOURTH WIN, IN ATLANTA IN 1996, REDGRAVE FAMOUSLY GASPED “IF YOU EVER SEE ME NEAR A BOAT AGAIN, YOU HAVE MY PERMISSION TO SHOOT ME.” HIS RETIREMENT DIDN'T LAST LONG, HOWEVER, AND HE WENT ON TO WIN A FIFTH GOLD MEDAL IN SYDNEY IN 2000.

ATHLETE PROFILE

Rowing demands a challenging blend of strength, stamina, balance, technical skill, and mental discipline. Rowers have some of the highest power outputs of athletes in any sport, and racing 1 mile 427 yd (2,000 m) requires the power of a sprinter together with the physical and mental endurance to keep going while the muscles are burning with lactic acid—and while maintaining balance, rhythm, and technical control. It helps to be tall, since long arms and legs provide the advantage of a long stroke through the water; many top male rowers are nearing 6 ft 7 in (2 m) and many of the top women are over 6 ft (1.8 m).

Bowside
A rower whose oars extend from the right (starboard) side of the boat is called a bowsider

Strokeside
If the oar extends out on the left (port) side of the boat, the rower is a strokesider



The oar
A modern oar is usually hollow carbon with a rubber handle and a flat blade or spoon at the other end

Oarlock
Also called a rowlock, and fastened by a bar called a gate, the oarlock holds the oar as it rotates through each stroke

Rigger
Bolted to the shell, the rigger is a frame, usually aluminum or steel, that supports the oarlock

Tight fit
Rowers wear a tight-fitting onepiece, also known as a unisuit, zootsuit, or all-in-one, reflecting their club or national colors

Tough shell
A rowing boat is called a shell and is typically made of lightweight carbon fiber and plastic



RACE FORMATS

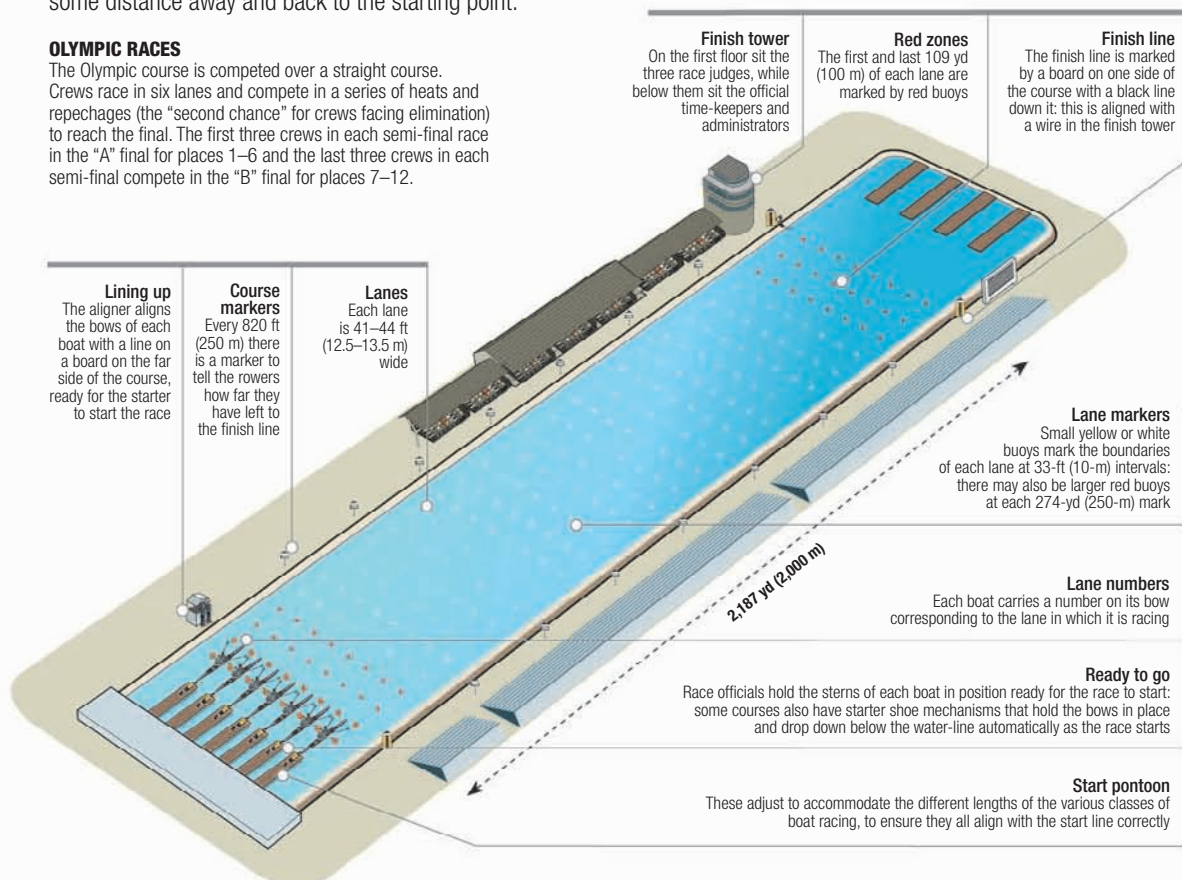
There are many different types of rowing race, reflecting the sport's long history. In addition to standard 2,000 m races, there are time-trial events called head races, long-distance events such as the Tour du Léman, and regattas over non-Olympic distances. In the UK, there are also bumps races that involve a pursuit to "bump" the boat in front, while stake-racing is an American event that involves a race to a marker some distance away and back to the starting point.

OLYMPIC RACES

The Olympic course is competed over a straight course. Crews race in six lanes and compete in a series of heats and repechages (the "second chance" for crews facing elimination) to reach the final. The first three crews in each semi-final race in the "A" final for places 1–6 and the last three crews in each semi-final compete in the "B" final for places 7–12.

COASTAL AND OCEAN ROWING

Although not included in the Olympic program, there are many coastal and ocean rowing events. FISA organizes the World Rowing Coastal Challenge as a championship event for international crews, and there are many other cross-ocean races and coastal regattas worldwide.



2,000 M RACES

The Olympics, World Cup, and World Championships are all rowed over a standard distance of 1 mile 427 yd (2,000 m). There are 14 different events in the Olympics and the World Cup, eight for men and, since they were first introduced in 1976, six for women. Every year except an Olympic year sees the staging of a World Championship, which has 24 events, including 14 for men and 10 for women. World Cup events occur annually as a series of three international regattas at different venues chosen each year. Adaptive rowing events, for rowers with physical disabilities, were first incorporated into the World Championships program for 2002 and the Beijing Paralympic Games for 2008.

LIGHTWEIGHT ROWING

Rowing is unusual in that it is one of few non-combat sports to have a special weight category for lightweights. This allows countries with "less statuesque" people to participate in the sport. For men in the lightweight class, the crew average must be 154½ lb (70 kg), with no individual crew member weighing more than 159¼ lb (72.5 kg); for women, the crew average is limited to 125 lb (57 kg), with an individual maximum of 130 lb (59 kg) for each crew member. Lightweight events were first included in the World Championships in 1974 for men and 1985 for women, and were added into the Olympic program in 1996.

HEAD RACES

An alternative to side-by-side racing, a Head race is essentially a time trial and can involve hundreds of crews setting off in procession, seconds after each other, and chasing each other down the course. The oldest, founded in 1926, is the Head of the River Race on the Thames in London, UK; the largest is the Head of the Charles in Boston, Massachusetts, now the largest rowing event in the world.

OTHER RACES

Over time various other events have established themselves in the rowing calendar. First held in 1829, the Oxford and Cambridge Boat Race is contested annually by the two English universities over a course of 4 miles 374 yd (6,779 m) on the Thames in London, UK. Yale and Harvard universities have been having a similar annual battle since 1852 in New London, Connecticut. There are many other variations on university races and on regattas over distances other than 2,000 m, such as Henley Royal Regatta. Established in 1839, this unique and prestigious international event races crews side-by-side two abreast down a course that is 1 mile 550 yd (2,112 m) long. In 1988, the first Henley Women's Regatta was held, and in 1993, Henley Royal Regatta introduced its first event for women, for single sculls. This has since been followed by events for eights and quads.

ONE OAR OR TWO?

The difference between rowing and sculling lies in the number and size of the oars used—the shells used are the same, just rigged differently to accommodate the respective number of oars.

ROWING

Competing in combinations from a pair through to an eight, rowers have one blade each. Many rowers have one preferred side, just as most people have a preferred writing hand.

SCULLING

Scullers have two oars, one in each hand. Although octuples (eight scullers in a boat) do exist, most sculling events are for combinations from a single through to a quad (containing four scullers).



EVENTS

The classification system used to describe rowing events uses a mixture of characters:

- L OR LT** the event is for lightweights.
- J** the event is for under-19s.
- B** the event is for under-23s.
- M** the event is for men.
- W** the event is for women.
- 1** the number of athletes in the boat; the number will be either 1, 2, 4 or 8.
- X** the event is for scullers.
- + OR -** signifies whether a cox is or is not present.

So, for example, LM4x denotes a lightweight men's quad, while W8+ is a heavyweight women's eight. There are further classifications at national level to denote experience or handicap levels, or age classifications for veteran rowers, but these vary from country to country and most are not used for international competition.

BOATS AND BLADES

Rowing equipment is expensive and usually owned and maintained by rowing clubs or squads, although many scullers own their own single scull. For racing, rowers usually wear a one-piece suit in club or national colors. This garment is designed to be tight-fitting to avoid snagging on the boat or blades during the race. Additional layers of breathable clothing may be worn depending on the weather conditions.

SHELLS

Traditional wooden rowing boats have been largely replaced by boats made from modern materials such as carbon fiber and fiberglass. The shell has a long, narrow shape to cut through the water with minimum drag. The length conforms to the rules of FISA and varies according to the class (minimum requirements shown below). The shells range from 23½ to 24½ in (59.7 cm to 62.2 cm) wide. A small fin or skeg is fitted to the hull for stability, and a small rudder will be attached to all classes of boat except single and double sculls.

STEERING

Most racing shells have rudders not much larger than a credit card, and these are connected to rudder wires that feed back into the boat. If the boat is coxed, the coxswain will control the rudder (see box below); if not, the rower or sculler nearest to the bow (the front of the boat) will usually control the steering via a moveable footplate to which the rudder wires have been attached. He or she may have to look around to check the direction of the boat at regular intervals, depending on how straight the course is.

SMALL BUT SIGNIFICANT

Pronounced "cox'n" and often shortened to "cox," coxswains can perform a vital role in a crew. Not only do they steer the boat, they also call the tactical shots, provide the motivation, act as on-the-water coaches to focus the crew's technique during the race, and tell the rowers what's going on around them. Traditionally they carried megaphones but now they use "cox boxes"—small amplifiers linked to speakers fitted throughout the boat. To avoid the rowers carrying excess weight, coxswains tend to be light—the FISA minimum is 121¼ lb (55 kg) for a men's crew and 110¼ lb (50 kg) for a women's crew.

BOAT CLASSES

The seven main boat classes are shown here, with their respective crews and minimum boat lengths and weights according to FISA classifications. The eighth boat class, the coxed pair, is less commonly used in competition.

Quad

Containing four scullers, this shell is 44 ft (13.4m) long and weighs 114 lbs (52 kg)

Straight Four

Also known as a "coxless" four, this shell contains four rowers, two on each side; it is 44 ft (13.4 m) long and weighs 110 lbs (50 kg)

Coxed Four

Containing four rowers and a coxswain, this shell is 45 ft (13.7 m) long and weighs 112 lbs (51 kg)

Eight

This shell contains eight rowers and a coxswain; it is 62 ft (19.9 m) long and weighs 211 lbs (96 kg)

Single Scull

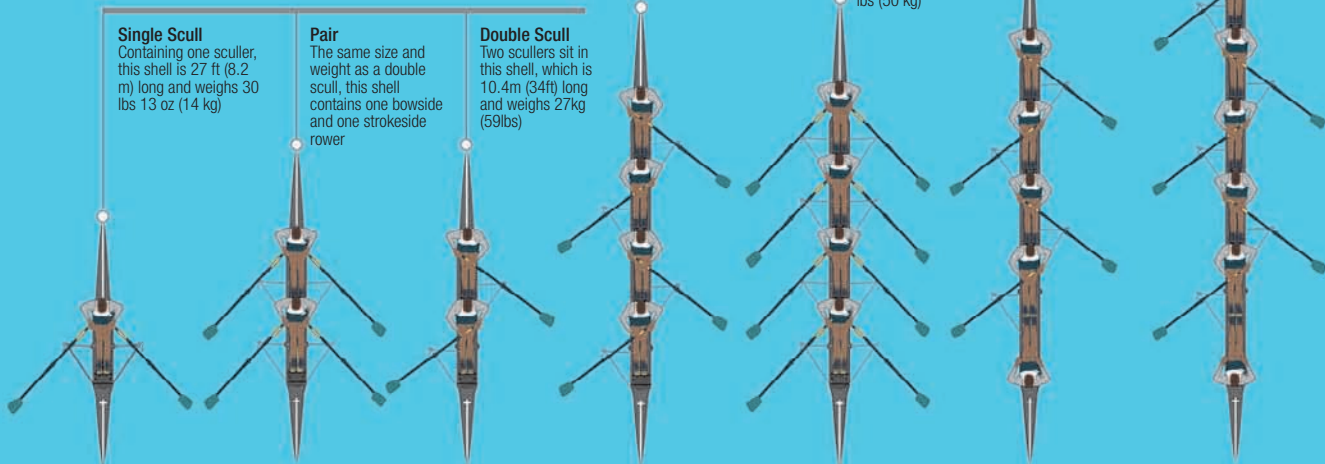
Containing one sculler, this shell is 27 ft (8.2 m) long and weighs 30 lbs 13 oz (14 kg)

Pair

The same size and weight as a double scull, this shell contains one bowside and one strokeside rower

Double Scull

Two scullers sit in this shell, which is 10.4m (34ft) long and weighs 27kg (59lbs)



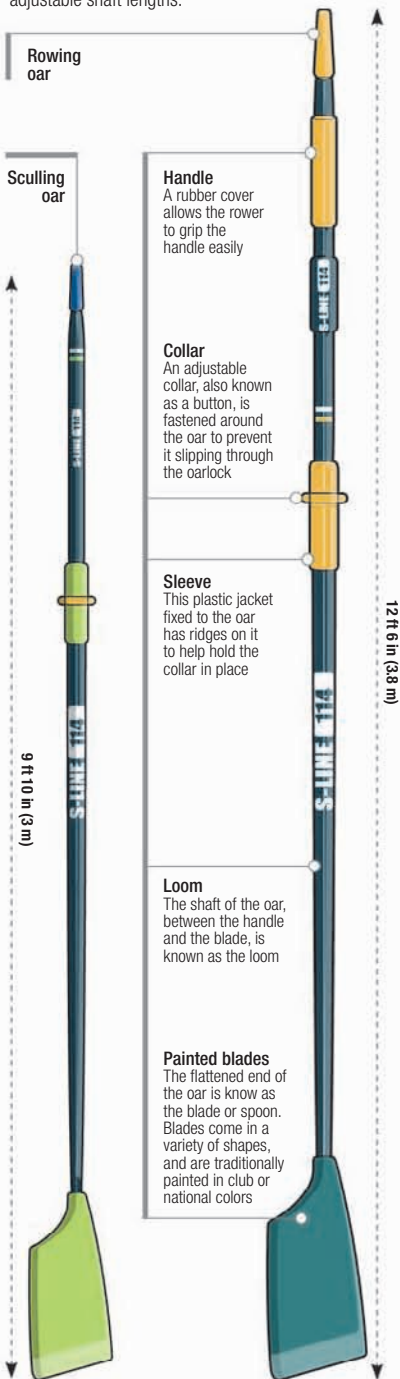


IN THE BOAT

Much of the equipment used for rowing and sculling is exactly the same, although the riggers and oars for sculling are smaller than those for rowing. There is no restriction on blade size or shape, but both oars and riggers are usually designed to be lightweight and very strong. The internal mechanisms within the boat, such as the seats and feet, are identical.

OARS

Modern oars are usually made of hollow carbon fiber. Lengths given are averages, as many designs have adjustable shaft lengths.



BOAT BASICS

Rowing shells are light, quite fragile, and built in different weights and strengths to suit a crew's size and weight. They are quite unstable without their oars in place.

Bowball

Every boat must have a rubber bowball secured to its bow. The bows of the boat would otherwise be very sharp, so bowballs can prevent any nasty spearings if a collision occurs

Canvas

The narrowing sections of the boat between the crew area and the bow or stern are named after the material historically used to cover them. Crews that win by just over 3 ft (1 m) are said to "win by a canvas"

Sliding seat

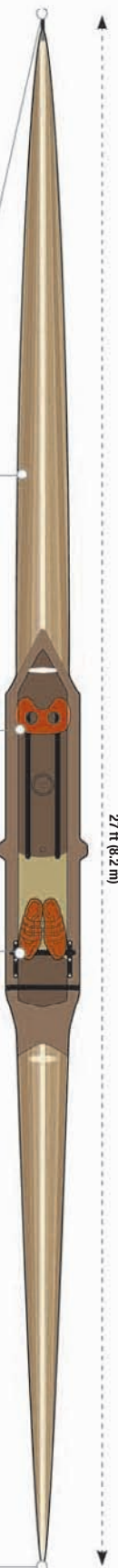
The seat is mounted on wheels that roll back and forth on rails (slides) fixed to the shell. The sliding seat allows the rower to use the legs to drive the oar through the water

Fixed feet

Shoes are bolted to an adjustable footplate within the boat. Fixing the feet provides the rower with a strong platform from which to push the legs and drive the oar through the water. Shoes have quick-release Velcro straps in case the boat capsizes

Built for speed

A modern shell is made from lightweight materials such as carbon fiber, and shaped to cut through the water. It has to be as light as possible, yet strong enough to support the crew



ROWING RULES

Within each country there is a national governing body with its own rules for rowing and sculling events. Although these rules vary slightly, they all exist to ensure that races run safely and fairly. Each national governing body is a member of the International Rowing Federation (Fédération Internationale des Sociétés d'Aviron; FISA), which is the world governing body for the sport.

RACES AND REGATTAS

Regattas take place under the supervision of a committee of race officials headed by a chairman. Before a crew takes to the water, officials check that the crew and the boat conform with the rules of the sport. At the start of the race, each crew lines up in lane and are held in place either by an electronic mechanism called a starter shoe or by an official, while the aligner checks that all the boats are lined up properly. A loud beep or gun may be used to start a race, the starter may call "Go," or a "traffic light" system may be used. At this point the boats are released and the race gets under way. In the event of a false start, a bell is rung and the starter waves a red flag to recall crews. Crews are allowed one false start only before being disqualified.

An umpire follows each race down the course to ensure that there are no steering infringements, for which crews can be disqualified. A hooter sounds as each boat crosses the finish line, and the umpire raises a white flag at the end of a race to confirm that it has been completed properly. The winner is the boat whose bow is deemed to touch the finish line first. Three photo-finish judges adjudicate if the race is too close to call. A jury of at least three officials, appointed by the race umpire before a race, resolves any formal protests arising out of competition.

CATCHING A CRAB

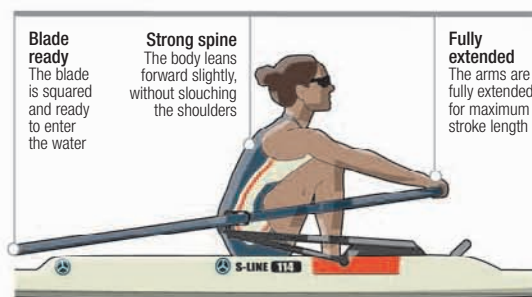
THE ROWER'S ULTIMATE NIGHTMARE IS CATCHING A CRAB—NOTHING TO DO WITH THE CLAWS OF CRUSTACEANS, BUT STILL VERY PAINFUL. CRABS ARE CAUSED BY THE BLADE ENTERING THE WATER AT THE WRONG ANGLE, WHICH SLICES THE BLADE DOWN AND CAUSES THE OAR HANDLE TO SHOOT UPWARD OR BACKWARD FAST—SOMETIMES FAST ENOUGH TO CATAPULT A ROWER OUT OF THE BOAT OR CAPSIZE IT. AND THAT'S IF THE ROWER'S LUCKY—IF HE OR SHE IS UNLUCKY, THE HANDLE JUST SLAMS THROUGH THEIR RIBS INSTEAD.

THE ROWING STROKE

Although rowing may look like an upper-body sport, the power in a rowing stroke comes from the legs. Rowers sit facing backward (toward the stern), holding an oar or oars, and propel the boat forward by pushing with the legs. The technique is fundamentally the same for both rowing and sculling, and involves four key phases (see below)—the secret is to flow smoothly from one phase to the other. Good rowing looks graceful and effortless, but this belies the tremendous power and physical demands required. Applying the necessary power smoothly enough to avoid acting as a brake on the boat, while also maintaining balance and keeping in time with the crew, is a task that requires great technical skill and many hours of practice.

TAKING THE CATCH

The rower leans forward with knees compressed so that the shins are vertical. With arms outstretched for maximum “reach,” the rower places the oar blades vertically (“squared”) in the water and starts to push with the legs against the footplate.

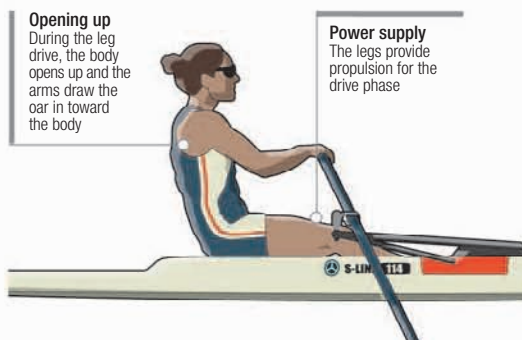


INDOOR ROWING

Most indoor rowing takes place on an ergometer (often shortened to “ergo” or “erg”), which is a land-based machine designed to simulate the experience of rowing. The ergo is a useful training tool and allows coaches to test a rower’s performance and power output. It can be a factor in making crew selections, although performance on the ergo does not always equate directly with performance on the water, where technique and balance also play a critical factor. Indoor rowing has also become a competitive sport in its own right. There are numerous local and national competitions worldwide, with hundreds of thousands of participants, and an annual world championship event, called the CRASH-B Sprints, which is held in Boston, Massachusetts.

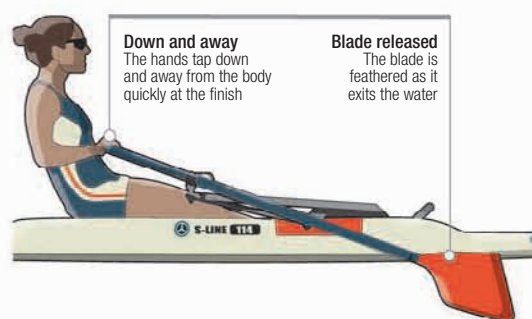
THE DRIVE PHASE

As the legs engage and start to power the blades through the water, the seat slides backward. The rower uses the momentum gained through the leg drive to draw the blade handles toward the body and leans back slightly to optimize the stroke length.



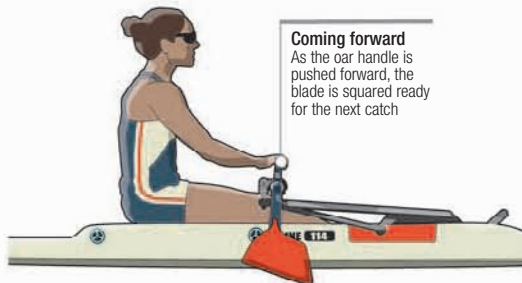
THE EXTRACTION

Also known as the finish or the release, for this phase the rower pushes down on the handle of the oars to lift the blades out of the water. Once the oars are clear of the water, the rower rotates the handle to “feather” or position the blades parallel to the water, which cuts down on air resistance.



RECOVERY TIME

The rower begins by stretching the hands forward beyond the knees, with the blades initially still parallel to the surface of the water. The body then rocks forward to be ready in the catch position, while the hands are rotating the oar handles to square the blade and the legs are compressing to bring the body forward for the next catch.



SIDELINES

250,000

The number of spectators lining the banks of the Thames River each year to watch The Boat Race between Oxford and Cambridge.

7,500

The number of competitors competing in the annual Head of the Charles race in Boston.

11.68

The lung capacity in liters of British rower Peter Reed (equivalent to 20½ pints and more than double that of the average person).

0.08

The margin of victory in seconds over the Canadian boat when British rower Matthew Pinsent took his fourth consecutive Olympic gold in the men’s coxless four in the 2004 Athens Olympics. Pinsent’s teammates were James Cracknell, Ed Coode, and Steve Williams.



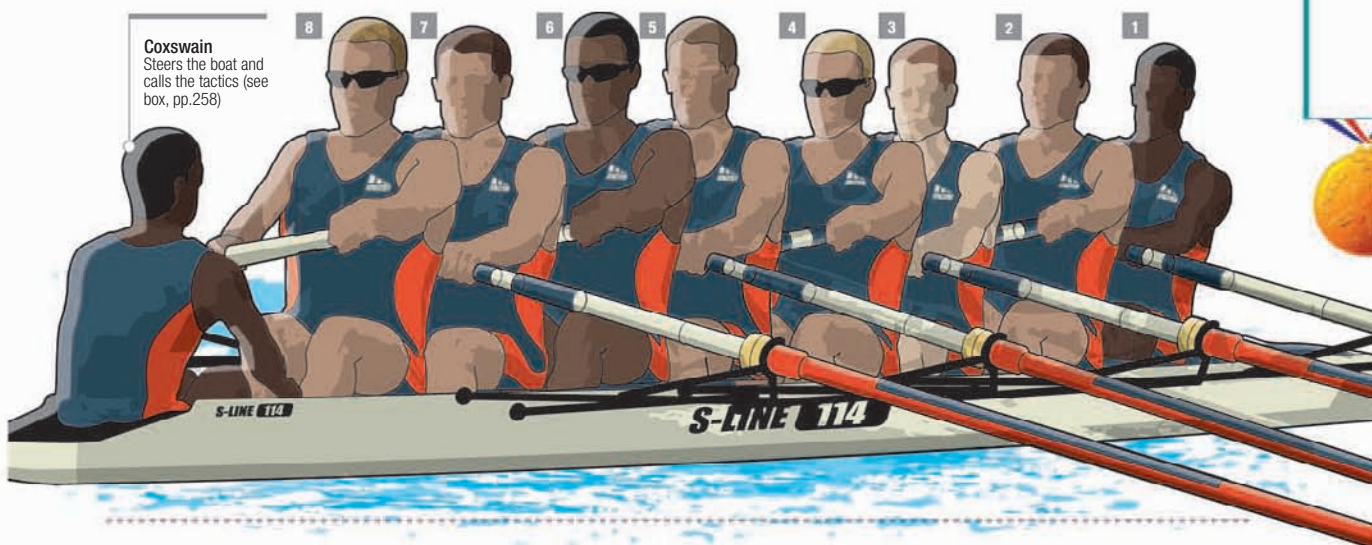
RACING TO WIN

Rowers talk in terms of “rating”—the number of strokes a crew completes in a minute. At the start of a race the stroke rate will be high—upward of 50 for a men’s eight—as the boat sprints away. During this phase the rowers are working hard and building up lactic acid in their muscles. Once the boat is up to speed, the crew settles into its race pace and the rate steadies out—around 38–40 for a men’s eight. At tactical points in the race, or to counter threats from the opposition, there may be a call for a “power 10” on the legs or an “up two” of the rating. Approaching the finish, crews wind up for another sprint and the stroke rate rises again—46 or more is not uncommon—and the rowers’ muscles and lungs will be burning even more than they did at the start. A high rate does not always guarantee speed, however: a good technical crew may go faster than a less able crew rowing at a higher rate.

TEAM WORK

Aside from the single scull, rowing requires a high level of team work. One rower cannot pull a crew to victory alone; it takes the whole crew to win. Bladework and timing must be synchronized; body positions and movements must be coordinated. Crews are numbered from the bow through to the stern, with Bow first, then Two, Three, etc. through to Seven and finally Stroke.

- 8 Stroke**
A good technical rower who sets the pace and rhythm for the crew
- 7 Seven**
Supports Stroke and transmits the rhythm and cadence to the rest of the crew
- 6 Six**
Leads the “engine room” of the middle four crewmembers; helps keep rhythm and length in the water
- 5 Five**
Backs up six in supplying power to back up the stern pair and transmitting rhythm
- 4 Four**
Lynchpin of the engine room. Four connects the crewmembers in the bows to the action in the stern
- 3 Three**
Provides power and keeps bow pair in touch with the rhythm in the boat
- 2 Two**
Leads bow pair; a technical rower who has quick bladework and can anticipate each stroke
- 1 Bow**
First over the finish line; another technical rower who, with Two, helps to balance the boat



Coxswain

Steers the boat and calls the tactics (see box, pp.258)

STAT CENTRAL

WORLD BEST TIMES (MEN)

CLASS	CREW	TIME	YEAR
M1X	NEW ZEALAND (M. Drysdale)	6:33.35	2009
M2-	GREAT BRITAIN (J. Cracknell, M. Pinsent)	6:14.27	2002
M2X	FRANCE (J.-B. Macquet, A. Hardy)	6:03.25	2006
M4-	GERMANY (S. Thormann, P. Dienstbach, P. Stürer, B. Heidicker)	5:41.35	2002
M4+	GERMANY (J. Dederig, A. Weyrauch, B. Rabe, M. Ungemach, A. Eichholz)	5:58.96	1991
M4X	AUSTRALIA (C. Morgan, J. McRae, B. Long, D. Noonan)	5:36.20	2008
M8+	USA (J. Read, W. Allen, C. Ahrens, J. Hansen, M. Deakin, D. Beery, B. Hoopman, B. Volpenheim, P. Cipollone)	5:19.85	2004

WORLD BEST TIMES (WOMEN)

CLASS	CREW	TIME	YEAR
W1X	BULGARIA (R. Neykova)	7:07.71	2002
W2-	ROMANIA (G. Andrunache, V. Susaru)	6:53.80	2002
W2X	NEW ZEALAND (G. Evers-Swindell, C. Evers-Swindell)	6:38.78	2002
W4-	AUSTRALIA (R. Selby-Smith, J. Lutz, A. Bradley, K. Hornsey)	6:25.35	2006
W4X	GERMANY (K. Köppen, K. Baron, K. Rutschow-Stomporowski, J. Sorgers)	6:10.80	1996
W8+	USA (B. Sickler, M. Cooke, A. Goodale, L. Shoop, A. Mickelson, S. Francia, C. Lind, C. Davies, M. Whipple)	5:55.50	2006

INSIDE STORY

“Modern” competitive rowing probably began between the watermen of the Thames River in London, but had spread to Europe and North America by the late 18th century. In the UK, The Boat Race, between Oxford and Cambridge universities, was first held in 1829, followed by the first annual regatta at Henley in 1839. In the US, Yale and Harvard established their own intercollegiate race in 1852, and by 1892 the sport’s popularity ensured its inclusion in the 1896 Athens Games, although bad weather prevented the Olympic debut until the 1900 Paris Games. Women’s events were first introduced in the 1976 Montreal Games, and lightweight rowing has been an Olympic sport since the 1996 Games in Atlanta.

INTERNATIONAL ROWING FEDERATION

The International Rowing Federation (Fédération Internationale des Sociétés d’Aviron; FISA) is the world governing body for rowing. FISA organizes international regattas such as the Olympics, the World Championships and the Rowing World Cup. Founded in 1892, it is the oldest international sports federation in the Olympic movement.



KAYAKING



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EVENT OVERVIEW

From the adrenaline-fueled excitement of the white-water slalom to the sheer speed and lung-busting effort of the flat-water sprint, kayaking is a sport of supreme athletic ability and technical skill. In the Olympics, there are individual, paired, and four-person flat-water sprints over various distances, as well as the dramatic white-water slalom. In the individual race against the clock, each competitor paddles around a series of gates, in assigned order and direction, without touching any part of the gate. In addition to the Olympic events, marathon and wild-water races are contested on an international level. There is even a ball sport, confusingly called canoe polo, played in kayaks.

COMPETITOR PROFILE

Flat-water kayak events demand a high degree of aerobic fitness and muscular stamina. Competitors must maintain excellent technique under pressure. Technical ability is more important in slalom races, but strength, power, and aerobic endurance are still essential.

Propulsion

High-level competitors use a double-bladed paddle made from a lightweight carbon-epoxy laminate

Gripping the paddle

Many competitors use paddle grips to provide a better grip for more efficient paddling

Head protection

The helmet is made from reinforced plastic, fiber glass, or super-light carbon. Required in the slalom, the helmet protects the head from impacts against rocks or gates

Staying afloat

A personal flotation device (PFD) is an essential piece of paddling gear. Lightweight and comfortable, the foam-filled PFD keeps the competitor afloat after capsizing

Power paddle

Kayakers need fantastic upper body strength to power through the water—the more forceful their paddling, the faster they will travel

SAFETY FIRST

Kayaking gear is designed with safety in mind. Perhaps the most important safety equipment is the personal flotation device, which keeps a kayaker afloat in the water. Equally important, however, are wetsuits and drysuits, which guard against hypothermia in cold water.

Staying dry

Outer shells made from synthetic fabrics are waterproof and windproof yet allow sweat to escape from the inside

Spray skirt

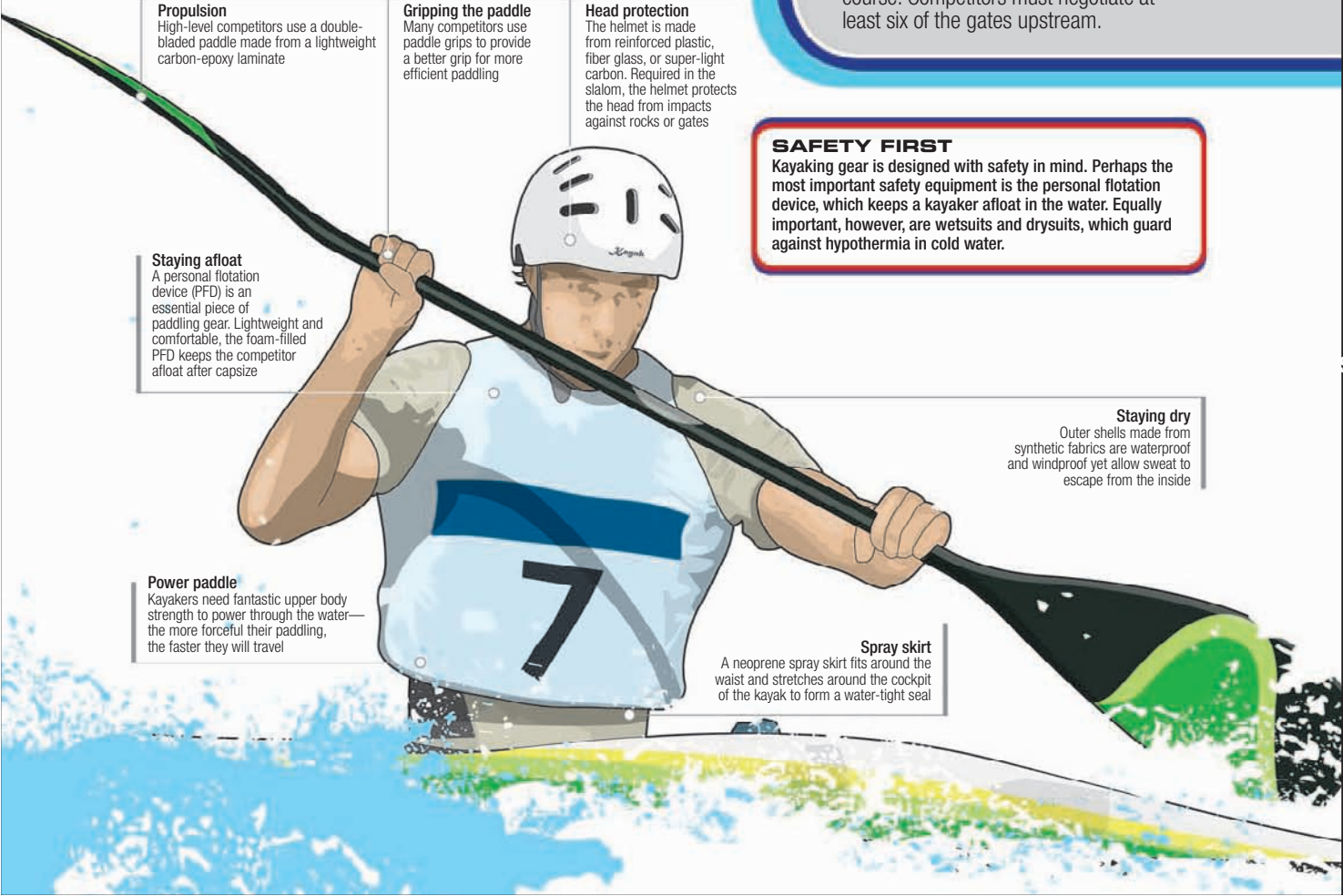
A neoprene spray skirt fits around the waist and stretches around the cockpit of the kayak to form a water-tight seal

NEED2KNOW

- Kayaking differs from canoeing in that competitors paddle from a seated position and use a double-bladed paddle.
- Especially popular in North America and Europe, kayaking is governed by the International Canoe Federation (ICF).
- The Olympic Games are the highest level of competition. The ICF World Championships are also highly prized.
- Flat-water and slalom races require different techniques, and some of the gear used is unique to each event.

ON THE COURSE

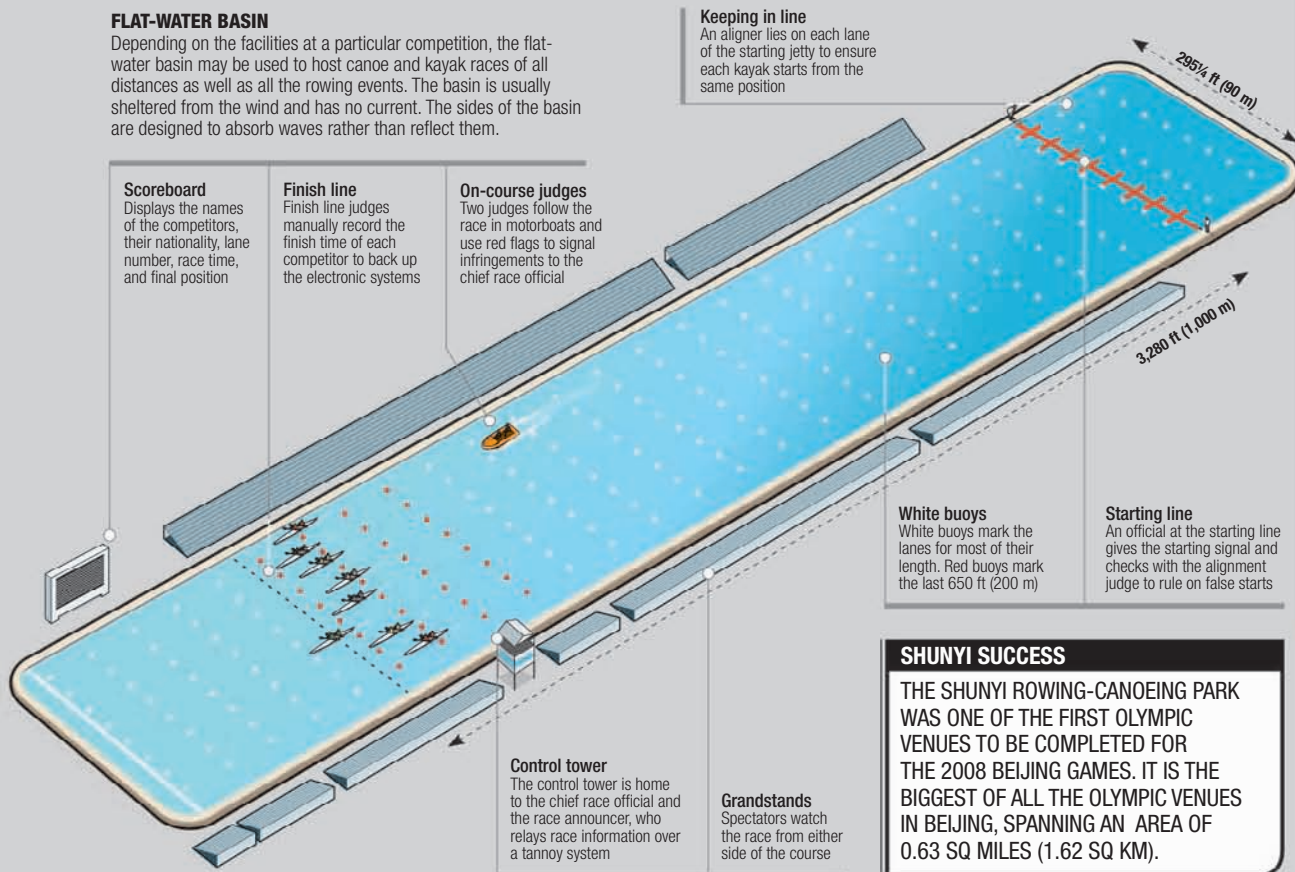
Olympic flat-water competitions take place over 1,625 ft (500 m) or 3,250 ft (1,000 m) of calm water. The International Canoe Federation World Championships also includes a 650 ft (250 m) sprint race. The straight course is marked into nine lanes (see right). Each lane is 29 ft 3 in (9 m) wide. Slalom events take place on natural rivers or purpose-built waterways. The course varies in length but always includes between 18 and 25 gates (pairs of poles) suspended above the surface of the water. Each gate has a number that marks the route of the course. Competitors must negotiate at least six of the gates upstream.





FLAT-WATER BASIN

Depending on the facilities at a particular competition, the flat-water basin may be used to host canoe and kayak races of all distances as well as all the rowing events. The basin is usually sheltered from the wind and has no current. The sides of the basin are designed to absorb waves rather than reflect them.



Keeping in line

An aligner lies on each lane of the starting jetty to ensure each kayak starts from the same position

Scoreboard

Displays the names of the competitors, their nationality, lane number, race time, and final position

Finish line

Finish line judges manually record the finish time of each competitor to back up the electronic systems

On-course judges

Two judges follow the race in motorboats and use red flags to signal infringements to the chief race official

3,280 ft (1,000 m)

295 1/4 ft (90 m)

White buoys

White buoys mark the lanes for most of their length. Red buoys mark the last 650 ft (200 m)

Starting line

An official at the starting line gives the starting signal and checks with the alignment judge to rule on false starts

Control tower

The control tower is home to the chief race official and the race announcer, who relays race information over a tannoy system

Grandstands

Spectators watch the race from either side of the course

SHUNYI SUCCESS

THE SHUNYI ROWING-CANOEING PARK WAS ONE OF THE FIRST OLYMPIC VENUES TO BE COMPLETED FOR THE 2008 BEIJING GAMES. IT IS THE BIGGEST OF ALL THE OLYMPIC VENUES IN BEIJING, SPANNING AN AREA OF 0.63 SQ MILES (1.62 SQ KM).

FLAT KAYAK CLASSES

In flat-water Olympic races, there are three different kayak classes: K1, K2, and K4. The letter "K" stands for "kayak", and the number represents the number of competitors in the boat. In the Olympic K1 and K2 classes, men race over 1,640 ft (500 m) and 3,280 ft (1,000 m). In the Olympic K4 class, men compete over 3,280 ft (1,000 m). Women race over 1,640 ft (500 m) in all three Olympic classes (WK1, WK2, and WK4; the letter "W" stands for "women"). The specifications of the single, double, and four-person kayaks are listed below.

	K1 SINGLE	K2 DOUBLE	K4 FOUR-PERSON
LENGTH	17 ft (5.2 m)	21 ft 3 in (6.5 m)	36 ft (11 m)
BEAM	1 ft 10 in (51 cm)	1 ft 11 in (55 cm)	2 ft 1 in (60 cm)
WEIGHT	26 lb 6 oz (12 kg)	39 lb 10 oz (18 kg)	66 lb (30 kg)

JOHN MACGREGOR AND ROB ROY

MANY PADDLERS DATE THE BEGINNING OF RECREATIONAL SEA KAYAKING TO JOHN MACGREGOR'S FAMOUS ADVENTURES IN THE SECOND HALF OF THE 19TH CENTURY. MACGREGOR COMMISSIONED A KAYAK OF CEDAR AND OAK, WHICH HE CHRISTENED "ROB ROY" AFTER THE FAMOUS SCOTTISH OUTLAW TO WHOM HE WAS RELATED, AND TRAVELED AROUND EUROPE AND THE MIDDLE EAST. HIS BOOK *A THOUSAND MILES IN THE ROB ROY CANOE* BECAME AN INTERNATIONAL BESTSELLER.

WHITE-WATER SLALOM

The white-water slalom is a technical and demanding race in which competitors guide their kayaks through a series of numbered gates over challenging rapids (see p.266). In the Olympics, there are single slalom kayak events for men (K1) and women (WK1). Each competitor has two attempts on the course. The final result is based either on the faster of the two runs or the total time for both runs, plus any time penalties.

GATE PENALTIES

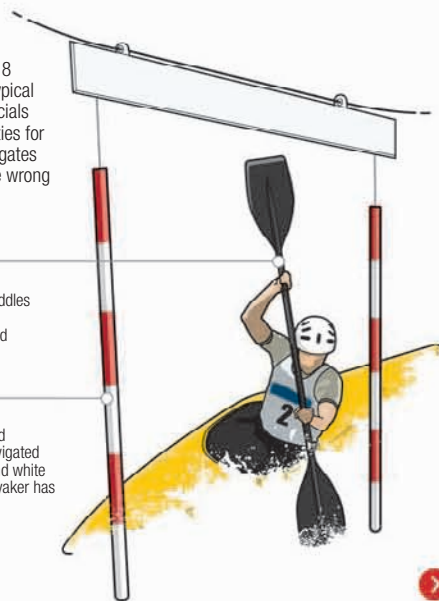
There are between 18 and 25 gates on a typical Olympic course. Officials hand out time penalties for touching or missing gates or taking them in the wrong direction.

Paddle penalty

Competitors keep paddles vertical when going through gates to avoid touching them

Gate stripes

Gates with green and white stripes are navigated downstream. Red and white stripes mean the kayaker has to paddle upstream



COMPETITION CLOTHING

Competitors' clothing is made from the latest synthetic materials. The aim is to keep warm, dry, and comfortable, but the clothing also incorporates some vital safety features, such as the combined dry top and spray skirt, which stops water from entering the cockpit of the kayak and prevents it from sinking.

WARM AND DRY

The vest and trunks are made from lightweight antimicrobial fabrics. These undergarments act as base layers, keeping competitors warm, dry, and free from infection.



Water resistant
A waterproof dry top combines with the spray skirt to prevent water from entering the cockpit of the kayak.



Sleeveless top
Vests prevent chafing under the arms caused by repetitive paddling.

Tight trunks
Tight-fitting, quick-drying trunks have durable seat panels and hidden seams to prevent chafing around the crotch.



K1 slalom: maximum 13 ft (4 m)



K1 flat-water: maximum 17 ft (5.2 m)



K1 flat-water: maximum 7-9 ft (2-3 m)

At least 7 1/2 in (20 cm)

ABOUT A BOAT

Modern flat-water racing kayakers are usually made out of lightweight composites. Ultralight carbon fibers or aramid fibers (such as Kevlar) are the materials of choice, with epoxy resin used to glue the layers together. Top-end K1 or K2 kayakers cost anything upward of \$4,000. The ICF publishes strict guidelines for each kayak class. Kayakers must conform to standards for the maximum length, minimum beam (width), minimum weight, and boat shape.

Wing paddle
The curved, wing-like blades catch the water better than traditional flat blades. This creates greater propulsive force.

PADDLING SKILLS

The body is the driving force behind all the key paddling strokes. Beginners often try to power the stroke with the arms, resulting in rapid fatigue and poor technique. Experienced kayakers use the body as the engine, the arms as the transmission, and the blades as the wheels. Another common mistake for novices is to grip the shaft tightly with both hands. An experienced kayaker grips the shaft securely with the control hand only. The shaft should be able to rotate freely in the other hand.

PADDLING

Every stroke in kayaking involves pulling against the water with the control hand and letting the other hand relax and push the stroke through. The stroke is done with both arms held comfortably in front of the body. A left pull starts by cocking the wrist of the left hand down to turn the pulling blade into position. After the pull, the left hand relaxes and rotates the shaft into position for the right pull.

CATCH

The basic paddling stroke starts with the catch, when the driving paddle enters water.



Plant the paddle
The kayaker plants the paddle firmly in the water.

BRACE

The brace steadies the kayak in preparation for the main propulsive phase of the stroke.



Body rotation
Upper body and paddle rotate to one side ready for the stroke.

FORWARD SWEEP

The forward sweep is a control stroke used to spin the kayak in a stationary position or to make a turn when moving forward. It is both a propulsive stroke and a turning stroke, so it is the best way of turning without losing momentum. The stroke is powered by a solid catch at the same time as rotating the upper body.

STARTING THE SWEEP

The forward sweep begins in the same position as the basic forward stroke. The kayaker plants the blade in the water and then rotates his or her upper body toward the stern. The kayaker then pushes the legs in the direction of the new course.



SWEEP TO STERN

The kayaker sweeps the paddle through an arc extending about 3 ft (1 m) from the boat, at the same time rotating his or her upper body as the blade moves to the stern. Most of the power is produced as the paddle sweeps between the hip and the stern.



BODY BALANCE

At the end of the sweep, the kayaker's body faces toward the side of the turn, with the shaft of the paddle over the water and parallel to the kayak. Before starting the next stroke, the kayaker edges his or her body back into the center of the kayak.





OTHER KAYAK SPORTS

Flat-water and white-water slalom are the only kayak events contested at the Olympic Games, but there are many other competitive races and sports held at international level. Wild-water is a race against the clock along a white-water section of a river. Marathon races are long-distance races on natural bodies of water. And canoe polo is a ball sport played by two teams of five players in kayaks.

WILD-WATER

Unlike the slalom events, there are no gates to consider in wild-water; the simple aim is to complete the course in the fastest time possible. There are two types of events. Sprint events are frenetic dashes over 545–820 yd (500–750 m). Classic races take place over a longer distance, usually 4–6 miles (6–10 km). The kayaks used for wild-water racing are longer and narrower than those used for flat-water racing.

MARATHON

ICF rules set the minimum distance for marathon races as 12½ miles (20 km) for men and 9½ miles (15 km) for women. At the World Cup and World Championships races usually cover up to 25 miles (40 km) and include obstacles such as rocks and shallows. Many marathon races are extreme endurance events, often held over hundreds of miles which take many hours to complete.

CANOE POLO

Described as a cross between water polo and kayaking, the object of canoe polo is to score more goals than your opponent in two ten-minute halves. The game is usually played in an indoor swimming pool. Enjoyed competitively in many countries throughout the world, the pinnacle is the World Championships, which is held every two years.

SIDELINES

6.5 The cost in millions of dollars to construct the Penrith Whitewater Stadium for slalom canoe-kayak events at the 2000 Olympic Games in Sydney, Australia.

44.56 The record in hours and minutes to complete the 460 mile Yukon River Quest in a solo kayak. The record is held by American Carter Johnson.

90 The percentage of medals won by European competitors since canoe-kayak events became full-medal sports at the Olympic Games.

SURFSKI RACING

SURFSKIS ARE LONG, NARROW KAYAKS USED FOR LIVESAVING IN SURFING HOTSPOTS AROUND THE WORLD, ESPECIALLY AUSTRALIA, NEW ZEALAND, SOUTH AFRICA, AND CALIFORNIA AND HAWAII IN THE UNITED STATES. MANY LIFEGUARDS COMPETE IN SURFSKI RACES ORGANIZED BY THE INTERNATIONAL LIFESAVING FEDERATION (ILF). THERE ARE MANY DIFFERENT EVENTS, FROM SHORT SPRINTS TO LONG-DISTANCE "IRONMAN" SURFSKI EVENTS.

ESKIMO ROLL

The Eskimo, or sweep, roll is a technique that involves a flicking hip motion and use of the paddle to right a capsized kayak. The hip flick is the key step in a kayak roll. It involves jerking the lower body to one side so that the kayak begins to return to an upright position. The Eskimo roll is one of the easiest techniques to master. Other roll styles suit different kayakers. An example is the hand roll, which is performed without a paddle.

SIT-UP START

To do an Eskimo roll to the left, the kayaker does a "sit-up" to the right side and pushes his hands up and out of the water so the forearms press against the side of the kayak.



INSIDE STORY

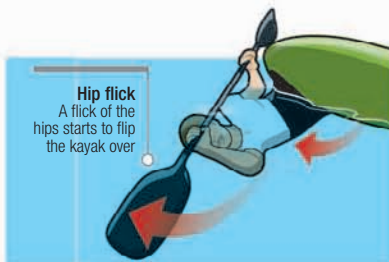
Competitive kayaking first came about in the 19th century, when people began to race over set distances. Flat-water racing became an official Olympic sport in the 1936 Berlin Games. White-water slalom is a more recent addition to the Olympic calendar, becoming a regular event since the 1992 Barcelona Games.

INTERNATIONAL CANOE FEDERATION

The International Canoe Federation (ICF) is the ruling body for all canoe and kayak events held at international level, including the Olympic flat-water and slalom races. It is also responsible for dragon boat racing and ocean kayaking. The ICF was founded in Stockholm in 1946 to replace the International Repraätantschaft für Kanuspart (IRK). It is now based in Lausanne, Switzerland.

FLICKING THE HIP

Keeping the head near to the water's surface, the kayaker then sweeps his body and paddle away from the side of the kayak. The hip flick begins at the same time as the sweep.



Hip flick
A flick of the hips starts to flip the kayak over

FLIPPING OVER

The hip flick continues until the kayak flips all the way over to an upright position. The kayaker straightens his back to recover and begin paddling again.



STROKE

Propulsion is achieved as the blade sweeps through the water.



Held aloft
The paddle is almost vertical as the kayak is propelled forward

TRANSITION

The transition of strokes from side to side should be as smooth as possible.



Side swap
As soon as the blade emerges, the catch starts on the other side

EVENT OVERVIEW

Canoeing is a strenuous water sport for men and women, competing either individually or as a pair. Competitors race to complete the course in the quickest time, and use a single-bladed paddle to propel the craft through the water. There are two competitive disciplines—slalom and flatwater canoeing. Staged on fast-flowing water, slalom events involve competitors negotiating a series of gates, while flatwater racing takes place on calm water with competitors racing side-by-side. Unlike kayakers, canoeists usually paddle from a kneeling position.

NEED2KNOW

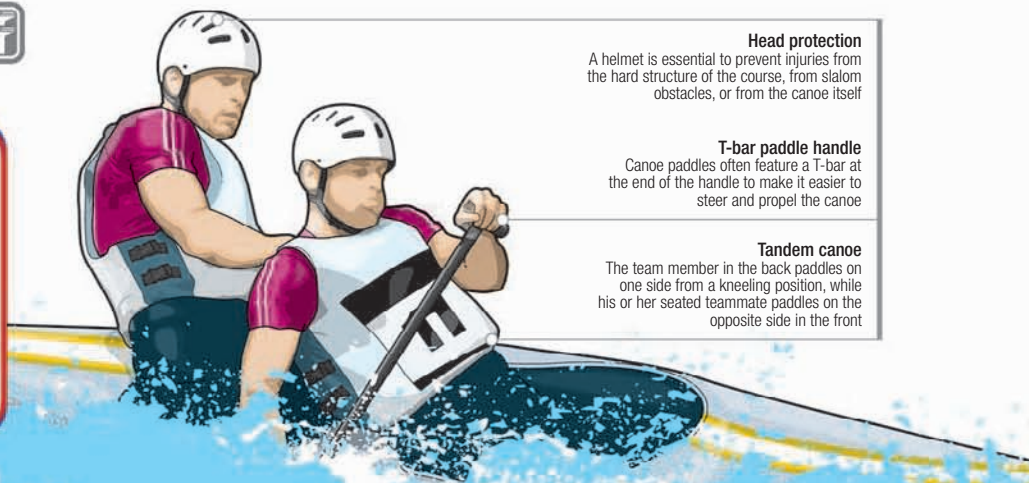
- ➔ A popular worldwide sport, canoeing is governed by the International Canoe Federation (ICF), based in Switzerland.
- ➔ Developed by the indigenous peoples of the Americas, boats are sometimes referred to as Indian or Canadian canoes.
- ➔ Competitors from 78 nations competed in 100 races at the 34th ICF Flatwater World Championships in Croatia in 2005.

CANOEING



COMPETITOR PROFILE

Competitive canoeists tend to develop a very high level of physical flexibility, strength, and stamina, as the repetitions involved in the aerobic activity of paddling make use of all the muscles in the upper body—abdominals, arms, shoulders, back, and chest—as well as those in the legs.



Head protection

A helmet is essential to prevent injuries from the hard structure of the course, from slalom obstacles, or from the canoe itself

T-bar paddle handle

Canoe paddles often feature a T-bar at the end of the handle to make it easier to steer and propel the canoe

Tandem canoe

The team member in the back paddles on one side from a kneeling position, while his or her seated teammate paddles on the opposite side in the front

THE SLALOM COURSE

Slalom events are staged on natural stretches of water, such as fast-flowing rivers, or on purpose-built courses that re-create the effects of fast-moving currents. In each case, the course is approximately 1,300 ft (400 m) long. Gates (pairs of poles) are suspended above the water to define the route. Green and white striped gates must be negotiated in a downstream direction, while at least six red and white striped gates require the canoeist to paddle upstream. Slalom courses are also used for kayaking (see p262).

Slalom gate poles

The colored poles indicate which direction the canoeist should take when negotiating the gates

Artificial river

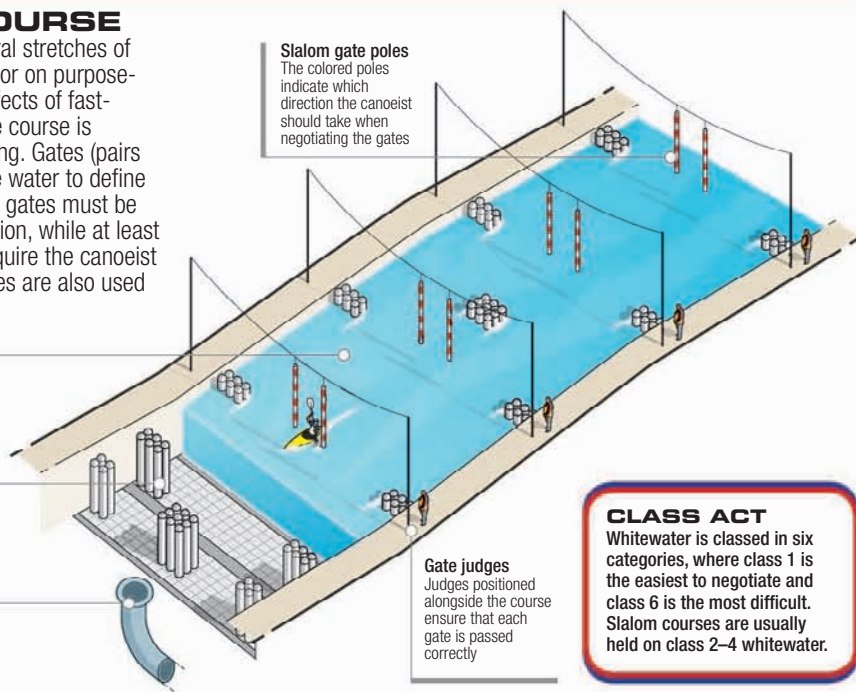
On purpose-built slalom courses, as shown here, the water channel is constructed from reinforced concrete, with a drop of several degrees between the top and the bottom

Creating hazards

A moveable obstacle system consisting of concrete blocks makes it simple to alter the direction of the water flow

Water recycling

The water is pumped back up when it reaches the end of the course



Gate judges

Judges positioned alongside the course ensure that each gate is passed correctly

CLASS ACT

Whitewater is classed in six categories, where class 1 is the easiest to negotiate and class 6 is the most difficult. Slalom courses are usually held on class 2–4 whitewater.



SPEED AND SAFETY

Racing or sprint canoes are long and narrow to facilitate high speeds. Slalom canoes are shorter and are fitted with a spraydeck—a waterproof apron worn around the canoeist that stretches over the rim of the canoe cockpit to prevent water from entering the boat.

Protective helmet

A lightweight yet tough and rigid outer shell covers an inner foam lining to provide maximum protection and comfort



Paddle top

A fully waterproof cagoule (or cag), which allows the canoeist complete freedom of movement, is made from a special lightweight rubber material



Buoyancy vest

To help a canoeist remain afloat in case of a capsize, a foam-filled vest is a useful piece of safety gear, particularly on fast-flowing watercourses, such as whitewater rivers



Flexible spraydeck

The cagoule is combined with a rubber spraydeck that stretches over the canoe cockpit to form a watertight seal

Lightweight paddle

Many modern canoe paddles consist of a durable polypropylene blade mounted on an aluminium shaft



Solo slalom canoe 12 ft 1 in (3.6 m)



Team racing canoe 16 ft (5 m)



TOUGH HULL

Canoe hulls, which need to be lightweight yet impact-resistant, are constructed from materials such as fiberglass, Kevlar, polyethylene plastic, or ultralight carbon fiber.

SLALOM RACING

The object of canoe slalom racing is to negotiate a rapid-flowing natural or artificial river course measuring around 1,300 ft (400 m) in length. The course is defined by 18–25 gates, and the competitor must finish the course, without making any faults, in the shortest time possible. Each competitor's run is accurately timed, with a time penalty of two seconds added for touching a gate. An international competition consists of two runs, and the times are added together to give the overall time.

RACING ON FLATWATER

ICF-recognized flatwater canoe race competitions take place over clearly defined, unobstructed courses. Competitors race alongside each other, often in lanes, along courses ranging from 650 ft (200 m) to 1,625 ft (5,000 m) in length. A minimum of three boats are required for each race, and the winner is the first canoe to completely cross the finish line. As in slalom canoeing, separate events are held for men and women.

EXTREME PADDLING

AS WELL AS SLALOM AND FLATWATER RACING, CANOEING HAS MANY OTHER DISCIPLINES. IN PLAYBOATING (OR RODEO), FOR EXAMPLE, COMPETITORS EARN POINTS BY PERFORMING STUNTS AND TRICKS, WHILE EXTREME RACING INVOLVES NEGOTIATING DANGEROUS WHITewater.

POWERING UP

To gain the optimum power from each stroke, the flatwater canoeist braces his or her body by kneeling on one knee with the other leg thrust forward. From this position, the paddle is driven swiftly into the water, with the canoeist leaning into the paddle and using their full body strength to pull against the paddle handle.

Start position

Paddle is held at arm's length at an angle, ready for the downstroke



Down stroke

Paddle is thrust down and into a vertical position in the water



Pull stroke

Paddle blade is pulled back through the water and upward



Repeat stroke

Blade is returned to the start position and the stroke is repeated



DRAGON BOAT RACING

268



NEED2KNOW

- ➔ Most dragon boats can carry crews of 20 paddlers, although these boats are often raced with just 18 paddlers.
- ➔ The largest boats, called swan boats, carry about 50 people. They are largely ceremonial and seldom raced. Smaller phoenix boats are raced with 10 paddlers.
- ➔ Competitive events are held over a range of distances, between 217 yd (200 m) sprints and marathons of 31¼ miles (50 km).

SPORT OVERVIEW

Originally based on Chinese customs, dragon boat races have been taking place for more than two thousand years, and today elite crews race each other all over the world. With up to seven brightly decorated dragon boats taking part, the races make an impressive spectacle.

In control

The steerer, or helmsman, stands in the stern; with the best view of the water ahead, he has overall command of the boat

Stern look

The stern has a traditional shape to symbolize a dragon's tail; it is painted in the same style as the head, so the whole boat resembles a dragon

Steering oar

The helmsman has a long oar that trails behind the boat; he pull the handle toward him to go right, and pushes it away to go left

Shell design

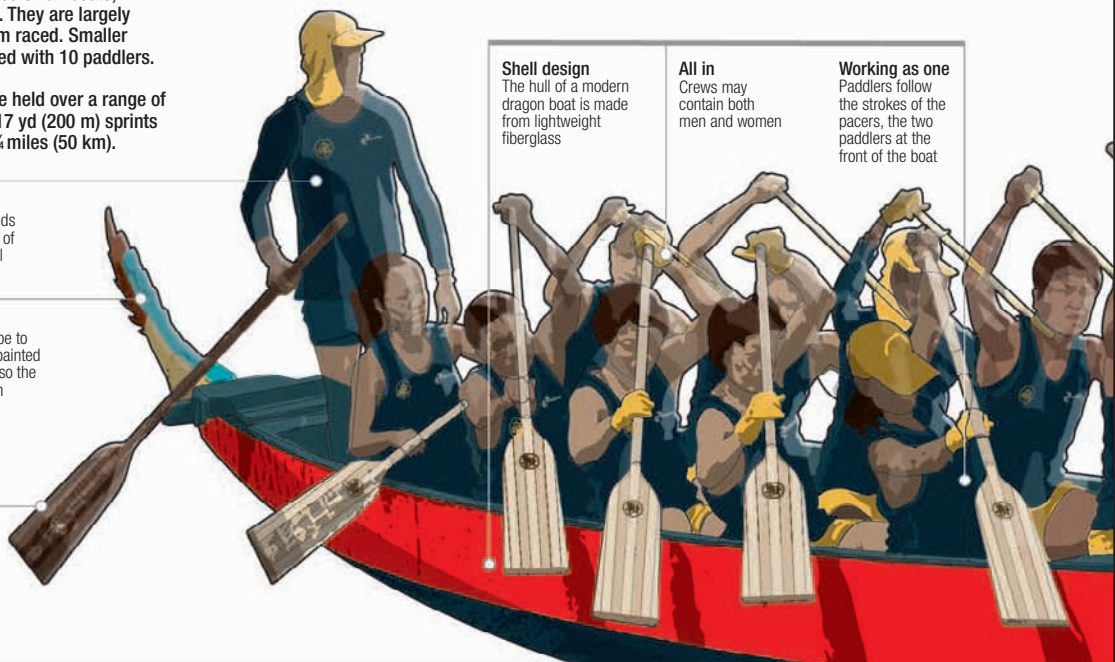
The hull of a modern dragon boat is made from lightweight fiberglass

All in

Crews may contain both men and women

Working as one

Paddlers follow the strokes of the pacers, the two paddlers at the front of the boat



ON THE HEAD

Races, especially sprints, may be very close. In the days before photo finishes, crews had an elegant solution to determine the winner, one which is still widely used today. As the boat approaches the finish, an extra crew member—the flag catcher—climbs onto the dragon's head and reaches forward. The finish line is marked by flags in each lane, and whichever crew's puller grabs a flag first is the winner. Boats with large heads to accommodate pullers originate from Taiwan.



Finishing flag

You need to catch your team flag to finish, and there are penalties if you miss the flag

Reaching out

The flag puller sits behind the drummer until the closing stages

TRADITIONAL ORIGIN

ACCORDING TO ANCIENT CHINESE LEGEND, DRAGON BOAT RACING COMMEMORATES THE DEATH OF QU YUAN, A FAMOUS POET AND KING'S MINISTER OF THE 3RD CENTURY BCE. QU YUAN COMMITTED SUICIDE IN PROTEST AGAINST CORRUPT RULERS BY JUMPING INTO A RIVER. VILLAGERS ROWED OUT TO SAVE HIM BUT WERE TOO LATE. THEY STAYED IN THE WATER, HOWEVER, AND BEAT DRUMS AND SPLASHED THE WATER TO KEEP FISH AND EVIL SPIRITS AWAY FROM HIS BODY. THE RACES COMMEMORATE THEIR UNSUCCESSFUL RESCUE ATTEMPT.

EQUIPMENT

The boats and equipment used in modern dragon racing are produced using the latest technology and materials, but it still must conform to a set of traditional standards.

Drum role

The drum is held between the caller's legs; some boats carry a gong instead

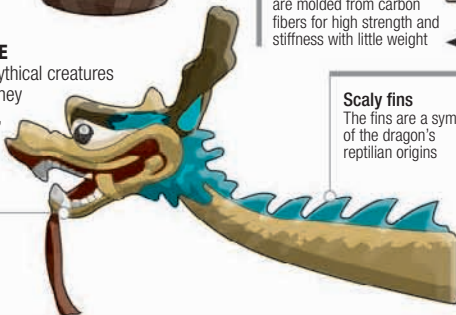


SYMBOLIC CREATURE

Dragons are the only mythical creatures in the Chinese zodiac; they rule the rivers and seas, and govern rainfall.

Dragon's beard

Legend says that the dragon has the whiskers of a catfish



DIRECTING PROGRESS

The rudder is for steering only, not propulsion; unlike the paddlers' oars, the rudder may be rested on the side.

The shaft

Flattened facets along the length of the shaft help the helmsman's grip

Rudder blade

This has a much bigger surface area than racing blades



Stiffer than a board

Modern racing paddles are molded from carbon fibers for high strength and stiffness with little weight

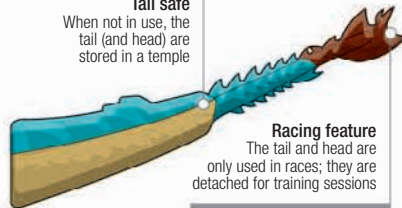


Scaly fins

The fins are a symbol of the dragon's reptilian origins

Tail safe

When not in use, the tail (and head) are stored in a temple



Racing feature
The tail and head are only used in races; they are detached for training sessions

Drum control
The caller faces the crew and matches his beat to that of the pacers

Dragon's head
The bow decoration is traditionally carved from the same tree trunk as used in the hull, but is nowadays often a fiberglass attachment

Hull with no W
Traditional wooden boats had a W-shaped cross-section below the waterline created by three beams lashed together; today hulls are normally flat-bottomed

SYMBOLIC SPORT

In China, dragon boat races are held on May 5th, the so-called Double Fifth—the fifth day of the fifth month. The races mark the beginning of the rice planting season, and by celebrating the spirit of the dragon—the ruler of water—the racers hope that rain will come to flood the fields. Before a boat can be raced, its dragon head is “awoken” by a priest or another dignitary, who paints red dots on the bulging eyes.

Today, the safety of crews is taken seriously, but in ancient times racers that fell in and were drowned were thought to have been sacrificed to the dragon spirit—a sign of a good harvest to come.

STROKE-PULLING

A crew must paddle in time to move at top speed. Even small discrepancies in timing slow the boat. It is hard for people in the stern to see the paddles of the pacers in the bow; that is why the caller's beat is so important. Paddle blades hitting the water a fraction of second after the ones in front is called “caterpillaring” because the paddles resemble a many-legged animal.

The largest paddlers sit amidships to keep the boat balanced and be the powerhouse that drives the boat along. A paddle may be any length between 41 in (104 cm) and 51 in (129 cm). Taller crew members have longer paddles.

TAKE THE A-FRAME

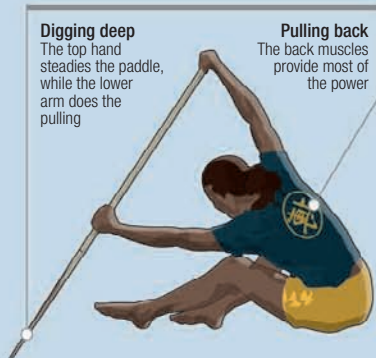
At the moment of entry into the water, the paddle and the paddler's upper body should form the shape of the letter A. There should be no splashing, because splashing is inefficient and wastes energy.

Digging deep

The top hand steadies the paddle, while the lower arm does the pulling

Pulling back

The back muscles provide most of the power



INSIDE STORY

The sport became popular outside of China in the late 1980s, at first in Canada and the west coast of the United States. The sport has since spread to Australia and Europe. The annual international Hong Kong races have been held since the mid-1970s, and a World Nations Championship has been held every two years since 1995. In the even-numbered years there is a world championships for the top club crews.

INTERNATIONAL DRAGON BOAT FEDERATION (IDBF)

The IDBF currently has more than 50 member nations, including Britain, Denmark, Germany, Italy, South Africa, and Switzerland.

Ear protection

Trick and slalom skiers do not have to wear helmets, but for jump skiers it is compulsory

Life jacket

Tournament waterskiers must wear a tournament-approved life jacket

Water wear

Professional skiers wear wetsuits that are specially designed to protect against potential impact damage

COMPETITOR PROFILE

Tournament waterskiers require excellent balance and a strong, athletic physique. Flexibility is essential for executing various tricks, so their muscles are well-defined. However, the focus is on muscular power and stamina over size. Waterskiers are strong, particularly in the back and shoulders, which absorb much of the force from being towed by a powerboat. Waterskiers also have strong leg muscles for maneuvering the ski and maintaining a strong ski position.

Taut line

To maintain momentum, it is important that the towline remain taut

Strong grip

Waterskiers wear specialized gloves to help them grip the towline handle

Leg position

In order to stay balanced on the ski or skis, a skier must maintain a slightly bent and stable leg position

Waterski boots

These are rubber boots that quickly release from the ski when a skier falls

WATERSKIING



EVENT OVERVIEW

Waterskiing is a high-speed, adrenaline-fuelled water sport. Skiers demonstrate impressive agility and balance in executing jumps, turns, and acrobatic maneuvers while being towed at great speeds behind a powerboat. Tournament waterskiing consists of three events: slalom, ski jump, and trick skiing. There are winners in each event, as well as men's overall and women's overall tournament champions. There are also professional tournaments for other waterskiing sports, such as wakeboarding, barefoot skiing, ski racing, and show skiing.

NEED2KNOW

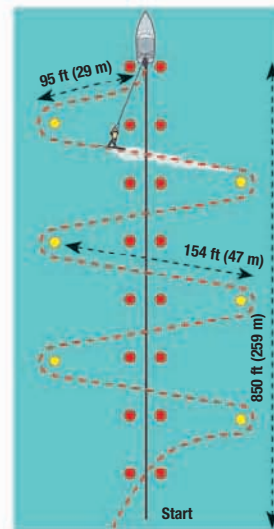
- ➔ Tournament waterskiing is popular all over the world. It is particularly popular in Australia, Canada, Ireland, France, New Zealand, and the United States.
- ➔ Waterskiing is not currently an Olympic sport. The closest it has come to acceptance was at the 1972 Olympic Games, where it was a demonstration event. To date there are no plans for the sport to be added to the Olympic program.

WATER COURSES

Tournament events can be conducted on almost any stretch of still water and are mostly held on lakes or rivers. If courses overlap, buoys from the unused course must be removed.

SLALOM

The slalom course is 850 ft (259 m) in length and consists of six small rubber buoys that a skier must round. The start and finish gates are also marked by buoys that are different in color from the course buoys. The distance from the entry gate to the first buoy is 95 ft (29 m), as is the distance from the sixth buoy to the finish gate. The distance between each successive course buoy is 154 ft (47 m). The line the powerboat must take runs straight from entry to finish gate and is marked by six pairs of buoys spaced 8 ft (2.5 m) apart. A turning buoy is placed 459–591 ft (140–180 m) beyond the start and finish gates, which boat and skier round before returning to continue the run.

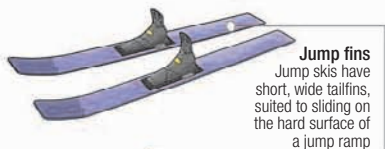


EQUIPMENT

Water skis were first made of wood, but modern skis are far more advanced. Most skis consist of a fiberglass or carbon fiber base, a fin secured to the bottom of the ski to make turning easier, and a foot binding that holds the skier's boot.

JUMP SKIS

Long and wide toward the back of the ski, jump skis have raised front edges that allow for entry on to the ramp.



Jump fins

Jump skis have short, wide tailfins, suited to sliding on the hard surface of a jump ramp.

TRICK SKI

Wide and flat, the trick ski has a smooth bottom and no fins, making it easier to turn and slide on the water's surface.

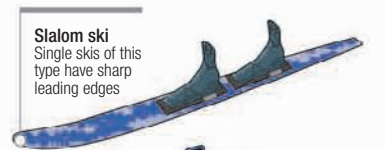


Bindings

Trick skis can have one or two foot bindings.

SLALOM SKI

Designed for making sharp turns at high speed, slalom skis have a tapered tail and concave underside.

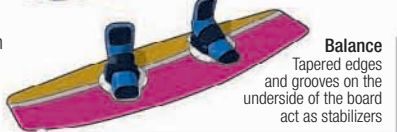


Slalom ski

Single skis of this type have sharp leading edges.

WAKEBOARD

This is a wide board with a concave base, which helps the skier achieve greater height jumping off the wake.

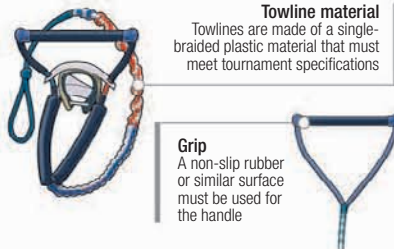


Balance

Tapered edges and grooves on the underside of the board act as stabilizers.

TOWLINES

Two lines are used in a tournament, measuring 75 ft (23 m) and 61 ft (18.5 m) respectively. The longer line is used for jump skiing and the shorter line for slalom.



Towline material

Towlines are made of a single-braided plastic material that must meet tournament specifications.

Grip

A non-slip rubber or similar surface must be used for the handle.

SAFETY GEAR

Protective equipment is important to competition skiers. They expose themselves to serious injury when reaching extreme speeds and dizzying heights, and in executing awkward maneuvers.



Helmet

Waterski helmets have thick ear padding to protect against eardrum perforations caused by high-speed falls.

Stomach protection

Waterski wetsuits are lined with padding in the abdominal area. This protects the ribs and internal organs from damage caused by high-speed impact with the water.

Wetsuits

Waterski wetsuits are made of neoprene, a synthetic rubber that is flexible and allows exceptional freedom of movement.

Life jacket

Slalom and ski jump athletes wear thicker life jackets than trick skiers due to the increased risks involved.

Boot buckles

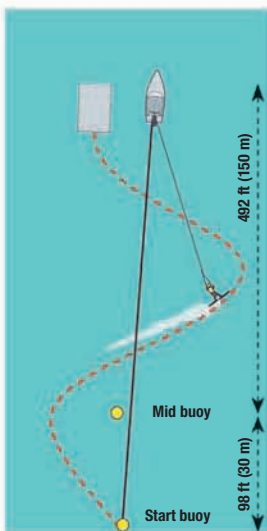
Lock down buckles increase the responsiveness of the skis.

Boots

Waterskiing boots are made from waterproof rubber and have strong ankle support.

JUMPING

The jump course is 591 ft (180 m) in length, measured from the start buoy to the front edge of the jump ramp. The ramp is made of wood or fiberglass and has either a waxed surface or is equipped with a watering system that ensures the surface is continually wet. The ramp surface is also required to be completely flat. It can range from 21 to 22 ft (6.4 m to 6.8 m) in length and 12 to 14 ft (3.7 m to 4.3 m) in width. In tournament jump skiing, a skier has a choice of two heights for the ramp: for men, either 5 ft (1.65 m) or 6 ft (1.80 m), and for women, either 5 ft (1.50 m) or 5 ft (1.65 m). Beyond the ramp, the water is marked with measurement buoys, for measuring the jump distance.



WATER INTO GUINNESS

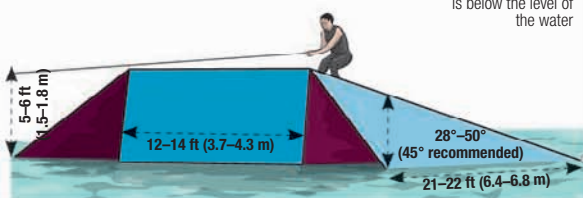
RALPH HILDEBRAND AND DAVE PHILLIPS WATERSKIED 1,337 MILES (2,152 KM) NON-STOP AROUND INDIAN ARM, AN INLET OF THE PACIFIC OCEAN IN CANADA. IT TOOK THE CANADIANS 56 HOURS 35 MINUTES AND 3 SECONDS TO ACCOMPLISH, WHICH GAVE THEM THE WORLD RECORD FOR THE LONGEST WATERSKIING MARATHON.

RAMP COLOR

The sides of the jump ramp are different in color from the ramp surface, so that a fast-moving skier can easily differentiate between the different surfaces.

Starting the jump

The front of the ramp is below the level of the water.

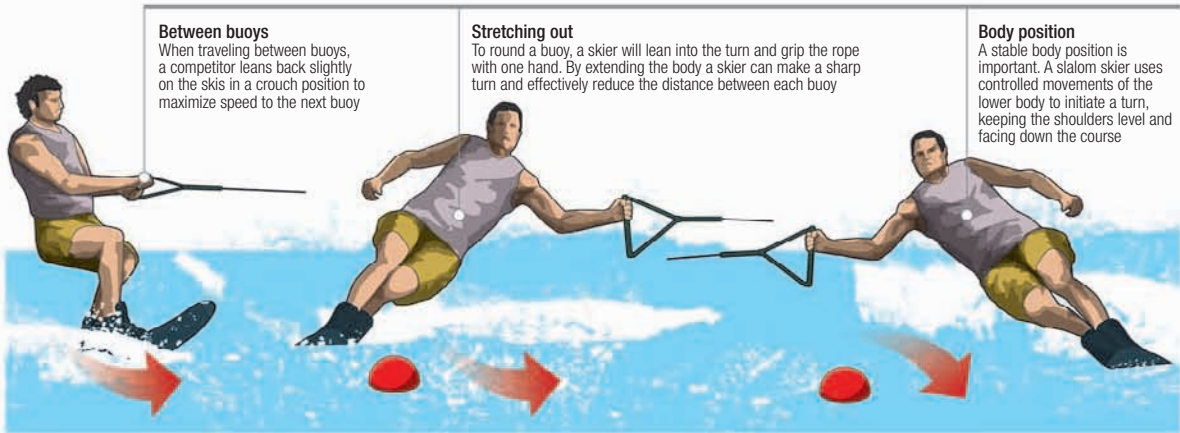


TOURNAMENT COMPETITION

Standard competitions involve three events: slalom, jump skiing, and trick skiing. Each event consists of a preliminary elimination round and a final round. In slalom, the winner is the skier who rounds the most buoys using the shortest towline in the final round. In jump skiing, the skier who jumps the farthest distance in the final round is declared the winner. In trick skiing, the skier who scores the most number of points in either of two 20-second passes in the final round is the winner. The overall tournament champion is awarded to the skier who accumulates the best overall score across the three disciplines. A skier's overall score is determined by adding up the points attributed to their best performance in each discipline, which are calculated using a predetermined formula.

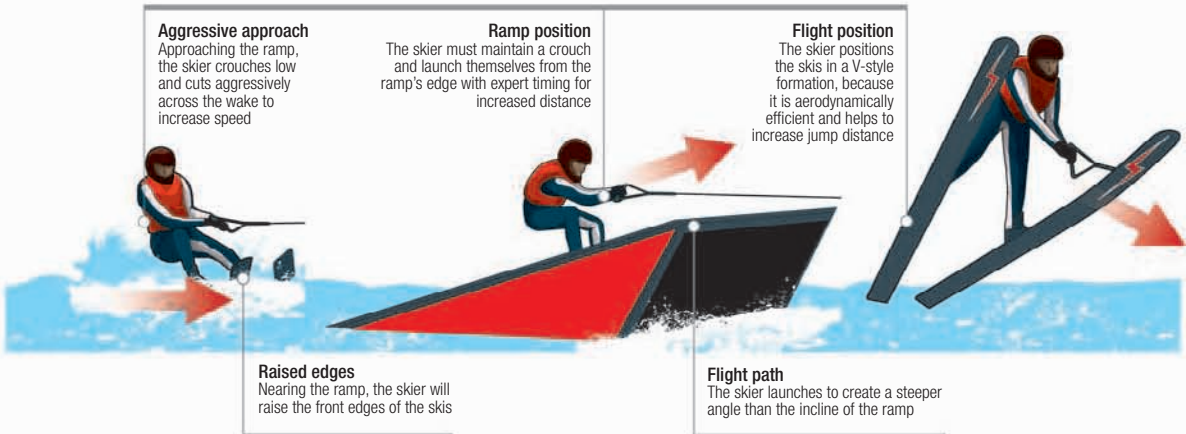
SLALOM

The skier is towed through the slalom course and must pass around the outside of all six buoys and proceed through the finish gate, make a turn, and return through the course in a similar fashion until a buoy or gate is missed. A skier is allowed three attempts in the preliminary round and three again if competing in the final round. The length of the towline is reduced for each run, making it harder for a skier to get from buoy to buoy. To round a buoy, the skier must ride outside or partially outside the buoy. Riding over or partially inside the buoy does not score. A run is concluded once the skier misses a buoy or misses an entry or finish gate.



SKI JUMP

Towed behind a powerboat at a fixed speed, the skier cuts a deliberate path across the course to achieve maximum speed on to the ramp. The path takes the form of an "S" shape (see pp.271), known as a "double-wake cut," with the skier cutting across the wake of the boat to create a slingshot effect. This method can increase approach speed up to 66 mph (100 kph). The skier is then slung from the ramp high into the air for many feet, holding the body rigid to reduce wind resistance. For the jump to be scored as complete, the skier must land and ski away without falling.



SIDELINES

75₀ 2 The number, in meters (246 ft), of the world record men's ski jump, held by Freddy Krueger of the United States since November 2008.

12,400₉ The highest number of points scored by a skier in the trick event. It was achieved by Nicolas Le Forestier of France in September 2005.

BOAT SPEEDS

The slalom and jump events both have predetermined boat speeds. For men's slalom it is 36 mph (58 kph) and for women's slalom it is 34 mph (55 kph). In the jump event, the maximum speed allowed for men is 35 mph (57 kph) and for women it is 34 mph (54 kph). In trick skiing, there are no predetermined boat speeds.

CRACK THE WHIP

ALFREDO MENDOZA DEVELOPED THE MODERN SKI JUMP APPROACH IN 1951. THE DOUBLE-WAKE CUT, OR "CRACK THE WHIP" AS IT WAS KNOWN THEN, HELPED MENDOZA WIN MANY WORLD TITLES DURING THE 1950S.

TRICK SKIING

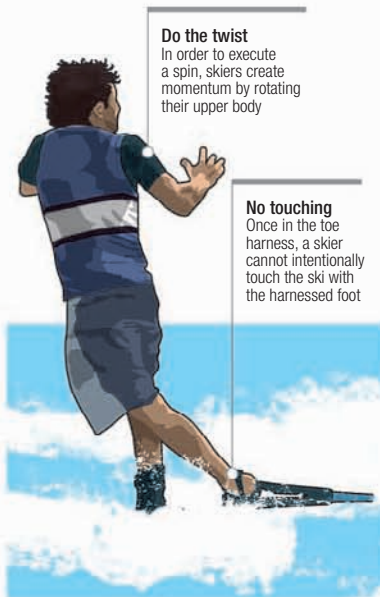
The trick ski course is 574 ft (175 m) in length. The skier is towed behind a powerboat at a constant speed of their choice, usually about 18 mph (29 kph). The skier is allowed two 20-second passes to complete as many tricks as possible, which must be submitted to the judges prior to starting the competition. A skier can use one or two skis, with each option suited to different types of tricks. A trick is any action completed by the skier that is specified in the tournament trick rules. Points are awarded for any successful trick according to its degree of difficulty and the accuracy of its execution. The degree of difficulty is calculated according to preset scores attributed to different elements of a trick.

TRICK TECHNIQUES

A trick skier's run will involve various combinations of flips, turns, spins, and holds. The highest scoring tricks usually combine the greatest number of spins and flips. A spin is known as a "wake-turn" (when executed in midair crossing the wake) or "water-turn" (when executed on the water surface). A skier will rotate anywhere from 180 degrees to 900 degrees during a spin. A "step-over" involves the skier jumping over the towline and is often combined with a spin or spins. Variations of both forward and back flips are used, which must involve the tail of the ski passing directly above the skier's head.

TOEHOLD

One of the more awkward tricks is the "toehold." A special harness is used to secure the skier's foot to the towline handle. The competitor then proceeds to execute combinations of step-overs, jumps, and spins, with the foot secured to the handle. This trick requires exceptional balance and although not as breathtaking as a flip, it is still very difficult.



Do the twist

In order to execute a spin, skiers create momentum by rotating their upper body

No touching

Once in the toe harness, a skier cannot intentionally touch the ski with the harnessed foot

WAKE FLIP

One of the most exciting tricks is the "wake flip." A skier uses the wake created by the powerboat as a ramp from which to launch into the air. While airborne, the skier flips forward or backward and lands upright on the water. During the flip, the skier will also incorporate twists or spins and is capable of rotating through 720 degrees.



Head above water

If a skier's head touches the water during a flip, no points are awarded for that trick

Short ski

Most skiers use a short ski for the flip, because it is easier to control on landing

Taut rope

To maintain momentum in executing the flip, the towline must remain tight

OTHER WATERSKI SPORTS

One of the main attractions of waterskiing is its variety. It is also one of the few sports in which exhibitions are every bit as exciting as competitions. A number of new waterskiing sports have their own international tournaments and are rapidly gaining the popularity of traditional waterskiing events.

BAREFOOT SKIING

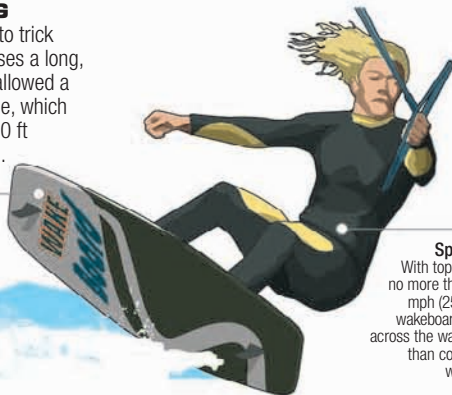
The three main competitions in barefoot skiing tournaments are similar to those in tournament waterskiing. In the trick event, competitors have two passes (each of 15 seconds) in which to execute as many tricks as possible. In barefoot slalom, the objective is to cross the powerboat's wake as many times as possible in the 15-second time limit. In the jump event, the goal is to jump the furthest distance, with top professionals capable of clearing 88 ft (27 m).

SKI RACING

This is the fastest form of waterskiing. It is held over long set-courses: the longest distance covered by an event being 87 miles (140 km). Skiers race each other at high speeds, and are capable of reaching 118 mph (190 kph). Professionals use a long, single ski because it is easier to control. The skier holds and is harnessed to a towline to reduce the strain on the arms.

WAKEBOARDING

This event is almost identical to trick skiing, except that the skier uses a long, wide board. Competitors are allowed a two-pass run over a set course, which varies in length between 1,000 ft (305 m) and 1,400 ft (427 m).



Board style

The wakeboard platform is short and broad, with front and rear fins

Speed limit

With top speeds of no more than 16–23 mph (25–37 kph), wakeboarders move across the water slower than conventional waterskiers

SHOW SKIING

Teams have one hour to perform "acts" of their own design. These acts can involve activities such as a "ballet line," a team ski-jump, and a "final pyramid" that displays all team members creating a human pyramid while skiing. Backing music and the skill of the powerboat drivers is also considered in the scoring, which is assessed by five judges.

INSIDE STORY

The invention of waterskiing is widely accredited to Ralph Samuelson. In 1922, Samuelson first tried skiing on the Mississippi River on two curved staffs detached from a wooden barrel. He fastened the staffs to his feet using two leather straps and his brother Ben pulled him along using a window sash as a towrope. Samuelson later fashioned waterskis out of two lengths of wood.

GOVERNING BODY

The International Water Ski Federation is the sport's governing body, which sets the official rules for events. Founded in 1946, it was originally known as the World Water Ski Union. It later organized the first World Championship in 1949.



WINDSURFING



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EVENT OVERVIEW

Windsurfing is both a high-speed and acrobatic water sport. Competitors sail or race a board powered by a single sail across an inland lake or the open sea. When professional windsurfers aren't reaching speeds of up to 50 mph (80 kph) they are performing gravity-defying tricks, such as jumps, spins, and loops. There are a number of professional disciplines, some of which focus on speed and technical skill, while others focus on tricks and style.

NEED 2 KNOW

- ➔ The popularity of windsurfing peaked in the 1980s, when it was first introduced as an Olympic sport in 1984.
- ➔ Indoor windsurfing is a popular event. In 1991, the first indoor race was held in Paris. Sailors race in a 246 ft (75 m) pool with 25 fans set up to create wind.
- ➔ The first professional windsurfing World Cup tour involving multiple events in various countries was established in 1983.

COMPETITOR PROFILE

Windsurfing is a very physical sport. Studies have shown that Olympic windsurfers are as fit as Olympic rowers and cross-country skiers. Competitors must be extremely strong through the chest and shoulders to control the sail in strong winds and must have powerful leg muscles for maneuvering the board on rough open water. Stamina is also crucial for extended periods of racing in difficult conditions.

PLANING

The term given to how a windsurf board skims across the water surface is "planing." In winds of 17–29 mph (28–46 kph), the windsurfer is lifted on to the water surface and can reach significantly faster speeds because it is no longer breaking through the water.

Extra strength

Sails are reinforced with "battens" to make the sail more taut and therefore stable in strong winds

WINDSURFER

The basic premise of the windsurfer has not altered much since it was first patented by Jim Drake and Hoyle Schweitzer of the United States in 1970.

Luff tube

The luff is the leading edge of the sail, which houses the mast in a sleeve called the luff tube

Sail size

Small sails catch less wind and are easier to maneuver. Large sails catch more wind and are good for high-speed sailing

Leech

This is the rear edge of the sail. A loose leech makes the sail easier to handle in high winds, and a tight leech keeps power in the sail in light winds

Sail material

This is made from a lightweight polyester composite material and is reinforced with a light but strong Kevlar mesh

Sail types

There are two types of sails: the camber-induced sail and the rotational sail. Camber-induced sails create greater speed and stability. Rotational sails are easier to handle and maneuver

Wishbone boom

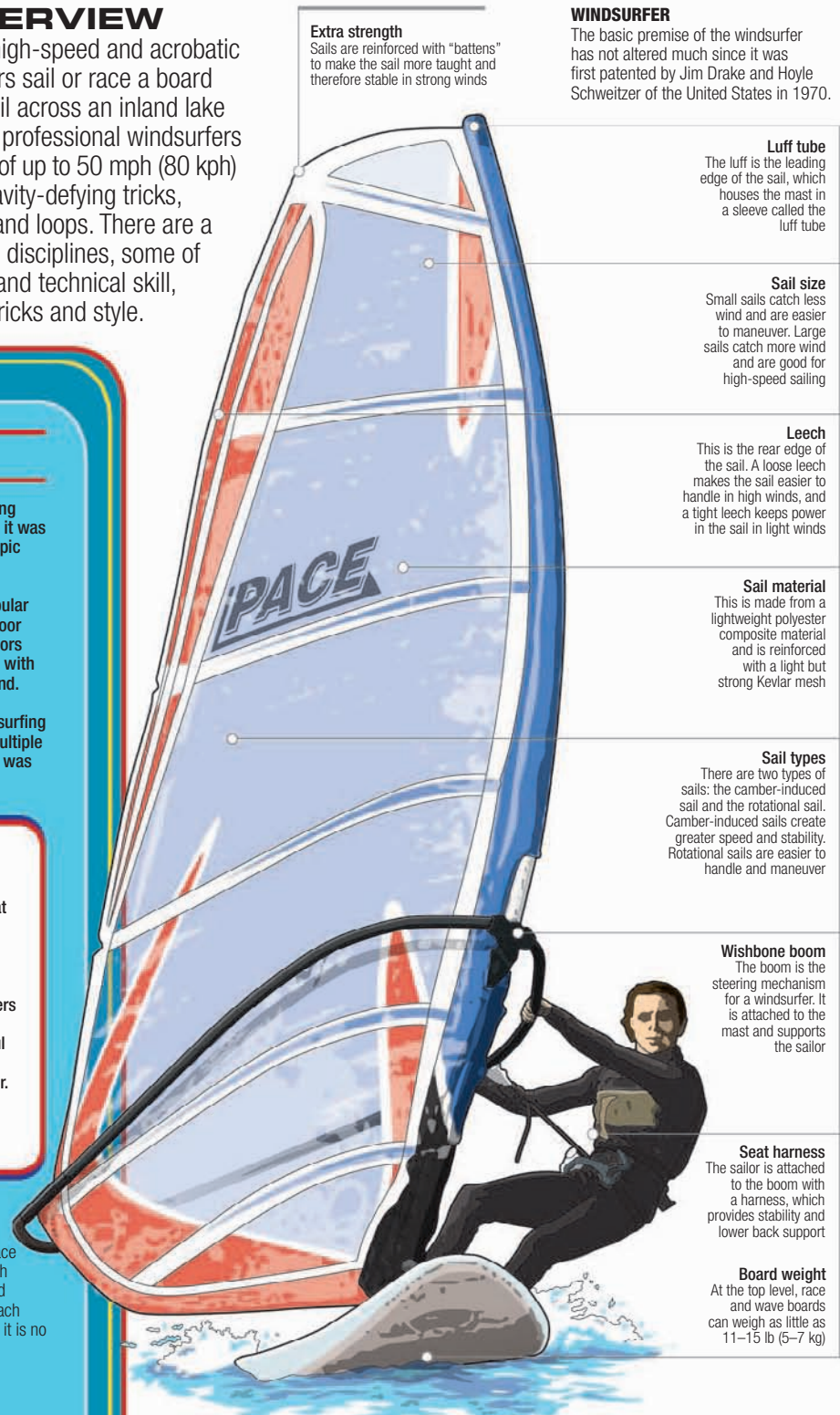
The boom is the steering mechanism for a windsurfer. It is attached to the mast and supports the sail

Seat harness

The sailor is attached to the boom with a harness, which provides stability and lower back support

Board weight

At the top level, race and wave boards can weigh as little as 11–15 lb (5–7 kg)





COMPETITION

The main competition divisions of windsurfing each focus on differing elements, such as speed, technical skill, tricks, and style.

WAVE AND FREESTYLE

Wave and Freestyle competitions are the high-flying, acrobatic divisions of windsurfing. In Wave performance, sailors perform jumps and tricks in a predetermined area of surf and are judged on how well they execute tricks and ride waves. Freestyle competitions involve timed runs on a set area of open water, where sailors perform jumps and tricks for which they are judged and awarded points.

SLALOM

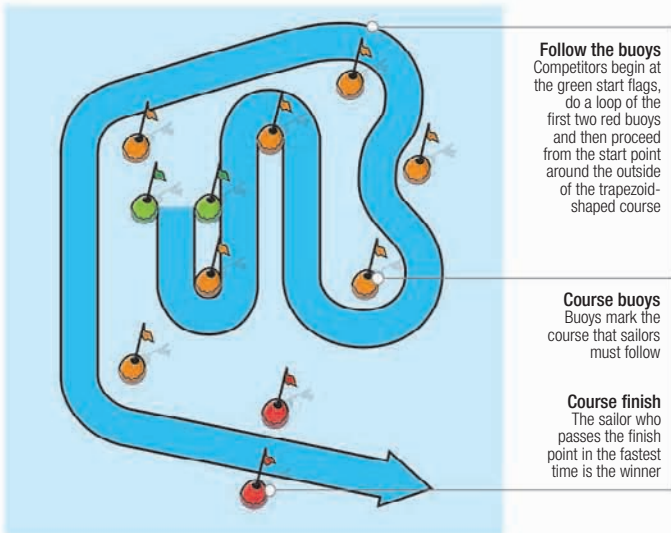
Slalom courses follow a figure of eight pattern and are raced primarily downwind. Races can be started afloat or ashore and competitors race together. The course is on open water and marked by buoys, which sailors must follow and "jibe" or "tack" (see p77) around in completing the course. An event will normally constitute a number of heats (maximum of 15), using either elimination rounds or an aggregate points system to find a winner.

SPEED SAILING

There are two forms of speed sailing. The first involves sailors racing separately on a 1,641 ft (500 m) course. A sailor's best two speeds from a two-hour heat are averaged and the sailor with the best average speed wins. The second format is based on record attempts. Sailors wait for favorable winds to attempt to break the current speed sailing record of 56 mph (90 kph).

OLYMPIC AND FORMULA

In both Olympic and Formula competition, sailors race as one fleet (a fleet can be as many as 120 windsurfers) around a set course marked by buoys. A competition has two to three races per day, which are usually 60 minutes in duration. Races are held on a "windward/leeward" course (meaning it contains mainly upwind and downwind sections) or a trapezoid-shaped course (see below). In Olympic competition, sailors must use identical windsurfers. In Formula competition, sailors' boards and sails can differ slightly in size, but must still be certified Formula-class windsurfers.



EQUIPMENT

Windsurfers come in various shapes and sizes. The type of windsurfing being practiced will determine what style of windsurfer is needed. Some sailors choose to wear wetsuits on the water, especially in colder weather, and competitors are responsible for wearing life jackets suitable for racing. Head protection is advised but not required.

BOARDS

Board sizes are measured by volume in liters. A beginner's board will typically measure 150–250 liters (33–55 gal). Professional boards are much lighter; for example, a Freestyle board measures 80–110 liters (18–24 gal), which makes them harder to control but faster and easier to maneuver. Professional boards are fragile, consisting of a polystyrene foam core and reinforced with a composite casing of carbon fibre, Kevlar, and fiberglass.

SAILS

The size and shape of a sail will give it particular performance characteristics. Larger sails catch more wind, so are better in light wind conditions, while smaller sails are used in strong wind conditions.

OLYMPIC

All competitors must use a windsurfer made to identical specifications. All competitors must use a board that weighs no less than 34 lb (15.45 kg). Formula-class boards are similar in size.



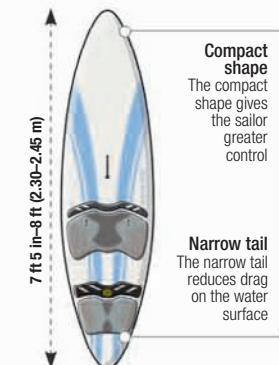
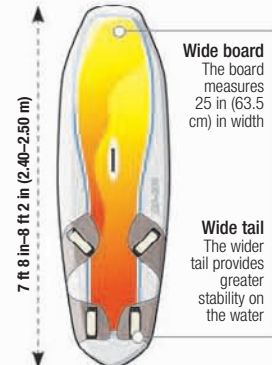
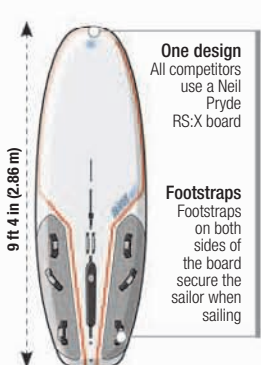
SLALOM

The board and sail used for Slalom are designed to maximize speed and planing ability. A slalom sail is usually shorter than an Olympic sail but has more battens, making the sail taugth and therefore faster.



FREESTYLE

Maneuvering and jumping are the key features of Freestyle windsurfing. Boards are therefore short in length and weigh only 11–15 lb (5–7 kg). Wave performance windsurfers have similar dimensions.



STAT CENTRAL

MEN'S OLYMPIC MEDALISTS

2008 BEIJING

GOLD TOM ASHLEY (NZL)

SILVER JULIEN BONTEMPS (FRA)

BRONZE SHAHAR ZUBARI (ISR)

2004 ATHENS

GOLD GAL FRIDMAN (ISR)

SILVER NIKOLAOS KAKLAMANAKIS (GRE)

BRONZE NICK DEMPSEY (GBR)

2000 SYDNEY

GOLD CHRISTOPH SIEBER (AUT)

SILVER CARLOS ESPINOLA (ARG)

BRONZE AARON MCINTOSH (NZL)

WOMEN'S OLYMPIC MEDALISTS

2008 BEIJING

GOLD YIN JIAN (CHN)

SILVER ALESSANDRA SENSINI (ITA)

BRONZE BRYONY SHAW (GBR)

2004 ATHENS

GOLD FAUSTINE MERRET (FRA)

SILVER YIN JIAN (CHA)

BRONZE ALESSANDRA SENSINI (ITA)

2000 SYDNEY

GOLD ALESSANDRA SENSINI (ITA)

SILVER AMELIE LUX (GER)

BRONZE BARBARA KENDALL (NZL)

SIDELINES

8,120 The greatest distance covered, in kilometers (5,046 miles), on a windsurfer. Flavio Jardim and Diogo Guerreiro traveled from Chui to Oiapaque in Brazil, from May 2004 to July 2005.

4 The number of consecutive world titles won by Finian Maynard in speed windsurfing. Maynard was world champion from 1998 to 2001.

13 The age at which Robby Naish of the United States won his first world championship. Naish went on to claim another 22 world titles over the next 16 years in various divisions.

64.26 The speed, in kilometers per hour (39.92 mph), of the nautical mile world record in the women's division. This was set by Zara Davis of Britain in 2006 at Walvis Bay, Namibia.

COMPETITION REGULATIONS

Competitions for all disciplines are governed by strict regulations, primarily about who has right of way over whom. When windsurfers are on the same "tack" (turning), a windsurfer who is positioned downwind has right of way over a windsurfer who is positioned upwind. When on opposite tacks, a windsurfer on a "port tack" (wind blowing from the left side of the board) must give way to a windsurfer on a "starboard tack" (wind blowing from the right side of the board). In general, turning windsurfers must keep clear of those not turning. In racing competitions, a windsurfer on the inside line when rounding a buoy has right of way over a windsurfer on the outside line. In trick events, windsurfers coming into shore must give way to those going out. In Wave performance, if two windsurfers share a wave, the first board completely on the wave sailing shoreward has possession.

SCORING

In Slalom and racing events, points are awarded according to placement in a predetermined number of heats. In trick events, a panel of judges awards points for tricks executed in each run, based on the style and successful execution of the maneuvers. The winner of a heat scores 0.7 of a point, the sailor in second place two points, and so on. Scores are aggregated at the end of an event and the competitor with the lowest score wins. In speed sailing, the average speed from a sailor's best two runs determines their placement. The sailor with the best average speed wins.

WIND CONDITIONS

A wind speed range of 7–40 mph (11–65 kph) is best for windsurf racing and trick events, with a minimum wind speed of 7 mph (11 kph) required for most disciplines. Ideal wind conditions for racing allow sailing along or back toward the shore for the benefit of spectators.

AIRBORNE ACROBATICS

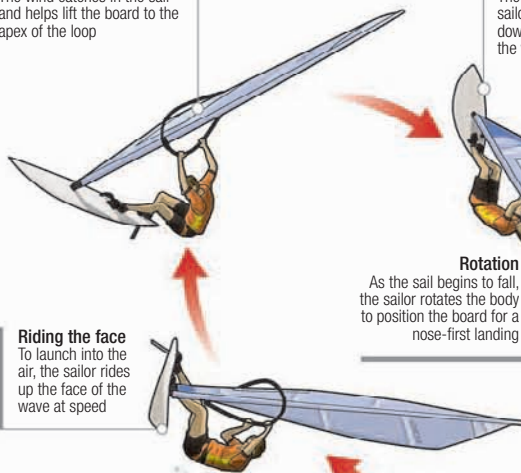
Freestyle and Wave performance are the crowd pleasers of windsurfing. Accomplished sailors perform stunts and tricks in dizzying combinations with apparent grace and ease. In sailing out over the waves, windsurfers execute various loops and jumps and when returning to shore on a wave will display a number of spins and turns. A panel of three to five judges awards points based on the style, variety, and quality of a performance.

BACK LOOP

There are three classic loops—forward, backward, and push loops. Of these, the back loop is a notoriously difficult move to execute successfully: while initiating the takeoff is relatively simple, a clean, nose-first landing is another matter. Speed, timing, and correct body and board position are fundamental. Performed by professionals, the back loop looks smooth and effortless and is a high point scorer.

Catching air

The wind catches in the sail and helps lift the board to the apex of the loop



Landing

The board is brought over the sailor's shoulder and brought down nose-first to land on the water

Rotation

As the sail begins to fall, the sailor rotates the body to position the board for a nose-first landing

Riding the face

To launch into the air, the sailor rides up the face of the wave at speed



SAILING TECHNIQUES

In windsurfing, the sail catches the wind to create lift, which raises the board and allows it to plane across the water surface. The stronger the wind, the faster the board can move. A key windsurfing technique is "sheeting," which is angling the sail to increase or decrease the amount of wind in the sail, and thus controlling the speed of the board. "Sheeting in" (holding the sail close to the body) increases power by catching more wind. "Sheeting out" (holding the sail away from the body) decreases power by catching less wind. A key technique only allowed in certain disciplines is "pumping." In light winds, sailors repeatedly pull the sail toward the body to create wind, which can induce planing and increase speed.

TACKING

Standard tacking is an essential skill for any windsurfer and is the fastest way to turn when upwind. Tacking involves pushing the nose of the board through 180 degrees into and through the wind. To do this, the sailor steps around the front of the mast to the opposite side of the board, repositioning the sail and maneuvering the board with the front foot in the desired direction. Faster but more difficult forms of tack are generally used by professionals. For example, a "helicopter tack" involves quickly spinning the sail as the board moves through the tack. A "nose tack" involves pushing the nose of the board into the water and pivoting the tail of the board into the position.



Tilt the sail

First the sailor removes the feet from the straps, then tilts the sail back to the board's rear

Light feet

Holding the boom, the sailor steps around the mast while remaining close to it

Turning the sail

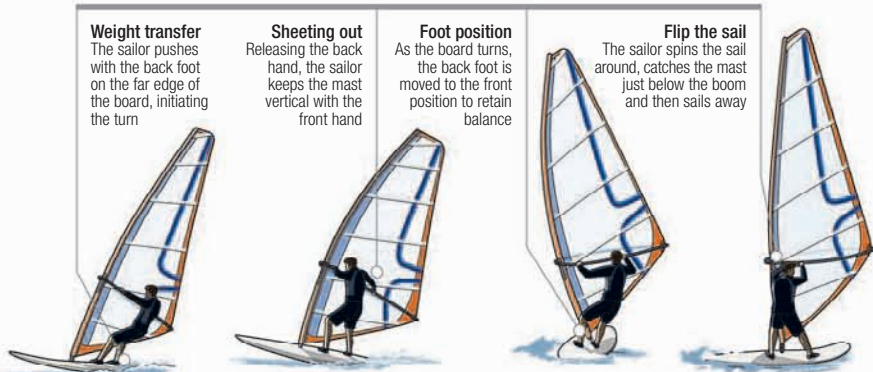
Pulling the mast toward the nose of the board, the sailor catches the boom on the other side of the sail

Up and away

The sailor returns the mast to vertical and pushes the board in the new direction using the front foot

JIBING

Jibing (or "gybing") is the fastest turning maneuver and is used for turning when downwind. While keeping the mast vertical, the tail or stern of the board is pushed through 180 degrees by sheeting in and pushing with the back foot. Again, professionals use more difficult and faster forms of jibe. The "carving jibe" involves turning the board on its edge and carving through the water 180 degrees. Wave windsurfers score extra points by incorporating tricks into the jibe.



Weight transfer

The sailor pushes with the back foot on the far edge of the board, initiating the turn

Sheeting out

Releasing the back hand, the sailor keeps the mast vertical with the front hand

Foot position

As the board turns, the back foot is moved to the front position to retain balance

Flip the sail

The sailor spins the sail around, catches the mast just below the boom and then sails away

FLYING IRISHMAN

FINIAN MAYNARD OF IRELAND IS A TRUE MASTER OF SPEED. MAYNARD IS THE NAUTICAL MILE (1.15 MILES/1.85 KM) WORLD RECORD HOLDER, COVERING THE DISTANCE AT A SPEED OF 46 MPH (74 KPH) IN OCTOBER 2005. HOWEVER, MAYNARD'S WORLD RECORD FOR THE 500 M (JUST OVER ¼ NAUTICAL MILE) MADE HIM THE FASTEST SAIL-POWERED MAN ON WATER. IN APRIL 2005, HE BROKE HIS OWN RECORD WITH 56 MPH (90 KPH). THE PREVIOUS RECORD WAS SET IN 1993 BY THE THREE-HULLED SAILBOAT *YELLOW PAGES ENDEAVOUR*. FRENCH KITESURFER SEBASTIEN CATTELAN BECAME THE FIRST MAN TO BREAK THE 50-KNOT BARRIER IN 2008, REACHING A SPEED OF 50.26 KNOTS, EQUIVALENT TO 57.83 MPH (93.08 KPH), AT LUDERITZ, NAMIBIA.

INSIDE STORY

The first windsurfer patent was granted in the United States to Jim Drake and Hoyle Schweitzer in 1970, and they are widely seen as the founders of modern-day windsurfing. However, from 1946–1949, windsurfing was practiced. A young Australian boy named Richard Eastaugh built crude windsurfers out of galvanized iron canoes that he equipped with sails and booms made from split bamboo. He successfully sailed these on the Swan River near his home in Perth and is recognized as the first individual to sail a windsurfer.

GOVERNING BODIES

The International Windsurfing Association (IWA) and the Professional Windsurfers Association (PWA) are the main governing bodies of the sport. Many professional windsurfing events are organized and sanctioned by these bodies, which are also responsible for making new rules, and providing support and services for windsurfers worldwide.

SURFING



- ➔ Most of the Earth's prevailing winds are westerlies, so many of the best surfing areas are on western coasts, such as those of California and Cornwall, England.
- ➔ The world championship circuit, organized by the Association of Surfing Professionals, takes in top venues in Australia, South Africa, Hawaii, Tahiti, and Fiji.
- ➔ There are separate events for men and women in competitions at all levels.

EVENT OVERVIEW

Exhilarating for both participants and spectators, the object of competition surfing is to ride breaking waves for as long as possible, performing tricks and maneuvers to impress a panel of judges. The most familiar form of surfing involves standing on either a short or a long board. Variations include bodyboarding, bodysurfing, kneeboarding, surf-skiing, kite surfing, and windsurfing (see pp.274–77). The most spectacular category is tow-in surfing, when the boarder is hauled by a boat to waves so big and powerful that they could not be caught any other way.

COMPETITOR PROFILE

Wiping out in big waves can be dangerous, so most surfers are outstanding swimmers. Professional surfers have excellent all-around fitness and a fine sense of balance. The ability to pick the best waves for the best rides is gained partly from local knowledge and partly from experience. Training on dry land involves gym repetitions on the leg muscles and abdomen.

Lifeline

A leash links the board to the surfer's ankle so the two are not separated

Board basics

Traditionally wooden but now made of fiberglass and polystyrene, most boards weigh less than 2.2 lb (1 kg)

Surf stabilizers

Fins on the rear underside of the board help to stabilize it on the wave



Water wear

Surfing wetsuits have permeable middle layers that let in water, which is then warmed by the heat of the surfer's body and provides the surfer with insulation from the cold outside

STAT CENTRAL

ASP WORLD CHAMPIONS: MEN

YEAR	NAME (COUNTRY)
2009	MICK FANNING (AUS)
2008	KELLY SLATER (US)
2007	MICK FANNING (AUS)
2006	KELLY SLATER (US)
2005	KELLY SLATER (US)

ASP WORLD CHAMPIONS: WOMEN

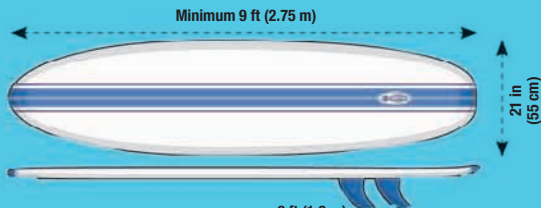
YEAR	NAME (COUNTRY)
2009	STEPHANIE GILMORE (AUS)
2008	STEPHANIE GILMORE (AUS)
2007	STEPHANIE GILMORE (AUS)
2006	LAYNE BEACHLEY (AUS)
2005	CHELSEA GEORGESON (AUS)

THE BOARD

There are two main types of surfboard: the longboard and shortboard. Pro surfers use shortboards for international competition, although there is still a longboard category in the International Surfing Association (ISA) world championships.

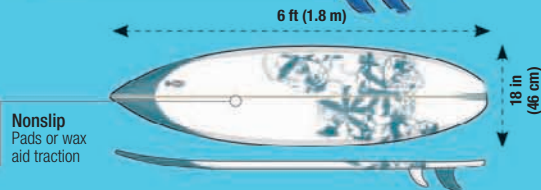
LONGBOARD

The heavy longboard provides greater stability than the shortboard but is harder to turn. For this reason, longboards are often used by beginners.



SHORTBOARD

The shortboard is light and streamlined to allow for tight turns. A wax covering or nonslip pads on the surface of the board give the surfer better grip.



BREAKER RULES

Surfers take to the water either two or four at a time and ride the waves several times in 20-minute heats. The regulations may vary from event to event, but in general the best two, three, or five rides are marked by a panel of five or six judges according to the following criteria: choice of wave (the harder the better); position on wave (the crest is best); time on wave; and quality of maneuver. In a four-surfer heat, the top two progress to the next round.

BOARDING PROCEDURES

There are two basic ways of addressing any wave: forehand, in which the surfer faces the wave, and backhand, where the surfer has his or her back to it. Getting the board position right is important, but it's what the surfer does while riding the wave that counts for points and prizes. Two of the fundamental surfing techniques are outlined below.

CUTBACK

This is a turn from the top to the bottom of a breaking wave and back up again. The surfer rides to the crest of the wave, transfers their weight onto the heels, and leans back, twisting the upper body into the turn. At the bottom of the wave, the surfer swings back onto the wave again.



PUSH BACK

The surfer rides up to the crest of a breaking wave and pushes back on the heels.

TURN AWAY

Twisting the upper body, the surfer turns into the wave as the board hits the foam.

SPEEDING UP

The surfer relies on the power of her turn to pick up speed for the remount.

THE REMOUNT

The surfer pushes down on the back of the board to remount the crest of the wave.

FLOATER

The floater is a tricky maneuver that a surfer uses to ride up onto the lip of a breaking wave and then "float" back down with the foam on to the clean face of the wave. The surfer's biggest challenge is making a good landing as the board hits the wave face.



BREAKING WAVE

The surfer rides up the face of the wave to approach the breaking section.

OVER THE LIP

Instead of turning, the surfer continues to ride up onto the lip of the wave as it peels away.

SKIMMING THE FOAM

The surfer hovers on the foam, arms outstretched, as the wave breaks below the board.

FINAL ASCENT

As the board drops down on to the wave face, the surfer bends the knees to absorb the impact.

SURF SLANG

Surfing has its own language, much of which originated in the United States. Here are just a few surfing terms you might encounter when reading about the sport:

BARREL (OR TUBE) The ultimate wave-riding experience—a wave that curls over as it breaks,

leaving a hollow tube that the surfer rides through.

CRUNCHER Any big, hard wave that is almost impossible to ride.

GLASS HOUSE The space inside a barrel or tube.

GOOFY FOOTER Someone who rides the surfboard with the right foot forward. Left foot forward is the normal stance.

HANG FIVE (OR TEN) To place one (or both) sets of toes over the front of the board when riding a wave.

NATURAL FOOTER Someone who rides the surfboard with the left foot forward. Also known as a regular footer.

SOUP Foam, or whitewater, from a broken wave.

INSIDE STORY

Surfing was commonplace among Pacific Islanders for thousands of years before Europeans got wind of it from Captain James Cook, who observed the practice when he discovered Hawaii in 1778. Although the main surfing centers are still in the Pacific, the sport is now also popular all over other parts of the world, including Brazil, Costa Rica, South Africa, Australia, France, Ireland, Jamaica, and Spain.

SIDELINES

21

The height, in meters (69 ft), of the tallest wave ridden. Pete Cabrinha achieved this feat in 2006 in Maui, Hawaii. He had to be towed out on a jet ski because the wave would otherwise have been unmountable.

76

The time in minutes for the longest ride on a single wave. The record belongs to Steve King, who in March 2006 surfed the tidal bore on the River Severn, England, for 7 miles (11 km).

ASSOCIATION OF SURFING PROFESSIONALS

The Association of Surfing Professionals now runs the highest level of competition worldwide, the ASP World Tour.



WINTER
SPORTS

07

NEED2KNOW

282

- The early form of skiing is known as Telemark after the Norwegian mountains where it was developed in the 1870. Telemark boots are bound to the ski at the toe only, making it easier to lift the foot and the ski when crossing flat areas.
- The first downhill race using alpine skis and boots was held in 1921 in Switzerland. In 1930, the downhill and slalom disciplines were recognized as official sports. They have been Olympic events since 1936.
- The word *slalom* comes from the Norwegian for “gentle slope.” Alpine skiers learn slalom skills first before attempting downhills.

Point and stick
Ski poles are used to help maintain balance during tight turns when the skier's body weight is shifted from side to side

THE COURSES

There are no set lengths for alpine-ski courses; the more famous ones have been used for decades and have remained largely unchanged in that time. Speed-event courses are designed to test competitors with a mixture of steep drops, sharp turns, and flat stretches. Slalom races are held on less challenging slopes, and the courses follow a much straighter route down the mountain. All courses are clearly marked with colored gates, through which every racer must travel. Men's races are held over longer distances and contain more gates than women's competitions.

Hand in glove

Gloves keep the hands warm and must not reach past the elbow; they are not a required piece of racing equipment, but few skiers race without them

Number check

All racers must wear a standard polyester bib that displays each competitor's race number

Second skin

Racers wear skin-tight suits to cut down on air resistance that might slow them down; the suits may be padded on the shins and around the shoulders



EVENT OVERVIEW

Alpine skiing is an exhilarating sport of speed and skill. Millions of amateur skiers get a taste of the excitement every winter at the world's many ski resorts, but few of them compete in organized races. There are five official types of alpine-ski competitions. Two of the disciplines—downhill and super giant slalom—focus on speed. Slalom and giant slalom are more technical events, where a competitor's skill will win the day. The fifth “combined” event tests both speed and technique.

PLAYER PROFILE

Although it is the force of gravity that provides the main propulsion in alpine skiing, the sport requires a high level of fitness. Most of the work is done by the legs; the upper body and arms are only really involved in maintaining balance. The muscles of the lower leg are especially important, since skiers use them to lean forward.



ALPINE SKIING

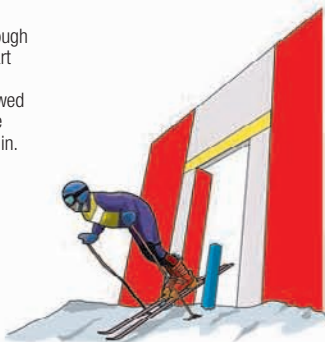


DEADLY SLOPE

THE FASTEST AND MOST DANGEROUS DOWNHILL RACE IS HELD ON THE HAHNENKAMM, NEAR KITZBÜHEL, AUSTRIA. THE EVENT HAS BEEN RUN THERE SINCE 1931, WITH COMPETITORS REACHING SPEEDS OF 93 MPH (150 KPH). SKIERS RACE ON A RUN CALLED THE STREIF, WHICH BEGINS WITH THE MOUSETRAP, A 164 FT (50 M) JUMP THAT HAS PROVED FATAL ON SEVERAL OCCASIONS.

AT THE GATE

A competitor passes through an electronic gate to start the timer and enter the course. Two beeps followed by a higher-pitched tone signal each racer to begin.



Cutting up

Icy courses are best because they do not degrade quickly, although rutting occurs at sharp bends.

In the net

Stretches of the course with high drops at the side are lined with netting to stop racers from falling; pads cover solid objects that might cause injuries.

Big drop

The longest courses are 3 miles (5 km) and descend up to 3,281 ft (1,000 m) for men's races.



THIS IS THE END

The finish line is marked by a giant gate. Often competitors can see their course time displayed on a large screen as they approach the finish.

Flat out

The lower section of a course might be a lot flatter than higher up; racers have to ensure they arrive on flats at top speed so they do not lose momentum.

Watch out

Spectators line the route cheering racers on by ringing large cow bells.

OPEN AND CLOSED

Alpine-ski courses are set out on managed slopes, or pistes, using pairs of colored flags called gates. The gates are most widely spread on the downhill courses, and placed closest together for slalom races. A gate composed of flags positioned side-by-side is called an "open" gate. A "closed" gate has one flag positioned in front of the other. Open gates show the direction that the competitor must follow down the piste, while closed gates are used to force racers to turn across the fall line—the natural line of descent.

Letting it slide

The course is prepared by spraying it with salt and water to melt the top of the snow and create a layer of ice, which ensures racers achieve top speeds.

At the summit

Downhill and super giant slalom courses start near the top of the mountain.

Clear off

Most races are run on pistes ordinarily occupied by tourists; however, the steepest slopes are reserved just for races.

Doing the splits

The time taken to complete half the course shows spectators whether a racer is likely to finish in the fastest time so far.

BEND NOT BREAK

The first slalom courses were marked with bamboo poles. In the 1980s these stiff sticks were replaced with "breakaway" gates, which are flexible plastic poles that have a hinge at the base.

WINNING WAYS

Alpine skiing events are time trials in which racers battle against the clock to complete the course in the shortest time. Downhill racers are allowed to practice on the course (to find the best racing line) in the three days prior to the competition. However, slalomists would cause too much damage to the pistes during practice, so they are limited to a one-hour course inspection.

SIDELINES

70

The maximum number of gates on a men's giant slalom course; 56 is the minimum number. A women's competition has between 46 and 58 gates.

1

The minimum number of minutes it must take to complete a downhill race. Any less than that and the course must be lengthened.

0.01

The fraction of a second to which races are timed.

120

The average speed, in kilometers per hour (75 mph), of a downhill skier.

700

The maximum vertical drop—the difference in meters (2,296 ft) between the altitudes of the start and finish—of a women's downhill race.



PISTE-WEAR

Alpine skiers wear as little as possible to make themselves aerodynamic. Loose clothing creates drag, which slows the racer down. However, a racing suit must conform to a minimum air permeability—in other words, it must not be treated to make it airtight and so offer less resistance to the air.

Racers are allowed to protect parts of the body with pads. The pads must not alter the natural shape of the competitor's body in a way that might reduce drag. For example, skiers may wear back protectors. These are heavily controlled and monitored for creating any aerodynamic advantage.

SKI BOOTS

Alpine ski boots are made from stiff plastic; they are close fitting and hold the feet tightly to create a very sturdy connection between the legs and the skis. The foot is unable to move inside, but the lower leg can bend forward.



Clunk click

Several buckles tighten the boot around the foot

Stiff upper

Top alpine skiers have the stiffest boots; beginners wear more flexible footwear

Soft touch

The lower leg is surrounded by thick padding

Chunky heel
The thick sole is attached to the ski

Tight fit
A plastic plate covers the instep

HELMET

Every competitor in an alpine-ski race must wear a crash helmet. These must cover the head and ears only; spoilers or fins are forbidden.

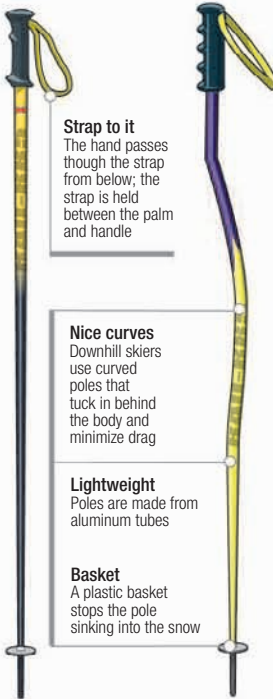


In place

The helmet is kept in place by a padded chin-strap

Hit me again

The protective shell is designed to withstand several impacts without needing to be replaced



Strap to it

The hand passes through the strap from below; the strap is held between the palm and handle

Nice curves

Downhill skiers use curved poles that tuck in behind the body and minimize drag

Lightweight

Poles are made from aluminum tubes

Basket

A plastic basket stops the pole sinking into the snow

GOGGLES

Well-fitting ski goggles are essential for protecting the eyes from the elements. Certain lenses also help improve visibility in low-light conditions.



Snug fit

A wide band keeps the goggles firmly in place

Tinted shield

The color of the goggle lenses cuts out glare and keeps snow out of the eyes

POLES

Ski poles are used to balance the skier and help them shift their weight. The length of a pole depends on the height of the skier: with the knees slightly bent, the pole should reach just above the elbow.

IT'S ANCIENT HISTORY

THE WORLD'S OLDEST SKI IS 4,500 YEARS OLD. REMAINS OF THE WOODEN RELIC WERE FOUND IN A SWEDISH BOG. SKIING IS THOUGHT TO HAVE BEEN INVENTED BY THE ANCESTORS OF THE SAMI PEOPLE FROM LAPLAND.

SKIS AND BINDINGS

Each alpine-ski event demands a certain type of ski. An alpine ski has a particular shape. When viewed from the side it has a slight arch, or camber, at the center—a shape that focuses the skier's weight toward the tips of the skis. Modern skis also have a side cut—both edges of the ski curve inward from each end making the ski narrowest near the central point. The curved edge cuts, or carves, into the snow easily making turning faster.

GIANT SLALOM

The skis used in giant and super giant slalom races are hybrids of slalom and downhill skis. They are longer to produce speed, but have medium-depth side cuts to make turning easier.

DOWNHILL

Long and wide skis produce the fastest speeds because they glide over the surface of the snow better. However, wide skis are hard to steer. Downhill skis have a small side cut to aid turning.

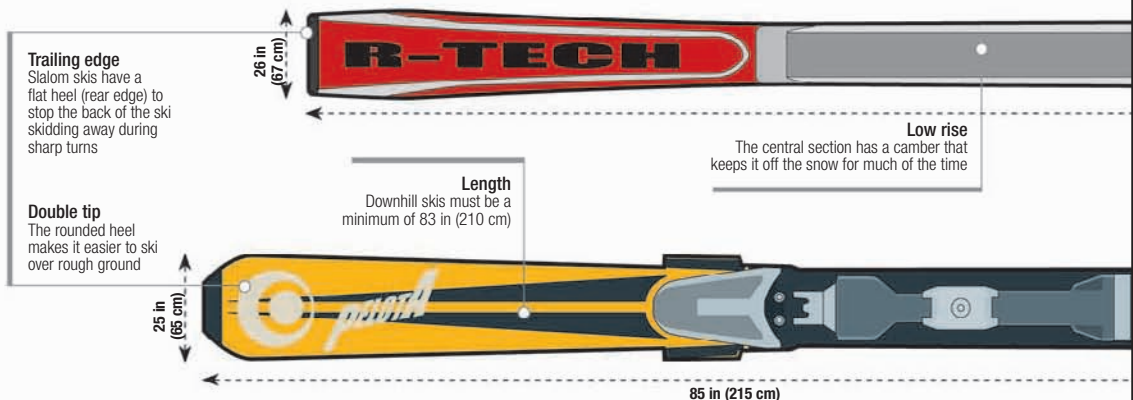
SLALOM

The shortest alpine skis are used in slalom races, where competitors sacrifice speed for maneuverability. The side cuts are deeper than on other skis so the ski cuts into the piste and bends into turns.



Slip and slide

The underside of the ski is coated with wax to keep it slippery



Trailing edge

Slalom skis have a flat heel (rear edge) to stop the back of the ski skidding away during sharp turns

Double tip

The rounded heel makes it easier to ski over rough ground

Length

Downhill skis must be a minimum of 83 in (210 cm)

Low rise

The central section has a camber that keeps it off the snow for much of the time

85 in (215 cm)

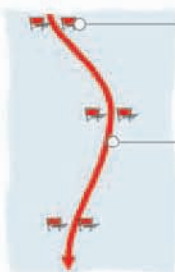


MASTERING THE SLOPES

Every alpine-ski discipline requires a different set of skills. The speed events are decided by a single timed run. Mistakes from world leaders and lucky runs from unknowns often turn the leader boards on their heads. Technical racers make two runs, both on the same day, and the times are added to determine each racer's finishing place. Competitors in the combined event are placed according to the combined time of a downhill and slalom run. The super giant slalom requires a unique set of skills. Like in a downhill race, competitors have just one run to show what they can do. However, as in other slalom events, practice on the course is forbidden: A super-G course is run once, and once only.

DOWNHILL

Courses are generally between 1.5–3 miles (2.5 and 5 km), and must take more than a minute to complete—most take about two. There are limits on steepness: men's courses must not drop more than 3,280 ft (1,000 m), while women's courses drop less than 2,300 ft (700 m).

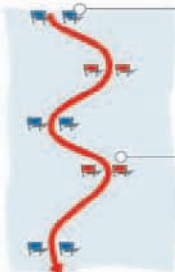


Colored
A downhill course is marked with wide gates of all the same color

Keep it fast
Gates are spread out to ensure high speeds, but each gate is always within sight of the next

SUPER-G

This is the newest alpine skiing discipline; it was introduced in 1982. Super-G, as it is known, merges the concepts of downhill with giant slalom. A downhill course is marked with giant-slalom gates, but these are widely spaced so races are run at almost downhill speeds.

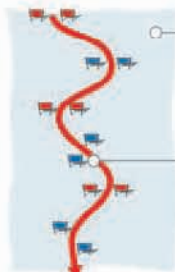


Color changes
Slalom courses are always marked with gates of alternating colors

Show the way
A super-G course has mainly open gates

GIANT SLALOM

The longest technical event, a giant slalom course is filled with twists and turns, but unlike in a slalom race, every giant-slalom gate does not require a change in direction. The number of turns is about 13 percent of the course's vertical drop in meters.



Top to bottom
Giant slalom courses have vertical drop of about 984 ft (300 m)

Mix match
Giant slaloms have an equal mixture of open and closed gates

SLALOM

Although it is the safest discipline, slalom is also regarded as the most technically challenging alpine-ski event. Every course has combinations of gates to test the skill of the competitors, including delay gates, which direct racers across, rather than down, the slope.



Racing line
The horizontal offset between gates is lowest in slalom creating a direct root down the mountain

Drop
The average vertical drop between each gate is 30 ft (9 m)

Thin out
Slalom skis are the narrowest of all alpine skis

Carving edge
A deep side cut makes the ski turn more efficiently

Staying wide
The front (and back) of the ski is wide to maintain stability

In the middle
Bindings are attached to the ski just behind the central point

Cut out
Giant slalom skis have a small side cut

Making a point
Slalom skis have pointed tips at the front to stop them from digging into snow

73 in (185 cm)

Speed above all
The wide ski spreads the skier's weight and ensures high speeds

In the round
The tips are low and rounded to make the ski aerodynamic

Heel toe
The toe (and heel) is locked to the ski by the binding

Quick release
A lever is pushed down to release the boot



Falling over
Each binding is set to withstand a certain force before releasing the ski

Brakes on
Stoppers point into the snow when the ski boot is off



Twister
Turning a screw adjusts the bindings to fit different-sized boots

Integrated
Alpine racing skis are sold with bindings already attached



STAT CENTRAL

FIS NATIONS CUP 2010 (M&W)

POSITION	COUNTRY
1	AUSTRIA
2	SWITZERLAND
3	ITALY
4	FRANCE
5	UNITED STATES
6	GERMANY
7	SWEDEN
8	CANADA
9	SLOVENIA
10	NORWAY
11	CROATIA
12	CZECH REPUBLIC
13	FINLAND
14	LIECHTENSTEIN
15	JAPAN

WOMEN'S OLYMPIC GOLD MEDALS

YEAR	DOWNHILL	G. SLALOM	SLALOM
2010	USA	GER	GER
2006	AUT	USA	SWE
2002	FRA	CRO	CRO
1998	GER	ITA	GER
1994	GER	ITA	SUI
1992	CAN	SWE	AUT
1988	GDR	SUI	SUI
1984	ITA	USA	ITA
1980	AUT	LIE	LIE
1976	GDR	CAN	GDR
1972	SUI	SUI	USA
1968	AUT	CAN	FRA
1964	AUT	FRA	FRA
1960	GDR	SUI	CAN
1956	SUI	GDR	SUI

MEN'S OLYMPIC GOLD MEDALS

YEAR	DOWNHILL	G. SLALOM	SLALOM
2010	SUI	SUI	ITA
2006	FRA	AUT	AUT
2002	AUT	AUT	FRA
1998	FRA	AUT	NOR
1994	USA	GER	AUT
1992	AUT	ITA	NOR
1988	SUI	ITA	ITA
1984	USA	SUI	USA
1980	AUT	SWE	SWE
1976	AUT	SUI	ITA
1972	SUI	ITA	ESP
1968	FRA	FRA	FRA
1964	AUT	FRA	AUT
1960	FRA	SUI	AUT
1956	AUT	AUT	AUT

RACING TECHNIQUES

It takes several years to learn how to ski at a high level. Most world-class alpine skiers will have begun to ski before they even went to school. A very few top skiers have been winners in several events. For example, the Swiss star Pirmin Zurbriggen won medals in the downhill, super-G, giant slalom, and the combined competition in the 1980s. However, most alpine skiers concentrate on speed or technical disciplines.

TURNING

For those who have not been on skis, making turns looks complicated. It certainly takes practice to be able to do it at racing speeds, but thanks to the shape of modern skis, turning has never been easier. The latest technique is to make so-called carving turns: For example, a racer shifts his weight onto the left ski, making its outside edge cut into the slope. The ski bends to match the shape of the slope, as the ski rotates to the left.

DOWNHILL

In speed events, turning is kept to a minimum because it slows the racer. When adjustments are needed to stay on the racing line, racers rely on their strength and balance to stay on their feet.



Shifting shape
The skier leans her weight onto the lower ski

Sign posts

Downhill gates are often placed at natural bends in the course



Close call
The turn must follow the racing line; too wide or too tight will cost time

Bend down

The racer stays as low as possible during the turn to maintain speed



Straight up

The crouching skier makes her skis parallel to get up to full speed again

SLALOM

Racers are forced to make turns through slalom gates. Top slalomists make turns very close to the gates, so their route is as straight, and short, as possible. The racers are allowed to push the gate poles out of the way, using techniques called blocks.



Rapid gates
Modern slalom gates have a hinge at the base so they bend out of the racer's path

Cross over

Top slalomists aim the body behind the pole while the skis pass in front; this is known as cross-blocking

On guard

Slalomists are allowed to wear stiff protectors on their forearm to prevent injuries



Outside-clear
Junior racers might use their outside arm to clear the gate

Inside-clear

The simplest block is to push the gate away using the inside forearm



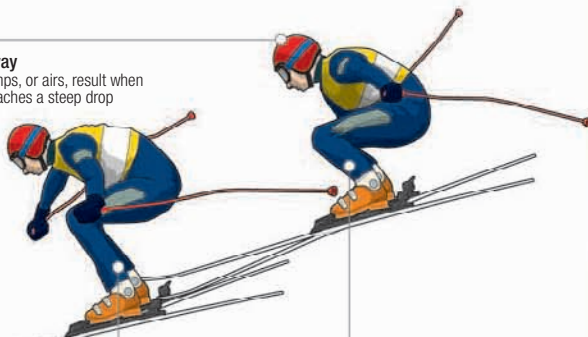
Up and down
Slalom racers bob up and down to shift their weight between turns; they make up to 60 turns in a race



JUMPING

Slalom racers rarely leave the ground; however, faster races often involve competitors making jumps. Downhill skiers, traveling faster than highway traffic, can fly up to 260 ft (80 m) in a single jump. A jump at this speed requires a lot of skill to prevent serious injury. Racers who fall on landing also rely on their equipment; the bindings release the skis, and the smooth racing suit allows them to continue sliding and to slow gradually and safely.

Up and away
Downhill jumps, or airs, result when the racer reaches a steep drop



Don't dangle
At first the skis drop down and begin to point upward

Keep it down
The racer does not push off as she leaves the ground; the jump needs to be long but not high

Tuck for landing

The heel, or back, of the ski will land first, and the racer absorbs the shock with her knees while crouching down into a high-speed tuck position

Skid lid

Although jumpers are rarely more than a few feet above the ground, their speed makes helmets essential



Push forward

As the jump continues, the skier must keep her weight forward so she is ready for landing

Straighten out

The racer must keep the skis level and pointing downward to reduce drag and ensure she travels in a straight line



SUPER SPEED

The friction between skis and snow is only small and the biggest limiter to a racer's speed are their turns and air resistance, or drag. Skiers reduce drag by making the forward surface area that is exposed to the oncoming wind as small as possible by adopting a tuck position.

Head down

The head is hunched under the shoulders, but the racer still needs to be able to see!

Wrap around

The poles bend in behind the body, so the baskets stay hidden from the front

Fold over

The upper body folds down onto the thighs

Shin up

The body weight is held forward on the shins

Out in front

The hands are held in front of the face with the palms facing inward

Making a point

With the hands and arms, the bent knees form a forward point that cuts through the air

Flatten out

The ankles must keep the skis flat so the edges do not cut into the snow and slow the skier



ONE OF THE GREATS

PERHAPS THE GREATEST SKIER OF ALL TIME IS JANICA KOSTELIC, A CROATIAN ALL-AROUNDER WITH FOUR OLYMPIC GOLDS. IN THE 2006 SEASON, KOSTELIC (BORN IN 1982) WON RACES IN ALL FIVE ALPINE-SKI DISCIPLINES. SHE WON WORLD CHAMPIONSHIPS IN SLALOM AND THE COMBINED EVENT IN BOTH 2003 AND 2005. IN 2005, SHE ALSO ADDED THE DOWNHILL TITLE.

FASTER THAN FALLING

Downhill racers are not the fastest skiers in the world; that honor goes to the speed skiers. This sport is outside the rules of normal alpine skiing: speed skis are longer and wider than racing designs, and skiers wear lightweight foam fins on the limbs and helmet to create a more aerodynamic shape. Speed skiers make straight runs down 3,280 ft (1 km) courses. Their speed is recorded halfway down, leaving the lower slope for slowing down safely. The current world record is held by Italian Simon Origone, who reached 156.2 mph (251.4 kph) in April 2006. That is even faster than the terminal velocity of a skydiver (120 mph; 193 kph).

INSIDE STORY

The first recorded ski race was held in Tromsø, Norway, in 1843. By the late 19th century, competitions were being held across Europe and North America. These early skiers were using Telemark equipment. Downhill races using alpine skis and according to modern rules have been held since 1921; the first slalom was in 1922. In 1936, Alpine skiing became part of the Olympic program for the first time. Giant slalom became a standard event in 1950; super giant slalom was introduced in 1982.

GOVERNING BODY: FIS

The Fédération Internationale de Ski (FIS; International Ski Federation) is the governing body of all ski competitions, including speed skiing, Nordic skiing (such as ski jumping and cross-country), snowboarding and freestyle (acrobatics), as well as alpine skiing. The FIS was founded in 1924. It is based in Switzerland and has 111 national members.

SIDELINES

328 The number of skiers who have achieved speeds of 124 mph (200 kph) or more, generally achieved on high-altitude courses.

3.65 The number of people who are injured while skiing each day per every 1,000 skiers.

40 The minimum number of seconds left between the starts of downhill competitors.



FREESTYLE SKIING

288



EVENT OVERVIEW

The two main types of freestyle skiing are moguls and aerial, while a third variety, acro, is practiced on a more limited basis. Moguls involves skiing down a steep slope covered with “moguls” (small bumps) and jumping off two ramps, while aerial involves jumping off a ramp and performing twists and spins in midair. Acro (not an Olympic sport) is a combination of gymnastics and dance, performed on a gentle slope.

GEARED UP

Competitors in each of the three disciplines use similar gear. Acro skiers, and the mogul skier shown here, have the full complement of waterproof and insulated clothing, poles for balance, twin-tip skis, helmet, and goggles. Aerial skiers wear the same clothing and skis, but don't use poles.

Protective helmet

A helmet is vital for freestyle skiing, giving warmth and extra protection for the head

Waterproof jacket

Insulated, waterproof jackets are worn to stay warm

Ski poles

Poles are crucial for turning and propelling the skier. Acro poles must not exceed the skier's height, and mogul poles are usually 2 ft (60 cm) shorter than the athlete

Ski bindings

Standard ski bindings are used to attach the boots to the skis

Twin-tip skis

Freestyle skiers use flexible skis with smooth undersides, and raised tips at both ends

THREE-PISTE SUIT

Moguls, aerials, and acro are sufficiently distinct disciplines to each require a dedicated course. Mogul courses are the steepest of the three, with a constant decline for the whole slope. The aerial slope has four stages, each at different gradients—the inrun, table, landing zone, and finish area. The acro course is a single slope at a constant gradient.

HOT DOGGING

A SKIING TREND DUBBED “HOT DOGGING” BROUGHT FREESTYLE SKIING TO A NEW AUDIENCE IN THE LATE 1960s. INSPIRED BY THE MOVES AND STYLE OF SKATEBOARDERS, AMERICAN SKIERS BEGAN TO EXPERIMENT WITH JUMPS AND TRICKS ON THE SLOPES, AND ADOPTED THE TERM TO DESCRIBE THE SHOWBOATING STYLE THAT EVOLVED.

MOUNTAIN MOLEHILLS

The mogul slope has a constant gradient of 24–32°. Competitors negotiate the moguls at high speed, before jumping off ramps called kickers to perform aerial maneuvers.

Judges' stand

Each run is scored by seven judges, who sit in a stand in the finish area

Starting position

The competitor descends the piste from here between the gates. In dual moguls, two skiers descend at the same time

Control gates

Contestants pass between control gates 26–49 ft (8–15 m) apart

Mogul mounds

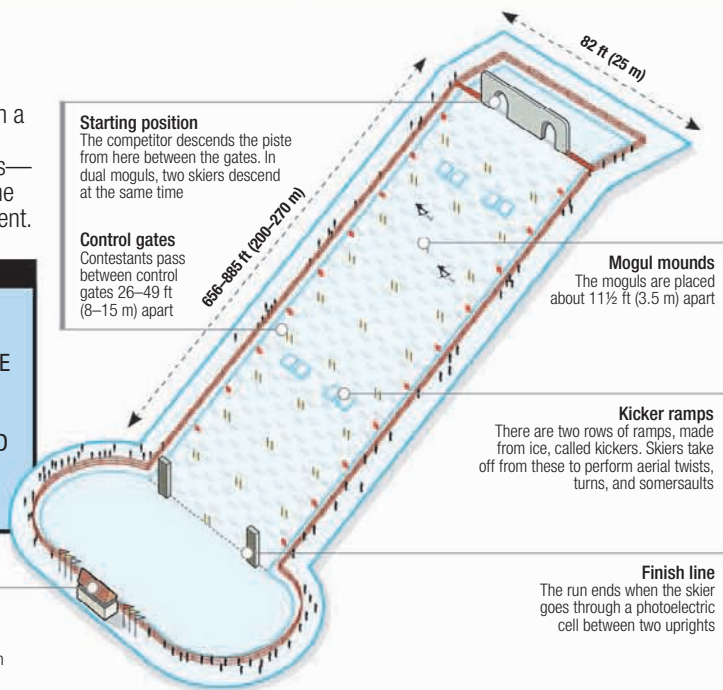
The moguls are placed about 11½ ft (3.5 m) apart

Kicker ramps

There are two rows of ramps, made from ice, called kickers. Skiers take off from these to perform aerial twists, turns, and somersaults

Finish line

The run ends when the skier goes through a photoelectric cell between two uprights





NEED2KNOW

- ➔ The first appearance of freestyle skiing was in the 1930s in Norway, when skiers began to perform acrobatics during alpine and cross-country training.
- ➔ Freestyle skiing is one of the most dynamic forms of skiing—the ethos is very much on individual creativity and expression. It has much in common with snowboarding, particularly in clothing and techniques.
- ➔ Moguls and aerial are both Olympic sports. Acro was a demonstration sport in 1988 and 1992, but has not been adopted fully.

SKIER PROFILE

Each freestyle discipline has its own demands, but they all require physical endurance and technical ability. Some freestylists work out by bouncing on trampolines while wearing skis, and in the absence of snow during the off-season, aerial skiers practice on artificial ramps that end in swimming pools or lakes.

SKI BOOTS

Made from plastic, ski boots are incredibly stiff with high sides to support the ankles, to ensure that the feet are secured firmly to the skis.



Ski clips

The boots are closed and secured by a number of clips

SIDELINES

3 The maximum number of backflips permitted in an aerial competition. Up to five twists may also be added, in order to win as many points as possible for “form.”

18 The height, in meters (59 ft), that top aerial freestylers rise above the slope after lifting off from a kicker. Jumps in mogul contests are smaller in size.

98 The vertical drop, in meters (321 ft), of the Sauze d’Oulx mogul run, which was used for the Turin Winter Olympics. Fresh snow for the moguls was produced artificially from rainwater.

41,102 The total number of tickets sold for the freestyle skiing events at the Turin Winter Olympics, held in 2006. This is the highest attendance ever achieved for freestyle events at any Winter Olympics.

STYLISH GEAR

Headgear and clothing are the same in all three forms of freestyle. Acro skis are shorter and more flexible than their mogul and aerial equivalents.

PLASTIC HELMET

Helmets are nearly always worn, and are required for aerial skiers. Made from plastic, they are held in position with a chinstrap.



Padded fit

Helmets come with padding on the inside for a comfy fit

SKI GOGGLES

Goggles are worn to protect the eyes from the glare of the sun, and also to prevent snow from getting in the eyes.



Elastic strap

The goggles are secured with an elastic strap

SKI LENGTHS

The skis used for moguls and aerial have specific maximum lengths. Acro skis may be no more than 80 percent of the skier’s height.



Maximum length: men 6 ft 3 in (1.9 m); women 5 ft 11 in (1.8 m)

Ski bindings

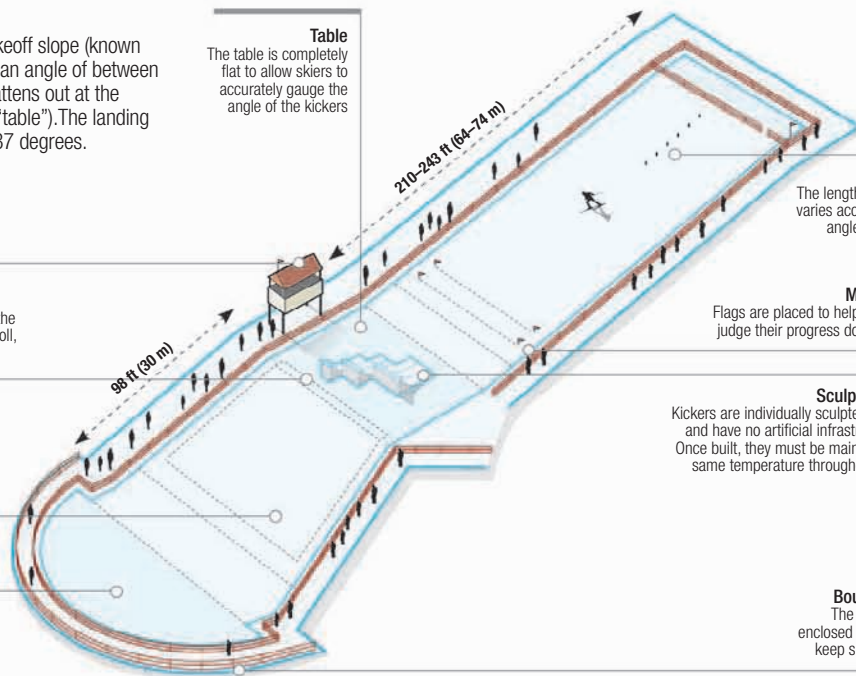
The bindings secure the skier’s boot onto the ski

Flexible ski

The ski’s profile is curved, which makes it more flexible

AERIAL SLOPE

On the aerial course, the takeoff slope (known as the “inrun”) descends at an angle of between 20 and 25 degrees, then flattens out at the takeoff area (known as the “table”). The landing zone is built at an angle of 37 degrees.



Judges’ stand

The judges sit on a raised platform to get a good view of the jump

Knoll

The transition from the table to the landing zone is known as the knoll, and is marked with a red line

Landing zone

The slope in the landing zone is scattered with wood shavings to give the skiers a clear view of the ground

Finish area

There are no size regulations for the finish area; it is usually built as large as possible

Table
The table is completely flat to allow skiers to accurately gauge the angle of the kickers

Inrun

The length of the inrun varies according to the angle of the slope

Marker flags

Flags are placed to help competitors judge their progress down the inrun

Sculpted kickers

Kickers are individually sculpted from snow and have no artificial infrastructure at all. Once built, they must be maintained at the same temperature throughout the event

Boundary wall

The finish area is enclosed by fencing to keep spectators out

MOGUL MAGIC

The goal of moguls is to get down the course as fast as possible, while winning points awarded by seven judges for the overall style and technique of the descent, and for compulsory elements, such as jumps. There are three scoring elements: the quality of turns around the moguls, maneuvers made in the jumps, and the overall speed of the descent.

BUMPY RIDE

Skiers can go straight over the moguls, but this takes longer than twisting and turning around them. Bumps are absorbed by bending the knees.



Pole position
As the skier prepares to turn to the right, he or she pivots on the right pole and shifts his or her weight to the right

BACK SCRATCHING

The back scratcher is a move performed in mid-air just after a jump, in combination with one or two other positions. The skis must stay in parallel with each other.



Pointing back
The skis are pointed down at the ground and the trailing ends "scratch the back"



Lifted high
The poles must be lifted high and wide, to avoid striking the skis or legs

SPREAD EAGLE

The spread eagle is a popular mid-air move. The skier launches off a kicker and spreads both arms and legs as wide as possible.

KNEE-TO-SHOW BASIS

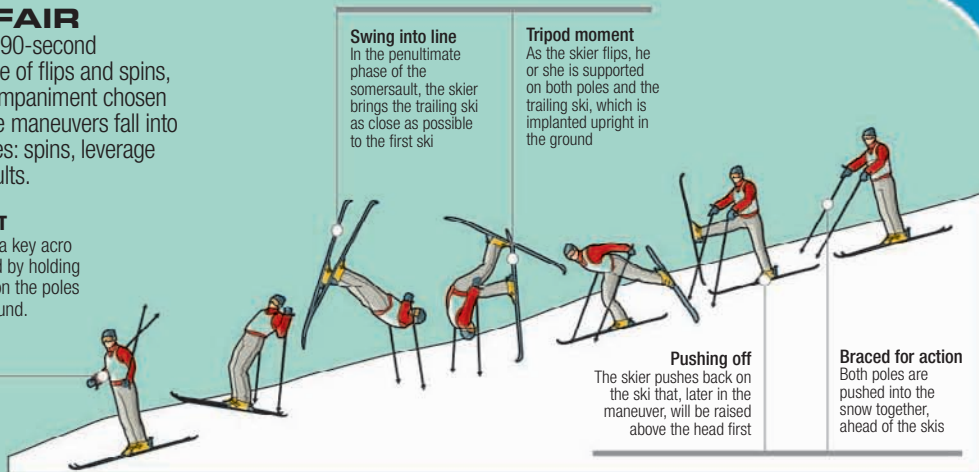
IN 1994, CANADA'S JEAN-LUC BRASSARD WORE BRIGHTLY COLORED KNEEPADS TO ENSURE THE JUDGES MISSED NONE OF HIS TRICKS ON THE MOGUL SLOPE. HE TOOK GOLD, AND NOW EVERYONE WEARS THEM.

ACRO AFFAIR

Acroskiers perform a 90-second choreographed routine of flips and spins, set to a musical accompaniment chosen by the competitor. The maneuvers fall into one of three categories: spins, leverage moves, and somersaults.

FORWARD SOMERSAULT

The forward somersault is a key acro move. It can be augmented by holding the upside-down position on the poles before returning to the ground.



Over and out

After landing on both skis, the skier returns to the upright position and continues down the slope

Swing into line

In the penultimate phase of the somersault, the skier brings the trailing ski as close as possible to the first ski

Tripod moment

As the skier flips, he or she is supported on both poles and the trailing ski, which is implanted upright in the ground

Pushing off

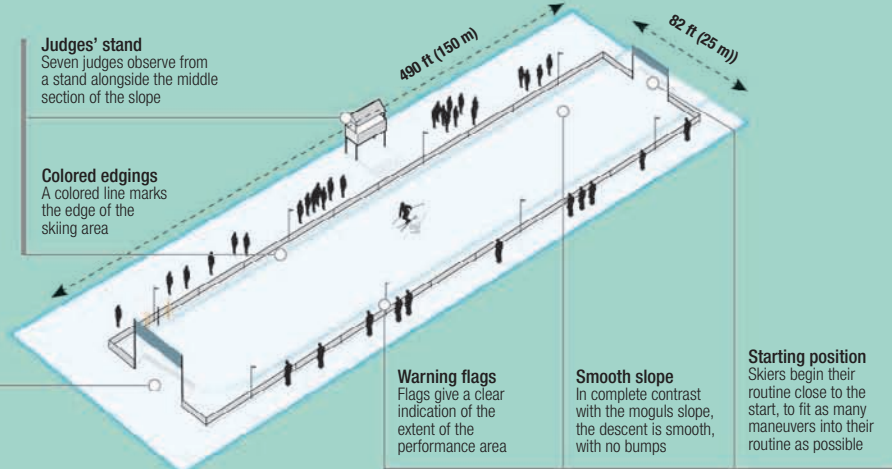
The skier pushes back on the ski that, later in the maneuver, will be raised above the head first

Braced for action

Both poles are pushed into the snow together, ahead of the skis

THE ACRO SLOPE

Acro skiers perform their moves on a slope with a gradient of approximately 24 degrees. The slope must be as smooth as possible—the winter sports equivalent of a bowling green. Competitors use the whole available area, beginning their routines almost as soon as they have left the start line, and ending right at the finish.



Judges' stand

Seven judges observe from a stand alongside the middle section of the slope

Colored edgings

A colored line marks the edge of the skiing area

Finish line

A photoelectric cell between the uprights at the end of the slope

Warning flags

Flags give a clear indication of the extent of the performance area

Smooth slope

In complete contrast with the moguls slope, the descent is smooth, with no bumps

Starting position

Skiers begin their routine close to the start, to fit as many maneuvers into their routine as possible

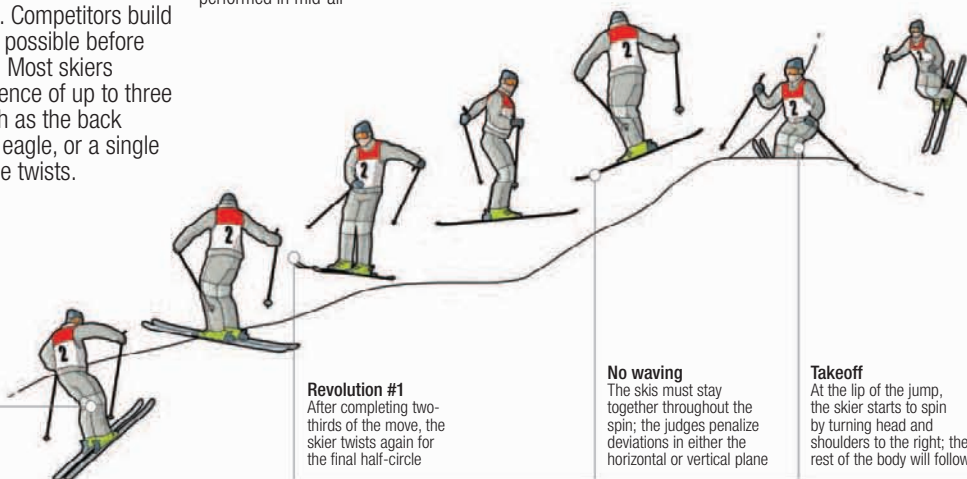


MOGUL MOVES

The highlights of each mogul run are the jumps and maneuvers that are carried out at the two kickers. Competitors build up as much speed as possible before they get to the jumps. Most skiers attempt either a sequence of up to three individual moves, such as the back scratcher and spread eagle, or a single jump involving multiple twists.

540 DEGREE AERIAL TURN

This impressive maneuver consists of one-and-a-half horizontal rotations, performed in mid-air



Touchdown

The knees are bent to absorb the impact; on landing, the skier pushes off down the slope

Revolution #1

After completing two-thirds of the move, the skier twists again for the final half-circle

No waving

The skis must stay together throughout the spin; the judges penalize deviations in either the horizontal or vertical plane

Takeoff

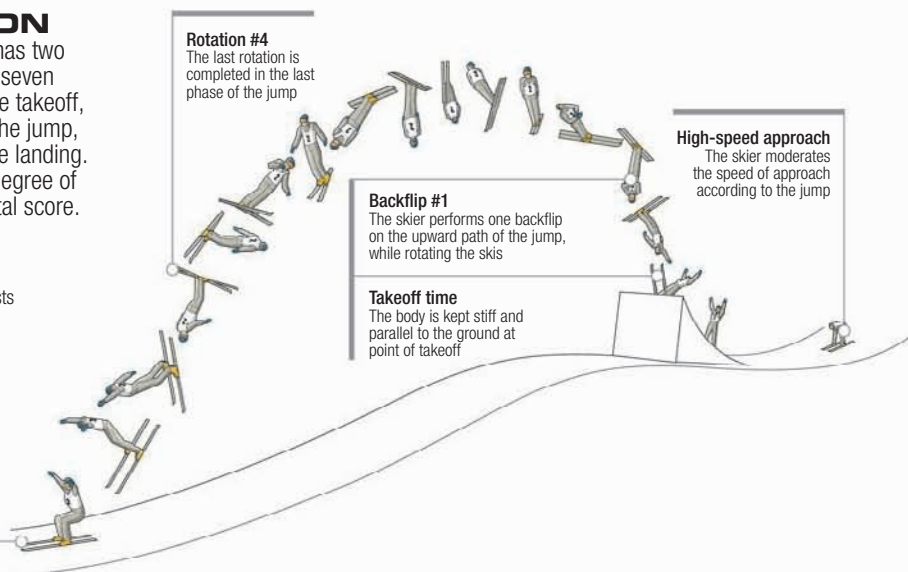
At the lip of the jump, the skier starts to spin by turning head and shoulders to the right; the rest of the body will follow

AERIAL ACTION

In aerial events, each skier has two jumps, which are scored by seven judges. Five judges score the takeoff, length, height, and form of the jump, while the other two score the landing. The total is multiplied by a degree of difficulty (DD), to give the total score.

DOUBLE FULL-FULL-FULL

This jump involves three "full" somersaults, with two horizontal twists on the first somersault and one on each of the other two. Three is the maximum number of somersaults permitted in competitive aerials.



Rotation #4

The last rotation is completed in the last phase of the jump

High-speed approach

The skier moderates the speed of approach according to the jump

Backflip #1

The skier performs one backflip on the upward path of the jump, while rotating the skis

Takeoff time

The body is kept stiff and parallel to the ground at point of takeoff

Parallel lines

The skis must be kept parallel on landing, and the knees are bent to absorb the impact

STAT CENTRAL

OLYMPIC CHAMPIONS: MEN'S MOGULS

YEAR	NAME	COUNTRY
2010	GUILBAUT COLAS	(FRA)
2006	DALE BEGG-SMITH	(AUS)
2002	JANNE LAHTELA	(FIN)
1998	JONNY MOSELEY	(USA)
1994	JEAN-LUC BRASSARD	(CAN)

OLYMPIC CHAMPIONS: MEN'S AERIAL

YEAR	NAME	COUNTRY
2010	ALEXEI GRISHIN	(BLR)
2006	XIAOPENG HAN	(CHN)
2002	VALENTA, ALES	(CZE)
1998	ERIC BERGOUST	(USA)
1994	ANDREAS SCHÖNBÄCHLER	(SUI)

OLYMPIC CHAMPIONS: WOMEN'S MOGULS

YEAR	NAME	COUNTRY
2010	HANNAH KEARNEY	(USA)
2006	JENNIFER HEIL	(CAN)
2002	KARI TRAA	(NOR)
1998	TAE SATOYA	(JPN)
1994	STINE LISE HATTESTAD	(NOR)

OLYMPIC CHAMPIONS: WOMEN'S AERIAL

YEAR	NAME	COUNTRY
2010	LYDIA LASSILA	(AUS)
2006	EVELYNE LEU	(SUI)
2002	ALISA CAMPLIN	(AUS)
1998	NIKKI STONE	(USA)
1994	LINA CHERYASOVA	(UZB)

INSIDE STORY

The first freestyle skiing World Cup was held in 1981; the inaugural World Championship followed four years later. Moguls first featured in the Winter Olympics in 1992; aerials joined the Games in 1994. Acroski is still unrecognized by the International Olympic Committee (IOC), although it was a demonstration sport at the 1988 and 1992 Olympics.

GOVERNING BODY

The Fédération Internationale de Ski (FIS) currently has 107 member nations.



NEED2KNOW

- Snowboard Cross, in which four boarders race each other downhill through a series of obstacles, was introduced at the Turin Winter Olympics in 2006.
- In "Big Air" riders jump off a 60 ft (18 m) ramp, then spin and flip for 100 ft (30 m).
- Craig Kelly, the "godfather of freeriding," won four World Championships and three US Championships. He was killed in an avalanche in January 2003.

PLAYER PROFILE

Aside from being daring, with a great deal of self-confidence and a sense of adventure, a snowboarder has to have excellent physical posture from which they gain strength, flexibility, and agility. As with any snow sport, balance and coordination are vital, as is quick-thinking. A flair for putting on a performance is an important quality in freestylers.

Goggles

Goggles protect the eyes against snowblindness. They also prevent snow from getting in the eyes, which can cause temporary vision loss, dangerous at high speeds

Upper body

Body gear is designed to protect the shoulders, elbows, and spine. Dense, high-impact foam is used, along with neoprene for flexibility

Wrist guard

In the event of a fall, wrist guards reduce the likelihood of sprains or breaks

SIMON DUMONT

DUMONT SMASHED THE WORLD QUARTER-PIPE RECORD ON APRIL 11, 2008. THE 21-YEAR-OLD AMERICAN BOARDER JUMPED 35 FT 6 IN (10.8 M), EXACTLY 3 FT 3 IN (1 M) HIGHER THAN THE PREVIOUS RECORD.

SPORT OVERVIEW

Developed in the United States in the 1960s, snowboarding combines the skills required for skiing, skateboarding, and surfing. Riding on a single, wide, ski-like board, to which both feet are attached, snowboarders are known for their speed and boldness on the slopes, and their agility in snowparks.

RACING AND TRICK RIDING

Snowboarding has a variety of different elements, including downhill riding and racing, mogul techniques, tricks performed in half- and quarter-pipes, and powder riding. Racing, known as alpine snowboarding, uses skills similar to downhill ski racing. The race course is set up with gates and is called giant slalom. The object of the race is to go as fast as possible. Missing a gate results in disqualification. Parallel giant slalom consists of two boarders racing against each other on parallel courses.

EXTREME SNOWBOARDING

Done on near-vertical (45 degrees plus) mountain slopes with cliffs, deep snow, chutes, and trees, extreme snowboarding is not for the fainthearted. Competitions include racing and freestyle events that involve courses of up to 4,000 ft (2,000 m) with many natural obstacles. Entrants are judged on factors such as time and style.

Helmet

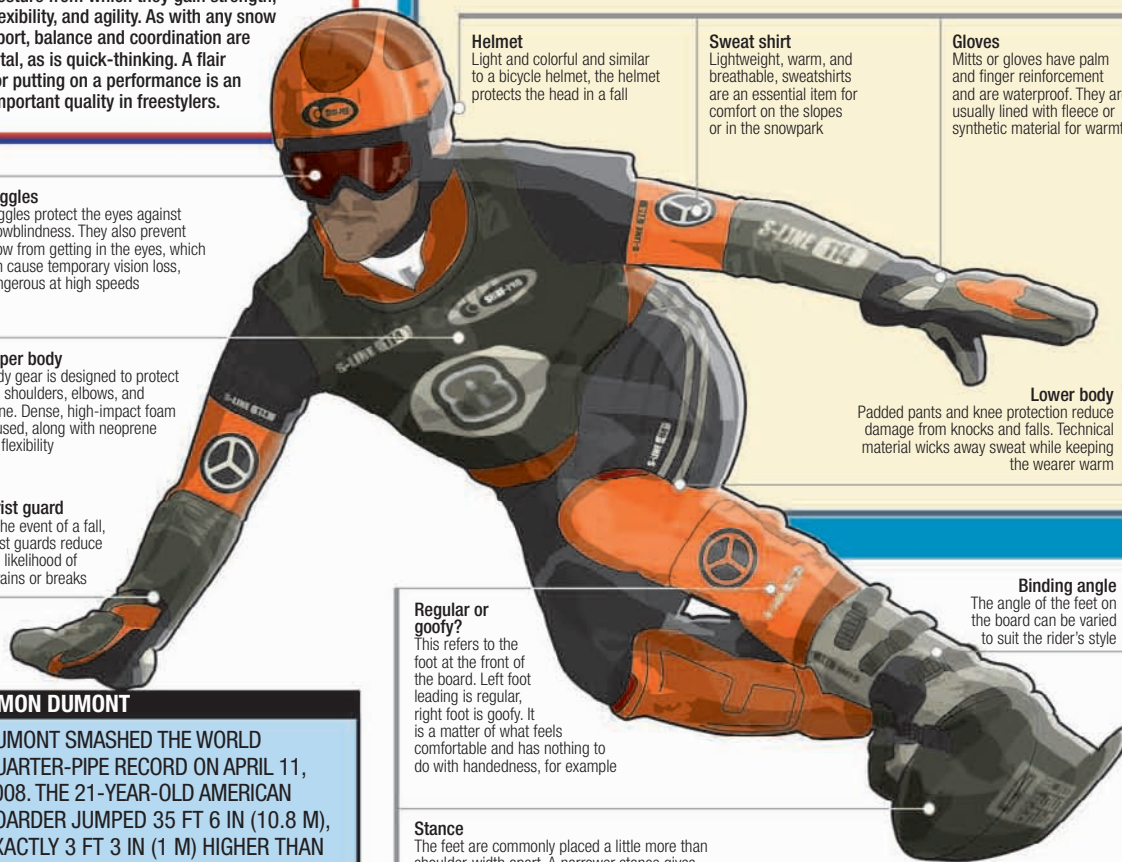
Light and colorful and similar to a bicycle helmet, the helmet protects the head in a fall

Sweat shirt

Lightweight, warm, and breathable, sweatshirts are an essential item for comfort on the slopes or in the snowpark

Gloves

Mitts or gloves have palm and finger reinforcement and are waterproof. They are usually lined with fleece or synthetic material for warmth



Lower body

Padded pants and knee protection reduce damage from knocks and falls. Technical material wicks away sweat while keeping the wearer warm

Regular or goofy?

This refers to the foot at the front of the board. Left foot leading is regular, right foot is goofy. It is a matter of what feels comfortable and has nothing to do with handedness, for example

Binding angle

The angle of the feet on the board can be varied to suit the rider's style

Stance

The feet are commonly placed a little more than shoulder-width apart. A narrower stance gives more control for turning on the slope, and a wider one is more stable for freestyle boarding



SNOWBOARDING



HALF-PIPE

A half-pipe is a specially constructed, U-shaped, sloping, tubular arena with curved walls and a flat bottom in which snowboarders can carry out acrobatic displays. Half-pipes originated in skateboarding parks.

HOW IS IT DONE?

Snowboarders descend one wall of the U to get up speed; this enables them to ascend the opposite wall and reach the lip, from where they jump into the air and perform moves and tricks. The farther up the pipe they start, the more jumps they can do. To use a half-pipe riders need excellent edge- and turning control. They need to be able to go backward (fakie) as well.

COMPETITIONS

Most half-pipe competitions have five judges, each responsible for a different area. Scores are given for tricks, such as spins and flips, technical merit, landing, and the height a rider attains in jumps.

TECHNIQUES

In a half-pipe a boarder employs a variety of techniques, such as a rolling edge (ascending on one board edge and descending on the other) and making a slide turn (on the snow or ice) or jump turn (in the air) at the top of the vertical.

ALLEY OOP

This half-pipe trick involves an uphill turn through 180 degrees in the air. The rider needs to be traveling at speed to achieve enough height in the air and the board must be flat on takeoff.



Grab

In the air, grab the toe edge of the board to start the turn

Body bend

Turn your body to the front of the board. As with all jumps, draw your knees up to your body when in the air

Release

Release the grab as the board approaches the half-pipe lip and land flat to ride away

Upside down
Being upside down is part of being a talented freestyle snowboarder. Grabs assist midair stability during complicated tricks

Straight leg

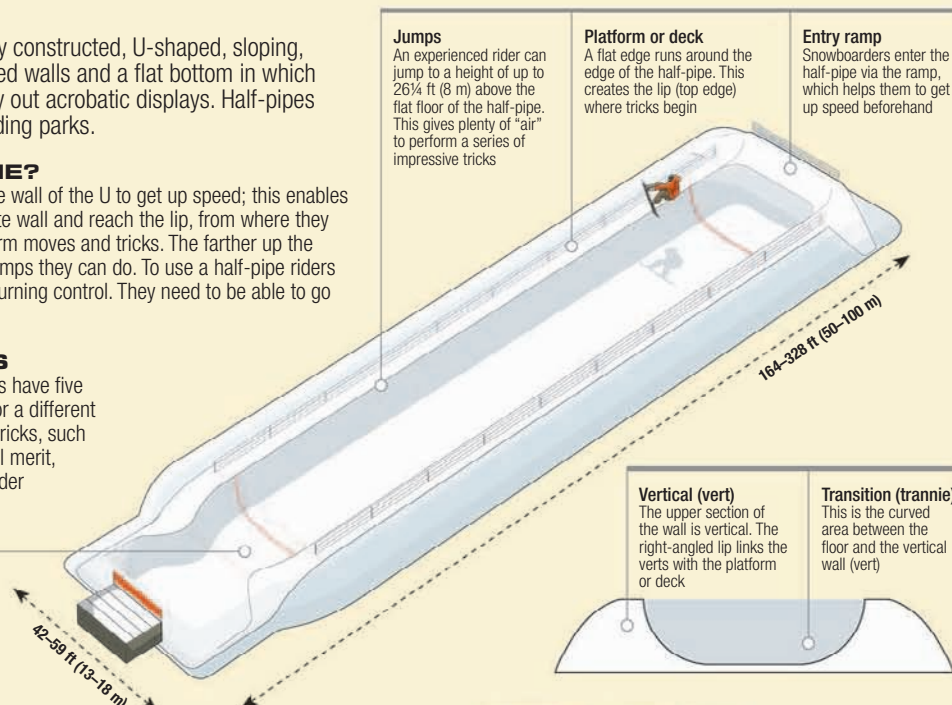
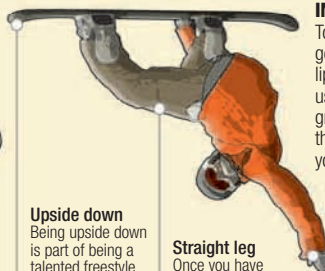
Once you have made the grab, straighten the leading leg as far as possible

Leading arm

Use your leading arm to counterbalance

INDY GRAB

To make an indy grab get plenty of "air" at the lip, draw your knees up, use your trailing hand to grab the board between the bindings, and extend your leading arm.



Jumps
An experienced rider can jump to a height of up to 26¼ ft (8 m) above the flat floor of the half-pipe. This gives plenty of "air" to perform a series of impressive tricks

Platform or deck
A flat edge runs around the edge of the half-pipe. This creates the lip (top edge) where tricks begin

Entry ramp
Snowboarders enter the half-pipe via the ramp, which helps them to get up speed beforehand

End to end

Snowboarders must travel the whole length of the pipe, from the entry ramp to the exit

Vertical (vert)
The upper section of the wall is vertical. The right-angled lip links the verts with the platform or deck

Transition (trannie)
This is the curved area between the floor and the vertical wall (vert)

EQUIPMENT

Boots and boards are the most basic requirements. There are two main types of snowboard: freestyle (free-riding) and alpine. A freestyle board is comparatively short and flexible with symmetrical nose and tail. Alpine boards are long, narrow, and rigid, with a distinct front and back.

SNOWBOARD

Snowboards have a light, strong, and flexible wood core with fiberglass lamination. The base is made of a porous plastic saturated with wax for a smooth, fast run, and is patterned to channel snow and water.

Curve

The edges are symmetrically curved. Curves assist turning. The shorter the radius, the tighter the turn

Edges

A steel edge ¼ in (2 mm) square creates board "grab"



Toe space

The toes should not be able to feel the end of the boot, but the foot should feel snug and protected



Highback

A molded support sits behind the ankle and extends up the calf

BOOTS

Freestylers use flexible boots of soft synthetic leather. Alpine rider's boots are like ski boots, with a stiff plastic outside.

BINDINGS

These hold the feet on the board and do not release automatically. Bindings can be adjusted for a perfect fit.

INSIDE STORY

The first crude snowboards were made in the 1950s by surfers and skaters who wanted to try a new sport. In 1965, Sherman Poppen bolted two skis together to make a "snurfer," a hybrid board that came somewhere between a skateboard and a toboggan. Jake Burton Carpenter started making fiberglass snowboards in 1979, and added bolted-on bindings for more control. Steel edges arrived in the 1980s as did highback bindings. Snowboarding became a Winter Olympic sport in 1998.

CROSS-COUNTRY SKIING

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NEED2KNOW

- ➔ Cross-country skiing has long been popular in northern Europe and Canada. It has grown considerably in the US, along with other countries with extensive winter snow cover.
- ➔ The sport is on the programs of the Winter Olympics, the FIS World Cup, and the Nordic World Ski Championships.
- ➔ There are 12 cross-country skiing competitions at the Winter Olympics, six for men and six for women.

EVENT OVERVIEW

Cross-country skiing is probably the most grueling of the winter sports. Competitive cross-country is divided into classical and freestyle, and races are run over distances from ¼ mi (400 m) sprints to 31 mi (50 km) marathons or longer. In classical competitions, skiers use a straight stride and stay within predetermined tracks, only leaving them to overtake. In the faster freestyle discipline, skiers push off on alternate skis in a style of movement that resembles skating.

Head cozy

A ski hat keeps the head warm, and nonfogging eyewear reduces sun glare without impairing vision

COMPETITOR PROFILE

A cross-country skier needs huge strength and stamina, as well as a perfect technique. Training on snow in winter and an arduous regime of cycling, running, and roller skiing in summer build the athlete's physical and mental strength. Technique is perfected through practice on the white stuff.

COMPETITION GUIDELINES

Cross-country circuits vary enormously, but international competition guidelines recommend that a course contains uphill, downhill, and undulating terrain in roughly equal measure. The uphill section should have a gradient of 9–18 percent. For sprints, the difference between the lowest and highest points should not exceed 98 ft (30 m). For races of 9.3 mi (15 km) and more, the difference should not be greater than 656 ft (200 m). However, Norway's Birkebeiner race involves more uphill than downhill.

THE "NANNSTAD EXPRESS"

NORWEGIAN SKIER BJORN DAEHLIE HAS WON MORE WINTER OLYMPIC MEDALS THAN ANYONE ELSE. NAMED FOR HIS SPEED, DAEHLIE WON HIS EIGHT GOLDS AND FOUR SILVERS FROM 1992 TO 1998. IN 1994 HIS RELAY TEAM MISSED GOLD BY JUST 0.4 SECONDS—AFTER A RACE OF ALMOST 25 MILES (40 KM)!

Poles apart

Freestyle poles may come up to the chin or mouth, to allow for a higher arm action. Classical poles (shown right) are shorter

Competition bibs

Skiers wear their start numbers on their chest and back; numbers may also appear on the leg closest to the camera at the finish line

Handcover

Cross-country gloves are lightweight, thermal, and windproof

Ski suit

A stretchable, close-fitting Lycra suit allows unrestricted, streamlined body movement and the maximum release of perspiration

Ankle support

The boots used for freestyle cross-country skiing are relatively rigid and give more ankle support than classical boots

Fixed toe

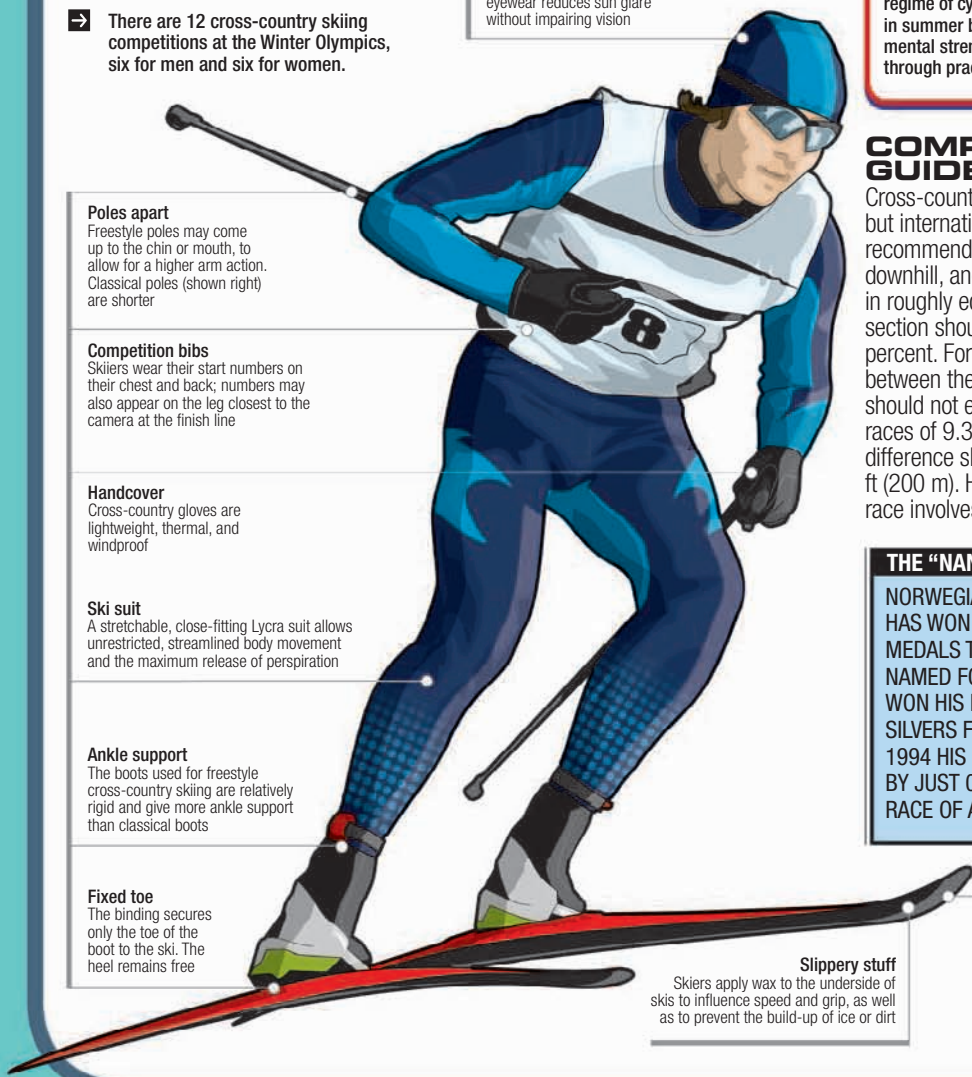
The binding secures only the toe of the boot to the ski. The heel remains free

Slippery stuff

Skiers apply wax to the underside of skis to influence speed and grip, as well as to prevent the build-up of ice or dirt

Curved tips

Cross-country skis are longer and narrower than those used by Alpine skiers, and the skis have steeply curved tips to avoid catching the snow

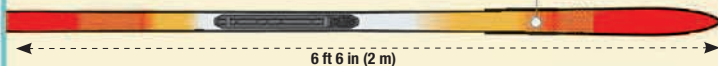


ALL ABOUT WAX

Using the right wax can take a skier to victory. Snow and the weather influence which wax to use: glide wax decreases the friction between the skis and the snow, giving a skier more speed; kick (or grip) wax increases friction between the skis and the snow and stops the skier from slipping.

FREESTYLE SKIS

The skis are shorter than those used for classical at 5 ft 7 in–6 ft 6 in (1.7–2 m), and the upward curve of the tips is not so pronounced. The skis are narrow, just 1.75–2 in (4.5–5 cm) wide.



6 ft 6 in (2 m)

POLES

Ski poles have to be lightweight but stiff: energy is wasted if the poles bend. They are usually made of aluminium, fiberglass, graphite, or carbon fiber.

Slip and slide

Glide wax keeps ski frictionless and stops dirt and ice build-up

CLASSICAL SKIS

Longer and more rigid skis, these spread the weight of the racer more evenly. The minimum length of skis for classical events is 6 ft 5 in–7 ft 6 in (1.95–2.3 m).



7 ft 6 in (2.3 m)

Wax to win

Glide wax is used on the front and rear of the ski; kick wax on the middle



Ankle angles

Flexible boots allow for maximum strides

CLASSICAL BOOT

The classical boot is relatively flexible and similar to a running shoe, allowing for plenty of ankle movement.



Hard case

Boots support the joints that do most work

FREESTYLE BOOT

The freestyle boot is more rigid and gives more support to the ankle than the classical cross-country ski boot.

PENALTY CLAUSE

Competitors in nonsprint classical races may be penalized for failing to allow a faster skier to overtake them at the first request, unless they are in the marked zone at the end of the course. Skiers may also be disqualified for using nonclassical techniques.

In any competition, racers will be penalized if they obstruct other skiers, make a false start, or wax, scrape, or clean their skis during a race.

Both classical and freestyle techniques are used in races known as double pursuits. In this style of race, there are two courses, one requiring classical-style skiing, and the other freestyle. Between the courses the competitors must stop in order to change gear, because the skis and poles are not interchangeable between the two styles. However, the clock keeps going, and the first skier across the finish line wins.

Light and strong

The graphite and Kevlar shaft tapers to the bottom

Getting a grip

A plastic web or disc, called a basket, gives advantage by preventing the pole from plunging too low in to the snow



GETTING ALONG

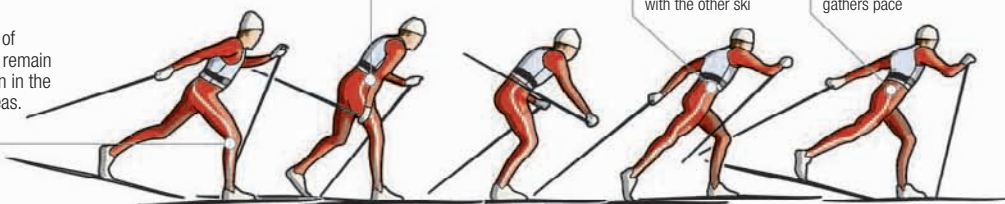
Classical skiers may only use a diagonal stride. Freestylers can use the faster skating (or free) technique, pushing the inside edge of the ski simultaneously backward and outward at about a 45-degree angle.

DIAGONAL STRIDE

This technique is the workhorse of classical cross country. The skis remain parallel to each other and remain in the tracks, apart from in marked areas.

Pushing off

The skier glides one of the skis forward and plants the pole in the snow on the same side of the body.



Pulling forward

The skier pulls on the ski pole to pull the body forward

Switching sides

The pole is then pulled out of the snow, and the skier pushes forward with the other ski

Gathering pace

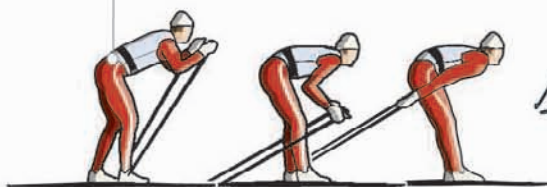
Alternating between left ski and pole and right ski and pole, the skier gathers pace

DOUBLE PUSH

The skier plants both poles in the snow at the same time and pushes on both poles together. Both skis move forward together.

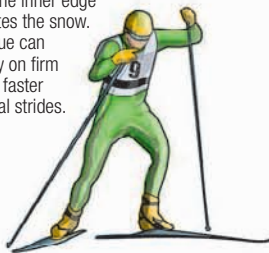
Pushing forward

The poles are planted, and the skier pushes backward against them to achieve drive



SKATING STEPS

In this freestyle technique, the skier pushes out and forward so the inner edge of the ski bites the snow. The technique can be used only on firm snow, but is faster than diagonal strides.



INSIDE STORY

Cross-country skiing was probably first practiced in the Nordic countries hundreds, if not thousands, of years ago. It was the most efficient way for hunting communities to move long distances in winter as they tracked herds of elk and deer. Traditionally, wooden skis and bamboo poles with leather handstraps were used. Men's cross-country skiing was included in the first Winter Olympics in 1924, but women's events did not make an appearance there until 1952.

GOVERNING BODY: FIS

The Fédération Internationale de Ski (International Ski Federation) was founded on 2 February 1924, during the first Olympic Games in Chamonix, France, with 14 member nations. Today, 107 National Ski Associations comprise the membership of FIS.

NEED2KNOW

- The average jump takes between 8 and 12 seconds, of which only 2 or 3 seconds are spent in flight.
- The most successful jumpers have been from Scandinavia and Japan.
- A proposal for women to compete in the 2010 Winter Olympics was rejected because too few female athletes from too few countries participate in the sport.
- Jumping was the most popular skiing spectator sport until downhill skiing took over after World War II.

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ATHLETE PROFILE

Ski jumpers must have nerves of steel and a head for heights. The top athletes start jumping from around the age of five, gradually building up confidence by jumping from higher hills. Once the basic skills have been honed, jumpers perfect each part of the jump by training on smaller hills. Endurance is vital, and most of the top ski jumpers include cross-training to build up cardiovascular fitness.

THE EAGLE HAS LANDED

EDDIE "THE EAGLE" EDWARDS ACHIEVED FAME AT THE 1988 WINTER OLYMPICS IN CALGARY, CANADA—FOR SKI JUMPING SO POORLY. ALTHOUGH THE BRITISH PLASTERER FINISHED LAST, SPECTATORS WARMED TO HIS PERSONALITY AND PASSION, TURNING EDWARDS INTO A MEDIA SENSATION.

SIDELINES

239 The distance, in meters, of the world record jump set by Bjoern Einar Romoeren of Norway in 2005.

5 The number of medals won by the most successful Olympic ski jumper—Matti Nykänen of Finland, who has won 4 golds and 1 silver.

50,000 The average number of spectators that gather to watch the annual Holmenkollen ski-jumping competition in Norway.

SKI JUMPING



EVENT OVERVIEW

Ski jumping is a spectacular sport that involves skiing down a steep ramp, taking off, jumping as far as possible, and then landing smoothly without falling over. Its best practitioners hold their near-horizontal pose—and their nerve—as they soar through the air until bringing their skis down at the last second, to a cacophony of cheers and cow bells. Skiers in this popular and predominantly male winter sport compete not only for the longest distance jumped, but also for the style of their takeoff, flight, and landing.

Safety helmet

A helmet is a vital piece of gear for a jumper flying through the air at speeds approaching 60 mph (95 kph)

View finder

The skier's goggles must allow clear vision so he can place his landing accurately

Jump suit

Made from a thin, synthetic fabric, the jump suit molds around the body. This reduces wind resistance and may squeeze an extra inch out of the jump

Ski boots

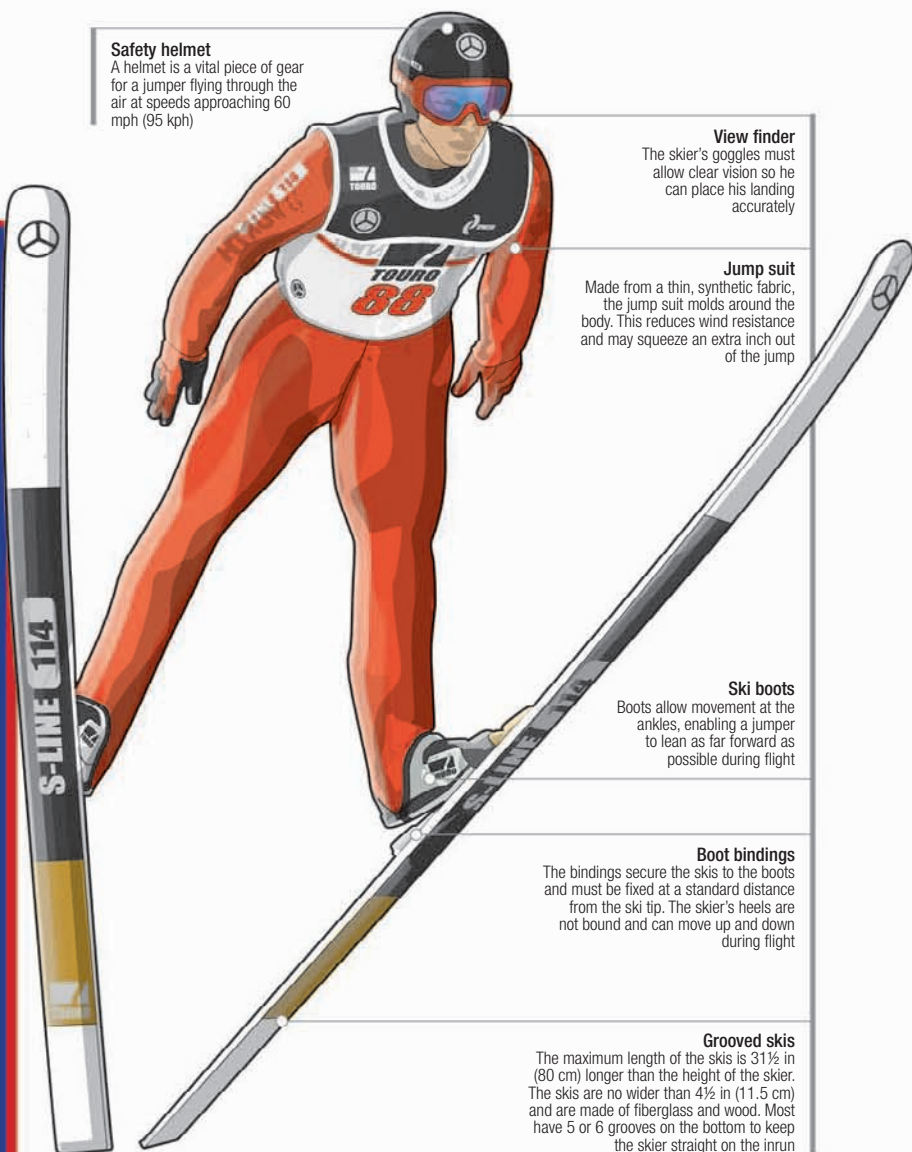
Boots allow movement at the ankles, enabling a jumper to lean as far forward as possible during flight

Boot bindings

The bindings secure the skis to the boots and must be fixed at a standard distance from the ski tip. The skier's heels are not bound and can move up and down during flight

Grooved skis

The maximum length of the skis is 31½ in (80 cm) longer than the height of the skier. The skis are no wider than 4½ in (11.5 cm) and are made of fiberglass and wood. Most have 5 or 6 grooves on the bottom to keep the skier straight on the inrun



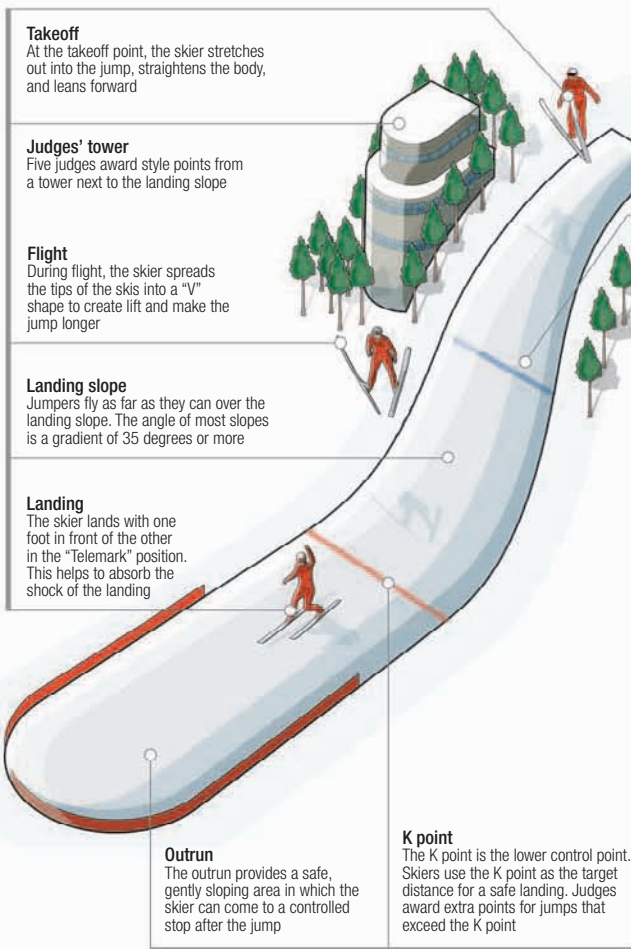


EVENTS ON THE HILL

Competitors start from a jumping ramp on to two types of ski-jumping hill. A K90 hill measures 295 ft (90 m) from the takeoff table to the recommended landing point, or K point. A K120 hill measures 394 ft (120 m). Competitions usually have two jumps in three events: an individual K90 jump, an individual K120 jump, and a team competition on the K120 hill.

FARTHER AND FARTHER

Changing techniques have enabled jumpers to fly farther and farther. At first, jumps were only about 148 ft (45 m). In the 1920s, jumpers flew 330 ft (100 m) with the Kongsberger technique—they leaned forward, bodies bent at the hip, arms extended and their skis parallel. In the 1950s, Swiss skier Andreas Daescher brought the arms in toward the body to squeeze out an extra few feet. In 1985, Jan Boklöv of Sweden pioneered the flying V technique (below)—the skier holds the tips of the skis apart in a V-shape, thereby gaining both extra lift and stability.



Jumping ramp
Skiers wait at the starting gate for the signal to jump, then they push off and quickly gain momentum

Accelerating down
Skiers tuck themselves into an aerodynamic crouch and accelerate down the inrun toward the takeoff table

Inrun
The surface of the jumping ramp is called the inrun. It is covered with hard-packed snow during the winter or an artificial surface in summer

Takeoff table
The takeoff table at the end of the inrun has a gradient of 11 percent to provide sufficient lift for the jump

Norm point
The norm point, or P point, is marked in blue and indicates where the curve of the hill ends and the steepest part of the slope begins

Takeoff
At the takeoff point, the skier stretches out into the jump, straightens the body, and leans forward

Judges' tower
Five judges award style points from a tower next to the landing slope

Flight
During flight, the skier spreads the tips of the skis into a "V" shape to create lift and make the jump longer

Landing slope
Jumpers fly as far as they can over the landing slope. The angle of most slopes is a gradient of 35 degrees or more

Landing
The skier lands with one foot in front of the other in the "Telemark" position. This helps to absorb the shock of the landing

Outrun
The outrun provides a safe, gently sloping area in which the skier can come to a controlled stop after the jump

K point
The K point is the lower control point. Skiers use the K point as the target distance for a safe landing. Judges award extra points for jumps that exceed the K point

FOUR HILLS

THE PRESTIGIOUS FOUR HILLS TOURNAMENT, PART OF THE ANNUAL SKI JUMPING WORLD CUP, IS CONTESTED ON TWO HILLS IN AUSTRIA AND TWO IN GERMANY. JANNE AHONEN OF FINLAND AND JENS WEISSFLOG OF GERMANY ARE THE ONLY SKIERS TO HAVE WON THE TOURNAMENT FOUR TIMES.

SCORING

Judges score for distance and style. A skier who jumps to the K point is given 60 points. Two points per meter (3 feet) are added or deducted on K90 hills for longer or shorter jumps, 1.8 points for K120 hills. Five judges also award up to 20 points each for style: good body position during takeoff, flight, and landing; steady skis in flight. The distance score and middle three style scores are combined to give the jump an overall score. The skier with the highest score for two jumps wins.

INSIDE STORY

Once a local event at Norwegian winter carnivals, ski jumping has spread throughout Europe and North America to become one of the most popular events in the winter sporting calendar. Ski jumping was recognized as an official sport in 1892, when brave competitors contested the King's Cup at Holmenkollen, Norway. It remains one of the Winter Olympics' most coveted prizes.

AN OLYMPIC SPORT

Ski jumping has been an Olympic sport since the first Winter Games were held in Chamonix, France, in 1924. Although Finland top the Olympic medal table, with ten golds, Norway has won more medals in total: 28 compared to Finland's 22.

RECORDS GALORE

During the 2005 World Cup Finals held in Planica, Slovenia, several jumpers broke the world ski jumping record of 758 ft (231 m), set by Finland's Matti Hautamäki. Bjoern Romaeren from Norway set the new world record with 784 ft (239 m), with Hautamäki achieving the second best jump of 772 ft (235.5 m). Another of Romaeren's jumps reached 769 ft (234.5 m).

NEED 2 KNOW

- ➔ Nordic combined has been in the Olympic Games since the first Winter Games were held at Chamonix, France in 1924.
- ➔ The individual event consists of two jumps from K90 and a 9¼ mile (15 km) cross-country race. Competitors in the sprint make one jump from K120 and ski a 4½ mile (7.5 km) cross-country race.
- ➔ In the team event, each member of a team of four jumps twice from K90 and skis 3 miles (5 km) of a 12 mile (20 km) relay.

COMPETITOR PROFILE

Nordic combined athletes need courage for the jumps, and stamina and strength in cross-country races. Both disciplines are technically demanding. Competitors spend as much training time working on their technique as they do on maintaining cardiovascular fitness.

Bodysuit

Competitors wear skintight bodysuits made from thin, synthetic fabrics

Ski poles

Long, straight ski poles help the skier push hard against the snow to maintain momentum

Free heels

Bindings hold the boots to the ski at the toes, leaving the heels free to "skate" across the snow

SKI JUMPING

The jump has four main phases: inrun, take-off, flight, and landing (see also pp296–97). The jumper approaches the take-off table with their body crouched and arms behind their back. On take-off, they straighten their body and lean forward, spreading the skis in a V-shape to create lift. At the end of the jump, they land with knees bent and one foot in front of the other, "telemark" fashion.

Start and inrun

The jumper leaves the starting gate and accelerates to about 60 mph (96 kph)

Take-off table

The jumper launches into the air from the take-off table

JUMPING HILLS

There are two jumping hills, which differ only in size. The smaller hill is also known as K90 because the horizontal distance between the take-off table and the K point—the par landing point—is 295 ft (90 m). The take-off table of the larger hill, K120, is 394 ft (120 m) from the K point.

Hill height

Hills vary in height but are all daunting for novices

K point

The jumpers aim for the K point or beyond. Extra points are awarded for jumps that exceed the K point

Judging tower

A panel of five judges watches each jump and awards points from a tower next to the landing slope

Outrun

The jumper comes to a controlled stop in the outrun and braking area

JUDGING THE JUMPS

For each jump, points are given for distance achieved and overall technique. Jumps that reach the K point are worth 60 points. The score is increased for longer jumps and deducted for shorter ones. The five judges may also award between 0 and 20 for technique, and the middle three results are taken into consideration in the final score.

Skis

Cross-country skis measure up to 6½ ft (2 m) long and have curved tips. Competitors wax the skis to help them slide easily over the snow



NORDIC COMBINED



EVENT OVERVIEW

Nordic combined is a one-day winter competitive sport that combines ski jumping with cross-country skiing. Ski jumping usually takes place first, followed by cross-country. Athletes take part in individual, sprint, and team events. There are Olympic, World Cup, and World Championship Nordic combined events, and currently these are all for men only.

CROSS COUNTRY

The cross-country starting order is decided by the results of the previous days' jumping competition, with points being converted into seconds. Most competitors race using the "skating" style, sliding each leg forward with the ski angled so its inside edge drives back against the snow. Weight is transferred entirely from one ski to the other as the skier moves. In this way, they can achieve speeds of up to 16 mph (30 kph). The first past the post in the cross country is the overall winner.



BIATHLON



EVENT OVERVIEW

Biathlon as a winter sport combines cross-country skiing with rifle shooting. The sport has a military origin in 18th-century Scandinavia, when accurate shooting and fast skiing were vital for soldiers patrolling the long border between Norway and Sweden. There are individual, sprint, relay, pursuit, and mass-start events. All involve racing in laps around an undulating course and firing at targets in a shooting range.

THE COMPETITION

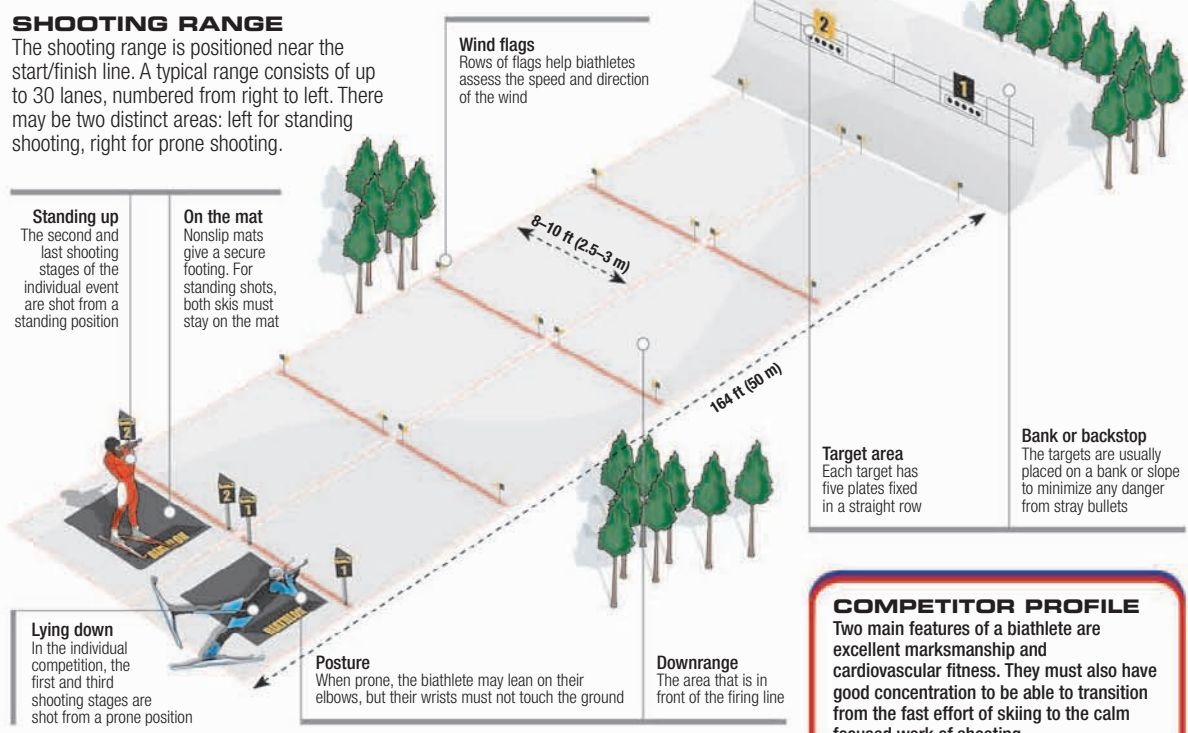
Competitors usually start at timed intervals and ski in "skating"-style against the clock, stopping to shoot at the targets. When shooting, they alternate between standing and prone (lying down) positions. Missing a target is penalized (see below). The distance of the race and number of shooting phases depends on the event.

RACE TYPES

The main event is the individual race, which is 12 miles (20 km) for men and 9 miles (15 km) for women, including four shooting phases. The sprint is 6 miles (10 km) for men, or 4½ miles (7.5 km) for women, with two shooting phases. In the relay, four biathletes each ski 4½ or 3¾ miles (7.5 or 6 km), and shoot twice. The pursuit is a 7½- or 6¼ mile (12.5 or 10 km) race with four shooting phases.

SHOOTING RANGE

The shooting range is positioned near the start/finish line. A typical range consists of up to 30 lanes, numbered from right to left. There may be two distinct areas: left for standing shooting, right for prone shooting.



NEED2KNOW

- Biathlon became an Olympic event for men in 1960, and for women in 1992. There is also a World Championship, first held in Austria in 1958, and a World Cup.
- Skis must be at least 2½ in (4 cm) shorter than the height of the skier, while the length of the poles must not exceed the biathlete's height.
- In an increasingly popular summer biathlon, skiing is replaced with cross-country running.

TARGETS

The black targets, which work electronically or mechanically, turn white when hit. They are very small, being 4½ in (11.5 cm) wide for standing shooting and 1¾ in (4.5 cm) wide for prone shooting.

STANDING TARGETS



PRONE TARGETS



COMPETITOR PROFILE

Two main features of a biathlete are excellent marksmanship and cardiovascular fitness. They must also have good concentration to be able to transition from the fast effort of skiing to the calm focused work of shooting.

OFF TARGET

Before they start to shoot, competitors must come to a complete stop and drop both ski poles. They may slow down just before the shooting phase to bring their heart-rate down, which helps achieve accuracy. Penalties are awarded for missing a target. In the individual event, there is a time penalty of one minute for each target missed. In other events, competitors must ski a 492 ft (150 m) penalty loop for every target missed. For elite athletes, this typically adds up to about 30 seconds on the overall race time.

SHOOTING GEAR

Competitors each carry a 7½ lb (3.5 kg) small-bore rifle on their back. These fire .22 (5.6mm) ammunition and are loaded manually or have a five-bullet magazine.

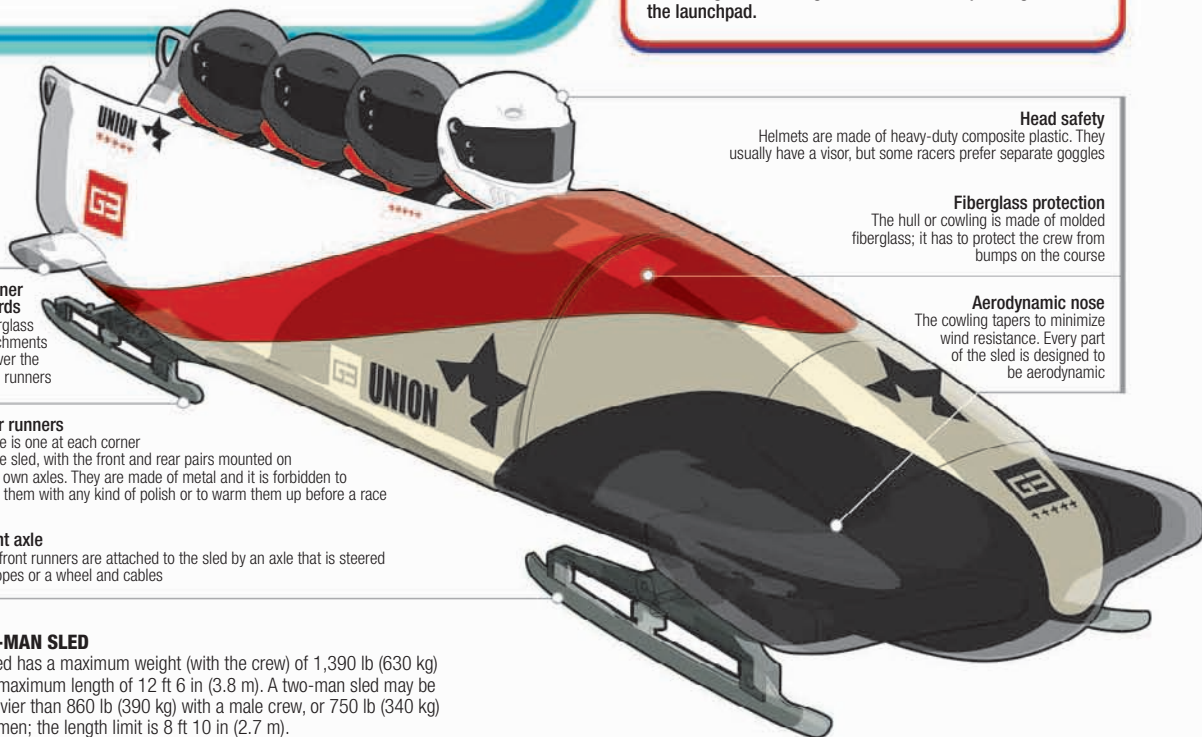
NEED2KNOW

- The name bobsled comes from early racers bobbing their heads to try to increase their speed at the start.
- Four-man bobsleds can reach speeds of up to 100 mph (160 kph).

300

COMPETITOR PROFILE

All bobsledders need good balance and strong nerves. In addition, pilots must have an eye for the best line to steer. Many pushers are athletes from track and field, who have the explosive power to get the bobsled moving. They train by sprinting and by lifting weights, which increases the strength of their legs and shoulders for pushing down the launchpad.



Runner guards

Fiberglass attachments sit over the steel runners

Four runners

There is one at each corner of the sled, with the front and rear pairs mounted on their own axles. They are made of metal and it is forbidden to treat them with any kind of polish or to warm them up before a race

Front axle

The front runners are attached to the sled by an axle that is steered by ropes or a wheel and cables

Head safety

Helmets are made of heavy-duty composite plastic. They usually have a visor, but some racers prefer separate goggles

Fiberglass protection

The hull or cowling is made of molded fiberglass; it has to protect the crew from bumps on the course

Aerodynamic nose

The cowling tapers to minimize wind resistance. Every part of the sled is designed to be aerodynamic

FOUR-MAN SLED

The sled has a maximum weight (with the crew) of 1,390 lb (630 kg) and a maximum length of 12 ft 6 in (3.8 m). A two-man sled may be no heavier than 860 lb (390 kg) with a male crew, or 750 lb (340 kg) for women; the length limit is 8 ft 10 in (2.7 m).

BOBSLEDDING



EVENT OVERVIEW

Bobsledding (or bobsleighbing) is one of the fastest winter sports. Teams of two men or women or four men make timed runs down steep, twisting ice tracks in steerable sleds. After a push-off by the whole team, it is the driver's responsibility to steer the best line to complete the course in the fastest time over a number of runs.

The sport is not for the faint-hearted: crews regularly undergo four, five, or six times the force of gravity on the banked curves. Bobsled crashes are spectacular and potentially dangerous. The shell of the sled protects the crew, who wear compulsory safety helmets and one-piece suits.

SIDELINES

6

The number of Winter Olympics competed in by bobsledder Carl-Erik Eriksson of Sweden between 1964 and 1984—the first athlete to do so. Only five others have equalled his achievement in any winter sport and no one has surpassed it.

48

The age in years of Jay O'Brien when he became the oldest-ever winner in the four-man event, taking gold for the United States in the 1932 Winter Olympics at Lake Placid.

30,000

The approximate minimum cost in US dollars of a four-man Olympic-quality bobsled.

30

The number of Olympic bobsledding medals won by Switzerland between 1932 and 2010 (nine gold, 10 silver, 11 bronze)—more than any other country.

5

The G force to which bobsledding crews may be subjected for up to two seconds as their sled corners a bend at speed.



THE COURSE

Bobsled runs are made of U-shaped concrete half-pipes covered with artificial ice. They are at least 1,300–1,400 yd (1,200–1,300 m) long and should have at least 15 curves. At the Winter Olympics the refrigerated track is shared with competitions for luge and skeleton. The angle of descent is 8–15 percent.

Flying start
Up to 54 yd (50 m) long; the runners follow grooves in the ice so that crews concentrate on pushing, not steering

Steep banking
All bends are built up and angled on one side, with an overhang to stop the bob from shooting off the track

Dramatic loops

Steeply banked features test the nerve of the athletes and provide dramatic viewing for spectators

Straightaways

The fastest parts of any run; crews take care not to touch the walls, which slows them dramatically. They must also ensure they do not enter the next bend too quickly

Omega feature

Most tracks include a complete, or almost complete, loop called an omega

The finish

Beyond the end of the course there is a runoff loop for braking and disembarking

TRACK TALK

A seeding system decides the order of racing. Teams that have performed better in the previous competitions get the advantage of racing early in the first round, before the track is cut up by other sleds. In the second round, the order is reversed: the team with the best first descent has the last run. The race is timed from the start line until the nose of the sled breaks a light beam at the finish. Weights can be added to bring the sled up to the combined weight for sled and crew. There is also a minimum combined weight of sled and crew.

SERIES OF RUNS

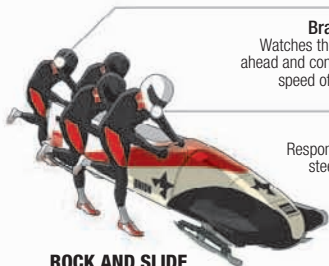
In Olympic and World two-man events, each crew makes four runs down the course over two days; women also make four runs over two days. Other major competitions are held over two runs. Olympic and World four-man events have four heats over two days.

CHILLED OUT

IT HAS LONG BEEN TAKEN FOR GRANTED THAT BOBSLEDDING IS BEST DONE BY COUNTRIES WITH SNOW AND MOUNTAINS. THE 1988 WINTER OLYMPICS IN CALGARY, CANADA, CHANGED THE GAME, BY INCLUDING TEAMS FROM "HOT" COUNTRIES INCLUDING AUSTRALIA, MEXICO, AND, MOST NOTABLY, JAMAICA. THE WEST INDIAN TEAM'S STORY WAS MADE INTO A 1993 MOVIE CALLED *COOL RUNNINGS* STARRING JOHN CANDY.

PUSHING OFF

A fast start is key, so bobsled athletes all wear specially designed spiked shoes to provide traction on ice. Every crew member helps push the pod using retractable handles. The driver jumps in first, followed in a four-man crew by the two middlemen; the brakeman always gets in last. Top crews aim to complete the push-off in about five seconds.



Brakeman
Watches the course ahead and controls the speed of the bob

Driver
Responsible for steering the best line

ROCK AND SLIDE

After taking up their positions, the team members rock the sled and then push off down the launch pad.

Last in

If any member of the crew fails to get on board, the team is disqualified

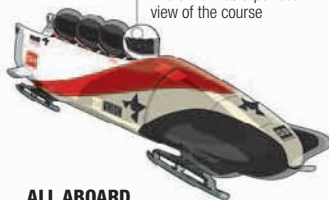


FINAL PUSH

The brakeman jumps in after the driver and other members of the crew are in position; he or she must climb on board within 54 yd (50 m).

Full speed ahead

The driver has a perfect view of the course



ALL ABOARD

The driver steers the sled; the brakeman slows it after the finish line by moving a rear-mounted handle that lowers a line of metal teeth into the ice.

INSIDE STORY

Bobsledding was invented in the late 19th century, when Swiss tobogganers added a steering mechanism to a sled and gained control of direction. The first bobsled club was founded in Switzerland in 1897. For its first decades, the sport was largely a diversion enjoyed by the rich upper-class, who raced at Europe's leading alpine resorts. It took on a more competitive form in the 1950s and 1960s. The Olympics and World Championships were the leading bobsledding competitions until the mid-1980s, when the World Cup was introduced. This is a very demanding competition, in which teams race throughout the season on a variety of tracks in different countries.

GOVERNING BODY

Fédération Internationale de Bobsleigh et de Tobogganing (FIBT) was founded in 1923, a year before four-man sledging became an Olympic sport. The first two-man medal events were held in 1932. Bobsledding for women made its debut at the 2002 Games in Salt Lake City, Utah.

NEED2KNOW

- The International Luge Federation (FIL), based in Germany, is responsible for the sport worldwide .
- The first organized luge race was along a track between Klosters and Davos, Switzerland, in 1883. It resulted in a tie.
- Germany has had more Olympic luge champions than any other country. Georg Hackl won gold in three successive tournaments: 1992, 1994, and 1998. He also won the World Championships in 1989, 1990, and 1997.

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ATHLETE PROFILE

Luge racers are physically sturdy and need to withstand G forces and great stresses, particularly on their neck, abdomen, chest, and feet. They are psychologically tough, and have sharp reflexes that enable them to control the runners of their luge.

Foot brake

Athletes wear streamlined shoes with smooth soles, which they drag along the ice to slow them down

Low profile

The competitor wears a tight-fitting bodysuit and lies flat to reduce air resistance

Helmet and visor

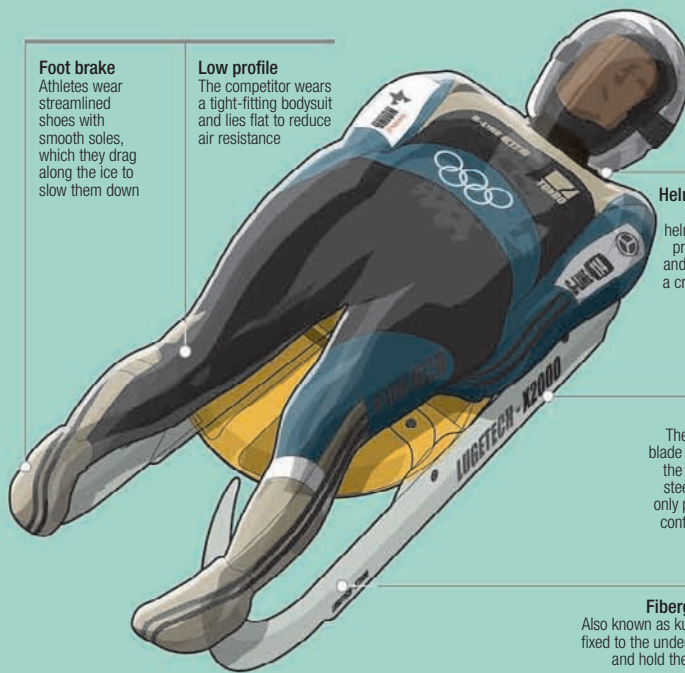
A streamlined helmet with a visor protects the head and face in case of a crash against the sidewall

Sharp blades

There is one sharp blade on each side of the luge. Known as steels, they are the only parts that are in contact with the ice

Fiberglass runners

Also known as kufens, these are fixed to the underside of the pod and hold the steels in place



A MEGA-SLIDE

Luge tracks are mostly artificial with a 1 in (2.5 cm) thick covering of ice. They measure between 1,100 yd (1 km) and 1,420 yd (1.3 km) for men's singles and between 875 yd (800 m) and 1,150 yd (1,000 m) for women's and doubles events. The tracks feature left and right turns, S-curves, 180-degree bends, and hairpins. Typically, the average gradient over this distance may be 8 percent. Sidewalls, which are also covered with a thin coating of ice, keep the luges on course as they bank around corners at hair-raising speeds. Popular in some countries in Central Europe and North America, natural tracks are created during winter on winding roads covered with ice. They have no sidewalls or artificial banks.



LUGE

EVENT OVERVIEW

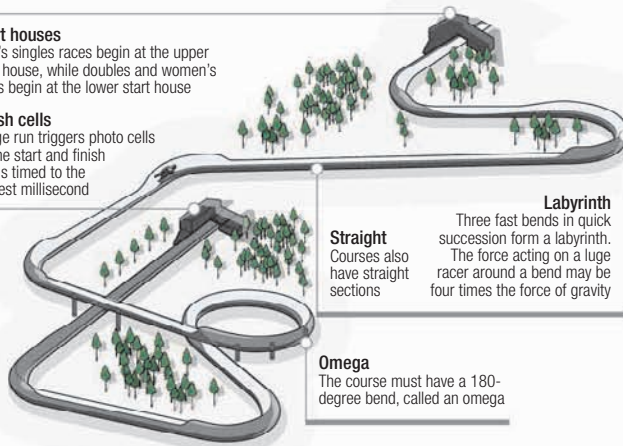
Luge athletes take part in the fastest sport on ice as, lying feet first on their back on a fiberglass sled, they twist and turn down a track at breathtaking speeds of more than 85 mph (135 kph). In races against the clock, men compete in singles and doubles and women in singles. These events are held in competitions, such as the World Championships and the Winter Olympics.

Start houses

Men's singles races begin at the upper start house, while doubles and women's races begin at the lower start house

Finish cells

A luge run triggers photo cells at the start and finish and is timed to the nearest millisecond



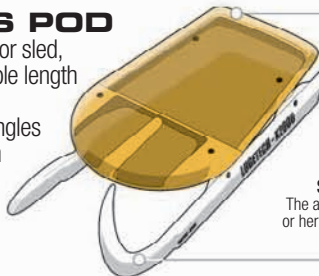
Straight
Courses also have straight sections

Labyrinth
Three fast bends in quick succession form a labyrinth. The force acting on a luge racer around a bend may be four times the force of gravity

Omega
The course must have a 180-degree bend, called an omega

FIBERGLASS POD

The luge, which is French for sled, is a fiberglass pod of variable length attached to two runners on steel blades. The luge in singles events weigh no more than 51 lb (23 kg); the doubles' luge is longer and cannot exceed 60 lb (27 kg).



Molded pod
The length of a singles' luge is 4¾ ft (1.45 m) on average

Steering bows
The athlete places his or her legs outside the steering bows

MOVING AND STEERING

To start a run, the racer sits on the luge and slides back and forth while holding on to handles on either side of the track. After a powerful push, the racer paddles the ice with spiked gloves and then lies back and steers by either applying leg pressure to the steering bows or by shifting the body weight with a movement of the head or shoulders. The race winner is usually the fastest over four (singles) or two (doubles) runs.



EVENT OVERVIEW

Although the top speeds achieved by skeleton racers are slightly slower than luge competitors, in some ways the sport requires even more courage, because athletes travel headfirst. Skeleton events for men and women are held at World Championships and at the Winter Olympics.

SKELETON



ATHLETE PROFILE

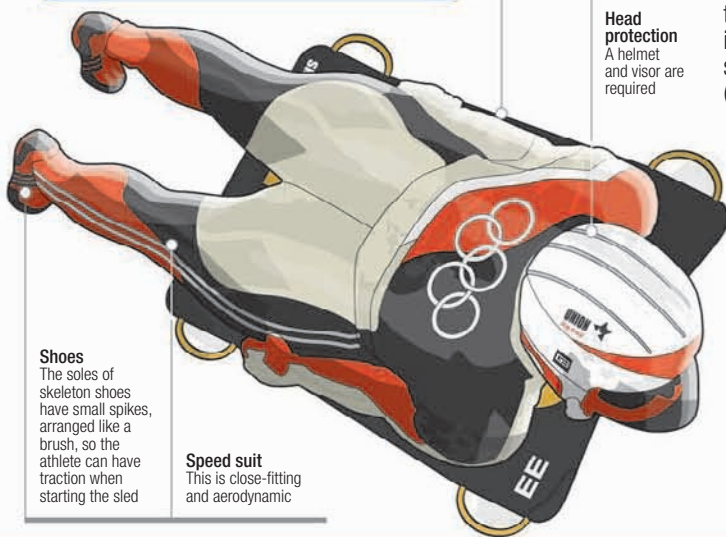
Razor-sharp reflexes are essential for a skeleton racer. Since the push phase is so important, competitors need strong legs and the ability to sprint. They also need a strong responsive body core that shifts their weight from one side to the other while steering the skeleton.

Weight restriction

The combined weight of the skeleton and athlete must not exceed 254 lb (115 kg) for men and 203 lb (92 kg) for women, or the maximum weight of the sled has to be reduced

Head protection

A helmet and visor are required



Shoes

The soles of skeleton shoes have small spikes, arranged like a brush, so the athlete can have traction when starting the sled

Speed suit

This is close-fitting and aerodynamic

NEED2KNOW

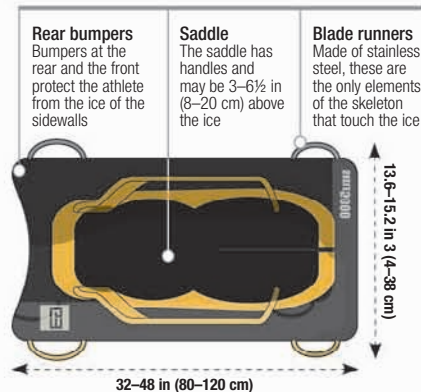
- ➔ The first competitive skeleton race was organized between the Swiss towns of St. Moritz and Celerina in 1884. The winner received a bottle of champagne.
- ➔ Olympic skeleton events—men's singles and women's singles—are timed to 0.01 seconds. There are four runs over two days, and the fastest aggregate time wins.
- ➔ The Fédération Internationale de Bobsleigh et de Tobogganing (FIBT) is the governing body for skeleton. It organizes the World Skeleton Championship.

FAST AND STEEP

Skeleton events are run on the same tracks as bobsleigh competitions. Male and female athletes compete on the same course and over the same distance. The track is fast and steep—it must be at least 1,312 yd (1,200 m) long, with total vertical drops that average around 380 ft (116 m).

SPEED SADDLE

The athlete lies on the steel frame and saddle, and the sled moves along on runners. The base-plate is made of fiberglass or steel, and the runners are steel. The skeleton weighs a maximum of 95 lb (43 kg) for men and 77 lb (35 kg) for women.



GETTING A WINNING START

To stand any chance of a fast time, the athlete needs a quick running start. This is called the push phase and is typically 27–44 yd (25–40 m) long.

Crouch and run

The athlete crouches down and prepares to push and run



RUN!

At the start, the competitor runs as fast as he or she can, holding the handles and pushing the skeleton along the ice.

RACING RULES

There are two key skeleton rules. First, athletes cannot warm the runners of their sled to make them run faster. At the start of the race the runners must be within 7°F (4°C) of the reference runner, which is exposed to the air for an hour beforehand. Second, the contestant must cross the finish line on the skeleton for the run to be valid.

Body control

Tremendous arm strength is needed to control the transition from takeoff on the ice to landing on the skeleton



JUMP!

The athlete leaps up from the track and forward onto the skeleton. If this move is not carried out precisely, he or she will probably lose control of the sled.

Streamlined position

Arms are tucked in close to the body to reduce wind resistance



FLOP!

The racer lands headfirst and belly down on the skeleton with the arms pulled in tightly against the side of the body for the most aerodynamic profile.

SPEED SKATING

- Skaters can achieve speeds of 40 mph (65 kph) on the long track. On the short track, the top speed is around 30 mph (50 kph).
- Long-track skating is particularly popular in Scandinavia, Eastern Europe, the Netherlands, the United States, Canada, and Japan.
- Short-track skating is a newer sport. It has attracted many competitors from traditional nonskating nations, such as South Korea and Australia.



EVENT OVERVIEW

Speed skating is a spectacular sport in which male or female athletes race on skates around an oval ice track, alternating between powerful, rhythmic gliding on straights and demanding cornering around the bends. On the long track, skaters race in pairs over various distances—from 500 m to 10 km—against the clock. Short-track events involve up to six skaters racing on a circuit with no lane markings, and crashes are common. There is also a short-track relay event for teams of four.

COMPETITOR PROFILE

Speed skaters are powerful and agile, with explosive power at the start. Short-track skating is technically demanding, and requires courage as skaters hurtle around tight curves at high speed. Aerobic endurance is more important on long-track skating.

Bodysuit

The long-track skater wears a skin-tight bodysuit with a hood and loops for the thumbs to minimize drag

Leg power

Skaters develop strength in their legs, particularly the thighs, by running, heavy weight sessions, and endless circuits of the skating rink

Skates

These are attached to ankle-high boots

WHEN GOD SMILES DOWN

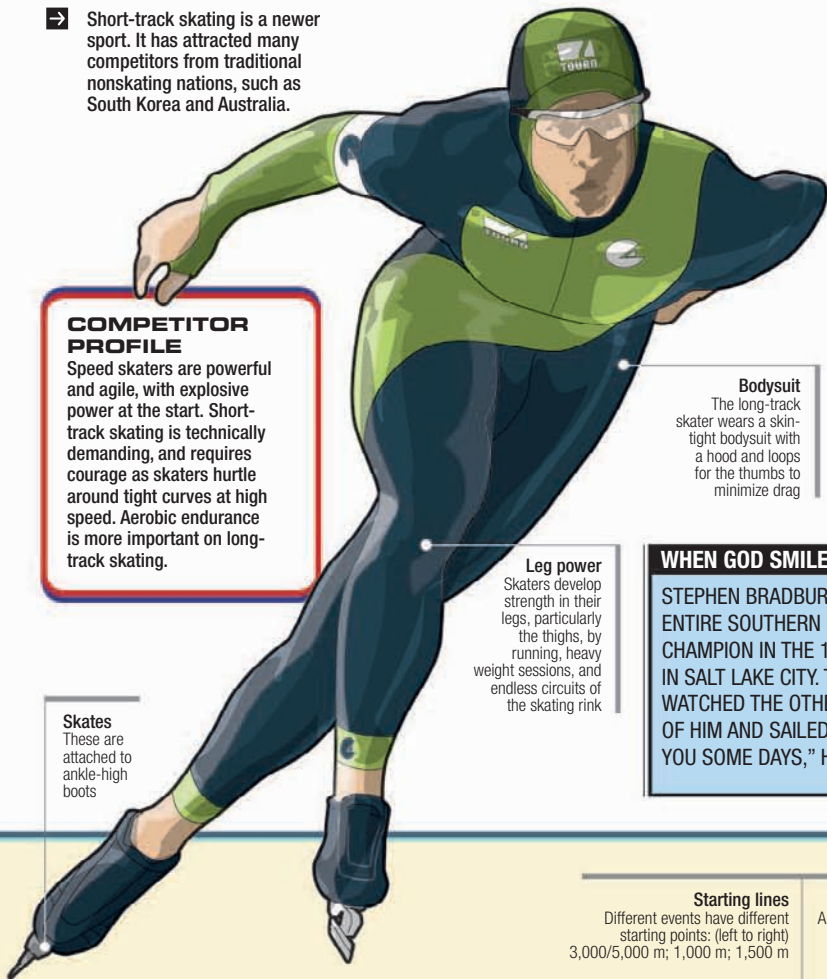
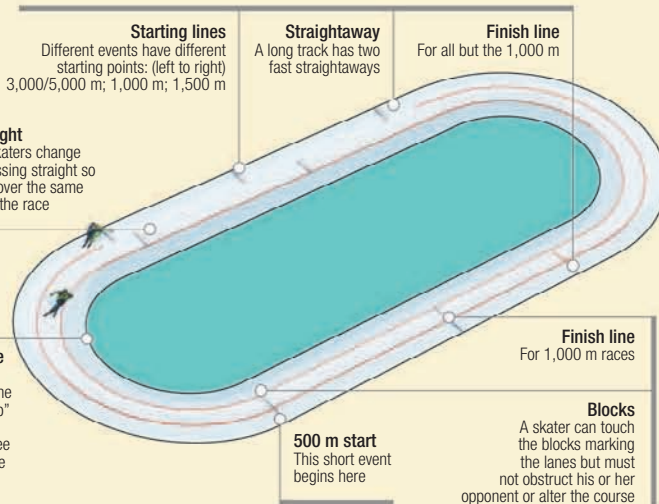
STEPHEN BRADBURY BECAME AUSTRALIA'S (AND THE ENTIRE SOUTHERN HEMISPHERE'S) FIRST WINTER OLYMPIC CHAMPION IN THE 1,000 M SHORT TRACK AT THE 2002 GAMES IN SALT LAKE CITY. TRAILING NEAR THE END OF THE FINAL, HE WATCHED THE OTHER FOUR COMPETITORS CRASH IN FRONT OF HIM AND SAILED PAST TO CLAIM GOLD. "GOD SMILES ON YOU SOME DAYS," HE NOTED.

THE RINKS

The long-track rink is a 437 yd (400 m) oval; short-track courses are 121½ yd (111.12 m) long. Long-track lanes are marked with painted lines and movable blocks of rubber or wood. The blocks are 1 ft 8 in (50 cm) apart for the first and last 49 ft (15 m) of the track, and 3 ft 3 in (1 m) apart elsewhere.

LONG TRACK

There are two racing lanes on the long track. Skaters switch between the lanes every lap. Depending on the event, competitors start from different parts of the circuit.





ALL ROUNDERS

The "all-round" is the name given to a combination of long-track races held over 500 m, 1,500 m, 3,000 m, and 10,000 m. The times for each race are converted into points using a set scale. The skater with the fewest points wins the overall competition. Although the "all-around" is popular, it has been included in the Olympics only once (in the men's games in 1924) because skaters tend to specialize at particular distances.

GEARED FOR SPEED

On the short track, skaters' skin-tight bodysuits are lined with Kevlar—also used in bullet-proof vests—for protection from slashing blades. Skaters also wear helmets and guards on their neck, shins, and knees. Gloves with coated fingertips are also essential, because skaters place their hands on the ice to stay upright in rapid turns. The profile of the bottom of a speed skate's blade is flat, unlike the concave shape of a figure skating blade.

SKATE DIFFERENCES

The blade of the short-track skate is long and thin. It is positioned diagonally across the sole, and curves to help with cornering. On the long track, skaters wear clap skates. The long, straight blade is centered on the sole and hinged at the toe.



Clap skate hinge
The blade of the clap skate detaches from the heel at the end of each stride. This increases the time the blade is in contact with the ice

17 in (42 cm)

BREAKING THE RULES

Skaters can touch the blocks marking the turns, but may not skate inside them. Physical contact is part and parcel of the short track, but on the long track, interfering with an opponent or skating out of lane leads to disqualification.

TRACK TECHNIQUES

Short-track skaters use small running steps to gain speed at the start. In the basic body position on the straight, the short-track skater leans the body forward, bends the knees, and swings the arms to maintain momentum. Approaching a corner, the skater crouches very low and leans in to the turn, often touching the ice with the inside hand. Crossover steps make cornering easier.

On the long track, skaters make long, gliding strokes on the straightaway, and keep one arm behind their backs to reduce drag. Crossover steps are used to negotiate corners.

BALANCING ACT

This sequence shows how a skater who is negotiating a bend compensates for having one foot off the ice by extending the arms onto the same side of the body.



Straight ahead
On leaving a bend of the track, the skater drops both arms

IN FULL CRY

When accelerating down the straightaways of a long track, the skater bends and crouches to lower their center of gravity and reduce wind resistance.



Streamline effect
The lower the profile, the higher the speed

PASSING CONTACT

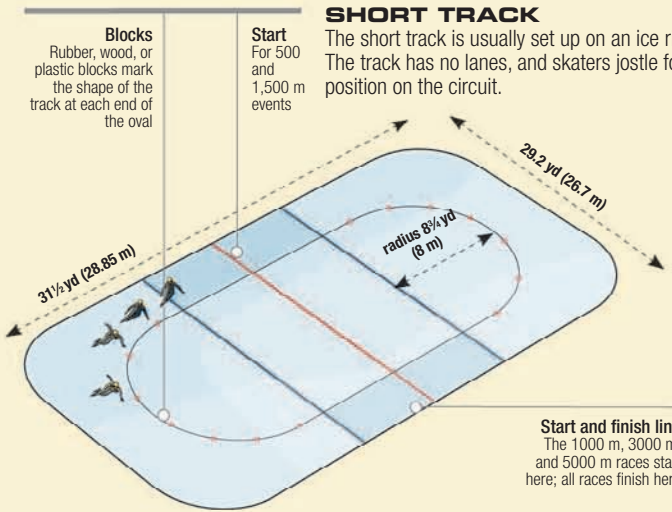
The corners on the short track are so tight that the hand closer to the inside of the course may come down so low that it scrapes the ice: no penalty is incurred for this, it is just a touching moment.



Touch and go
The skater leans in to every curve

SHORT TRACK

The short track is usually set up on an ice rink. The track has no lanes, and skaters jostle for position on the circuit.



Blocks
Rubber, wood, or plastic blocks mark the shape of the track at each end of the oval

Start
For 500 and 1,500 m events

Start and finish line
The 1000 m, 3000 m, and 5000 m races start here; all races finish here

LAP COUNT

The number of laps per event is as follows:
500 M—4½ laps **1000 M**—9 laps
1500 M—13½ laps **3000 M**—27 laps
5000 M—45 laps

INSIDE STORY

Competitive speed skating began on frozen canals and lakes in 19th-century Europe. The International Skating Union (ISU), founded in 1892, formalized the rules. Short-track skating began in North America in the early 20th century.

INTERNATIONAL SKATING UNION (ISU)

The ISU was founded in 1892 in the Netherlands and is the oldest governing body of any winter sport. The ISU was originally a federation of 15 European countries until Canada joined in 1894.

NEED2KNOW

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- Figure skating is popular worldwide, but particularly in North America, Europe, and the former Soviet states.
- Figure skating competitions are contested between individual male and female skaters and mixed pairs. There is also a competition for synchronized skating and ice dance.
- Many of the outstanding moves in skating are named for the skaters who first made them famous. For example, the Axel jump is named for Norwegian skater Axel Paulsen, who first performed it in 1882.

Ankle bracing

Skating boots are custom-made for each foot. Extra support is added to brace the ankles, and the interior is reinforced with stiff leather.



GET YOUR SKATES ON

The structure of the boot gives the skater support and control, but allows enough flexibility to perform the moves. The blade is $\frac{1}{8}$ in (44 mm) thick and has two edges, inner and outer, and a serrated toe pick on the tip.

Wide tongue

A wide, padded tongue aids a skater's stability and increases flexibility.

Spin speed

A skater can speed up or slow down her spin by moving her free leg inward (accelerate) or outward (decelerate).

Technical specialists

The technical specialist and assistant technical specialist determine which elements the skater has—or hasn't—performed.

Judges

A panel of 12 judges marks the skaters on technical ability and performance.

Referee

A referee sits with the panel of judges to oversee all elements of a competition.

COMPETITOR PROFILE

Top figure skaters must have the flexibility of a gymnast, the poise of a dancer, and the balance of a speed skater to perform breathtaking combinations of spins, leaps, lifts, and spirals. Hours of meticulous drilling and training are necessary to perfect these incredible skills. Perhaps even more so than gymnasts, figure skaters need finely honed positional sense so that they know exactly where they are at any given moment in the air or on the ice.

Costume decoration

Nondetachable decoration can be worn, and outfits can reflect the character of the music.

Competition clothing

Outfits allow free movement, but competitors must be modestly dressed.

FIGURE SKATING



EVENT OVERVIEW

Both technical and beautiful, figure skating is a whirl of leaps, spins, and spirals. Single skaters or pairs of skaters perform prescribed movements on the ice in front of a panel of judges, who give them marks for technical ability and artistic interpretation. Figure skaters compete in a short program of required elements that tests their technical skills and an original free skate program that allows them to explore artistic expression. Figure skating became an official sport of the Olympic Winter Games in 1924.

BARBARA ANN SCOTT

IN 1942, CANADIAN BARBARA ANN SCOTT BECAME THE FIRST FEMALE SKATER TO LAND A DOUBLE LUTZ IN COMPETITION. SHE WAS ONLY 13 AT THE TIME.



THE ICE RINK

The temperature of the ice is an important factor: it is maintained at 22°F (-5.5°C), which is 6°F (3.5°C) warmer than an ice hockey rink. Colder ice is harder and slower, whereas warmer ice is faster and offers more glide and softer landings. At major competitions, such as the Winter Olympics and ISU championships, referees, judges, and other officials sit outside the rink. At lower levels, officials often sit on the ice.

Covering the ice

A skater's routine must cover the entire surface of the ice. Marks are deducted if the full area is not used or if competitors perform the majority of their routine in front of the judges' bench.

Surface area

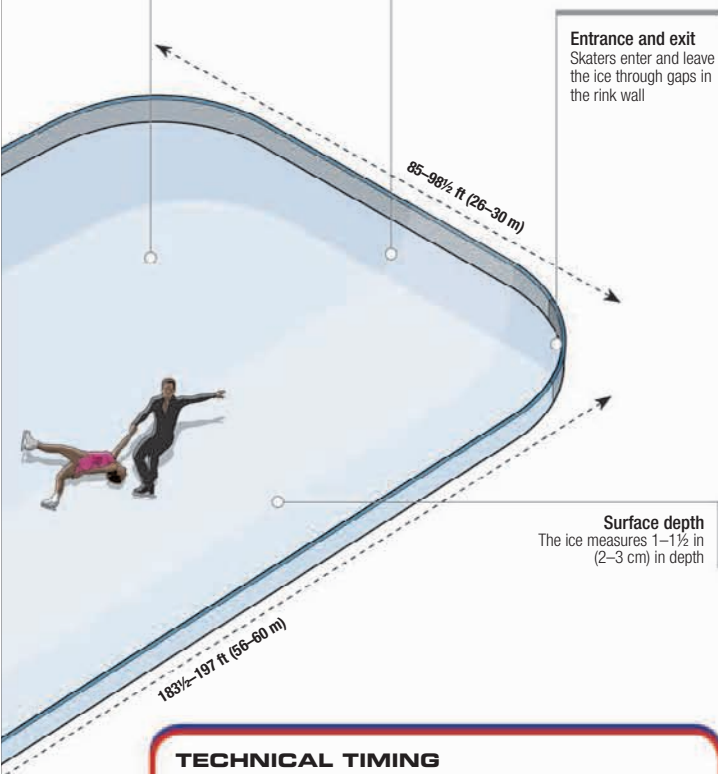
The ice rink has a surface area of up to 19,375 sq ft (1,800 m sq) and contains as much as 1,907 ft cu (54 m³ cu) of ice.

Entrance and exit

Skaters enter and leave the ice through gaps in the rink wall.

Surface depth

The ice measures 1–1½ in (2–3 cm) in depth.



TECHNICAL TIMING

The figure skating programs are timed. The short program for pairs and singles should last no longer than two minutes and 50 seconds, while the free skate program lasts four and a half minutes for men and pairs, and four minutes for women.

KISS AND CRY

THEY'VE GIVEN IT EVERYTHING AND SKATED THEIR HEARTS OUT. NOW IT'S TIME TO WAIT FOR THE JUDGES RESULTS. THE KISS AND CRY AREA IS THE SPOT BY THE SIDE OF THE RINK WHERE SKATERS AND THEIR COACHES SIT IN FULL VIEW OF THE TV CAMERAS FOR THE MOMENT OF TRUTH—AND THEN KISS OR CRY.

SKATING ON THIN ICE

Figure skaters perform two programs—short and free skate—and need to fulfill certain elements in each. Eight prescribed elements are required for the technical short program, which can include a double Axel jump, flying sit spin, combinations of double and triple jumps, and, for pairs, spirals and throws. The second part of the competition, the free skate program, requires a balance of elements that cover the full rink area, including jumps, spins, spirals, and step sequences. Pairs are required to perform moves simultaneously, either in parallel or symmetrically. For maximum scores, skaters must link the elements together with difficult connecting steps in different holds and positions.

SCORING

The ISU Judging System was introduced in 2004 after a scandal hit the headlines at the 2002 Winter Olympics in Salt Lake City, Utah, when the judging of the figure skating competition was alleged to have not been entirely objective. In the new system, which judge awards which mark remains anonymous.

THE ISU JUDGING SYSTEM

Every element is given a scale of value that determines how many points it is worth; a grade of execution from -3 to +3 is then applied to that value, depending on how well the element is performed. In major competitions, the marks of only seven judges determine a skater's final score. Nine judges from the panel of 12 are selected at random by a computer. The highest and the lowest marks are then deleted and the scores of the remaining seven judges are averaged to leave the "trimmed mean," which is added to the base value for the final score.

TECH TALK

Knowing what commentators are talking about helps to understand the intricacies of a skating routine and the sheer physical skill of the skaters on the ice:

TOE JUMP When the skater uses the toe pick of the blade to launch themselves into the air in, for example, a flip, Lutz, or toe loop.

EDGE JUMP When the skater uses a particular edge of the blade of one skate to take off, for example, Axel, loop, and Salchow jumps.

SPIN Move in which the skater pirouettes on the spot on the ice. In combination spins, the skater changes foot and position while maintaining the speed of the spin.

LIFT A technique of pairs skating in which the man lifts his partner, often overhead, and sometimes throws her in the air.

FOOTWORK Step sequences that move the skater across the ice to link set moves while showing off their skills.

SIDELINES

60 The temperature, in degrees Celsius (140°F), of the water that is sprayed on the ice rink by a machine called a Zamboni to create a smooth surface.

11 The number of Olympic golds won by Soviet and Russian pairs skaters since 1908.

160,000 The fine in dollars that disgraced American figure skater Tonya Harding paid in March 1994 for her involvement in an attack on fellow American figure skater Nancy Kerrigan at a practice session for the U.S. Figure Skating Championships. Harding won the competition while Kerrigan withdrew due to the injury. Harding was later stripped of her title.

2 The number of gold medals awarded in the 2002 Winter Olympics pairs figure skating competition. A judging scandal resulted in both the Russian and Canadian pairs winning gold.



PERFORMING PERFECTION

Perfect execution of the technical elements in the skating programs ensure high scores. Not only do the elements have to be performed flawlessly, they also have to be performed at fast speeds, in complex flowing combinations, and, in the free skate programs, with individual artistic expression.

JUMPS

For the spectator, dazzling jump sequences are the mark of a great skater. At the top level of competition, men perform triple or quadruple rotation jumps, while women perform triples. Jumps can be driven from the toe or the edge of the blade and performed singly or in combinations.

Axel jump

The skater takes off forward from the front outside edge of the blade of his left foot



Backward landing

The skater lands backward on his right foot after rotating through the air

SPINS

Speed and control are the keys to successful, point-winning spins. The speed of the spin dictates the number of rotations the skater performs (the more the better). The ability to spin in one spot shows mastery of the technique, while looking effortless shows total control throughout the spin.



Biellmann spin

The skater arches his back and catches his right foot by the blade

Spinning splits

The skater raises his right leg behind him as he spins

SPIRALS

Spirals are flamboyant and rather dangerous looking moves performed by pairs in both the short and free skate programs. At least one full revolution must be made.



Death spiral

The man is the pivot of the spiral

Perfect harmony

The pair must work in complete synchronicity

Inside, outside

The death spiral can be performed backward outside or backward inside. This means that the pair skate on the rear outside or rear inside edge of the blade

Flat out

The man holds his partner with the same arm as his skating foot and spins her around as she leans back toward the ice, aiming to bring her back parallel and her head as close to the ice as possible

SYNCHRONIZED SKATING

A skating spectacular, synchronized skating involves teams of 16 skaters (usually all women, although mixed teams are allowed) performing as single, coordinated units. Skaters need flawless skills in speed and footwork, as well as in jumps, turns, and lifts. In competition, teams perform a technical short program, including lines, circles, and other complex formations, and a creative free program, allowing competitors freedom of expression.

INSIDE STORY

Figure skating competitions have been held since the 1880s and the first World Championship, for men, was held in 1896. The women's first World Championship was held in 1906. The event first appeared at the Summer Olympics in 1908, but has since become the longest standing Winter Olympic sport.

INTERNATIONAL SKATING UNION (ISU)

The ISU was founded in 1892 in the Netherlands and is the oldest governing body of any winter sport. It was originally a federation of 15 European countries until Canada joined in 1894, and today it has 60 member countries. During its history, the ISU has seen all its disciplines become official Winter Olympic sports.



ICE DANCING



NEED2KNOW

- ➔ Couples skate the compulsory and original dances in traditional closed dance holds, such as the Kilian, waltz, or foxtrot positions, for most of the routine. In the free dance, holds are much more open and couples are encouraged to be creative.
- ➔ Ice dancing is popular in Europe with strong roots in the UK. In more recent years the sport has been dominated by former Soviet countries.
- ➔ The first Olympic ice dance champions were Ludmilla Pakhomova and Alexander Gorshkov of Russia, in 1976.

EVENT OVERVIEW

Ice dancing is a couples' event with three phases of competition at the highest level—the compulsory dance, the original dance, and the free dance—and is often likened to ballroom dancing on ice. The free dance allows couples to show off their creativity. Ice dancing is sometimes competed as a group event with two competing couples on the ice together.

The first world championships were held in 1952, but ice dancing did not become a Winter Olympic sport until 1976 in Innsbruck in Austria.

RULES OF ENGAGEMENT

In ice dance competitions, couples must stay close together on the ice, keeping a constant distance between them. The man must lead and the woman must follow. They are judged on how well they perform set moves as a unit and how well they interpret the music in each dance. Points are awarded for the level of difficulty of an element and the quality of its execution. Points are deducted for illegal moves or elements, or wrong interpretation and expression of the musical rhythm.

COMPETITION

Ice dancing is contested in three phases. The compulsory dance is chosen by the ISU and couples are required to skate prescribed patterns to set musical rhythms and tempos. For the original dance, the couples use their own choreography, including some required elements, and music, but the dance rhythm is selected by the ISU and the couple must dance to the strong beat rather than the weak (less obvious) beat. The free dance allows couples to choose their own music and choreography, although they must include some required elements and express their artistic skills through their interpretation of the music. Originality is rewarded by the judges. The free dance lasts for four minutes, plus or minus ten seconds.



Dance skates
Dance skates have shorter blades and higher heels than figure skates to allow the skater to perform quick footwork

Woman's attire
The woman must wear a skirt and her outfit needs a degree of modesty while allowing her to move freely. Theatrical and garish costumes are penalized, as is excessive nudity

Man's attire
Men must wear full-length pants; tights are not allowed. The man's attire complements the woman's outfit, and the couple's clothing can reflect the character of the music

TORVILL AND DEAN

GREAT BRITAIN'S JAYNE TORVILL AND CHRISTOPHER DEAN BECAME HOUSEHOLD NAMES AT THE 1984 WINTER OLYMPICS, WOWING JUDGES TO BECOME THE HIGHEST SCORING ICE DANCERS OF ALL TIME. THEY SCORED 12 PERFECT SIXES FOR THEIR PERFORMANCE.

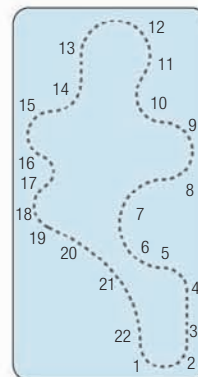
BALANCING ACT

The main technique ice dancers need to learn is balance, especially the man, whose job it is to lift the woman. A close second is endurance, as ice dancers need to skate at speeds comparable to those of speed skaters. Coordination is key, as delivering perfect footwork in a ballroom dance is no easy feat.

DANCING BY NUMBERS

Ice dancers use patterns and step charts to learn and perfect a dance before performing it in competition. The pattern of the Westminster Waltz is shown here as a diagram, with the man's steps shown in [color 1] and the woman's in [color 2]. The rink is divided into quarters by long and short axes; the curved line—the passage of the dance—is the continuous axis, which must not cross the long axis.

The Westminster Waltz is characterized by stateliness, elegance, and dignity, and the couple tries to convey this to the judges as they perform two sequences.



The logo for Target Sports is centered on a light blue background. The word "TARGET" is written in a bold, black, sans-serif font. Below it, the word "SPORTS" is written in a white, outlined, sans-serif font. The background features a large, stylized graphic element on the left side, consisting of a thick red vertical bar that curves at the bottom into a horizontal bar, with a thin yellow line tracing its inner edge. The bottom of the page is a solid light blue color.

TARGET
SPORTS

08

NEED2KNOW

312

- St. Andrews golf course in Scotland, where the sport has been played since 1574, is known as the Home of Golf.
- Tiger Woods was the sport's undisputed world number one for a record 281 consecutive weeks from 2005–10.
- A game of fractions, with a very fine line separating a good shot from a very poor one, golf has a reputation for being both devilishly difficult and highly addictive.

Single glove

Optional, for better grip; worn on the left hand by right-handers, and the right hand by left-handers

Shaft technology

Club shafts need to be both strong and lightweight; they are usually made either of steel or graphite

Clubheads

The heads of all golf clubs are metal, even those known for historical reasons as "woods."

Course clothing

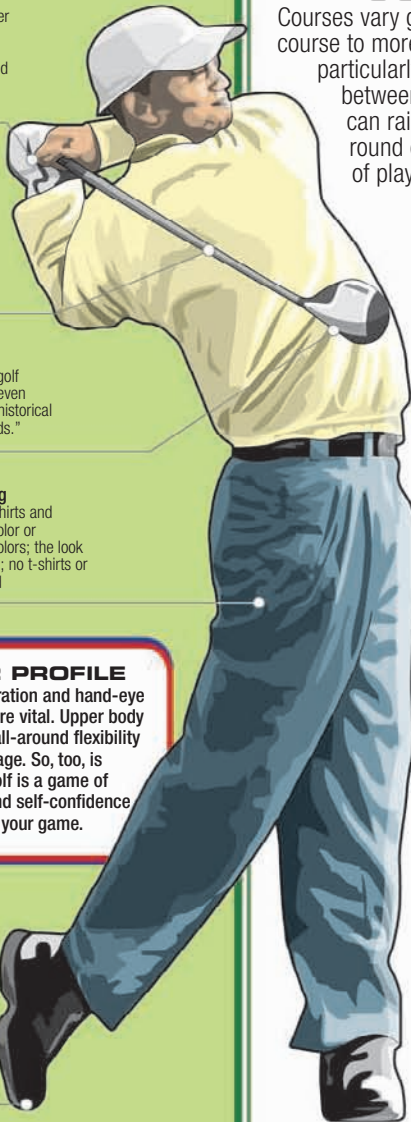
Regular or polo shirts and trousers in any color or combination of colors; the look is stylishly casual; no t-shirts or jeans are allowed

PLAYER PROFILE

Good concentration and hand-eye coordination are vital. Upper body strength and all-around flexibility are an advantage. So, too, is confidence: golf is a game of psychology, and self-confidence can invigorate your game.

Stylish footwear

Golf shoes have cleats that provide grip but do not damage the course. The uppers are made of leather



GOLF

GAME OVERVIEW

An individual sport whereby players (golfers) strike a ball with metal clubs around a course of nine, or more commonly 18, holes in the fewest shots possible. Each hole starts on a "teeing ground" and ends on a "green" containing a small, circular depression in the ground into which the ball must be sunk. Golfers take with them up to 14 clubs which are capable of hitting the ball different distances on a variety of trajectories, and use whichever of them is most appropriate for each shot.

THE COURSE

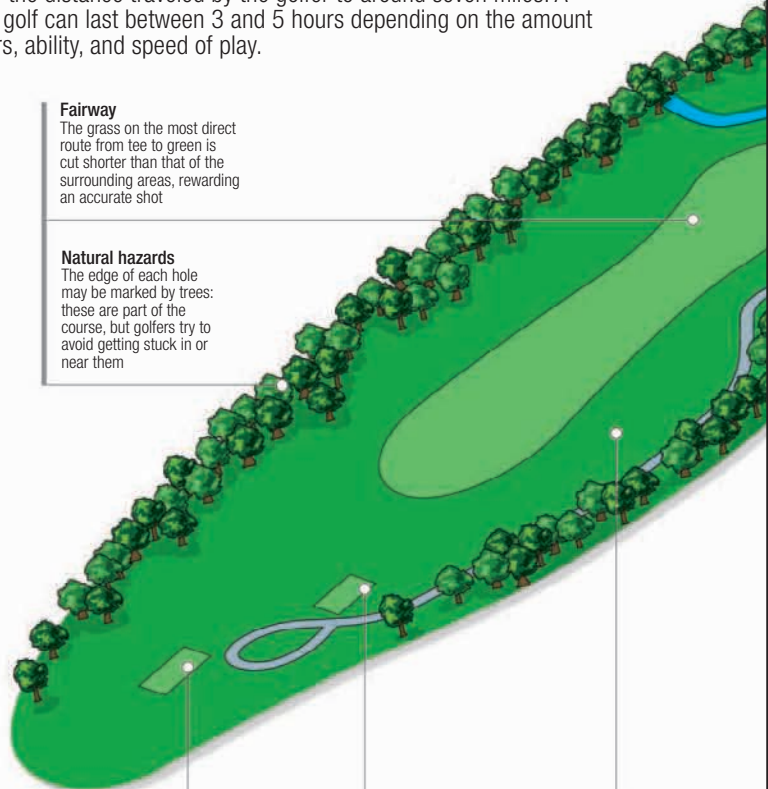
Courses vary greatly in length—anything from 1,300 yards for a par 3-hole course to more than 7,000 yards for some of the more brutal 18-hole courses, particularly in the US. These figures do not take into account the distances between the green and the teeing ground of the next hole, however, which can raise the distance traveled by the golfer to around seven miles. A round of golf can last between 3 and 5 hours depending on the amount of players, ability, and speed of play.

Fairway

The grass on the most direct route from tee to green is cut shorter than that of the surrounding areas, rewarding an accurate shot

Natural hazards

The edge of each hole may be marked by trees; these are part of the course, but golfers try to avoid getting stuck in or near them



Men's teeing area

The first stroke has to be taken from a designated part of this zone

Ladies' tee

Women start off ahead of the men; their teeing area may be directly in line with the men's equivalent or set at an angle, as here

Rough

A shot that goes off course may land in the long grass growing along the edges of the fairway, known as rough. Semi-rough gives way to heavy-rough on the extremes of many holes. Typically it is more challenging to hit a shot from rough than fairway

The ultimate objective

The hole is 4¼ in (108 mm) in diameter and at least 4 in (101.6 mm) deep; in it is a removable flag often bearing the number of the hole

Putting green

The area around the hole has very closely cut grass which facilitates smooth putting

Out of bounds

Land adjacent to the golf club is marked by a series of white posts, beyond which is deemed to be out of bounds. If a ball goes OB a player is penalized one stroke

Sand trap

Bunkers are strategically positioned by course designers to give players extra problems: this one guards the front of the green

Water hazard

If the ball lands here and is irretrievable, the player forfeits a stroke

Front nine

Holes 1–9 cover a total distance of 3,735 yd (3,415 m)

Back nine

Holes 10–18 cover a total length of 3,710 yd (3,392 m)

THE HOLES

Each of the 18 holes must comprise a teeing area, a fairway, a putting green, and a hole with a removable flag in it. There may be any number of surrounding hazards: these include artificial bunkers (large depressions filled with sand), and natural features, such as trees, lakes, and streams. The most economical route around the golf course is by keeping the ball on the fairway, but this is far easier said than done. Golf courses are made up of an unregulated variety of par 3, 4, and 5 holes. Par is determined by the hole's length. Par 3s can be any distance to 240 yards, par 4s 241–474 yards, and par 5s over 475 yards. When calculating par, it is assumed the player will take two putts on the green. Therefore a par 3 should require one shot to reach the green, par 4 two, and par 5 three. However, the player can make a score in any way he or she wishes.

HANDICAP

Each hole is given a par, based on its length, which is the number of strokes that are deemed reasonable for its completion, always including two strokes for putting. A player's handicap is the number of strokes over the allocated.

TYPES OF GOLF COURSE

Golf's popularity around the world is reflected in the vast diversity of the physical landscapes in which it is played. Golf course types range from the open, windswept coastal "links" of Scotland, where the game evolved, to the perfectly manicured resort courses of the Middle East, set in a sea of desert sand. Golf courses can be found in almost every environment that can afford the space. Probably the most accessible and popular types of course are the tree-lined parkland courses that are common features of many city suburbs.



Par threes

Four of them: holes 4, 6, 12, and 16; the shortest is 155 yd (142 m), the longest 240 yd (219 m)

Par fours

Ten in all: 1, 3, 5, 7, 9, 10, 11, 14, 17, and 18; lengths between 350 yd and 505 yd (320–462 m)

Par fives

A total of four: holes 2 (575 yd/526 m); 8 (570 yd/521 m); 13 (510 yd/466 m); and 15 (530 yd/485 m)

COURSE LAYOUT

Venue for the annual Masters Tournament, one of golf's four Major Championships, the Augusta National Golf Club is one of the world's most exclusive and naturally beautiful courses. Situated on the site of a former tree nursery, Augusta is a prime example of a parkland course with lush fairways bordered by trees and shrubs from which the holes take their names.



GOLFING GEAR

A selection of clubs and a good supply of balls are the essentials for a round of golf, and the well-equipped player needs tees (see opposite page), ball markers (to mark the position of the ball if it has to be picked up), and a pitch-mark repairer. Since a golfer may be on the course for some hours, he or she may also want to take food and energy drinks, an umbrella and waterproofs, a towel, gloves, and other assorted items. To carry all this gear, golfers use a specially made carry-bag or cart. For the serious golfer, a battery-powered golf cart takes over the role of the traditional caddy.

Golf clubs usually have dress rules requiring players to wear smart-casual clothing. Special golf shoes, with spiked or rubber soles to provide grip during the swing, are indispensable.

TOO MANY CLUBS

IN 2001, WELSH PROFESSIONAL IAN WOOSNAM BEGAN THE LAST DAY'S PLAY IN THE BRITISH OPEN GOLF CHAMPIONSHIP WITH A GREAT CHANCE OF WINNING. HE STARTED WELL, BIRDIEING THE FIRST HOLE, BUT ON THE SECOND TEE HIS CADDY NOTICED AN EXTRA CLUB IN THE BAG. THE TWO-SHOT PENALTY HE INCURRED PROBABLY COST HIM VICTORY IN THE END.

SELECTION OF CLUBS

A golfer can use up to 14 clubs in any combination he or she chooses. Usually this comprises 2-3 "woods" including a "driver" for maximum distance, 6-7 irons for play from the fairway and rough, 2 wedges for shots from 100 yards and in, and a putter for on the green. All clubs have a head, for striking the ball, a shaft, and a rubber grip. Clubs vary greatly in price and quality as with all sports equipment—some particularly sophisticated drivers can cost more than an entire set from another manufacturer—but clubs are commensurate with quality. An expensive set of clubs will not make a good golfer, but a good player can prosper with a supposedly inferior set of clubs.

DRIVER

The driver is the hardest club in the bag to hit because of its shallow, unforgiving face. When struck well, however, it comfortably travels the farthest distance.



7-11°

IRON

Generally used for medium length shots, irons are the most versatile clubs in a golfer's armory. They range from 1 irons (16°) loft to 9 irons (44°).



16-44°

WEDGE

Pitching wedges, for short shots from grass, and sand wedges for bunkers have recently been joined on the market by highly lofted lob wedges.



45-60°

PUTTER

The most shallow-faced club in the bag, the putter is used for stroking the ball on the green and sometimes from short grass just off the green.



4-7°

CLUB HEAD

Traditionally wooden, then made of steel, titanium clubheads are now becoming more common for drivers.

Because it is lighter, clubheads can be larger and more forgiving.



Hosel
Connects top of the clubhead to bottom of the shaft

Toe
The area of the clubhead farthest from the shaft is called the toe

Grooves
Horizontal indentations impart spin on the ball

MORE RULES THAN MOST

Golf has many more rules than most sports—34 plus various subclauses—but this reflects the nature of the game. There is clearly more potential for an incident on a playing area of 100 acres including trees and rivers than on, say, a tennis court. The Rules of Golf are enforced by the Royal and Ancient Golf Club of St. Andrews (R&A) in all golf-playing nations of the world except for the US and Mexico, where the United States Golf Association (USGA) governs.

STRIKING THE BALL

A stroke is defined as the forward momentum of the club with the intention of striking it. If you make an attempt to hit the ball, but miss it, that counts as one shot.

ON THE GREEN

On the green only, it is permitted to mark the position of your ball, lift it, and clean it. You can also brush aside loose leaves, twigs, and sand that might be on your "line." There is a two-stroke penalty for holing a putt without first removing the flag.

HAZARDS AND UNPLAYABLE LIES

There is no penalty for going in a bunker, but players must not ground their clubs before making contact with the ball. You are also permitted to play a shot from a water hazard, but a far

more practical option is either to replay the shot from the original position or take a drop, but not nearer the hole—both options incur a one-stroke penalty. If there is an unplayable lie, such as the ball in a bush, you can drop it at a distance of up to two club-lengths, not nearer the hole. This also incurs a one-shot penalty.

IMPEDIMENTS AND OBSTRUCTIONS

Movable natural objects—stones, leaves, etc.—are defined as loose impediments and can be moved from around the ball without penalty. Obstructions, such as bunker rakes, can be moved. If, however, the ball moves during the course of this action, it counts as one shot. Immovable obstructions are items such as fixed sprinkler heads. Free relief can be taken from these—if they interfere with the player's stance or swing—up to one club's length, not nearer the hole.

BALLS

Although there are strict rules covering the specifications of golf balls, there are many different models to choose from, each of which performs differently in terms of spin, speed, and trajectory. Some balls have multiple inner layers around a small core, while others have a single large core.

White missile

The surface of a golf ball is covered in tons of miniature dimples for aerodynamic purposes. The hard plastic outer casing covers a solid core.



Tee time

The height of the tee will vary according to the club used. With a driver, the ball should be struck slightly on the upswing to impart forward spin.

LOFT AND LIE

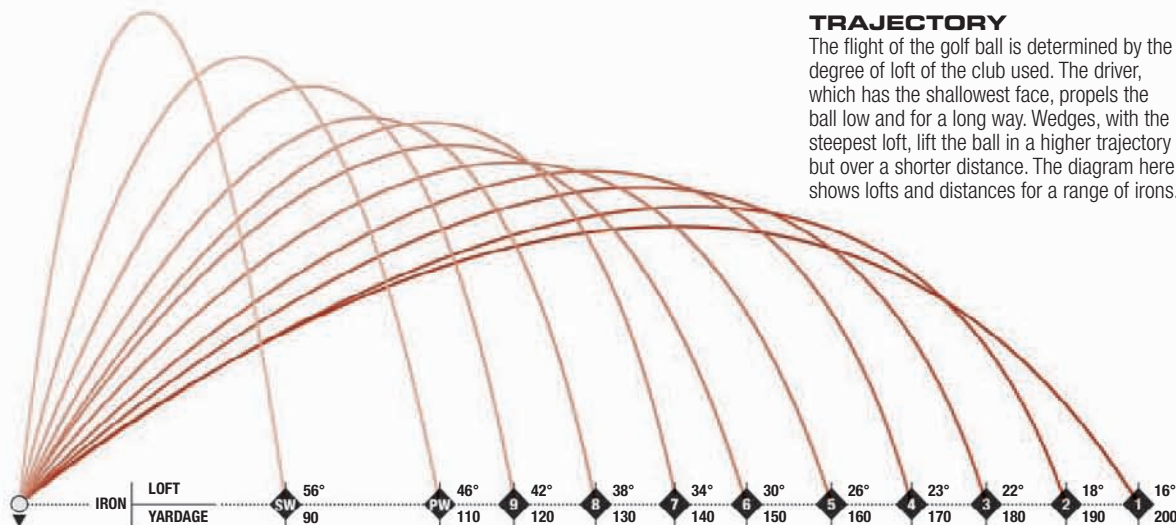
Different lies require different clubs. Balls that lie well on the short grass of the fairway have the greatest range of options. Shots that lie poorly in the rough often demand a mid- to short iron or a utility wood—something with sufficient loft to get the bottom of the blade under the ball. When chipping onto the green over a bunker, the player will opt for a lofted iron—giving maximum height and a soft landing. When there is no obstruction, a more shallow-faced club can chip-and-run the ball onto the green.

DISTANCE GUIDE

CLUB	DISTANCE	LOFT
D	230–290 YARDS	7–11°
3-W	210–240 YARDS	13–16°
5-W	200–220 YARDS	19–21°
3	180–205 YARDS	18°
4	175–200 YARDS	22°
5	165–195 YARDS	26°
6	155–180 YARDS	30°
7	140–170 YARDS	34°
8	135–155 YARDS	38°
9	130–145 YARDS	42°
PW	120–130 YARDS	46°
SW	90–100 YARDS	56°

TRAJECTORY

The flight of the golf ball is determined by the degree of loft of the club used. The driver, which has the shallowest face, propels the ball low and for a long way. Wedges, with the steepest loft, lift the ball in a higher trajectory but over a shorter distance. The diagram here shows lofts and distances for a range of irons.



TYPES OF PLAY

There is more than one way of playing golf. In strokeplay, golfers record their score for each hole and add the totals at the end. In Stableford, points are awarded for scores gained on each hole. Matchplay singles is head-to-head competition played hole by hole. Fourball betterball has the same principle as singles but is played in pairs. In foursomes, pairs compete with only one ball shared between partners.

SCORING

Players mark each other's scorecard, never their own. Certain scores are given names, as below.

PAR A score equal to the par of a hole.

BIRDIE A score one less (or under) the par such as a 3 on a par four.

EAGLE Two under the par. A hole-in-one on a par three is an eagle.

DOUBLE EAGLE Three under par, a extremely rare occurrence even for the world's best.

BOGEY One more than (over) par, for instance, a six on a par five.

DOUBLE BOGEY Two over par. Too many double bogeys result in a very poor score.

ETIQUETTE

Etiquette on the golf course ensures that everyone enjoys the game and plays in safety. Examples include: keeping quiet when a fellow player is taking a shot; raking bunkers after a shot to remove footprints; replacing divots; and not delaying other players. On the green, players should repair pitch-marks and avoid standing on a fellow player's line.

STAT CENTRAL

MAJOR WINNERS

PLAYER	TOTAL
JACK NICKLAUS	18
TIGER WOODS	14
WALTER HAGEN	11
BEN HOGAN	9
GARY PLAYER	9
TOM WATSON	8
HARRY VARDON	7
GENE SARAZEN	7
BOBBY JONES	7
SAM SNEAD	7
ARNOLD PALMER	7
NICK FALDO	6
LEE TREVINO	6



THE GOLF SWING

All good golf swings start with a good setup and it is impossible to overstate the importance of a good grip, alignment, stance, and posture for beginners. In fact, it is possible to hit the ball well with a good setup and a mediocre swing, but you can make the best swing the world and not hit the ball consistently with a poor setup. The golf swing itself is a question of repetition. The backswing and followthrough should be almost a mirror image of one another.

STANCE

Feet should be shoulder-width apart, aiming at the target, with legs slightly bent, and the ball position roughly midway between your feet. Bend forward from the waist toward the ball.

No tension

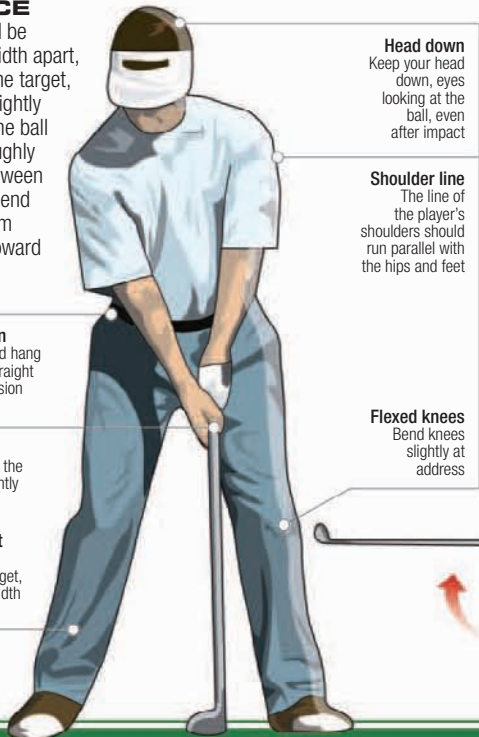
Arms should hang relatively straight with no tension

Grip

Do not hold the club too tightly

Alignment

Feet in line with the target, shoulder-width apart



GRIP

A good grip is a player's only means of controlling the clubhead and bringing it into impact in a square (straight) position. There are two, equally acceptable styles of grip (below) and a third, the baseball grip, suitable for junior golfers or those with arthritic problems.

Overlapping

The little finger rides piggyback on the back of the left hand (right handers)



Interlocking

The little finger interweaves with the index finger of the other hand



TAKEAWAY

The start of the swing should be a one-piece movement in which the hands, arms, and club remain straight and in unison. There should be no cocking of the wrists at this early stage, nor any movement of any other part of the body, aside from a small tilt of the shoulders.



PITCHING AND CHIPPING

For shots of 90 yards (80 m) and less players do not need to make a full swing; an abbreviated version, executed with an open stance, is more suited. Pitching shots are very much a question of "feel"—being able to judge specific distances—and this comes down to experience of play and trial and error. Chip shots are played from very close to the green and are either struck at a low trajectory, running along the ground toward the hole (a chip-and-run), or with great height and consequently a soft landing with minimal forward roll (a lob shot). Executing these type of shots well will result in many short putts, ultimately saving you a number of strokes per round.

PUTTING

Often described as "the game within the game," putting is an art in itself. Players should stand more upright than a regular shot, keep their head still and move only their hands and arms in a solid unit. However, a good putting stroke and a good judgement of distance is not enough. Players need to have a good appreciation of the contours of the green, how the ball will "break" (move in relation to the slopes), and the speed at which it will travel, after it is struck. A good understanding of these factors is known as being able to "read the green" and this is something that only comes with experience.



HOLE IN ONE

The Holy Grail of golf for many players, holes in one are normally only ever achieved on par 3s but can also occur on short par 4s and often by chance. Because of their propensity to consistently hit the ball close to the flag, professionals score a much higher number of holes in one than amateurs. Many professionals' hole-in-one tallies are well into double figures.

BACKSWING

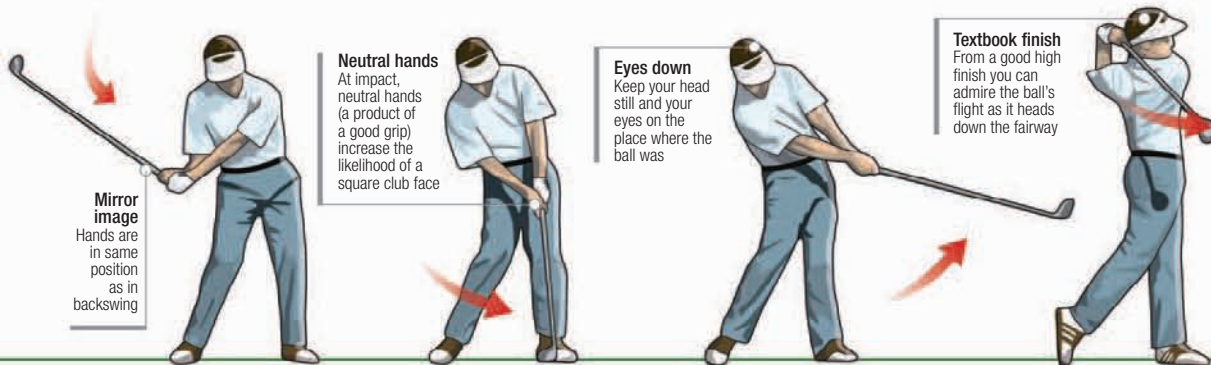
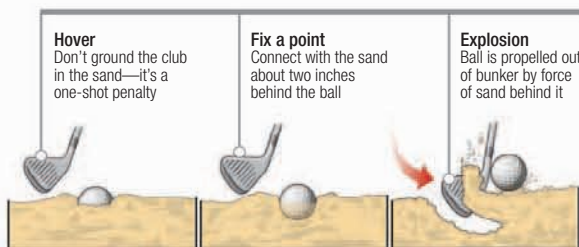
When the club is at about a 45° angle to the starting position, the player begins to cock the wrists and turn the upper body, pivoting it against the hips. It is essential the head remains still and does not sway or tilt as the shoulders turn.

DOWNSWING AND IMPACT

The downswing is essentially about mirroring, as closely as possible, the movements made in the backswing. The shoulders and upper body should uncoil as all the weight previously loaded onto the right side redistributes. The hands and arms follow, not lead, this movement to ensure the clubface reaches impact in the square (straight) position.

TROUBLE SHOTS

Of course, players do not always find themselves with a flat lie on short grass and there is little option when the player finds him or herself in, for instance, a clump of trees, than to chip the ball sideways. However, most situations can be overcome with minor adjustments to the setup. For example, when on uphill or downhill lies redistribute your weight and alter the position of ball in your stance; on sidehill lies aim more to the left or right of the target to compensate for the slope. Escape from bunkers is one of the shots that golfers struggle with most commonly. Remember to open the clubface and make a normal swing, making contact with the sand first, not the ball.

**SIDELINES**

4 The highest number of major tournaments won consecutively by a single player. Tiger Woods achieved this feat with the British Open, the US Open, and the USPGA in 2000, followed by the US Masters in 2001. In the modern era, a player has never won all four within the same calendar year—known as the Grand Slam of Golf.

1,007 The length, in yards (900 m) of the par-6 sixth hole at Chocoday Downs, Marquette, Michigan, the longest hole in world golf.

59 Shooting a round under 60 (usually about 10 under the par for the course) is one of the rarest occurrences in golf. Only three players have ever achieved this feat on the US Tour—David Duval, at the 1999 Bob Hope Classic, being the most recent.

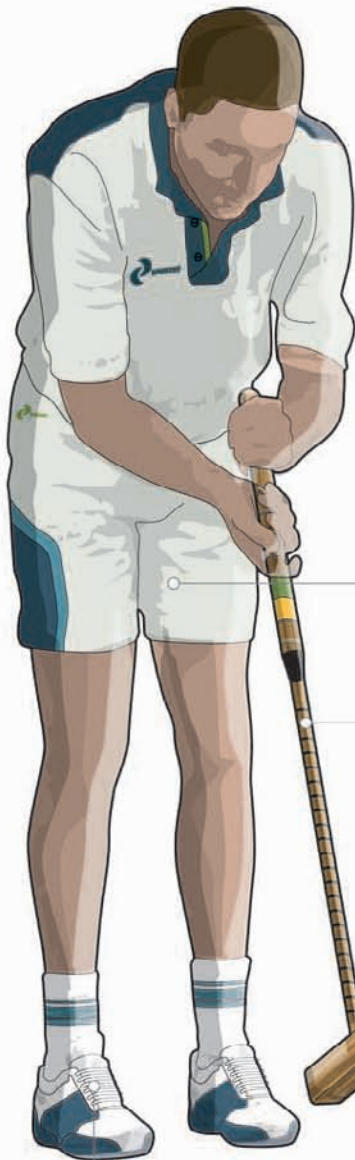
INSIDE STORY

The R&A and USGA oversee the governance of the sport predominantly for amateur golf. They enforce the Rules of Golf, test golf equipment for conformity, implement a handicapping system and host national championships for men's, women, and junior golf. Professional golf is organized by the PGA European Tour (which also encompasses some events in Africa, Asia, and Australasia) and the US Tour which organizes competition in North America. Since 1999 the International Federation of PGA Tours have run annually three World Golf Championship events open to the world's top ranked players.

THE MAJORS

In male professional golf the major championships are the most prestigious tournaments of the season and the benchmark by which players are judged. There are four and they run, in order of play, as follows: The Masters, held every April at the Augusta National Golf Club, Georgia, a strictly invitational tournament run by the club; the US Open, the flagship event of the USGA, in June; the Open Championship, organized by the R&A in July; and finally the USPGA Championship, in August.





CROQUET



GAME OVERVIEW

Croquet involves hitting balls with a mallet through hoops embedded in the grass playing arena. The winner is the first person or team to hit a centrally located pole. Association Croquet, described here, is the version of the sport played at most international tournaments. The game offers many opportunities to punish opponents, and has even been described as one of the world's most aggressive recreational activities—a far cry from the rather staid, genteel stereotype.

The white stuff

Players must wear shirts and trousers, or shorts or skirts, and every piece of clothing must be white

Croquet mallet

The mallet may be gripped anywhere on the handle, but players must not touch the head of it while playing a stroke

Wire wickets

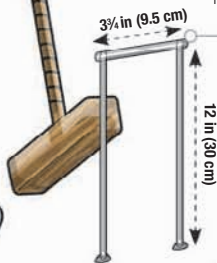
The croquet balls must be struck through wire hoops embedded in the grass court

Colored balls

They are only $\frac{1}{4}$ in (0.3 cm) smaller than the wickets, so there's very little margin for error

Soft shoes

Players must wear shoes with smooth soles in order to minimize damage to the manicured playing surface



PLAYER PROFILE

Many of the skills required by a croquet player are the same as those needed for proficient putting at golf. Both games require good judgment of the playing surface and of the weight of each shot. The croquet lawn is smaller than many putting greens, and the balls have relatively short distances to travel, so physical strength is rarely important. The players' age is hardly a consideration either, as seasoned hands may easily outsmart younger, fitter pretenders.

NEW BALLS, PLEASE

FOUNDED IN 1868, THE FIRST NATIONAL HEADQUARTERS OF CROQUET IN GREAT BRITAIN WAS THE WIMBLEDON ALL ENGLAND CROQUET CLUB. HOWEVER, JUST NINE YEARS LATER, THE CLUB WAS RENAMED THE WIMBLEDON ALL ENGLAND CROQUET AND LAWN TENNIS CLUB AND PLAYED HOST TO THE FIRST EVER LAWN TENNIS CHAMPIONSHIPS. AS THE POPULARITY OF TENNIS GREW, CROQUET WAS SIDELINED. THE CLUB EVEN DROPPED "CROQUET" FROM ITS NAME FOR A WHILE, AND STOPPED HOLDING CROQUET TOURNAMENTS.

NEED2KNOW

- A croquet match is played by two sides, made up of either single players or two teams of two. Each side has two balls: one blue and black, the other red and yellow.
- The world's leading international men's contest is the Croquet World Series for the MacRobertson Shield. The competition takes place over two weeks every three or four years between Australia, Great Britain, New Zealand, and the United States.
- In addition to the basic Association Croquet, there are several variant forms, including Mondo Croquet, played with sledgehammers and 10-pin bowling balls, and a mounted version on bicycles.

SIDELINES

1 The total number of paying spectators at the Olympic croquet final in 1900, the first and last time the sport was played at the Games. The event was held in Paris, nine out of the ten croquet competitors were French, and, perhaps not surprisingly, France took all the medals in both the singles and doubles competitions.

20 The number of countries that entered the 2005 Mitsubishi World Championships. In addition to the MacRobertson big four, there were some surprises for anyone who thinks of croquet as the quintessence of Englishness: the participants included Egypt and Russia. The transcontinental trend continued in 2007 with Uruguay's first tournament.

6,841 The number of registered players in Australia, the country with the most Association Croquet players in the world. New Zealand has the second highest number of registered players (4,000), with England not far behind in third place (3,500).

COURT CLIPPINGS

The playing surface is a level, well-manicured lawn approximately the size of two tennis courts. Play begins from behind the balk line at one end of the court. The first hoop has a blue top and the last hoop, known as the “rover,” has a red top. To remind players of the direction of play, and to show spectators whether a hoop is being played forward or backward, four colored clips are placed on top of each hoop at the start of the game. The clips indicate the next point for each ball, and are moved to the side of the hoop after the corresponding ball has passed through it once.

MALLET FORETHOUGHT

Each player has two colored balls, which must pass through six hoops twice in the correct order and direction, and then hit the central peg. Croquet is a tactical game, and players can sabotage their opponent’s position while completing the course.

CONTINUATION STROKES

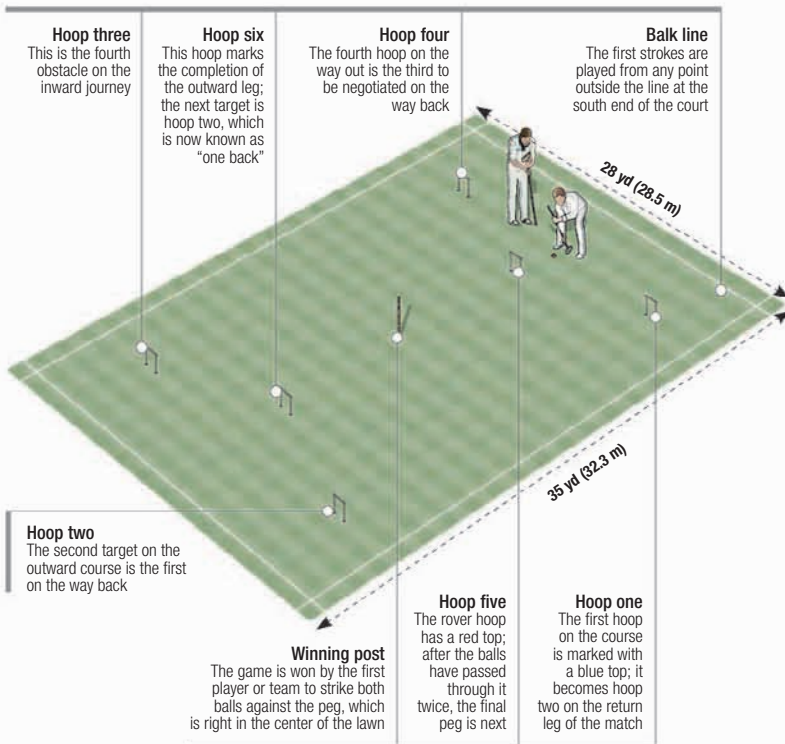
Twenty-six points are needed to win (12 hoop points and one peg point per ball) and players normally have just one strike per turn. However, if they send the ball completely through a hoop they get another shot (“a continuation stroke”). If the shot hits an opponent’s ball (“makes a roquet”), the striker gets two more shots: he or she first places the ball by hand against the opponent’s ball, and then strikes his or her own ball. The opponent’s ball may thus be sent out of bounds, which is how croquet got its reputation for aggression.

PEELINGS AND OFFSHOOTS

If the striker’s ball knocks an opponent’s ball through a hoop, the latter is said to have been “peeled”: the other side benefits, but does not get a continuation stroke. If a ball rolls off the court, it is replaced on the boundary line at the point where it went out of play.

EQUIPMENT

When not in use, the mallets, balls, hoops, and peg are stored in a long wooden box with rope handles at either end and a lid. It looks like a cross between a shipping crate and a coffin.



Croquet mallet
Wooden; may be any length, but must have parallel and identical end faces

Last post
The peg must be 18 in (45.7 cm) high and 1½ in (3.8 cm) in diameter; it usually has colored bands around its circumference

Wire wickets
Six; may be arched hoops or have right-angled crossbars

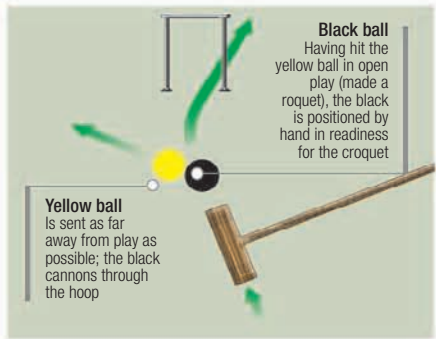
Colored balls
Four: wood or plastic; one blue, one black, one red, one yellow; weight 1 lb (453 g); diameter 3⅞ in (9.2 cm)

ROQUET SCIENCE

Unlike most target games, croquet allows players to actively hinder their opponents’ progress. This is done in two stages. First, a player performs a roquet stroke, which simply involves striking the other player’s ball. The player then picks up their ball, places it in direct contact with the “roquetted” ball, and takes a croquet stroke.

CROQUET STROKE

The purpose of the stroke from which the game gets its name is to send the opponent’s ball as far off course as possible. But the best offensive players work out angles that enable them simultaneously to gain advantage for themselves. The perfect croquet is a shot that knocks the opponent’s ball a long way off course and sends the player’s own ball through a hoop, thus earning a continuation stroke. The diagram on the right shows a typical example.



INSIDE STORY

Croquet began in Ireland in the 1830s, later spreading to Great Britain where it quickly grew in popularity. At the time, croquet was the first outdoor sport that could be played by both men and women on equal footing, and its popularity was sealed when a London sporting goods manufacturer began producing and selling croquet equipment. The sport soon caught on throughout the British colonies, most notably in Australia and New Zealand.

GOVERNING BODY

In England, Wales, and Northern Ireland, the Croquet Association makes the rules, awards top players’ seedings, and promotes and regulates the game.

CURLING



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GAME OVERVIEW

Sometimes known as “chess on ice,” curling is a game of skill, precision, and strategy. It began as a Scottish outdoor winter sport before spreading across the globe and becoming one of the highlights of the Winter Olympics. Curling is played on a sheet, or rink, of ice by two teams of four players. A team’s aim is to place its rocks closer to the tee, the center of a circular target, than the closest rock of the other team. One game is made up of ten rounds, or ends, and each player delivers two rocks, making a total of 16 rocks per end. Under the direction of the “skip,” the team sweeps the ice directly in front of the rock to adjust the speed and direction of each rock as it slides toward the tee.

THE SHEET

The playing area is known as the sheet and has a circular scoring area, or house, at each end. The house consists of four concentric circles dissected by the center and tee lines. The largest circle has a diameter of 12 ft (3.66 m) and the smallest circle, called the button or tee, has a diameter of 12 in (30 cm). The hog line marks the point where the rock must have been released during a throw, or delivery. A rock is out of play if it crosses the back line behind the house.

TURNING THE ROCK

A rock can be made to spin as it moves across the sheet. The direction of rotation a rock is given as it is released determines how it travels across the ice. The direction of the spin determines whether the rock will curl (curve) to the left or right: clockwise spin curls right and counterclockwise curls left. The greater the amount of spin which is given, the less the rock will curl. On some ice sheets which may not be perfectly level the rock may even travel against the spin.

KEEPING IT COOL

The surface of the ice needs to be kept at a constant temperature of 23° F (–5° C). The ice is sprayed with water before every game. The droplets freeze into tiny bumps on the surface, known as pebble. It is the friction between the stones and pebble that causes curling.

House

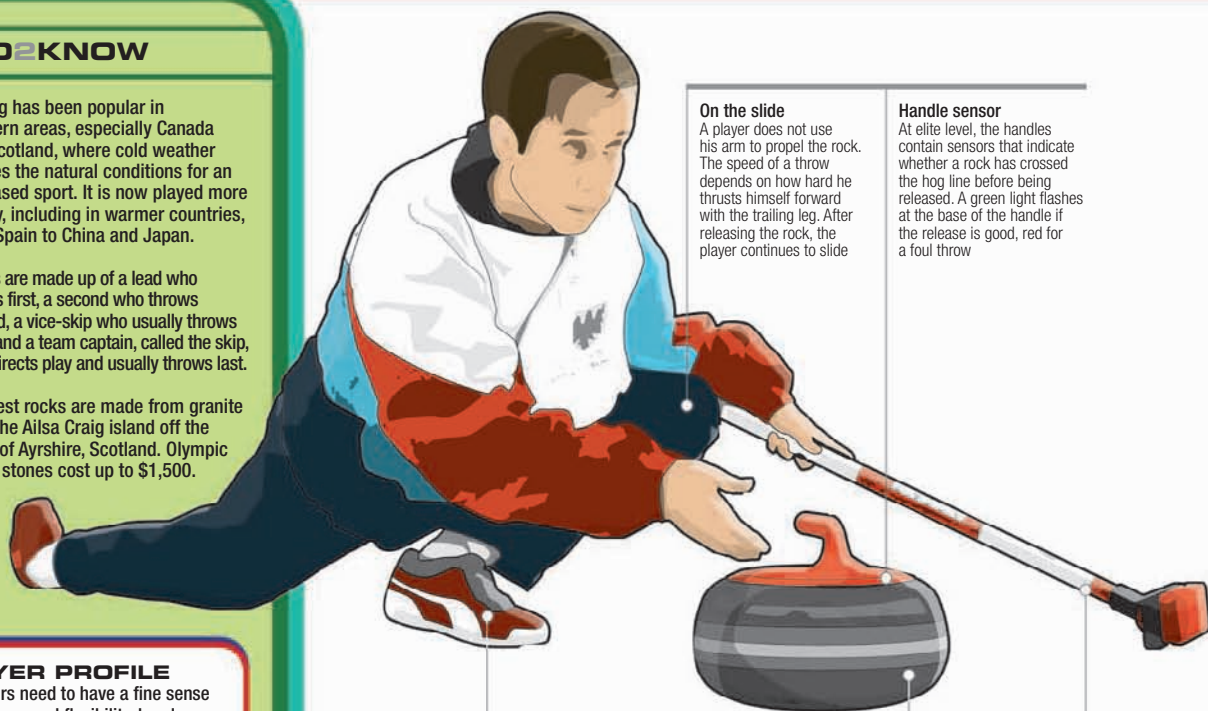
The scoring area; a rock must sit within the house (ring) to stand a chance of scoring points

Back line

A rock is deemed out of play if it crosses the line touching the back of the house

NEED2KNOW

- Curling has been popular in northern areas, especially Canada and Scotland, where cold weather creates the natural conditions for an ice-based sport. It is now played more widely, including in warmer countries, from Spain to China and Japan.
- Teams are made up of a lead who throws first, a second who throws second, a vice-skip who usually throws third, and a team captain, called the skip, who directs play and usually throws last.
- The best rocks are made from granite from the Ailsa Craig island off the coast of Ayrshire, Scotland. Olympic grade stones cost up to \$1,500.



On the slide

A player does not use his arm to propel the rock. The speed of a throw depends on how hard he thrusts himself forward with the trailing leg. After releasing the rock, the player continues to slide

Handle sensor

At elite level, the handles contain sensors that indicate whether a rock has crossed the hog line before being released. A green light flashes at the base of the handle if the release is good, red for a foul throw

PLAYER PROFILE

All players need to have a fine sense of balance, good flexibility, hand-eye coordination, and control on the ice. The skip and vice-skip also need a sharp mind for tactics and strategy as they direct their teammates to deliver rocks into winning positions.

Lead shoe

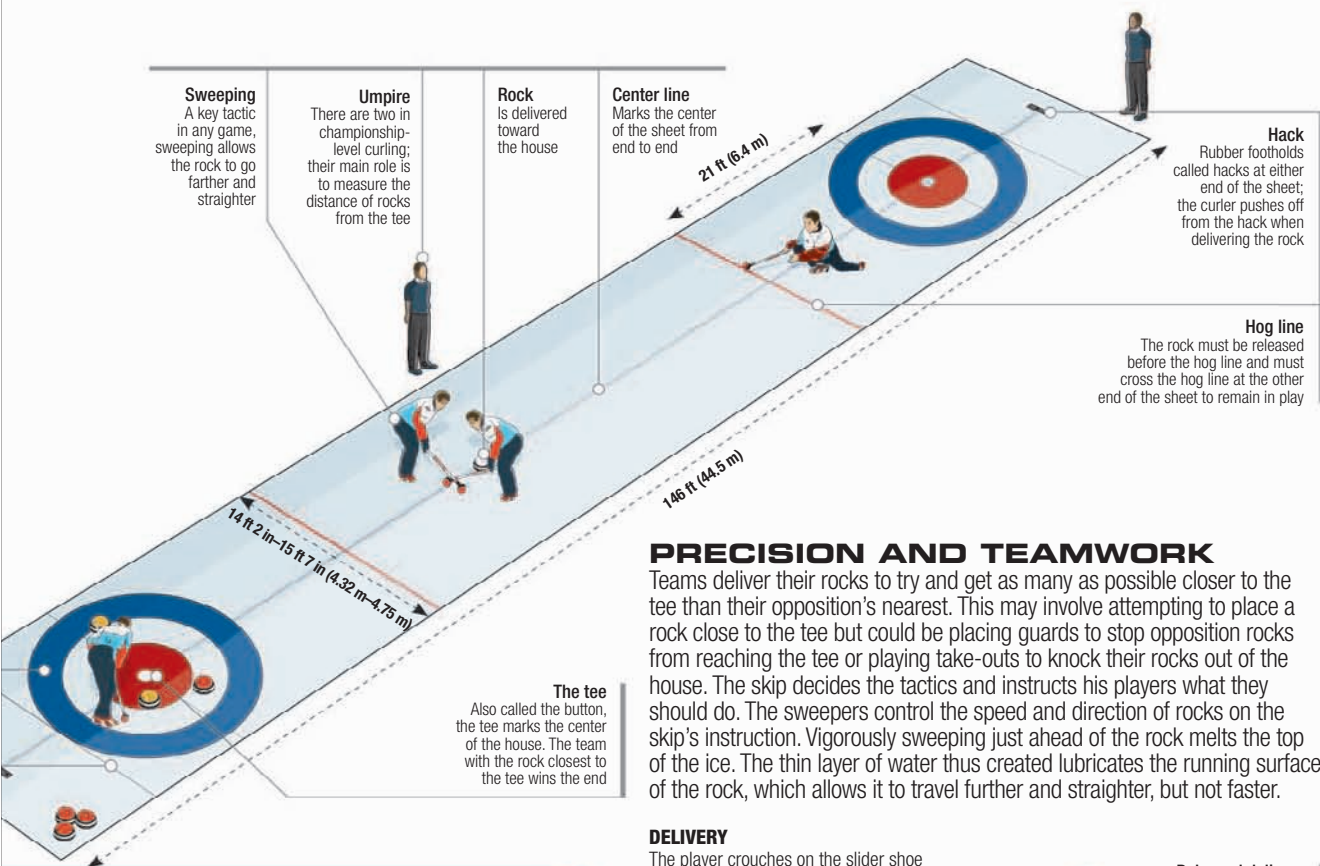
A “slider,” a shoe with a smooth Teflon sole, is worn on the lead foot during delivery. At other times the curler wears a thin rubber “gripper” over the slider for traction

Rock

Ailsite granite stones called “rocks” weigh a maximum of 44 lb (20 kg). The bottom of the rock is concave, and the running surface is a circle $\frac{1}{4}$ – $\frac{1}{2}$ in (6–12 mm) wide

Broom

A versatile piece of equipment, it is used to melt the ice, indicate where to aim the rock, or to balance the curler during throws

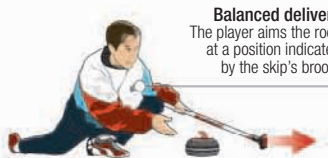


PRECISION AND TEAMWORK

Teams deliver their rocks to try and get as many as possible closer to the tee than their opposition's nearest. This may involve attempting to place a rock close to the tee but could be placing guards to stop opposition rocks from reaching the tee or playing take-outs to knock their rocks out of the house. The skip decides the tactics and instructs his players what they should do. The sweepers control the speed and direction of rocks on the skip's instruction. Vigorously sweeping just ahead of the rock melts the top of the ice. The thin layer of water thus created lubricates the running surface of the rock, which allows it to travel further and straighter, but not faster.

DELIVERY

The player crouches on the slider shoe and pushes against the hack with his other foot. He slides with the rock, controlling its speed, direction, and rotation, before letting go just before it crosses the hog line. Once the rock is released, it must not be touched by a broom or player.



Balanced delivery
The player aims the rock at a position indicated by the skip's broom

ON THE ICE

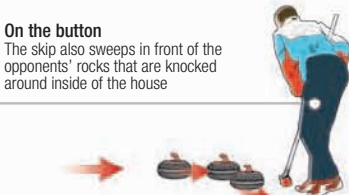
Rocks can curve, or curl, up to 6½ ft (2 m) to the side as they glide down the rink. The curling is caused by the bumpy pebble surface on the ice. Melting the pebble by sweeping stops the rock from curling. As a game progresses, the pebble rubs away and rocks may curl more or less than previously.



Quick sweep
Sweepers adjust the pressure on their brooms according to how much they want to redirect the rock

IN THE HOUSE

Inside the house, the skip helps sweep the rock to its desired resting place, either closest to the tee or in a blocking, or guarding, position to prevent the opponents' rocks reaching the tee. The last rock to be thrown is called the hammer. The team with the hammer is more likely to win the end.



On the button
The skip also sweeps in front of the opponents' rocks that are knocked around inside of the house

ROCK STEADY

Alternating between teams, each player delivers two rocks until all 16 have been thrown. The team with the rock closest to the tee wins. They score one point for each rock closer to the tee than any of their opponents' rocks, and only one team scores in each end.

DRAW

A draw is a throw that lands the rock in the house. A guard sits in front of the house to block opponents' shots. A raise shot promotes a rock into the house from outside, or one in the house closer to the tee.



Raise shot
This rock has been knocked into a winning position closer to the tee by a teammate's stone



TAKEOUT

A takeout is a shot that removes another rock from play—ideally the opposition's! A raise takeout is when the thrown rock uses an intermediate rock to take out the target rock.



Direct hit
The incoming rock strikes the opponents' stone and knocks it out of the house



INSIDE STORY

Curling originated in Scotland, where the outdoor game was popular between the 16th and 19th centuries. The Royal Caledonian Curling Club, curling's oldest society, was established in 1843. The first world championships were held in 1959 (1979 for women); men's and women's events have featured in the Winter Olympics since 1998.

GOVERNING BODIES

The Royal Caledonian Curling Club, the original governing body for curling, and the World Curling Federation (WCF) are based in Scotland. The WCF runs the World Men's and World Women's Curling Championships, as well as the World Junior Curling Championships, and has over 45 national members.



LAWN BOWLING

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NEED2KNOW

- ➔ Lawn bowling is one of the most popular games in the world for senior citizens, but at a competitive level, the sport is dominated by younger players.
- ➔ Bowls is most popular in Australia, Canada, New Zealand, the United Kingdom, and UK territories.
- ➔ All but one indoor bowls world champions have come from England, Ireland, Scotland, or Wales. The 1992 winner was an Australian.

GAME OVERVIEW

Lawn bowling—a.k.a. bowls—is a precision sport in which players roll slightly asymmetrical balls, called bowls, along a green. The winner is the person with whose bowls land closest to the target—the “kitty” or “jack.”



THE BOWLS

Although bowls were traditionally made of wood or rubber, or a composite, modern bowls are made of lignite. They are designed to travel a curved path, referred to as their bias, produced by the asymmetrical shape of the bowl. The jack is perfectly spherical and usually colored white.

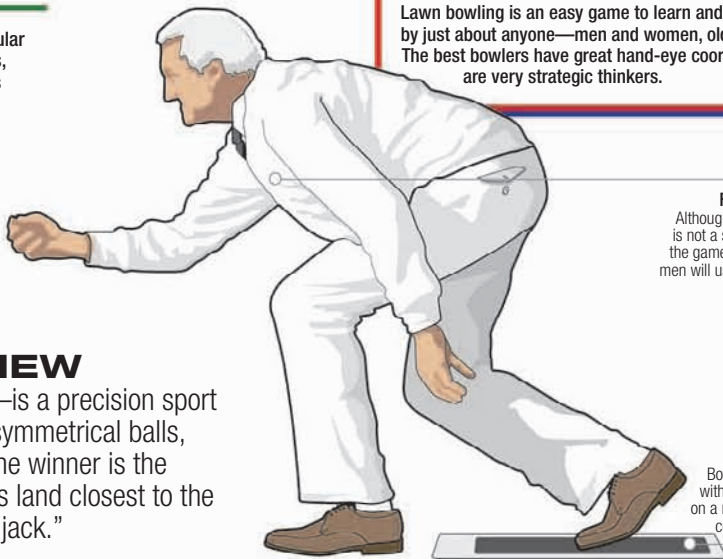
BIASED BOWL

The bowls are black or brown, weigh about 3.3 lb (1.5 kg), and are 4½–5½ in (12–14.5 cm) in diameter. The bowls are not quite round: their bias gives them a slight bulge on one side.



PLAYER PROFILE

Lawn bowling is an easy game to learn and is played by just about anyone—men and women, old and young. The best bowlers have great hand-eye coordination and are very strategic thinkers.

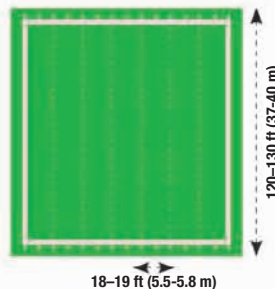


Formal flourish
Although a player's attire is not a significant part of the game, in competitions men will usually wear white clothes and a tie.

Rubber mat
Bowlers must stand with at least one foot on a rubber mat in the center of their rink.

THE GREEN

Bowls is usually played on a manicured grass or synthetic surface known as a bowling green, which is divided into parallel playing strips known as rinks. An indoor variation on carpet is also played. Outdoor greens have a uniform length, but may be of varying widths, depending on the number of rinks. Indoor greens are usually smaller, their dimensions being set by organizers.



LAWN RULES

In the simplest singles competition, on the toss of a coin one player begins by placing his rubber mat and rolling the jack to the other end of the green. Once the jack has come to rest, it is aligned to the center of the rink before the players take turns to roll their bowls. A bowl is allowed to curve outside the rink boundary, but must come to rest within the boundary to remain in play.

After the competitors have delivered all their bowls—four each in singles—the distance of the closest bowl to the jack is determined. Then a point is awarded for each bowl the winning competitor has between the jack and his opponent's closest bowl. This passage of play is known as an end.

BOWL DELIVERY

There are several types of delivery. For a right-hander, a “forehand draw” is aimed to the right of the jack, and curves in to the left. The same bowler can deliver a “backhand draw” by turning the bowl over in his hand and curving it the opposite way. A “drive” involves bowling with force with the aim of knocking either the jack or a specific bowl out of play.

SCORING

Scoring systems vary—either the first to a specified number of points, or the highest scorer after a number of ends. Some competitions use a “set” scoring system, with the first to seven points awarded a set in a best-of-five match.

AND THRASH THE SPANIARDS TOO

THE MOST FAMOUS STORY IN LAWN BOWLS INVOLVES SIR FRANCIS DRAKE. ON JULY 18, 1588, DRAKE WAS INVOLVED IN A GAME AT PLYMOUTH HOE WHEN HE WAS NOTIFIED THAT THE SPANISH ARMADA WERE APPROACHING. HIS IMMORTALIZED RESPONSE WAS THAT “WE STILL HAVE TIME TO FINISH THE GAME AND TO THRASH THE SPANIARDS, TOO.” HE THEN PROCEEDED TO FINISH THE MATCH—WHICH HE LOST—BEFORE EMBARKING ON THE BATTLE WITH THE ARMADA – WHICH HE WON.



PÉTANQUE

NEED2KNOW

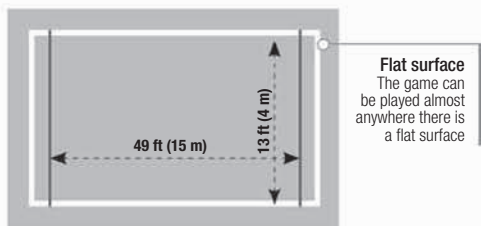
- ➔ Pétanque is generally associated with southern France, particularly Provence, from where it originates. It is the most played sport in Marseille.
- ➔ The casual form of the game of pétanque is played by about 17 million people in France—mostly during their summer vacations.
- ➔ The International Pétanque Federation was founded in 1958 in Marseille and has about 600,000 members in 52 countries. It is the fourth largest sports federation in the whole of France.

THE BOULES

Boules are traditionally made of steel and have a chrome outer finish. They each weigh $1\frac{1}{2}$ – $1\frac{3}{4}$ lb (650–800 g), and have a diameter of $2\frac{3}{4}$ –3 in (71–80 mm). The jack is made of wood or synthetic material and has a diameter of $1\frac{1}{4}$ in (25–35 mm). On the sides they bear engravings indicating the manufacturer's or player's name and the weight of the boule.

THE TRACK

The game is normally played on hard dirt or gravel, but can also be played on grass or other surfaces. The dimensions shown below are the recommended minimum.



PLAYING BY THE RULES

The game is played in singles or by teams of two or three. The side that wins the toss starts the game by drawing a circle on the playing field 14–20 in (35–50 cm) in diameter. Both feet must remain inside this circle, touching the ground, when the player is throwing.

The player then throws the jack to a distance of 20–30 ft (6–10 m) from the starting circle. The jack must be visible (not, for example, buried in gravel), and at least 3 ft (1 m) from any boundary, otherwise it must be thrown again.

A player from the same team plays the first boule, trying to place it as close to the jack as possible. Then the opposing team must get one of its boules closer to the jack, and they keep playing until they succeed. When they do, it is back to the first team for them to do better. When one team runs out of boules, the other team plays its remaining boules.

GAME OVERVIEW

Pétanque is a form of boules where the goal is to throw metal balls as close as possible to a small wooden ball called a cochonnet (“piglet”). The game is normally played on hard dirt or gravel, but can also be played on grass or other surfaces.

PLAYER PROFILE

No special skill is required to play pétanque, and people of all ages and both sexes play against each other. The game is simple, relaxing, lots of fun, and very sociable. Games are usually played in good spirits, and often while players are enjoying a cool drink. At competition level, the very best players tend to be excellent strategists and have great hand-eye coordination.

POINTING AND SHOOTING

Players may choose to place or “point” a boule—get it as near as possible to the jack—or “shoot” it—attempt to displace another boule. A successful pétanque team has players who are skilled at shooting as well as players who only point.

For obvious reasons, the pointers play first—the shooter or shooters are held in reserve in case the opponents place well. In placing, a boule in front of the jack has much higher value than one at the same distance behind the jack, because the pushing of a front boule generally improves its position. At every play after the very first boule has been placed, the team whose turn it is must decide whether to point or shoot.



ROLLING IN

This is the easiest shot to play. The ball is thrown about halfway down the track and rolls the rest of the way.



ROLLING IN FOR A HIT

With this shot you land your boule early and make it roll along the ground into your opponent's boule.



SHORT LOB

This shot requires quite a high trajectory with just the right amount of backspin on the boule.



LONG LOB

Going in high is the only way when the ground is rough. The boule lands just about where you want it to lie.



SHOOTING IN

This shot is played fairly low and hard and enables you to move your opponent's boule out of position.



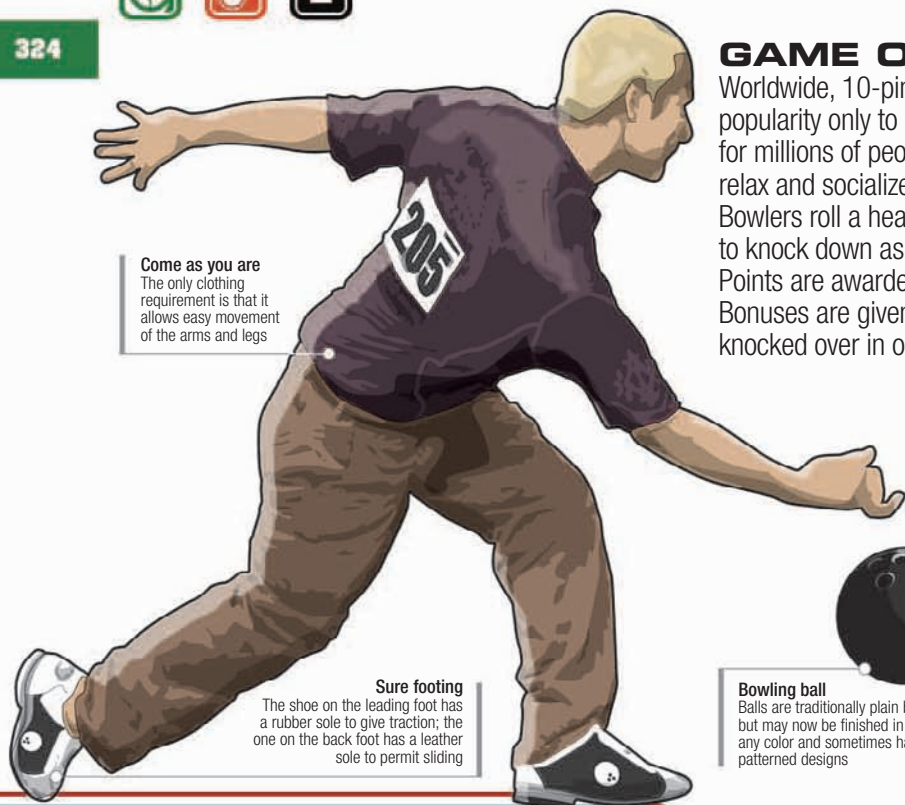
CARREAU

This is the hardest shot in pétanque. Hit the opponent's boule and make sure that yours sits in its place.

10-PIN BOWLING



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Come as you are
The only clothing requirement is that it allows easy movement of the arms and legs

Sure footing
The shoe on the leading foot has a rubber sole to give traction; the one on the back foot has a leather sole to permit sliding

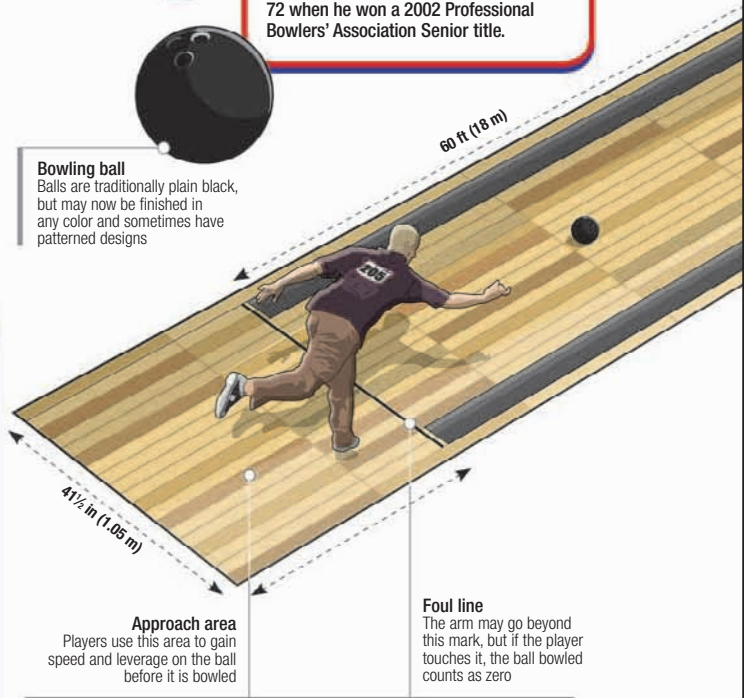
GAME OVERVIEW

Worldwide, 10-pin bowling is possibly second in popularity only to soccer as a participation sport. While for millions of people this indoor sport is a great way to relax and socialize, it can also be extremely competitive. Bowlers roll a heavy ball along a smooth lane and try to knock down as many of the 10 pins as possible. Points are awarded for the number of pins demolished. Bonuses are given for a “strike”—when every pin is knocked over in one attempt.

PLAYER PROFILE

The only essential characteristic is the ability to learn, through endless practice, the techniques of ball control. Age is no barrier: American Dick Weber was 72 when he won a 2002 Professional Bowlers' Association Senior title.

Bowling ball
Balls are traditionally plain black, but may now be finished in any color and sometimes have patterned designs



Approach area
Players use this area to gain speed and leverage on the ball before it is bowled

Foul line
The arm may go beyond this mark, but if the player touches it, the ball bowled counts as zero

NEED 2 KNOW

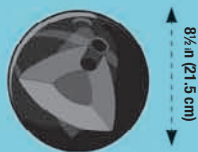
- The game emerged in the US in the early 1900s. The first British centers opened in London in 1960.
- One of the sport's annual competitions is the Weber Cup. Team Europe competes against Team USA in the equivalent of golf's Ryder Cup.

PINS AND BALLS

Pins and balls were once made simply of wood, but the former are now synthetic or plastic-coated wood, while the latter are made of plastic, urethane, epoxy, or a combination of these materials. For recreational 10-pin bowling, balls come in various weights to suit the strength of the player.

THE BALL

A full-size competition ball weighs 16 lb (7.25 kg). Its surface is entirely smooth apart from grip holes for the thumb, middle finger, and ring finger.



THE PINS

The pins are all of uniform height and should be 4 1/2 in (11.4 cm) wide at the belly. They each weigh 3 lb 6 oz–3 lb 10 oz (1.47–1.64 kg).



LIFE IN THE FAST LANE

The bowling lane is made of 39 planks of polyurethane or wood. On either side of it are semicircular gutters to collect off-target balls. Most public bowling centers have retractable guard rails that can be lowered into place on the lane-side of the gutters: these are normally brought down only to assist young children who lack the strength to control the balls. Contestants must release the ball before reaching the foul line, and, having bowled, they must not overstep onto the lane.

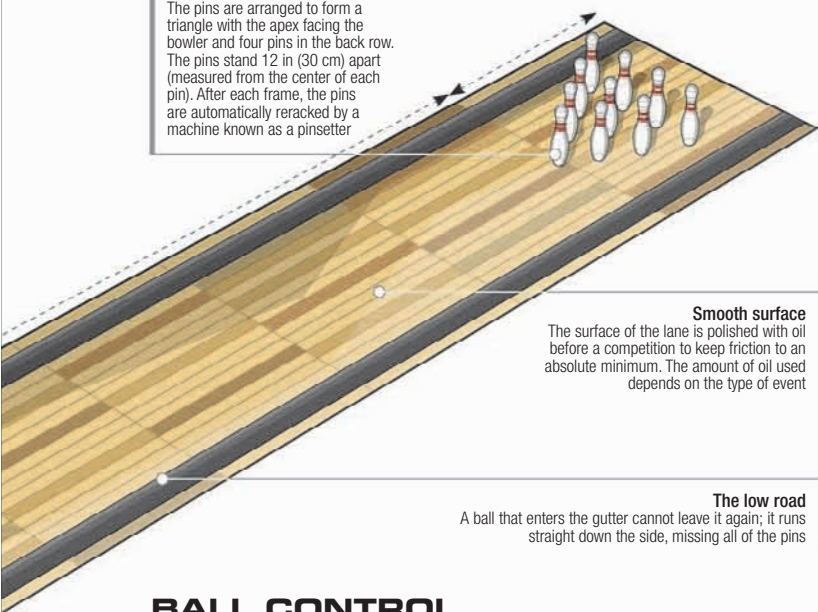
After every turn, the balls are automatically returned to the approach area along a raised, sloping trackway mounted on the right-hand side of the lane.

LANE LAW

In competitive 10-pin, each player has 10 frames, each of which consists of two attempts to knock down as many pins as possible. One point is scored for every pin that is knocked down. Contestants who demolish all 10 pins in the first attempt are awarded a strike, for which they earn a score of 10 points plus a bonus of the total of their next two shots. If the player knocks down all 10 pins in two attempts, he or she is awarded a spare and earns 10 points plus a bonus of the pins knocked down on the next shot. If there is still at least one pin standing after the second attempt, it is called an open frame.

Pin point

The pins are arranged to form a triangle with the apex facing the bowler and four pins in the back row. The pins stand 12 in (30 cm) apart (measured from the center of each pin). After each frame, the pins are automatically rerecked by a machine known as a pinsetter.



Smooth surface

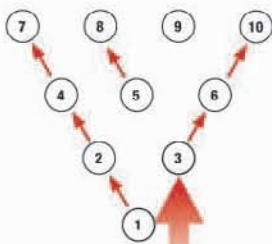
The surface of the lane is polished with oil before a competition to keep friction to an absolute minimum. The amount of oil used depends on the type of event.

The low road

A ball that enters the gutter cannot leave it again; it runs straight down the side, missing all of the pins.

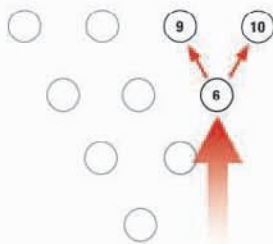
BALL CONTROL

Since it is physically impossible for the ball itself to strike every pin, the player needs to create a chain reaction of one pin hitting its neighbor, and so on, to get a good score. Experienced bowlers curve the ball's trajectory, or "roll a hook," to achieve maximum effect. The ball starts on a straight course but then curves to the left or right as it approaches the pins. Players whose first throw does not travel according to plan may end up with two or more remaining pins (7 and 10, for example) that are almost impossible to be knocked down with a single ball. In this instance, the player will knock down one of the remaining pins and settle for an open frame.



A PERFECT STRIKE

The ideal shot need hit only pins 1, 3, 5, and 9 (for right-handers) because these pins can then take out all the others. The same should also be true of a shot that hits pins 1, 2, 5, and 8 (for left-handers). It is usually important to avoid hitting pin 1 head-on.



MOP-UP OPERATION

In this example, the bowler failed to knock down all the pins on the first attempt; three (6, 9, and 10) were left standing. The player delivers a straight ball just to the right of pin 6, which in turn knocks down 9, and the ball continues and demolishes 10.

BOWLING ON THE BIG SCREEN

TEN-PIN BOWLING HAS FEATURED IN NUMEROUS POPULAR FILMS, INCLUDING THE COEN BROTHERS' *THE BIG LEBOWSKI* (1998), WHERE A DOPED-UP HIPPIE BOWLER IS DRAWN INTO A WEB OF CRIMINALITY. IN A 1996 FEATURE, WOODY HARRELSON IS AN EX-BOWLER IN *THE LOUD, RUDE, AND CRUDE* FARRELLY BROTHERS' FLICK *KINGPIN*.

STROKERS AND CRANKERS

Bowlers will always argue over the best method of delivery, and the reality is that each has its masters. Many top players use the graceful and stylish stroker, while others prefer the powerplay of cranking. And in East Asia, the spinning or "helicopter" delivery is popular.



STROKER

The stroker is the classic style of hook bowling. The player's sliding foot stops just before the ball reaches the lowest point of the swing, and his or her shoulders are square at the point of release.

CRANKER

The bowler produces the maximum amount of spin on the ball. When delivering the ball, he or she quickly pulls the arm through, bending the elbow to keep the hand behind and under the ball.

THE PERFECT GAME

Bowlers who score a strike every time they throw will score 30 points per frame. If they then get another strike in the tenth and final frame, they are awarded two extra balls. If these are also strikes, the bowler scores the maximum 300 points and has played the perfect game. In 1997, a Nebraska student became the first person to accomplish three consecutive perfect games in an approved series. Perfect games remain rare occurrences.

INSIDE STORY

There are many historical references to bowling, but the first indoor bowling alley was not opened until 1840—Knickerbockers in New York City. Today the sport is played in more than 100 countries.

The game developed greatly in the second half of the 20th century. While still a relaxed leisure activity for millions, it is now also a recognized competitive sport played by highly paid full-time professionals. Positions on the world ranking system are determined by players' performances in the American, Asian, and European tours.

GOVERNING BODIES

The World Tenpin Bowling Association (WTBA) governs the sport internationally, while the United States Bowling Congress (USBC) and the British Tenpin Bowling Association (BTBA) control the game in their respective countries.

5-PIN BOWLING



326

GAME OVERVIEW

Individuals or teams take turns to roll a ball at a group of pins; whoever knocks over the most pins after an agreed number of attempts wins the match. The game began as a gentle alternative to 10-pin bowling (see pp324–25), but soon acquired a devoted following of its own.

NEED2KNOW

- The pins are 25 percent smaller than those used for 10-pin bowling, and the ball can be held in the palm of the hand.
- The game originates from—and is still almost exclusively confined to—Canada. There, some public bowling alleys offer both 5-pin and 10-pin.
- Canada has three main annual knockout competitions: an open event, a youth challenge, and a doubles tournament. There is also a league.

EQUIPMENT

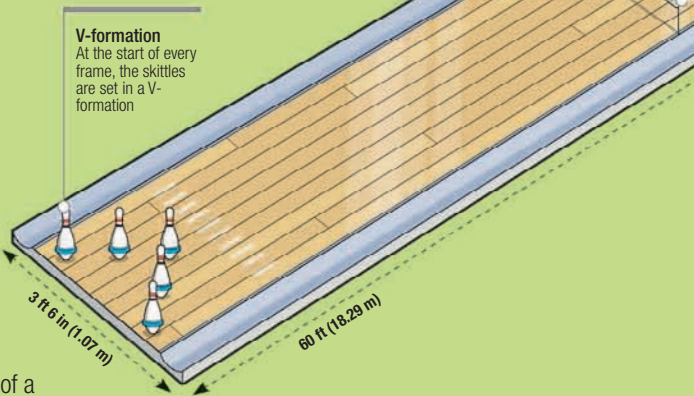
Originally carved out of maple wood, 5-pin skittles are now almost invariably mass-produced from plastic. The balls are made of solid rubber. Historically, they were of a uniformed design and color, but since 1990, players have been allowed to personalize their balls with engravings and ID.

BOWLING BALLS

Unlike its 10-pin bowling equivalent, the 5-pin ball has no finger holes, so maintaining a good grip is important.



Easy to grip
The 5-pin ball weighs 3½ lb (1.6 kg) and is easy to grip



SHAPELY SKITTLE

The 5-pin skittle is shorter and thinner than the equivalent used in 10-pin bowling. The ring around the bottom of its circumference lowers the center of gravity.



Belly band
The heavy rubber belly-band makes the skittle bounce farther than a 10-pin when hit



ATLATL

SPORT OVERVIEW

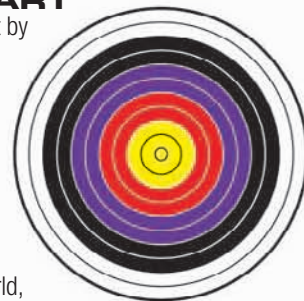
Atlatl involves using a sling device of the same name to throw a dart or light spear at a target. It combines the physical demands of the javelin in athletics (see pp66) with the accuracy of darts (see pp334–35).

NEED2KNOW

- Sling devices were used in many parts of the world until they were superseded by bows and arrows. Atlatl (pronounced “ott-lottle”) is an Aztec word. The Aztecs were using the weapon for hunting in the 16th century.
- The International Standard Accuracy Competition (ISAC), established in 1996, is a standardized event for atlatlists from around the world.
- Top players can hit targets from distances of up to 325 ft (100 m).

THROWING THE DART

The thrower, or atlatlist, holds the shaft by the handle and grips the dart, usually with his or her thumb and forefinger. As if throwing a javelin or a spear, the thrower brings their arm back and then swings it forward. Finally, with a flick of the wrist the dart is released at the target.



ATLATL EVENTS

Atlatl events take place around the world, particularly in the United States and Europe. Contests are held on dedicated ranges or in open country; each target is set at a different distance from the firing line, both for variety and to test a range of skills. The winner of an event scores the most points after shooting at all the targets.

HITTING THE TARGET

The targets may be any shape or size, but are usually similar to archery targets; others bear the outlines of wild animals. They all have marked areas that score varying numbers of points.

SLING DEVICE

An atlatl is a sling device composed from a shaft of wood. Any type of wood can be used. At one end is a handle and at the other a means of holding the dart.

Get a grip

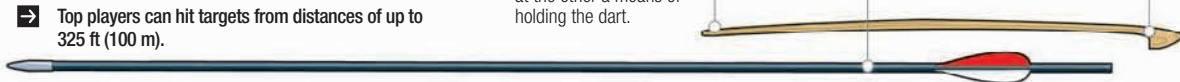
The thrower holds the atlatl by the handle

Large dart

The dart resembles a large arrow and is at least 4 ft (1.25 m) long

Holding a dart

A dart fits into a hook, pin, or socket



SKITTLES



GAME OVERVIEW

Skittle players or teams take turns to use a ball to knock down a diamond-shaped set of 9 skittles at the end of an alley. The player or team that scores the most wins the match. Skittles has many variations and local rules. It is a traditional game that is popular in pubs in parts of England, and is also played in Germany and Austria. Some rules do vary according to region.



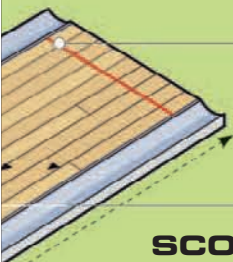
PIN LAYOUT

At the start of each turn, the 9 skittles are set out in a diamond pattern; they should be positioned no more than their own length apart.

VARIATIONS

Skittle alleys always have a smooth surface, often wooden, and are usually 21–36 ft (6.4–11 m) from the throwing mark to the front pin. Skittles vary in size and shape, and may include a kingpin. Balls also vary (one rare game uses a disc-shaped cheese) and are usually made of hardwood or rubber. They should be 4–6 in (10–15 cm) in diameter. The pins are 6–16 in (15–40 cm) high, and may weigh up to 6 lb 10 oz (3 kg).

Depending on the local rules, the ball may be rolled along the floor, bowled underarm—either with or without a bounce—or simply thrown at the skittles. A match usually consists of 12 hands (turns), and each hand comprises three throws. A point is gained for every skittle knocked over, so the maximum score per hand is 27.



Foul line

Players must release the ball before they reach this mark

Height restriction

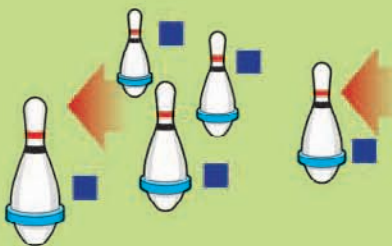
To ensure that balls are rolled, not thrown, a perspex sheet is placed across the lanes at a height of 6 in (15 cm)

SCORING

Players play 10 frames per game, with up to 3 attempts per frame. If a player gets a strike (knocks down all five balls at once), his or her scores on the next two attempts count double. The maximum game score is 450.

DECREASING VALUE

The foremost pin in the V-formation counts five points; the two behind it score three points each; the backmarkers are each worth two points.



LANE DISCIPLINE

Players must not overstep the foul line at the start of the lane: any violation incurs a 15-pin penalty, which is deducted at the end of the game.

HORSESHOE PITCHING



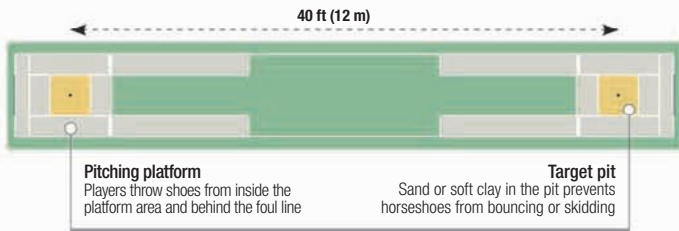
GAME OVERVIEW

Two players or two teams of two players take turns tossing horseshoes at stakes in the ground. The winner scores the highest number of points or near misses. Horseshoe pitching is very popular in parts of the United States.

LAW AND SCORE

Competitors stand at opposite ends of the playing area and aim their horseshoes at the stake next to their opponent's throwing position. They change ends after every turn, which consists of two throws.

A ringer (a horseshoe that lands around the stake) normally counts as 3 points. The exception is when both players throw a ringer on the same turn, in which case nothing is scored. On each turn, the closest horseshoe to the stake (a near miss) scores one point. The winner is normally the first to 21, although some matches are played in sets.

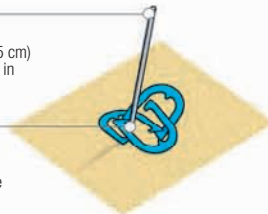


PLAYING AREA

A stake stands in the center of the target pit at each end of the playing area. There is a pitching platform on each side of a target pit.

High stakes

Stakes are 1 in (2.5 cm) in diameter and 15 in (37.5 cm) high

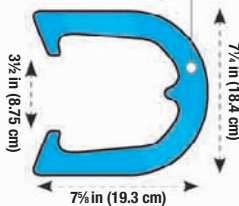


Sloping stake

A stake slopes 3 in (7.5 cm) toward the thrower

Shoe fitting

Each horseshoe must weigh no more than 2 lb 10 oz (1.2 kg); there is no minimum weight



PITCHING A SHOE

The horseshoes used in modern horseshoe pitching are usually about twice the size of a real horseshoe. A player stands inside one of the two pitching platforms beside the target pit and pitches at the stake at the far end. For a throw to score points, the stake must be wholly inside an imaginary line between the ends of the horseshoe.

GAME OVERVIEW

With its roots in the game of billiards (see p331), snooker is a sport where two players use cues and a cue ball to pocket as many colored balls as possible on a table with six pockets. Each of the balls has a points value and must be pocketed in a particular order. The player with the highest number of points wins the frame (game). Each match consists of an agreed odd number of frames, the winner being the player who secures the most frames.



SNOOKER

THE TABLE

A snooker table is made of a wooden frame within which sits a slate bed that is covered by a wool-based cloth known as baize. The table has six pockets with curved openings: two at the top cushion ("spot" end) corners, two at the bottom cushion ("baulk" end) corners and two in the middle of the side cushions (the center pockets).

THE BAULK AND THE D

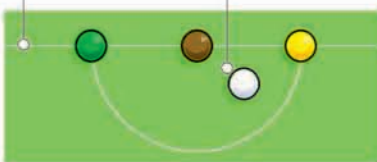
The area between the bottom cushion and a line (baulk line) 29 in (74 cm) along the table is known as the baulk. At the center of the baulk line is a semi-circle with a radius of 11½ in (29 cm) that is called the D.

Baulk line

The green, brown, and yellow balls are spotted along this line

Cue ball

This can be placed anywhere within the D when breaking off



PLAYER PROFILE

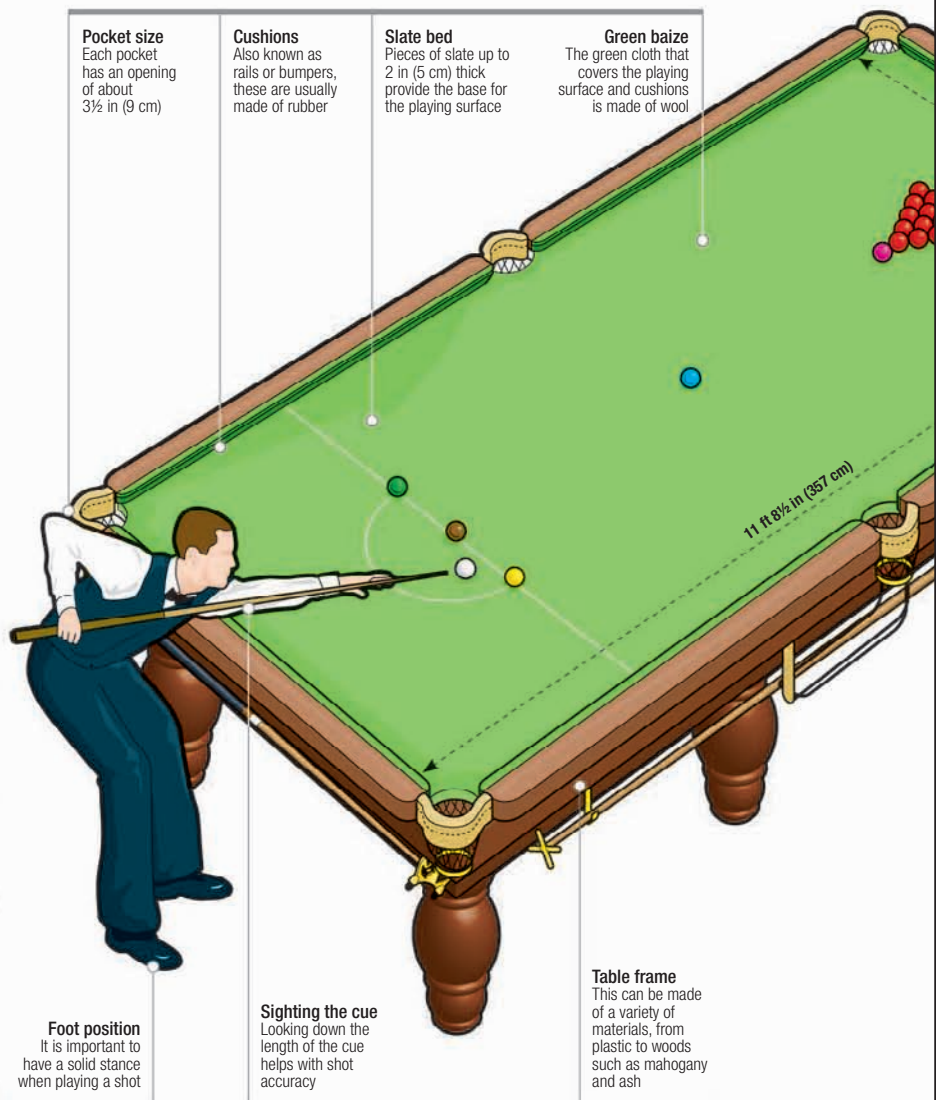
As well as good hand-eye coordination, a snooker player needs to have a steady arm and a firm wrist to achieve total control of the cue and enable shots to be played with accuracy and precision. Mental agility, tactical awareness, and technical consistency are other useful attributes.

NEED2KNOW

Snooker balls were originally made from ivory, with African ivory considered superior to the Indian variety due to its more even density. Despite their popularity, ivory balls were prone to losing their shape.

The first player to score a maximum 147 break on television was Steve Davis at the Lada Classic in Oldham in 1982.

The inaugural World Snooker Championship was held in 1927, and it was won by the organizer, Joe Davis.



Pocket size
Each pocket has an opening of about 3½ in (9 cm)

Cushions
Also known as rails or bumpers, these are usually made of rubber

Slate bed
Pieces of slate up to 2 in (5 cm) thick provide the base for the playing surface

Green baize
The green cloth that covers the playing surface and cushions is made of wool

11 ft 8½ in (357 cm)

Foot position
It is important to have a solid stance when playing a shot

Sighting the cue
Looking down the length of the cue helps with shot accuracy

Table frame
This can be made of a variety of materials, from plastic to woods such as mahogany and ash

EQUIPMENT

Aside from a table, a triangle, balls, and cues, very little equipment is needed for a game of snooker. Bridges, spiders, and extensions are special items used to help players execute difficult shots, while chalk adds control to the tip of the cue. For practical purposes, an overhead lamp provides additional lighting over the table.

CUES

These tapered shafts of wood come in one or two pieces and are traditionally made to a standard length of 4 ft 10 in (147 cm), though slightly shorter varieties are also available.



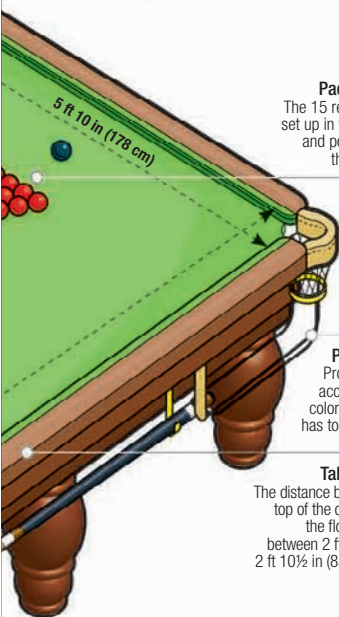
Cue length
Under official rules, a snooker cue must be at least 3 ft (91.4 cm) long

BRIDGES AND SPIDERS

Usually constructed from a wooden shaft with a brass or nylon attachment, bridges and spiders come in a range of shapes and sizes to suit different hard-to-reach shots.



Rest assured
The bridge rests on the table and provides a raised area over balls adjacent to the cue ball



Pack of reds
The 15 red balls are set up in the triangle and positioned at the spot end

Pocket rail
Provides easy access for any colored ball that has to be spotted

Table height
The distance between the top of the cushion and the floor must be between 2 ft 9½ in and 2 ft 10½ in (85.1 cm and 87.6 cm)

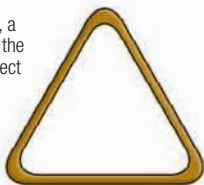
THE BALLS

Modern snooker balls are made of a plastic called phenolic resin. In addition to the nonvalue white cue ball, there are 21 other balls on a snooker table: 15 reds (worth 1 point each), plus one each of yellow (2 points), green (3 points), brown (4 points), blue (5 points), pink (6 points), and black (7 points). Full-size balls measure 2½ in (52.5 mm) in diameter but smaller balls can be used on reduced-sized tables.



TRIANGLE

Made of plastic or wood, a triangle is used to place the 15 red balls in their correct position on the table at the start of a frame. A tournament triangle is mounted on rollers for ease of positioning.



CHALK

This is applied to the cue tip, with the thin film of chalk providing grip on the ball when it is struck.



REFEREE

The referee has a variety of roles in a snooker game including the placing of the balls in their correct position at the start of a frame and repositioning colored balls—other than reds—after they have been pocketed during a frame (known as “spotting”). The referee also rules on foul shots, supplies bridges, spiders, and extensions when needed, and cleans a ball.

POCKET ROCKET

RONNIE “THE ROCKET” O’SULLIVAN IS THE MOST NATURALLY GIFTED PLAYER TO HAVE EMERGED IN THE SPORT FOR A GENERATION. SINCE TURNING PROFESSIONAL IN 1993 HE HAS WON EVERY MAJOR TOURNAMENT AT LEAST ONCE. EQUALLY ADEPT AT PLAYING RIGHT- AND LEFT-HANDED, THE CHARISMATIC O’SULLIVAN HAS SET NEW STANDARDS IN THE SPORT.

PLAYING BY THE RULES

At the heart of the sport of snooker is the sequence that the balls must be pocketed. A red ball has to be pocketed alternately with a colored ball until all the reds have been cleared from the table. After this, the colors must be pocketed in ascending order of their value—yellow, green, brown, blue, pink, and black.

FOULS

Foul shots generally incur a penalty of 4 points, which are added to the tally of the opposing player. Fouls can take place for a number of reasons including a player striking the ball with both feet off the ground (at least one foot has to be on the floor at all times), hitting a ball that is not “on” (an “on” ball is one that is valid for a player to strike, whether red or another color), and missing a ball completely. A few fouls incur a 7-point penalty, and these include using an object to measure the distance between balls and using any ball other than the white as a cue ball.

BALL PLAY

There are a whole set of regulations regarding what can and cannot be done with the balls at any given time. One example is a touching ball, a situation that arises after a player plays a shot and the cue ball stops next to—and is touching—one of the other balls. In this case, a player has to strike the cue ball away from the touching ball without moving it otherwise a foul will be called.

SIDELINES

147 The maximum number of points that can be scored on a snooker table if every red ball pocketed is followed by a black.

15 The number of times Joe Davis won the World Championship (1927–40 and 1946).

4 The number of consecutive century breaks scored by John Higgins in his match against Ronnie O’Sullivan at the 2005 Grand Prix, the first time this had been done at a major tournament. The feat was equaled by Shaun Murphy when playing against Jamie Cope in the 2007 Welsh Open.

105,000,000

The number of Chinese television viewers who watched live as countryman Ding Junhui beat Stephen Hendry in the 2005 China Open.



TECHNIQUES AND TACTICS

A good stance is a key factor in being able to attain the balance needed to play shots with confidence, and this can be achieved by bending your front leg but keeping your back leg straight. Hold the cue with enough grip so that you are fully in control of it but not too tightly—you will then be in an ideal position to place the cue in the “bridge” (hand position on the table) and line up a shot. Once you have decided which ball you are going to attempt to strike (the “object” ball) and what type of spin you are hoping to impart, pull the cue back and then forward into the cue ball in one smooth motion.

CUEING

An effective cueing action will provide you with consistently accurate shots that will enable you to accumulate the points needed to win a frame. Keep your arm over the cue and as you are about to strike the ball, ensure that the elbow with which you are holding the cue is in a straight line with the cue. Maintaining this position through the shot will enable you to hit the ball straight.

OPEN BRIDGE

Place your hand flat on the table and position the cue between your raised thumb and index finger. Raise your palm to follow-through on a shot or keep it flat to screw the ball back.



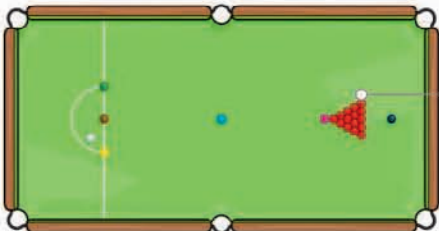
CLOSED BRIDGE

Again put your hand flat on the table but this time feed the cue under your index finger and move your thumb up so that there is a complete circle around the cue. The cue should be able to move smoothly through the circle.



BREAKING

The break takes place at the start of each frame, with the basic premise that the player breaking must strike one of the red balls. A good break will see the cue ball hitting a red ball with the minimum disruption to the pack of reds and then come back up the table to rest as close to the baulk cushion as possible. This will then put pressure on the opposing player.



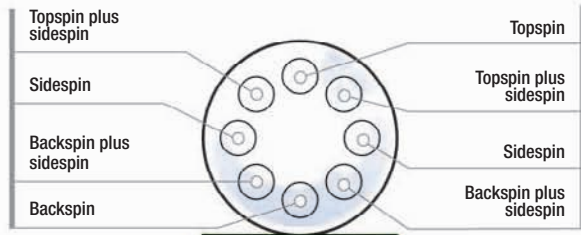
Corner ball
Strike the base of the pack but ensure you apply sidespin to return to a safe position back up the table

INSIDE STORY

Snooker developed out of variants of the game of billiards that were played by British Army officers stationed in India in the 1870s, with colored balls added to games previously consisting solely of 15 reds and a black. The word snooker itself came from a term for a new army recruit and was reputedly first used in 1875 by a Colonel Neville Chamberlain to describe the (inexperienced) players of this new game.

SPIN

The most important technical ability in snooker is using spin to control the direction of the cue ball and its final resting position. Striking the cue ball in different areas will generate one of three types of spin—backspin, sidespin, and topspin—that each have a particular effect on the behavior of the ball.



SWERVE

Swerve is a skill that can help to get a player out of a tricky situation or even make a difficult pocket. The shot is played by lifting the back of the cue and hitting down on the cue ball either just left or right of center. Combined with spin, it is an effective weapon in a player's armory.



Hand position
Raise your palm off the table to create a high bridge

Strike down

Strike down on the cue ball, to the left of center for left swerve as here, or right of center for right swerve



Object ball

With a little luck and a lot of practice you should be able to hit the object ball and either steer yourself out of trouble or make a pocket

BUILDING A BREAK

The most important aspect of amassing points in one visit to the table is thinking ahead to the next shot and the cue ball position needed to get on that shot. You may well forego an easy shot in order to get position on or pocket a ball of higher value. Getting balls into pocketable positions is also vital, so a shot that opens up the pack of reds can pay rich dividends.

SAFETY SHOTS

It's not just about pocketing the balls. In certain situations it is more beneficial to play a shot that will leave the cue ball in a difficult position for your opponent and open up the possibility of them playing a foul stroke. The ultimate safety shot is a “snooker.” When the consequence of the stroke you have just played is that your opponent is now unable to get a direct line to a red or colored ball that they must play. Frames can easily be won with strong safety play.

GOVERNING AUTHORITY

Snooker's governing body is the World Professional Billiards and Snooker Association (WPBSA). It has a commercial arm known as World Snooker that runs the professional tournament circuit and negotiates television rights around the world. The body has had great success in developing the East Asian market where the sport is gaining rapidly in popularity. This is due partly to the rise through the ranks of a number of high-quality players from the region, such as Ding Jinhui from China and James Wattana from Thailand.



BILLIARDS

NEED2KNOW

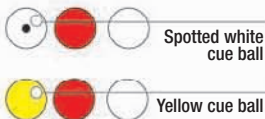
- ➔ Carom billiards tables are heated to warm up the cloth and thereby enable the balls to travel faster across the playing surface.
- ➔ Other names for carom billiards include straight rail, French billiards, and carambole.
- ➔ Early versions of billiards were first played in the 15th century.

SCORING

In carom, a "count" (point) is scored each time a player hits both the object ball and their opponent's cue ball in one stroke. In English billiards, this is known as a "cannon" and is worth 2 points. Extra points are scored by pocketing or going in off the red ball (3 points) or your opponent's cue ball (2 points). A single stroke can amass different types of points. For example, a cannon followed by pocketing the red will secure 5 points.

THE BALLS

Both carom and English billiards use just three balls: two cue balls (one white and one spotted white or yellow ball) and one red object ball. Each player is assigned their own cue ball that they keep throughout the game.



GAME OVERVIEW

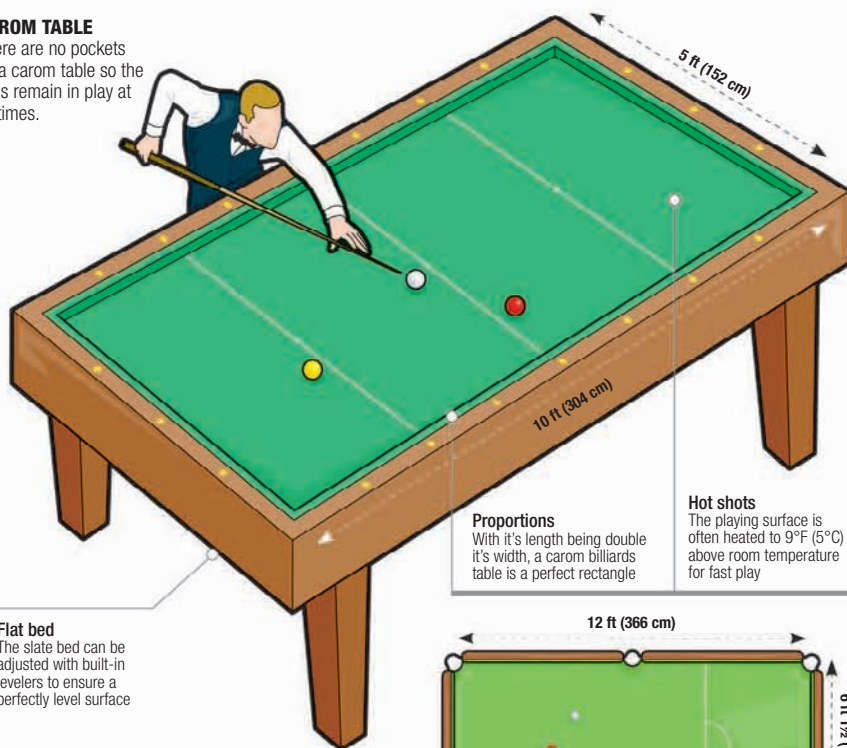
There are many different types of billiards, the most popular forms being carom billiards and English billiards. A carom table has no pockets, with scoring achieved by striking two balls into one another. An English table does incorporate pockets, and scoring takes place either in the carom style or by pocketing the balls.

THE TABLE

A billiards table is made up of a raised flat slate bed that is covered with fine woolen cloth. The playing surface is surrounded by cushioned edges that are flush around the table for carom but have six pockets set within them for the English variety.

CAROM TABLE

There are no pockets on a carom table so the balls remain in play at all times.



Flat bed

The slate bed can be adjusted with built-in levelers to ensure a perfectly level surface

Proportions

With its length being double its width, a carom billiards table is a perfect rectangle

Hot shots

The playing surface is often heated to 9°F (5°C) above room temperature for fast play

ENGLISH TABLE

Longer and wider than a carom table, an English billiard table also has six pockets, one at each corner and one on each side of the midline.



PLAYING BY THE RULES

At the start of a game of carom billiards, the balls are placed on three spots on the table: the red ball on the foot spot, the opponent's cue ball on the head spot, and the breaker's cue ball no more than 6 in (15 cm) from the center spot on the head string. The only rule is that the breaker must hit the red ball first. Foul shots include striking the wrong cue ball and playing two safety shots in succession. These incur a penalty of missing a turn and losing any count that resulted from the foul stroke.

In English billiards, the red ball is positioned on a spot at the top of the table and the breaker's cue ball is placed within the D (the opponent's cue ball is left off until their turn). Penalty points are added to the opponent's score for failing to strike a ball (1 point) and for pocketing the cue ball without hitting a ball (3 points).

STRINGING

This is the method used to determine the order of play in English billiards (known as lagging in carom). Before a game, the players take an as-yet-unassigned cue ball each and hit it from the baulk line so that it rebounds off the top cushion. The player whose ball stops closest to the baulk cushion has the choice of which cue ball to use and the option of shooting first.



NEED2KNOW

- ➔ The most widely played form of pool is the version known as 8-ball. The most popular form of the sport in the United States is 9-ball pool—it attracts TV coverage and sponsorship money for competitions.
- ➔ Pool was named after the poolrooms, or betting parlors, in the United States during the 19th century. Tables for playing pool helped patrons pass the time between horse races.
- ➔ Pool matches can be over any number of games, but the World Pool Association 8-ball final winner is the first to 17 games.

OBJECT BALLS

In all forms of pool the cue ball is white and the object balls are colored and usually numbered. In 8-ball pool and blackball pool, there are 15 object balls: those numbered 1 to 7 have different solid colors, while balls numbered 9 to 15 are white with different colored stripes and the 8-ball is solid black. (The numbers on the 6 and 9 balls are underscored to avoid possible confusion.) One variation of 8-ball pool that is common in Great Britain uses 7 red and 7 yellow balls without numbers except for a numbered black.

Players of 9-ball pool use 9 of the numbered object balls—1 to 8 are solid colors and the 9-ball is striped. In the game of 14:1 continuous pool, the 15 object balls are numbered.

POOL

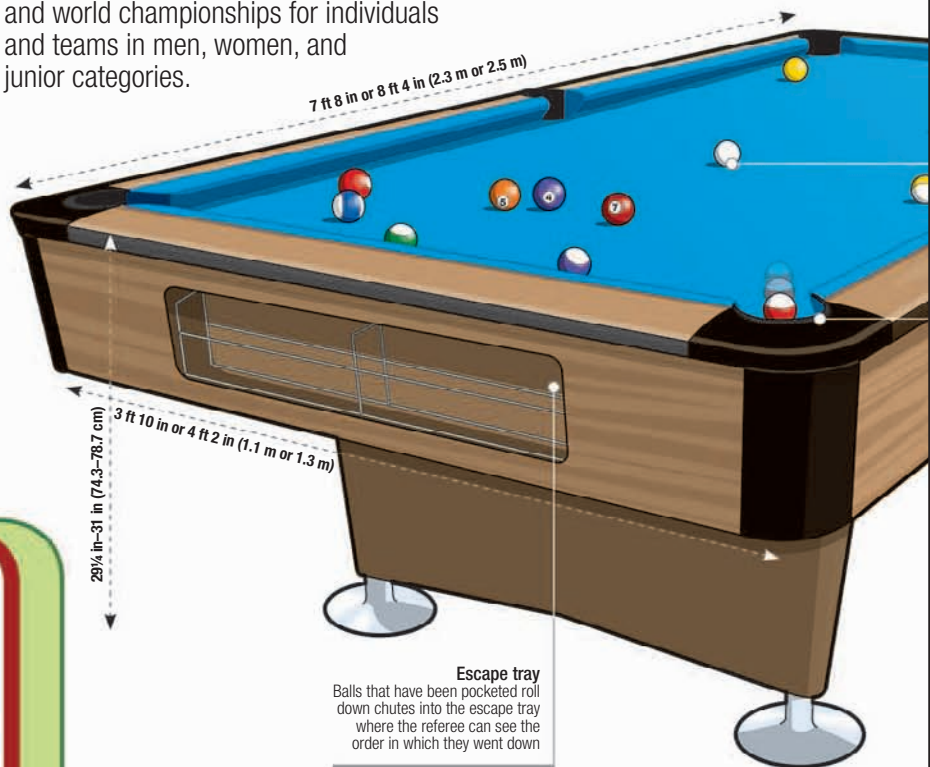


SPORT OVERVIEW

Popular in clubs and bars around the world, pool is a cue sport played with a set number of balls on a dedicated table with 6 pockets. Various forms include 8-ball, 9-ball, blackball, and 14:1 continuous pool (straight pool). Rules may vary from place to place. There are many local, national, and world championships for individuals and teams in men, women, and junior categories.

COMPETITOR PROFILE

Pool players need to develop a steady cueing action and good arm-eye coordination to enable them hit the white ball at exactly the right speed and direction. They also need to be able to judge angles perfectly in order to pocket the object balls and to put the correct spin on the white ball to control its subsequent position precisely.



STAT CENTRAL

WPA WORLD 9-BALL CHAMPIONS

YEAR	NAME	(COUNTRY)
2010	F. BUSTAMANTE	(PHILIPPINES)
2007	DARYL PEACH	(ENGLAND)
2006	RONNIE ALCANO	(PHILIPPINES)

WEPF WORLD 8-BALL CHAMPIONS

YEAR	NAME	(COUNTRY)
2010	MICK HILL	(ENGLAND)
2009	PHIL HARRISON	(ENGLAND)
2008	GARETH POTTS	(ENGLAND)
2007	GARETH POTTS	(ENGLAND)
2006	MARK SELBY	(ENGLAND)
2005	GARETH POTTS	(ENGLAND)
2004	MICK HILL	(ENGLAND)
2003	CHRIS MELLING	(ENGLAND)
2002	JASON TWIST	(ENGLAND)
2001	CHRIS MELLING	(ENGLAND)
2000	JASON TWIST	(ENGLAND)

Cue tip

The cue tip may be no more than 1/2 in (14 mm) in diameter

Cue shaft

The wooden shaft must be at least 39 1/2 in (1 m) long. It may have an internal ferrule for weight and balance

Chalk cube

Players apply chalk to the tip of their cue for "true" contact with the white ball



Bridge for support

To help them with shots that are hard to reach, players use a bridge (also known as a rake or crutch) to support their cue

Racking up

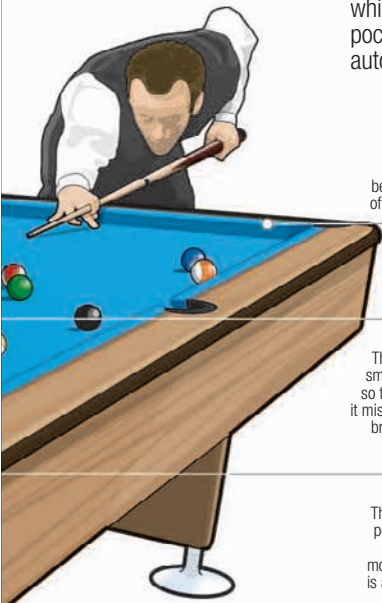
In 8-ball a triangle is used to arrange the object balls at the start of each game



FAIR AND FOUL

In 8-ball pool the player who pockets the first ball must continue pocketing balls of the same type (either solids or stripes). A player who pockets all 7 of their balls can then try to pocket the black. Whoever pockets this 8-ball in a nominated ("called") pocket wins the game. In 9-ball pool, players have to hit the lowest numbered ball on the table but do not have to pocket the balls in sequence. The 9-ball must be pocketed last. In 14:1 continuous pool, players call a ball and a pocket, scoring a point each time they achieve it.

Players continue shooting until they either fail to pocket an object ball or commit a foul—for example, by pocketing the white ball or an opponent's ball. Any player who prematurely pockets the 8-ball in 8-ball pool or the 9-ball in 9-ball pool automatically forfeits the game.



Rubber cushions

The height of the triangular-shaped rubber cushions is between 62.5–64.5% of the width of the ball

Cue ball

The cue ball is slightly smaller than the others so that, if it is pocketed, it misses the chute and is brought back into play

Big mouth

The mouth of a corner pocket is about 4½ in (11.6 cm) wide. The mouth of a side pocket is about 5¼ in (13 cm)

SPIN & SWERVE

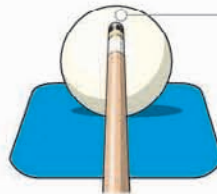
Pool players, like snooker players, can spin the cue ball in a number of ways. As they pocket an object ball they may apply topspin, backspin, or sidespin to help them gain a good position for their next shot. Sometimes, the path of the cue ball is blocked by an opponent's ball or by the 8-ball, preventing a player from hitting their object ball easily. Skilled players get around this by hitting the ball off-center, causing it to swerve: the further to the left or right of center, the greater the deviation. This is known as "putting side on it." To swerve around a ball that is very near the cue ball, players use the massé shot (from the French "to rub"), hitting the white off-center with a downward movement.

DO THE HUSTLE

HUSTLERS HANG OUT IN POOL HALLS LOOKING FOR PLAYERS WHO THINK THEY ARE BETTER THAN THEY ACTUALLY ARE. THEY SUGGEST A GAME, LOSE IT, THEN PLAY ANOTHER ONE FOR MONEY. AT THIS POINT THEY START PLAYING WELL, COMPREHENSIVELY BEAT THEIR OPPONENT, AND POCKET THE STAKES. THE "ART" WAS IMMORTALIZED BY PAUL NEWMAN IN THE MOVIE "THE HUSTLER."

TOPSPIN

Topspin makes the white ball run on after it has hit the object ball. Players hit the cue ball above its "equator," causing it to revolve forward on its axis faster than normal.



Run on
For topspin, players hit the top of the cue ball

BACKSPIN

Backspin makes the white ball move backward after hitting the object ball. Players hit the cue ball below its "equator," causing it to return toward them.



Pullback
For backspin, players hit the bottom of the cue ball

Corner balls

The two corner balls at the base of the 8-ball rack must be of different types

Foot spot

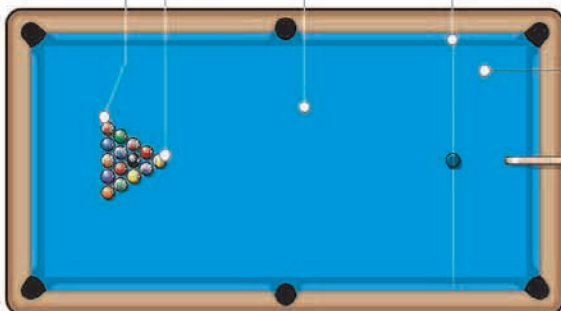
The apex ball sits on the foot spot when the balls are racked in 8-ball

Playing surface

Baize made of 85% combed worsted wool, and no more than 15% nylon

Head string

The opening break is made from behind the line of the head string



Baulk area

The baulk area behind the head string is sometimes known as the kitchen

SIDELINES

526 The number of balls pocketed consecutively without a miss by one player in a single session. This record high run was achieved by US champion Willie Mosconi while playing an exhibition match of 14:1 continuous pool in 1954.

128 The number of finalists (from more than 40 countries) in the men's 2007 World Pool Championships in Taiwan. The competition opened with four groups of 32; the top two in each went forward to a knockout. The first prize was \$75,000.

INSIDE STORY

Eight-ball pool is most popular in Great Britain and Europe, where it is played in clubs and pubs as well as in dedicated pool halls. Variation in the rules of 8-ball, particularly in Britain, include positioning the black on the foot spot when the balls are racked at the start of a game and giving two shots to an opponent after committing a foul. The World Eightball Pool Federation (WEPF) was set up in 1992 to unite the various organizations who promote 8-ball pool, to set criteria for the players and to organize an annual World Championship.

WORLD POOL-BILLIARD ASSOCIATION (WPA)

The WPA was a founding members of the World Confederation of Billiard Sports (WCBS) in 1990. The WPA organizes a World 9-ball Championship and an annual World 8-ball Championship that rivals the event organized by the WEPF.



DARTS

NEED2KNOW

- Although the target score is usually 501, it can also be 301, 601, 801, or even 1,001.
- The throwing line is known as the oche (pronounced "okky"), from the French "ocher," to cut a groove.
- More than 6 million people regularly play darts.
- The quickest way to get 501 is in 9 darts.
- Darts is a popular TV sport, with audiences of up to 5 million in countries such as Britain and the Netherlands.

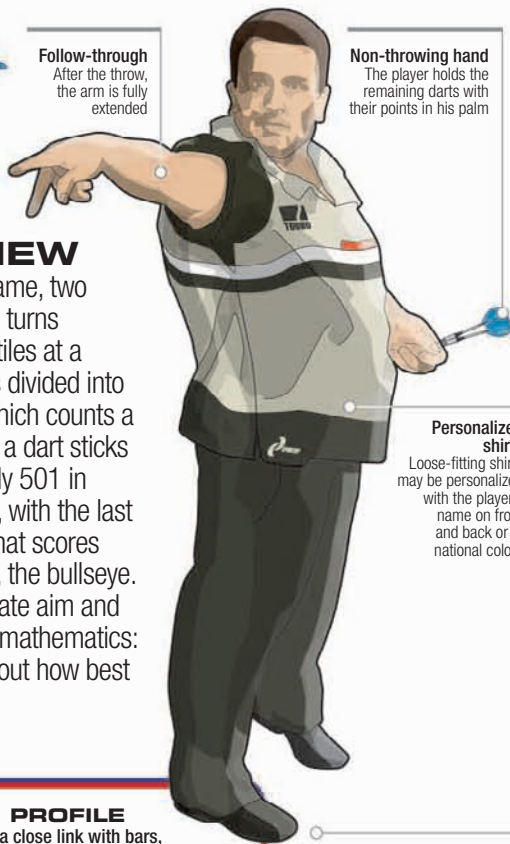
GAME OVERVIEW

In this enthralling and popular game, two players—male or female—take turns throwing three arrow-like projectiles at a circular board. The target area is divided into a total of 62 sections, each of which counts a different number of points when a dart sticks in it. The object is to score exactly 501 in fewer throws than the opponent, with the last dart hitting one of the sections that scores double points or, less commonly, the bullseye. The game is mainly about accurate aim and steel nerves, but it is also about mathematics: players need to be able to work out how best to reach the target score.



Follow-through
After the throw, the arm is fully extended

Non-throwing hand
The player holds the remaining darts with their points in his palm



Personalized shirts
Loose-fitting shirts may be personalized with the player's name on front and back or in national colors

Toeing the line
A throw does not count if the player oversteps the oche

HARROWING ARROWING

ALL PLAYERS DREAD "DARTITIS," OR THE YIPS, A NERVOUS CONDITION THAT PREVENTS THEM FROM THROWING SMOOTHLY. NO ONE KNOWS WHAT CAUSES IT—OR HOW TO CURE IT. ONE HIGH-PROFILE VICTIM WAS FORMER WORLD CHAMPION ERIC BRISTOW, WHO WAS EVENTUALLY FORCED TO GIVE UP THE GAME.

PLAYER PROFILE

Darts still has a close link with bars, although professionals no longer drink or smoke while playing. Today, younger players are increasingly drawn to the sport. Concentration and hand-eye coordination are keys to success, along with being able to repeat the same movement countless times with only tiny adjustments.

STAT CENTRAL

TOP CHECKOUTS

SCORE	OUTSHOT
170	TRIPLE 20, TRIPLE 20, BULL
167	TRIPLE 20, TRIPLE 19, BULL
164	TRIPLE 20, TRIPLE 18, BULL
161	TRIPLE 20, TRIPLE 17, BULL
160	TRIPLE 20, TRIPLE 20, DOUBLE 20
158	TRIPLE 20, TRIPLE 20, DOUBLE 19
157	TRIPLE 20, TRIPLE 19, DOUBLE 20
156	TRIPLE 20, TRIPLE 20, DOUBLE 18
155	TRIPLE 20, TRIPLE 19, DOUBLE 19
154	TRIPLE 20, TRIPLE 18, DOUBLE 20
153	TRIPLE 20, TRIPLE 19, DOUBLE 18
152	TRIPLE 20, TRIPLE 20, DOUBLE 16
151	TRIPLE 20, TRIPLE 17, DOUBLE 20
150	TRIPLE 20, TRIPLE 18, DOUBLE 18
149	TRIPLE 20, TRIPLE 19, DOUBLE 16
148	TRIPLE 20, TRIPLE 16, DOUBLE 20

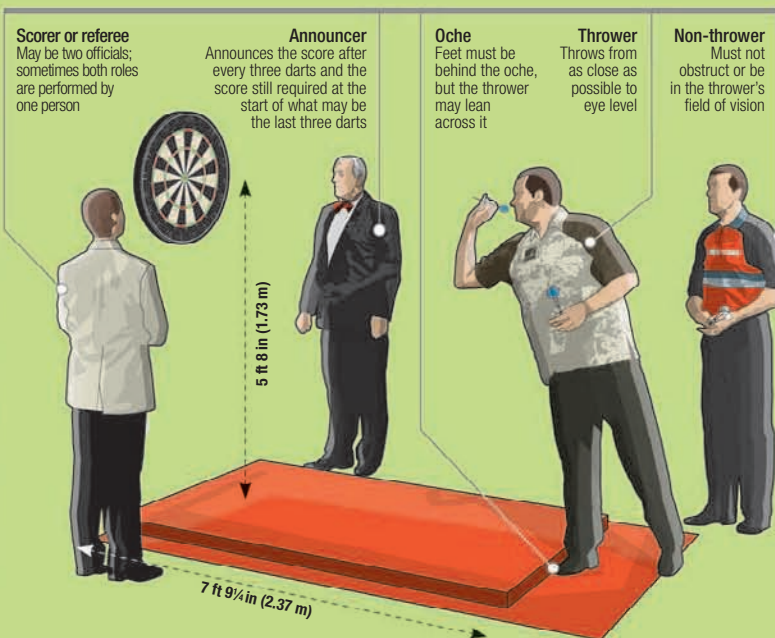
Scorer or referee
May be two officials; sometimes both roles are performed by one person

Announcer
Announces the score after every three darts and the score still required at the start of what may be the last three darts

Oche
Feet must be behind the oche, but the thrower may lean across it

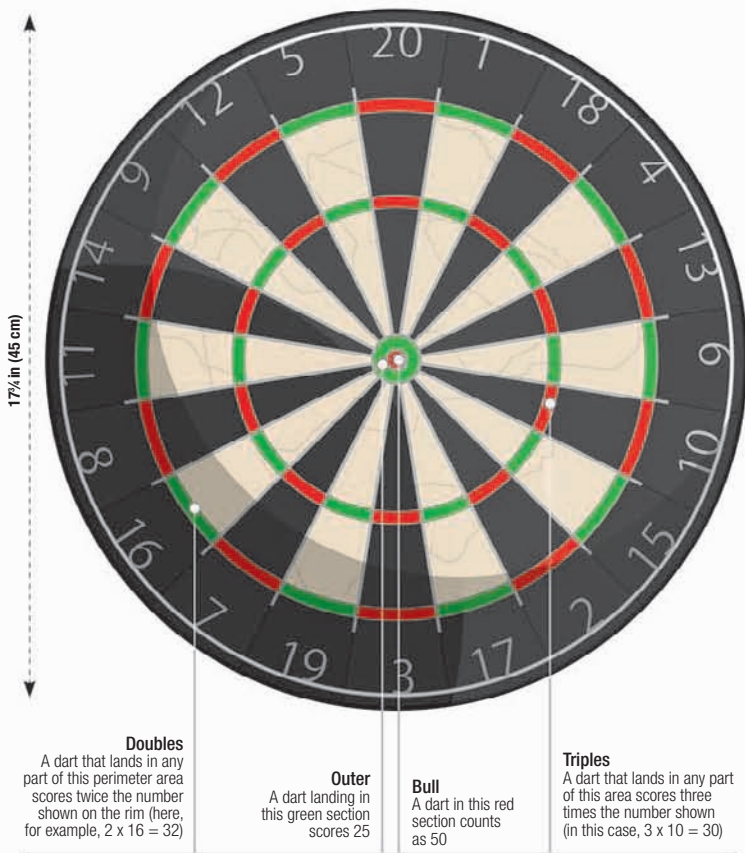
Thrower
Throws from as close as possible to eye level

Non-thrower
Must not obstruct or be in the thrower's field of vision



BOARD DISCUSSION

The bed of a dartboard is made of cork, sisal, and synthetic materials to give it a “bristle” appearance. Wire separates each scoring section; a dart that lands within a section scores the points, even if it bends the wire out of place. A dart that bounces back off the wire does not count.



Doubles
A dart that lands in any part of this perimeter area scores twice the number shown on the rim (here, for example, $2 \times 16 = 32$)

Outer
A dart landing in this green section scores 25

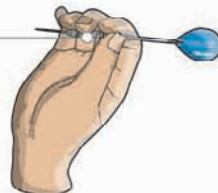
Bull
A dart in this red section counts as 50

Triples
A dart that lands in any part of this area scores three times the number shown (in this case, $3 \times 10 = 30$)

CHECKOUT TIME

For the first few darts, players try to score as much as possible, normally going for triple 20 each time. Nearing zero, they often try to leave themselves 32, so they can throw at double 16. This is the checkout of choice because a narrow miss that scores a single 16 leaves them on double 8; if that fails and they get a single 8, they can go for a double 4; if the same thing happens again, they are still left with a double 2.

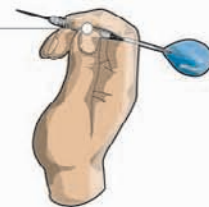
Well-balanced
The dart is held close to horizontal with three fingers in support



STANDARD GRIP

The shaft is gripped between the thumb and index finger, and steadied on the middle and third fingers; the little finger is withdrawn slightly out of the way.

High style
The tip is angled slightly higher than in the standard grip to compensate for the reduction in power that results from holding the dart with only two digits



PENCIL GRIP

The dart is held between thumb and forefinger alone. This common variant of the standard grip is used by many leading players, including 13-time world champion Phil “The Power” Taylor.

ARROWS OF DESIRE

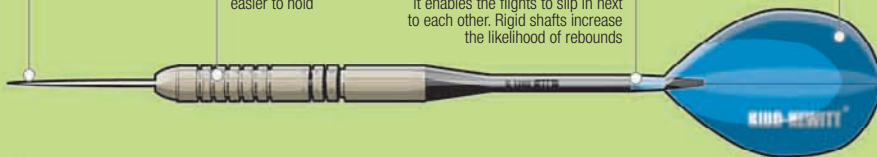
The maximum permitted weight of a dart is 1.8 oz (50 g). The pointed tip may be made of brass (the cheapest material), alloys of nickel and silver, or tungsten (the most expensive). The shaft is made of plastic or solid aluminum. The flight is detachable and replaceable; it is either tough nylon or flexible plastic.

Types of tip
The choice between hard (tungsten) and other “soft” tips is a matter of individual preference

Finger grip
The thick cylindrical casing around the middle section of the shaft helps balance the dart and makes it easier to hold

Spinning shafts
Some darts have shafts that spin while in flight. Although this does not make them fly straighter, it does help the thrower to get close groupings on the board, because it enables the flights to slip in next to each other. Rigid shafts increase the likelihood of rebounds

Stabilizing end
The flight has four tailplanes at 90 degrees from each other



Approx. 6 in (15 cm)

INSIDE STORY

Darts may have developed from archery—early dartboards had concentric targets, as in archery, and darts is still known as “arrows.” Darts was a regional game in Britain until the rules were codified in the 1920s. The sport enjoyed a heyday in the 1930s—helped when King George VI and his wife, Queen Elizabeth, were photographed throwing darts in a pub near Windsor. The sport’s next boom came in the 1970s, with the introduction of TV games, the emergence of the first darts stars, and the establishment of the World Darts Federation (WDF) and the British Darts Organization (BDO). The WDF now has 66 member nations.

PROFESSIONAL DARTS CORPORATION (PDC)

In 1992, one of the world’s leading players, Phil Taylor, led 15 other top players out of the BDO to form a rival body, the Professional Darts Council (PDC). The PDC has held its own world championship since 1994. It now runs a thriving tour with competitions as far afield as Blackpool and Las Vegas. Top BDO player Raymond van Barneveld defected to the PDC in 2006.

GAME OVERVIEW

Archery today is far-removed from its roots in hunting and warfare. As a modern sport it involves two or more archers competing against each other to get the highest score by hitting a target that is usually circular, but may also be the outline of a wild animal. Most competitions are held in several stages, at each of which the archers shoot from different distances to display their versatility. Round targets are marked in rings: the closer the ring to the center, the greater the number of points for a hit. On animal targets, the top scoring areas are those in which a blow to a real animal would be lethal. The winner of an archery tournament is the contestant with the highest points total after a previously agreed number of shots.

ARCHERY



ATHLETE PROFILE

Archers need steady arms, a good aim, and concentration, but these are not the only requirements. Much of the pressure is psychological—the need to hit a certain score to win may make a target harder to hit than it would be in a practice session.

Nock nock

A mark on the string indicates the nock point—the point at which the indent in the rear of the arrow should be placed

Excuse fingers

Leather tabs are worn to protect the first two or three fingers of the drawing hand

Bowstring

The string is made from high-strength polyethylene fiber

Accessible quiver

The arrows are held in a tube worn on the same side as the archer's drawing hand, for ease of reloading after every shot

Stand fast

Archers wear sturdy shoes with smooth soles to maximize the area in contact with the ground

Arm guard
A brace protects against burns from the string after release

Bow shaft
Once universally made from wood, the modern bow is a mixture of carbon fiber and fiberglass, bonded with plastic foam

Sharpshooter
A protruding metal or plastic rod with a viewfinder at the end is used by the archer to sight on the target

Steady as she goes
Long or short stabilizers jut forward to increase vertical balance, and sideways or in a V-shape to assist horizontal balance

Row of officials

Judges check distances and adjudicate any disputes; there should be at least one for every 10 targets. Scorers work out the points after each round

Traffic lights

Archers may not shoot on red; green means they may fire; amber means they have 30 seconds left

RECURVE BOW

The recurve bow is the type most often used by field archers, and is the only type used at the Olympics. It has tips that bend away from the archer.

FIRING RANGE

Target archery may take place indoors or outdoors. The normal indoor distances are 82 ft (25 m) and 59 ft (18 m). There are a range of other events: field archery involves shooting up and downhill, making the target harder to sight. In ski and run archery, competitors shoot at targets after skiing or running a set course, a little like the biathlon (see pp.298–299). Flight archery, rarely seen in competition, is one of the purest forms of the sport. There is no target: the aim is simply to fire an arrow as far as possible.

98–120 yd (90–110 m)

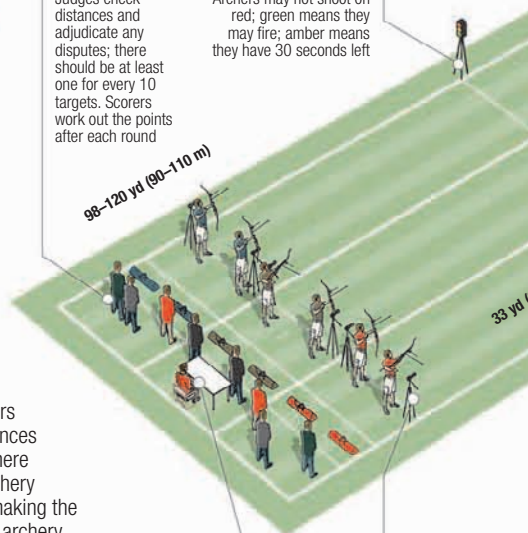
33 yd (30 m)

Director's chair

The director of shooting controls the competition, and receives points tallies from the scorers

Visual aid

A telescope helps archers see what they have scored and calculate what they still need



A ROBIN HOOD

ONE OF THE RAREST ACHIEVEMENTS IN ARCHERY IS SPLITTING THE SHAFT OF AN ARROW ALREADY IN THE TARGET WITH A LATER SHOT. ARCHERS WHO PERFORM THIS FEAT—KNOWN AS “A ROBIN HOOD” AFTER THE LEGENDARY 12TH-CENTURY ENGLISH BOWMAN—GET TO KEEP THE ARROWS AS A PROUD TROPHY OF THE FEAT.

FLIGHT CONTROL

In FITA tournaments archers have a fixed amount of time to shoot 12 rounds (a total of 36 arrows) at targets between 33 and 98 yd (30 and 90 m) away. Scores are updated after six arrows at longer distances and three at shorter distances.

An arrow touching two colors or a dividing line scores the higher value, and one that rebounds from or passes through the target counts only if it leaves a clear mark. In the event of a tie, the winner is the archer with the most scoring hits.

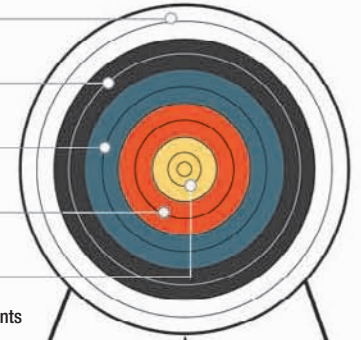
White outer: 1 point
White inner: 2 points

Black outer: 3 points
Black inner: 4 points

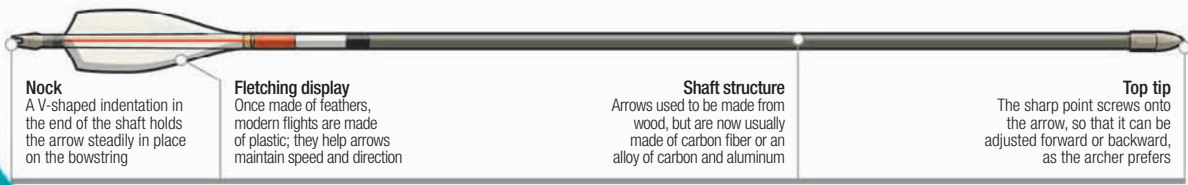
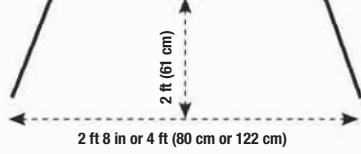
Blue outer: 5 points
Blue inner: 6 points

Red outer: 7 points
Red inner: 8 points

Gold outer: 9 points
Gold inner bull's eye: 10 points



TARGET TIME
Conventional targets are made of straw ropes and split into bands 2½ in (6 cm) or 1½ in (4 cm) wide. 3D archery targets are shaped like hunting animals.



Nock
A V-shaped indentation in the end of the shaft holds the arrow steadily in place on the bowstring

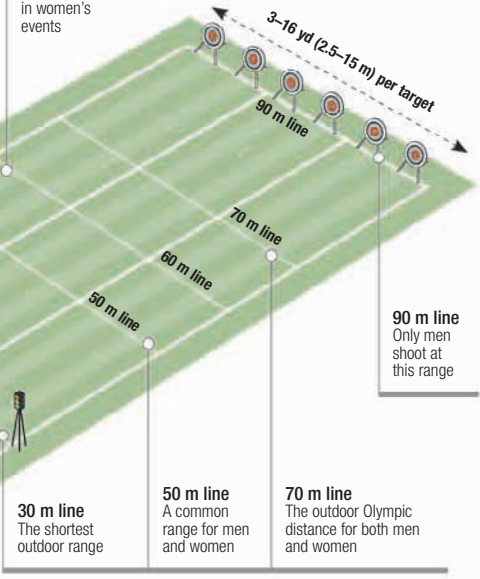
Fletching display
Once made of feathers, modern flights are made of plastic; they help arrows maintain speed and direction

Shaft structure
Arrows used to be made from wood, but are now usually made of carbon fiber or an alloy of carbon and aluminum

Top tip
The sharp point screws onto the arrow, so that it can be adjusted forward or backward, as the archer prefers



60 m line
Only used in women's events



30 m line
The shortest outdoor range

50 m line
A common range for men and women

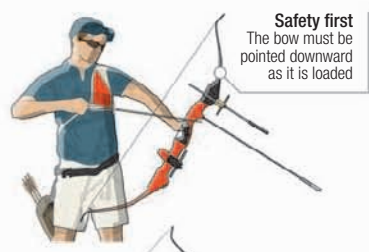
70 m line
The outdoor Olympic distance for both men and women

90 m line
Only men shoot at this range

ON TARGET

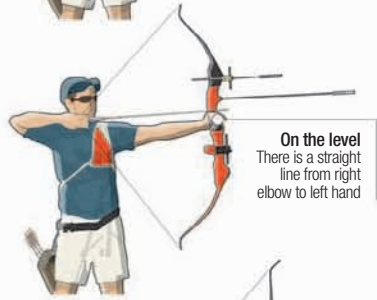
Archers with a dominant right eye hold the bow in their left hands, and vice versa. Each shot takes only about 15 to 20 seconds from loading to firing, but holding the bow and pulling the string is still tiring. Archers rest (“let down”) their bows in between shots to conserve their strength.

PREPARATION FOR SHOT
The archer stands with the leading shoulder toward the target and the feet set shoulder-width apart. He or she points the bow at the ground and loads the arrow by placing the front of its shaft on the arrow rest and the bowstring into the v-shaped nock at its fletching end.



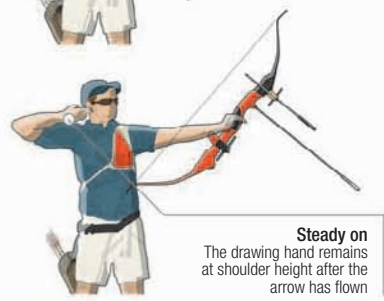
Safety first
The bow must be pointed downward as it is loaded

DRAWING AND TAKING AIM
Holding the string between the index and middle fingers, or the index and middle and ring fingers, the archer pulls it back, raises the bow, and looks down the sight at the target. This position is held at the “anchor point.” Some bows have a clicker that sounds when the archer reaches the right draw length.



On the level
There is a straight line from right elbow to left hand

FOLLOW THROUGH
As the archer prepares to fire, his or her bowstring hand should be resting against the cheek. The arrow is fired by relaxing and straightening the fingers of the drawing hand. Once the shot has been made, the archer “lets down” the bow to rest, and reaches into the quiver for the next arrow.



Steady on
The drawing hand remains at shoulder height after the arrow has flown

INSIDE STORY

Archery featured in the Olympics from 1900, but was dropped after 1920 because there were no internationally agreed rules. The establishment of FITA in 1931 changed all that, and the sport was reintroduced at the 1972 Games for both men and women. FITA was established by seven countries, but now has members from 140 countries.

- Pistol shooting debuted in the first Olympic Games of 1896. The events have evolved as the manufacturing of guns has developed and changed.
- Some nations with strict gun control laws, including the UK, do not televise shooting events.
- Target pistol shooting in its modern form is the conservationist's alternative to pigeon shooting.
- There are five pistol events in the Olympic Games.

COMPETITOR PROFILE

Pistol shooters need extraordinary powers of concentration and mental focus to remain relaxed under pressure, since any nervous tension in the shooting arm could cause the shot to go off center of the target. Shooters also need strength and stamina.

Eye protection

Competitors wear shatterproof safety glasses or similar protection to guard their eyes during the event

Free hand

The non-shooting hand must not be used in any way; it is usually tucked into a pocket or belt

SIDELINES

159 The number of national federation members from 5 continents that are affiliated with the International Shooting Sports Federation.

3 The number of Olympic golds won by German sportsman Ralf Schumann, the most successful pistol shooter to date in the 25 m rapid-fire event. His victories came in 1992, 1996, and 2004.

581 The world record score for the 50 m pistol event, set by Russian sportsman Alexander Melentiev at the 1980 Olympic Games. A perfect score would be 600; a score of around 570 is considered to be world-class.

PISTOL SHOOTING



SPORT OVERVIEW

In this sport, competitors stand and, with one hand, fire a pistol at a circular target divided into 10 concentric rings; the nearer to the center the shots land, the higher they score; the center (the bull's-eye) scores 10. The sport takes place on a shooting range. There are a number of events that are distinguished by the type of pistol used and the distance the competitor stands from the target.



Ear protection

Contestants wear earplugs, earmuffs, or some other form of ear protection while in the vicinity of the firing line

Shooting arm

The arm that holds the pistol is extended and must be completely unsupported

Competitor's gun

Three types of pistols are used, depending on the event

Competitors' clothing

No specific clothing is required, but garments that would help immobilize the arms, legs, or body are not allowed, and only low-sided shoes, without ankle supports, can be worn

SHOOTING RANGE

Pistol shooting events take place on a shooting range. Safety is of paramount importance, and officials are on hand to check the competitors' pistols, check the targets, and sometimes to keep a note of the scores after each round of shooting.

CONCENTRIC RINGS

The target is composed of concentric rings. The numbers are the points scored when a shot hits the ring. Shots hitting a line are awarded the higher point. Targets and the central ring (the 10-ring) vary in size.

Outer rings

Rings scoring 1 to 6 are white

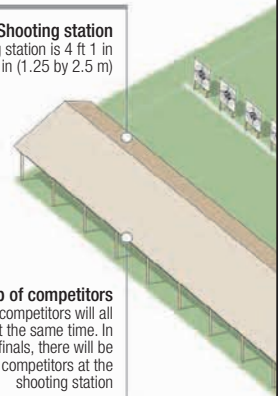
Inner rings

Rings scoring 7 to 10 are black



Shooting station

Each shooting station is 4 ft 1 in by 8 ft 2 in (1.25 by 2.5 m)



Group of competitors

A group of competitors will all compete at the same time. In Olympic finals, there will be six to eight competitors at the shooting station



TYPES OF PISTOL

Different types of pistol are used for the different events—the 10 m air pistol, the 25 m pistol, and the 50 m pistol. A pistol's caliber is the diameter of its barrel. For safety reasons, the ammunition must be made of lead or a similarly soft material. Regulations only allow open sights on the weapons, so mirrors, optical sights, and telescopic sights are all prohibited. Officials carefully check each competitor's weapon before an event begins to make sure the pistol complies with the event's regulations. If a competitor's weapon malfunctions during an event he or she has 15 minutes to repair or replace it.

10 M AIR PISTOL

Competitors use .177 in (4.5 mm) caliber pistols that fire lead pellets at targets 32¾ ft (10 m) away. The maximum allowable weight of the pistol is 3 lb 3 oz (1.5 kg). The diameter of the 10-ring is ½ in (11.5 mm).



Ammunition propulsion
The ammunition is propelled by precompressed air or by a carbon dioxide cylinder

25 M PISTOL

The same requirements govern the women's 25 m pistol and the men's 25 m rapid-fire pistol events. The guns have a caliber of .22 in (5.6 mm) with a maximum weight of 3 lb (1.4 kg). The diameter of the 10-ring in the rapid fire target is 4 in (10 cm).



Rapid firing
This type of pistol must be capable of firing five shots without reloading

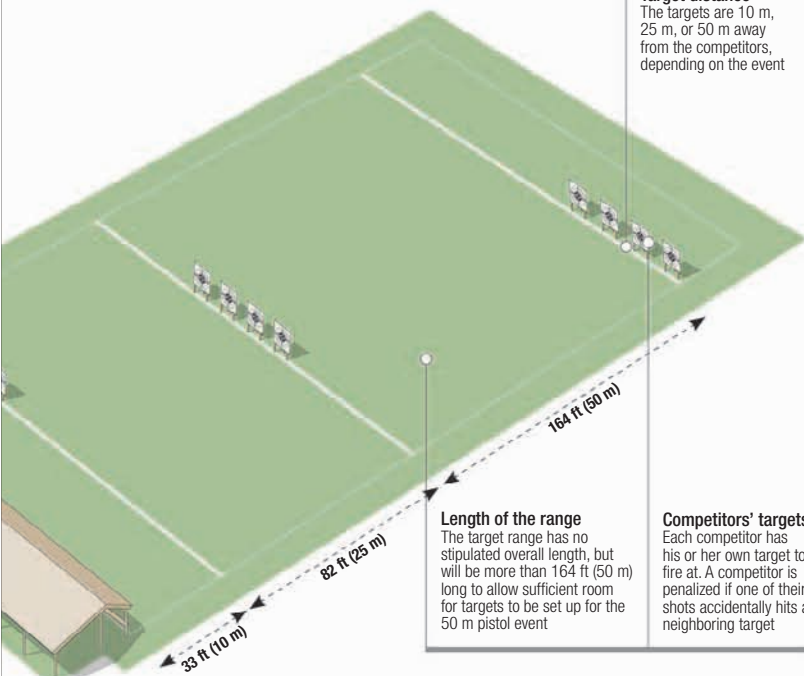
50 M PISTOL

Competitors use .22 in (5.6 mm) caliber pistols, which have a special customized grip but no maximum weight regulation. The precision target stands 165 ft (50 m) away and the diameter of its 10-ring is 2 in (5 cm).



Single cartridge
The pistol is loaded with one cartridge only

Target distance
The targets are 10 m, 25 m, or 50 m away from the competitors, depending on the event



Length of the range
The target range has no stipulated overall length, but will be more than 164 ft (50 m) long to allow sufficient room for targets to be set up for the 50 m pistol event

Competitors' targets
Each competitor has his or her own target to fire at. A competitor is penalized if one of their shots accidentally hits a neighboring target

OLYMPIC EVENTS

There are five Olympic pistol shooting events, two for women and three for men. The 10m air pistol event, which first featured in the Olympic Games in 1988, includes both men and women (in separate events). Men shoot 60 shots within 105 minutes, while women shoot 40 shots within 75 minutes. Women compete in the 25 m pistol event, firing two rounds of 30 shots. Men compete in the 25 m rapid-fire pistol event, which also consists of two rounds of 30 shots. Men compete in the precision 50 m pistol event, firing 60 shots within 120 minutes.

OVERALL WINNER

In each event all competitors take part in a qualification round, from which the best eight (or six for 25 m Rapid-Fire Men event) proceed to the final. The scores they achieve in the qualification round are added to their final round—whoever has the most points overall is the winner.

PERFECT SCORES

Scoring in the events can be complicated but competitors aim for perfect scores. For example, in the 25 m rapid-fire event, the perfect match score is 600 for qualification rounds and a score of 592 is categorized as world-class.

ONE-HANDED CHAMPION

KAROLY TAKACS WAS A MEMBER OF THE HUNGARIAN PISTOL SHOOTING TEAM WHEN, IN 1938, HE LOST HIS RIGHT HAND IN A GRENADE EXPLOSION. HE TAUGHT HIMSELF TO SHOOT LEFT-HANDED AND BECAME HUNGARIAN PISTOL SHOOTING CHAMPION IN 1940. HE WENT ON TO WIN GOLD MEDALS IN THE RAPID-FIRE PISTOL EVENT AT THE OLYMPIC GAMES IN LONDON IN 1948 AND AGAIN IN HELSINKI IN 1952.

INSIDE STORY

Along with other target-shooting disciplines, pistol shooting is governed by the International Shooting Sports Federation (ISSF), which was established in 1998 and was formerly the International Shooting Union (ISU). The ISSF supervises the World Championships every four years, two years after the Olympic Games. Pistol shooting events in the World Championships are organized for individuals and teams in men, women, and junior categories. The ISSF also supervises World Cups, Continental Championships, and Continental Games. The introduction, in 1989, of a new electronic scoring system eliminated paper targets at final competitions and enabled spectators to know results immediately. A new television era was born at the Olympic Games in Barcelona in 1992 when viewers all around the world witnessed coverage of the shooting events for the first time.

INTERNATIONAL SHOOTING SPORTS FEDERATION (ISSF)

The target shooting sport throughout the world is governed by the International Shooting Sports Federation, which is based in Germany.

SHOTGUN SHOOTING

340



EVENT OVERVIEW

Shotgun shooting is an event where competitors use a smooth-gauged (unrifled) shotgun to shoot at clay targets that are released from a machine called a trap. Clay Target shooting can be broadly split into three categories—trap, skeet, and sporting. Trap and skeet are both performed at the Olympic Games, while sporting involves shooting at targets designed to simulate those found in nature.

Sleeveless jacket

No specific clothing is required, but shooters tend to wear a loose sleeveless jacket with large pockets in which to store their cartridges. Shooters generally wear a fairly loose-fitting T-shirt or shirt so their arm movements are not restricted.

Shooting position

In all shotgun shooting events the competitors fire at the targets from a standing position.

COMPETITOR PROFILE

Shotgun shooters need to focus, both mentally and physically. They need excellent hand-eye coordination and visual-spatial skills. They need to be able to anticipate the trajectory of a fast-moving target and shoot slightly ahead of it, so they can hit it.



Optical sights

Any devices that can be fitted to the gun to help the shooter sight the target, such as magnifying lenses, are prohibited.

Shotgun barrel

Skeet-shooting guns often have a shorter barrel than trap-shooting guns (24–28 in/60–71 cm compared to about 28–34 in/71–86 cm), because of the shorter-range targets.

Ear protection

Competitors are advised to wear ear muffs or some other form of protective gear to protect their hearing.

Shotgun gauge

The shotguns used are generally of 12-gauge caliber. Smaller-gauge guns can be used, but anything larger than 12-gauge is not allowed.

FIELDS OF PLAY

The skeet and trap events utilize different fields of play. The Olympic skeet field features eight shooting stations arranged in a semicircle. The competitors shoot from each station in turn. The targets are released from a high and a low trap house at either side of the semicircle. The trap field features five banks of 3 traps that sit within a trench that is 49 ft (15 m) from the shooters. In the double trap event (not illustrated here), two targets are released simultaneously at different heights and angles from the center bank of traps, with competitors getting one shot at each target. There are five shooting stations, but unlike the trap field, they are set in a straight line.

NEED2KNOW

- The modern sport of shotgun shooting (both trap and skeet) derives from the custom of shooting birds, in particular pigeons and pheasants, for sport.
- Skeet shooting was invented in 1915 as a recreational sport. Live pigeons were used at first, but they were eventually replaced with clay targets.
- Trap shooting has been part of the Olympics since 1950, whereas skeet shooting appeared at the Games for the first time in 1968.
- The word “skeet” is derived from an old Scandinavian word which means “shooting.” The term was adopted by the sport in 1926.

SPORTING CONTROVERSY

IN 1992, CHINA'S SHAN ZHANG BECAME THE FIRST WOMAN TO WIN A MIXED-SEX SHOOTING EVENT IN THE OLYMPIC SKEET. THE EVENTS WERE SUBSEQUENTLY SEGREGATED, AND SHAN WAS NOT ALLOWED TO DEFEND HER TITLE.



THE OLYMPIC SKEETFIELD

A standard round of 25 targets are shot from 8 stations in a semicircle. At the ends of the semicircle are the high and low trap houses from which targets are released on a fixed trajectory and within defined limits. A set combination of single and double targets are shot from each station and scored on the basis of 1 point per target hit, and the shooter is only allowed one shot at each target. All shooters on the squad (up to 6 people) must have completed the station before moving to the next one.

COMPETITION

There are currently five shotgun shooting events at the Olympics, but the schedule of events has changed in the past. There have been more events in the past; the women's double trap event was dropped after 2004. The world championships feature a greater range of events, including skeet, trap, and double trap for both men and women.

Single and double targets

The round features both single and double targets. A single target is released from either the high or the low trap. Doubles mean that targets are released simultaneously from both the high and the low trap

Target crossing point

Targets properly released must pass through a circle located above the target crossing point

High trap house

Targets from the high trap house emerge at a height of 10 ft (3.05 m) and can travel about 213 ft (65 m)

Positions 1 to 7

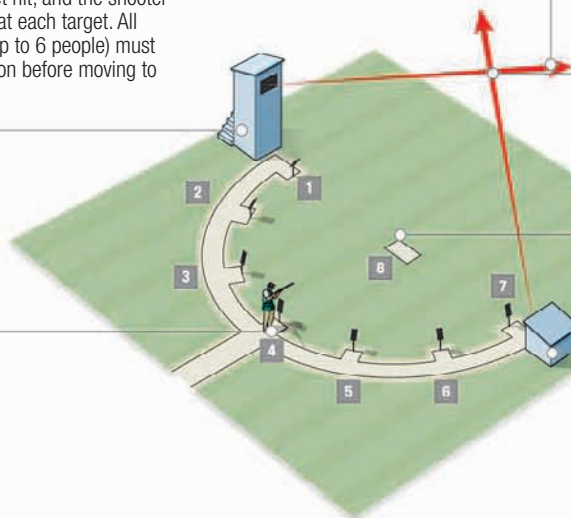
The competitor will start at station one and progress from station to station. These stations are 26½ ft (8.1 m) apart

Position 8

The 8th shooting station is the largest—it is 35½ by 73 in (90 by 185 cm), while the other stations are 35½ by 35½ in (90 by 90 cm)

Low trap house

The low trap house releases targets at a height of 3½ ft (1.05 m). The targets may travel at about 55 mph (88 kph)



TRAP FIELD

In the trap event, six shooters (a squad) are on the field at any one time. The targets are released immediately on the shooter's call but the shooter does not know which trap in a group of three will release the target. The target reaches an exit speed of about 80 mph (130 kph). Each shooter is permitted two shots at each target. Each shooter fires in turn from the shooting station until 25 targets (a round) have been shot at by all of the squad members.

Clay targets

The traps are set to shoot out the targets at a variety of heights, speeds and angles (between 0 and 45 angles, to both left and right). The competitors can take two shots at each target

Target distance

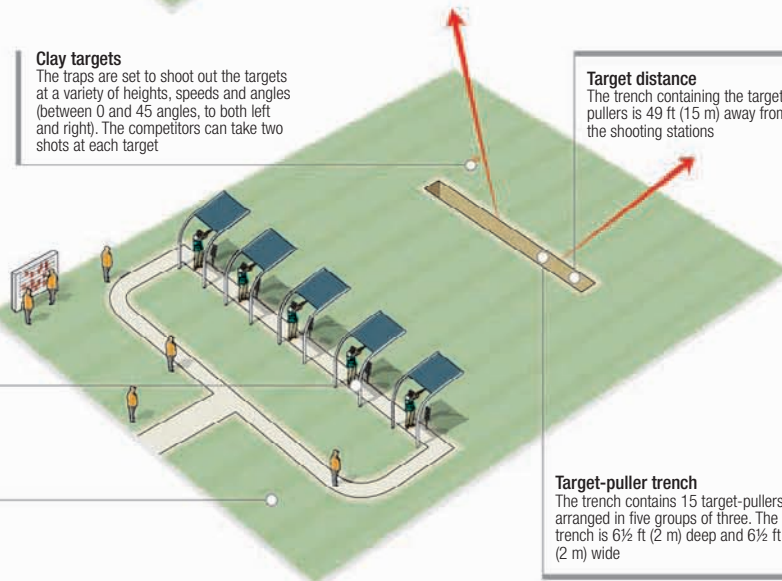
The trench containing the target-pullers is 49 ft (15 m) away from the shooting stations

Shooting stations

There are five shooting stations. Each is served by three traps (hence there are a total of 15 traps in the trench)

Field width

The total width of the field of play is 65½ ft (20 m)



Target-puller trench

The trench contains 15 target-pullers, arranged in five groups of three. The trench is 6½ ft (2 m) deep and 6½ ft (2 m) wide

SIDELINES

194

The current world record score for double trap shooting. This record was set by Italy's Daniele Di Spigno in 1999, and equalled by Ronjan Sodhi of India in 2008, and is the combined score out of 200 from the qualifying round and final. A perfect score in trap shooting would be 150; the highest score recorded so far is 147. This score has been achieved by several shooters so there is no overall record holder.

55

The distance, in meters, the targets in double trap shooting are set to travel when released from the trap (equivalent to 180 ft). Double trap shooters generally hit the targets from a distance of 82–131 ft (25–40 m).

3

The number of shotgun events that have been discontinued at the Olympics. This includes live pigeon shooting. Clay targets were substituted for live birds, but the traps tried to simulate the erratic patterns of birds in flight.

0-3

The maximum number of seconds between a skeet shooter calling for the target and the target being released. The time interval is deliberately random to increase the difficulty of the shooting challenge.

307

The number of gold medals won by Russia at the ISSF world championships since 1897. The World Championships are held in a different country every four years, two years after each Olympic Games.



EQUIPMENT

Competitors in shotgun events commonly use 12-gauge shotguns which fire cartridges containing small pellets. Guns for trap shooting are the heaviest at around 9 lb (4 kg), have the longest barrels, and have a single trigger for rapid firing. Shotguns used for skeet shooting weigh about 6½ lb (3 kg) and a shorter barrel for better maneuverability. Double trap guns are similar to those used in trap, but the pellets have a wider spread.

CLAY TARGET

The saucer-shaped "clay" target is actually made from pitch and chalk. They are approximately 4 x 1 in (110 x 25 mm); most are colored for better sighting.



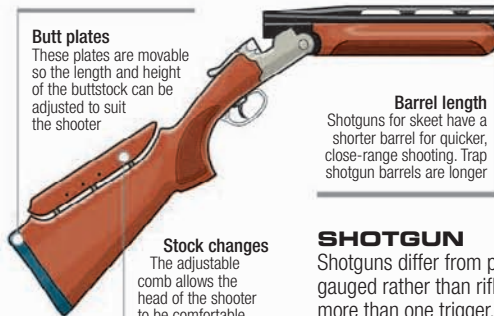
SHOTGUN CARTRIDGES

The cartridges are loaded with buckshot (lead pellets) and weigh ¼ oz (24 g). The exit speed of the cartridge will be close to 950 mph (1,530 kph).



Butt plates

These plates are movable so the length and height of the buttstock can be adjusted to suit the shooter



Stock changes

The adjustable comb allows the head of the shooter to be comfortable

Barrel length

Shotguns for skeet have a shorter barrel for quicker, close-range shooting. Trap shotgun barrels are longer

Barrel choke

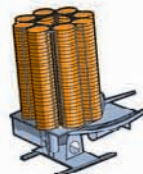
The choke (constriction at the end of the barrel) can be tailored to the range of the targets. Shotguns for skeet shooting give a wider shot pattern as the targets are shot at closer range; shotguns for trap give a tighter shot pattern

SHOTGUN

Shotguns differ from pistols and rifles as they are smooth-gauged rather than rifled and are sometimes built with more than one trigger. In shotgun shooting events the guns are loaded with two cartridges.

TRAP

The trap releases the targets automatically via a microphone system that responds to the shooter's call. Traps can be modified to adjust the height, throwing angle and speed of a target. Some traps can hold as many as 400 targets.



RULES AND REGULATIONS

In the Olympic competition, there are preliminary rounds from which six competitors proceed to the final. For the men's skeet and trap events, there are five rounds of 25 targets, followed by a final round of 25 targets. In the women's skeet and trap events, there are three rounds of 25 targets culminating in a final round of 25 targets. In the double trap (contested by men only), there are three rounds of 50 targets leading to a final round of 50 targets.

In Olympic skeet shooting, competitors have one shot at each target and there is a delay of up to three seconds before the clay appears. In trap shooting, contenders can take two shots at each target. In double trap, two targets are released simultaneously, so the shooter takes one shot at each.

SCORING

One point is scored for every target hit. To qualify for a hit, the target must be seen to be broken—the referee must see at least one piece fall from it. The referee indicates a target "dead" or "lost" and the scorer marks a "/" or "X" for dead and the figure "0" for lost. The targets used in finals rounds also contain a powder which is more easily seen by spectators and on television when the target is hit.

STAT CENTRAL

OLYMPIC SKEET CHAMPIONS

YEAR	NAME (COUNTRY)
2008	VINCENT HANCOCK (USA)
2004	ANDREA BENELLI (ITA)
2000	MYKOLA MILCHEV (UKR)
1996	ENNIO FALCO (ITA)
1992	SHAN ZHANG (CHN)
1988	AXEL WEGNER (GDR)
1984	MATTHEW DRYKE (USA)
1980	HANS KJELD RASMUSSEN (DEN)
1976	JOSEF PANACEK (TCH)

OLYMPIC TRAP CHAMPIONS

YEAR	NAME (COUNTRY)
2008	DAVID KOSTELECKY (CZE)
2004	ALEXEI ALIPOV (RUS)
2000	MICHAEL DIAMOND (AUS)
1996	MICHAEL DIAMOND (AUS)
1992	PETR HRDLICKA (CZR)
1988	DMITRI MONAKOV (USR)
1984	LUCIANO GIOVANETTI (ITA)
1980	LUCIANO GIOVANETTI (ITA)
1976	DONALD HALDEMAN (USA)



Trap shooting position

Trap shooters hold their shotgun in position before calling for the target

Pocket ammo

Shooters keep unused rounds in their jackets

TRAP STARTING POSITION

Trap shooters begin with their shotgun already in the shooting position and aiming at the target. The clay is launched on the call of "Pull!"



Over and under

One shotgun barrel is on top of the other

Marker tape

To monitor the position of the gun, competitors have a marker tape fixed to the outside of their jacket. This tape is yellow with a black border, and is 10 in long by 1¼ in wide (25 cm by 3 cm)

SKEET STARTING POSITION

Olympic skeet shooters begin with their gun held to their side, the bottom of the buttstock rests on a marker tape attached to their jacket.

INSIDE STORY

Shotgun shooting with clay targets first emerged in the 1880s. Shotgun shooting featured at the first Olympics in 1896, and the line-up of events has changed frequently since then. The first world championships featuring shotgun shooting were held in 1897.

ISSF

The International Sports Shooting Federation (ISSF) is the governing body of shotgun shooting. The ISSF holds world championships every four years (two years after the Olympics), featuring more events than the Olympics.



RIFLE SHOOTING



NEED2KNOW

- Rifle shooting is administered by the International Shooting Sports Federation (ISSF). There are six rifle-shooting classes at the ISSF World Championships, and three at the Olympics: 50 m Rifle Three Positions, 50 m Rifle Prone, and 10 m Air Rifle.
- Dismayed by the lack of marksmanship shown by their troops, Union veterans Colonel William C. Church and General George Wingate formed the National Rifle Association (NRA) in 1871.
- Only bullets made of lead or similar soft material are permitted in competition shooting. Tracer, armor piercing, and incendiary ammunition are prohibited.
- Women were first allowed to compete in Olympic shooting in 1968. Mexico, Peru, and Poland each entered one female contestant.

EVENT OVERVIEW

The aim of the competition is to shoot as many bullets into the center of the target, within a specific time frame. The shooters must take account of the number of shots they fire, and the amount of time they have to do so, both of which are governed by distance. There is a qualifying round, followed by a final, and the winner is determined by adding a competitor's qualification and final scores together.

COMPETITOR PROFILE
 Rifle shooters need to have extraordinary powers of concentration and mental focus. They also need to be able to control their breathing and hold their hands and body very still for sustained periods of time. Their eyesight must be extremely good as should be their judgment of the elements.

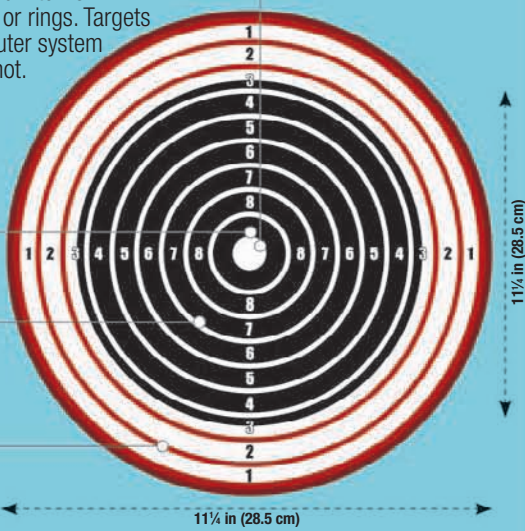
<p>Patched up The jacket and pants worn by shooters are made of canvas and leather, with nonslip rubber pads to aid steadiness</p>	<p>Tunnel vision Sun visors and other devices are sometimes affixed to the sides of shooting glasses to keep the wind and sun out of shooters' eyes</p>	<p>Wooden stock This part of the rifle can be wooden, metal, plastic, or fiberglass. It is the part of a rifle to which the barrel, action, and trigger are attached and when the shooter supports the gun</p>	<p>Gun metal The barrel is the heaviest component of the rifle. It is usually made from steel</p>	<p>Out of sight The foresight must not extend beyond the apparent muzzle</p>
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TARGET

For rifle, pistol, and running target events, shooters fire at round black aiming areas displayed on white backgrounds. The 50 m rifle target (right) is divided into 10 concentric scoring zones or rings. Targets are electronic with computer system to instantly score each shot. Television monitors will enable spectators to see the impact point of each shot fired.

Targeting the inner circle
 The inner ten (a circle inside the 10 ring) 5 mm in diameter is one of the determinants used in the event of a tie



Missing numbers
 The 9- and 10-point zones are not marked with a number

Magic numbers
 Scoring ring values 1 to 8 are printed in the scoring zones in vertical and horizontal lines, at right angles to each other

A fine line
 The thickness of the circles separating the scoring zones is between 0.2 mm and 0.3 mm

OLYMPIC SCORING

In the final round of Olympic competition, the 10 rings on the target are subdivided into "decimal" score zones (10.0 to 10.9), the highest score for a shot 10.9.

- Score 10.9**
 10 Ring: width $\frac{3}{16}$ in (10.4 mm)
 Inner Ten: $\frac{3}{16}$ in (5 mm)
- Score 10.8**
 9 Ring: width 1 in (26.4 mm)
- Score 10.7**
 8 Ring: width $1\frac{1}{2}$ in (42.4 mm)
- Score 10.6**
 7 Ring: width $2\frac{1}{2}$ in (58.4 mm)
- Score 10.5**
 6 Ring: width $3\frac{1}{2}$ in (74.4 mm)
- Score 10.4**
 5 Ring: width $3\frac{5}{8}$ in (94.4 mm)
- Score 10.3**
 4 Ring: width $4\frac{1}{2}$ in (106.4 mm)
- Score 10.2**
 3 Ring: width $4\frac{5}{8}$ in (122.4 mm)
- Score 10.1**
 2 Ring: width $5\frac{1}{2}$ in (138.4 mm)
- Score 10.0**
 1 Ring: 6 in (154.4 mm)



WHERE THEY SHOOT

New outdoor ranges must be constructed in such a way that the sun is behind the shooter as much as possible during the competition day. Also, 164 ft (50 m) ranges should have at least 148 ft (45 m) open to the sky, while the 984 ft (300 m) ranges should have at least 950 ft (290 m) open to the skies.

TARGET EVENTS

Shooting events are divided into four different groups: shotgun, rifle, pistol, and running-target events. The rifle events are held on shooting ranges with competitors for both men and women aiming at targets from distances of 10 m, 25 m, 50 m, and 300 m.

RIFLE RANGE

The firing line must be parallel to the line of targets, and wind flags must be placed at designated distances between the shooter and the targets.

Target height

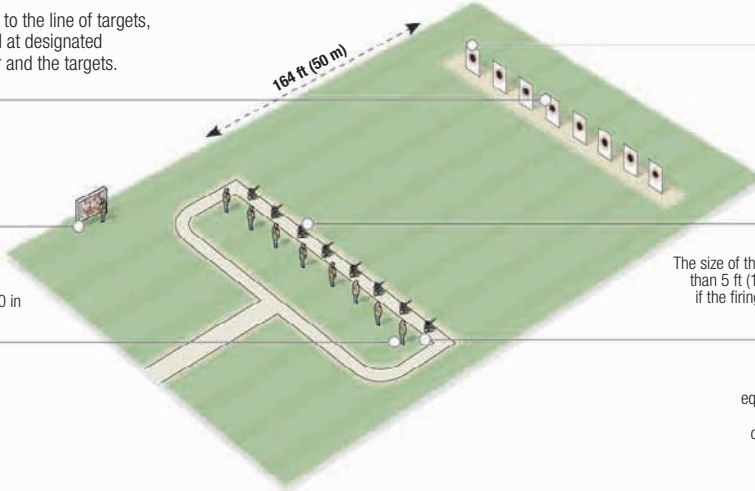
For 50 m ranges, the center of the target must be 2½ ft (0.75 m) tall, and 10 ft (3 m) tall on a 300 m range.

Keeping score

An unofficial scoreboard for the spectators must be provided. It should be approximately 20 x 20 in (50 x 50 cm).

The shooters

When shooters are given the go-ahead to start, they have a set amount of time to fire off all of their shots. This time varies, depending on the event.



Stable targets

Targets must be fixed in such a way that there will be no significant movement even in high winds.

Firing points

The size of the firing point must not be less than 5 ft (1.6 m) wide x 8 ft (2.5 m) long if the firing point is also used for 300 m.

Standard equipment

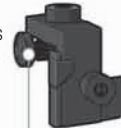
The firing point must be equipped with: a bench or stand 2½ ft (0.7m–0.8 m) high; a chair or stool for the shooter, a mat for shooting in the prone and kneeling positions.

EQUIPMENT

All rifles chambered for rimfire .22" (5.6 mm) Long Rifle cartridges, and .314" (8 mm) ammunition are permitted, provided they do not exceed 17½ lb (8 kg) for men or 14 lb (6.5 kg) for women, with all accessories used including palm rest or hand stop. In the 10 m air rifle event any type of compressed air or gas rifle which fires .177" (4.5 mm) caliber ammunition can be used, as long as it weighs 12 lb (5.5 kg).

RIFLE SIGHTS

Only "metallic" sights are permitted, which have no lenses or system of lenses.



Looking glass
The sight can not be enhanced in any way.

CARTRIDGE

The rifle ammunition must be between .22" (5.6 mm) and .314" (8 mm) caliber.



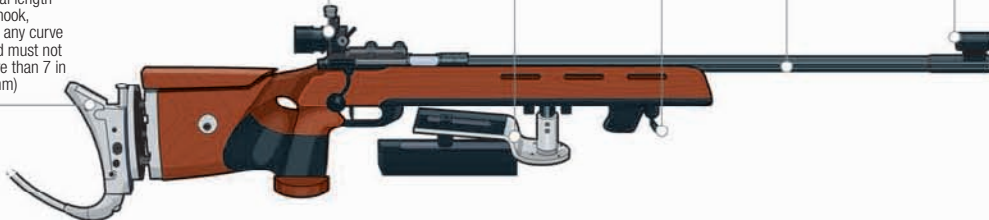
Igniting the cartridge
The striking pin hits the rim of the cartridge to ignite it.

.22 (5.6 MM) RIFLE

This rifle is a small gauge, single loaded rifle in .22" Long Rifle (5.6 mm) caliber. One of its many features is a shaped stock incorporating adjustments to suit the individual, which include a hook-type butt plate, and a palm rest.

Butt hook

The total length of the hook, around any curve or bend must not be more than 7 in (178 mm).



Metal sight

Colored filters are permitted and the rear sight has fine adjustments for windage and elevation.

Palm rest

A palm rest is any attachment or extension below the fore-end that aids the support of the rifle by the forward hand.

Gun sling

Maximum sling width is 1½ in (40 mm).

The barrel tube

The rifled barrel improves accuracy over long distances.

Foresight

Length of front sight tunnel must be 2 in (50 mm), and its diameter needs to be 1 in (25 mm).

.177 (4.5 MM) AIR RIFLE

The main air rifle competition is the 10 m 60 shot for men and the 10 m 40 shot for women. Rifles are usually single shot, with a rifled barrel, and a wooden or synthetic stock.

Breach capacity

The gun is single shot, so no magazine needed.

Rear sight

Any sight not containing a system of lenses is permitted.

Max velocity

Bullet velocity is up to 485 fps (feet per second).

Barrel length

The maximum length of the barrel is 30 in (762 mm).



Comfort stock

The stock may have an adjustable rubber pad attached for comfort.



RULES AND REGULATIONS

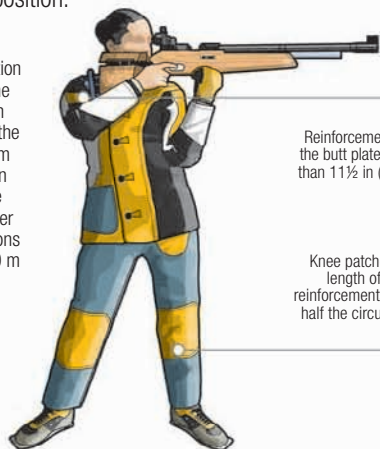
In all events the format is the same, only the number of shots fired and the time in which to take the required number of shots will change. In the 50 m Rifle 3 Position Men's competition, the shooter fires 40 shots each in the prone, standing, and kneeling positions at a target 164 ft (50 m) away. The center ten must be hit at a distance of 64 ft (50 m) within a time limit of 45 minutes in the prone position, 75 minutes in the standing position, and 60 minutes in the kneeling position. The best eight shooters qualify for the final. The final consists of 10 shots in the standing position with a time limit of 75 seconds per shot.

TECHNIQUES AND TACTICS

In the 50 m Rifle 3 Positions, illustrated below, shooters fire shots from three different positions: prone, standing, and kneeling. They have to take into account the climatic conditions at the time, utilizing the wind flags on the range, while being mindful of the time restrictions that are placed on each shooting position.

STANDING

In the standing position for all rifle events, the rifle is held with both hands and rests on the shoulder. The left arm may be supported on the chest or hip. The maximum changeover time between positions is 10 minutes for 50 m rifle events.



Shoulder patch

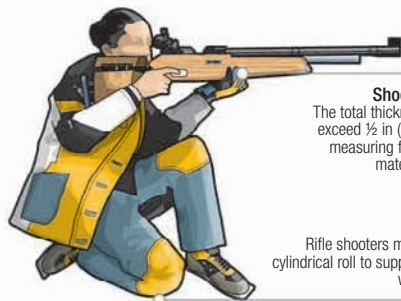
Reinforcement on the shoulder where the butt plate rests must not be longer than 11½ in (300 mm) either vertically or horizontally

Knee patches

Knee patches may have a maximum length of 11½ in (300 mm). Knee reinforcements must not be wider than half the circumference of the pant leg

KNEELING

When kneeling, the right-handed shooter may touch the ground with the toe of the right foot, the right knee and the left foot. The left knee may support the left elbow, but the point of the elbow must be no more than 4 in (10 cm) past or 6 in (15 cm) behind the point of the knee.



Shooting gloves

The total thickness must not exceed ½ in (12 mm) when measuring front and back materials together

Knee roll

Rifle shooters may use a soft, cylindrical roll to support the instep when kneeling

PRONE

This is the first position that the shooter adopts. A shooter may not let the rifle rest against, or touch, any object. The right-handed shooter's left forearm must form an angle of at least 30 degrees from the horizontal.



Regulation footwear

The maximum thickness of the shoe sole at the toe must be ¼ in (10 mm) and the upper part of shoe material must be ½ in (4 mm)

Approved clothing

Only one shooting jacket, one pair of shooting pants and one pair of shoes may be approved for each shooter for all rifle events

Trigger happy

Shooters can use both electronic and traditional triggers

Official length

The barrel can be no longer than 30 in (762 mm) from breech face to the end of the barrel

STAT CENTRAL

WOMEN'S 50 M RIFLE 3 POSITIONS

NAME (COUNTRY)	OLYMPICS
DU LI (CHN)	BEIJING 2008
LIUBOV GALKINA (RUS)	ATHENS 2004
RENATA MAUER (POL)	SYDNEY 2000
ALEKSANDRA IVSEV (YUG)	ATLANTA 1996

MEN'S 50 M RIFLE 3 POSITIONS

NAME (COUNTRY)	OLYMPICS
QIU JIAN (CHN)	BEIJING 2008
ZHANBO JIA (CHN)	ATHENS 2004
RAJMOND DEBEVEC (SLO)	SYDNEY 2000
JEAN PIERRE AMAT (FRA)	ATLANTA 1996

MEN'S 50 M RIFLE PRONE

NAME (COUNTRY)	OLYMPICS
ARTUR AYVAZIAN (UKR)	BEIJING 2008
MATTHEW EMMONS (US)	ATHENS 2004
JONAS EDMAN (SWE)	SYDNEY 2004
CHRISTIAN KLEES (GER)	ATLANTA 1996

OLYMPIC RIFLE / SHOTGUN EVENTS

50M RIFLE 3 POSITIONS (3X40 SHOTS) MEN
50M RIFLE PRONE (60 SHOTS) MEN
DOUBLE TRAP (150 TARGETS) MEN
SKEET (125 TARGETS) MEN
TRAP (125 TARGETS) MEN
50M RIFLE 3 POSITIONS (3X20 SHOTS) WOMEN
SKEET (75 TARGETS) WOMEN
TRAP (75 TARGET) WOMEN

OLYMPIC BLOOD SPORT

OSCAR SWAHN WAS ALREADY 60 YEARS OLD WHEN HE WON HIS FIRST OLYMPIC GOLD MEDAL. HE WON THE RUNNING DEER SINGLE-SHOT EVENT AND TOOK HIS SECOND GOLD OF THE GAMES THE NEXT DAY IN THE TEAM EVENT. SWAHN ALSO EARNED A BRONZE MEDAL IN THE RUNNING DEER DOUBLE-SHOT CONTEST. TARGETS, RATHER THAN LIVESTOCK, ARE SHOT.

INSIDE STORY

Shooting originated as a means of survival, since it was practiced in order to hunt game for food. In the 19th century, however, as the industrial revolution made hunting for food less necessary for many people, shooting evolved into a sport. The sport was first popular in English-speaking countries, notably England and the United States, as well as Ireland and South Africa.



SPORTS
ON WHEELS

09

Head protection

Riders must wear a full- or open-face helmet with a fastened mouth guard

RIDER PROFILE

BMX riders must maintain a high degree of flexibility and concentration. Aerobic fitness is vital on the track, while style and creativity are essential in freestyle events.



BMX

**Padded pants**

All riders must wear full-length BMX racing pants with padded knees

Padded shirt

Long-sleeve shirts with padded elbows are required for most track races

Gloves

Gloves stop hands from slipping on the bars and prevent blisters

Bike pads

Pads can be placed on the top tube of the frame and the neck of the handlebars to protect the rider in a fall

Race wheels

A typical BMX race bike has 20 in (51 cm) wheels. Cruiser class bikes have 24 in (61 cm) wheels

TRACKS & RAMPS

BMX races take place on specially built dirt tracks. Riders complete one lap of the circuit and contend with various jumps and turns as they progress to the finish line. Ramps are used in freestyle BMX events, of which the “vert” ramp is perhaps the most extreme example (see below).

DIRT TRACK

A typical BMX track consists of a starting gate, a dirt track that includes jumps and banked turns and flat corners, and a finish line. Riders complete the course in 30 to 45 seconds.

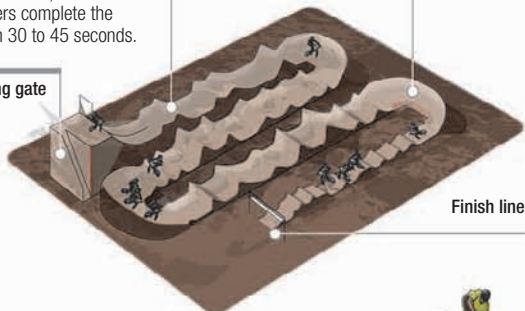
Jumps

Jumps on most tracks are fairly small, but some Supercross tracks include extreme 40 ft (13 m) jumps

Banked turn

Banked turns or corners are called “berms”

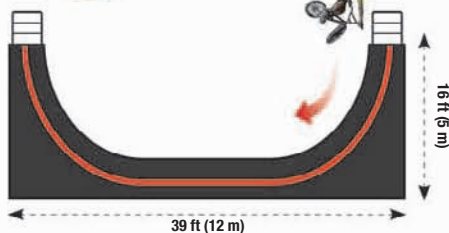
Starting gate



Finish line

VERT RAMP

Ramps used in freestyle events are usually “vert” ramps—a half pipe with a vertical section at the top of the ramp. The tallest ramps may be up to 13 ft (4 m) tall, with a 3 ft (1 m) vert section.

**Knobs or smooth**

Riders tend to use rough tires for dirt jumps. Vert riders on ramps use tires that are almost smooth

Can-can

At the top of the jump, the rider kicks his legs out to the side—a move known as a no-footed can-can

Brakes

The bikes used for dirt jumps do not have brakes; they're not much use in the air

**FLIPWHIP**

Riders pull some amazing tricks on dirt jumps. In the flipwhip, the rider flips the bike backward in the air while maintaining enough forward momentum to land and continue the routine.

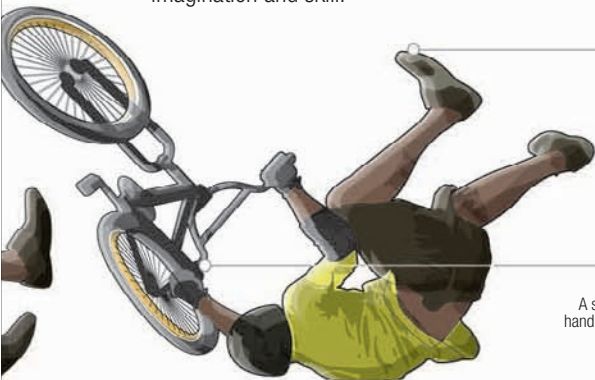


NEED2KNOW

- The Union Cycliste Internationale (UCI) is the international governing body for BMX events.
- BMX pioneer Scot Breithaupt organized some of the first races in Long Beach, California, in 1970.
- BMX racing was selected as an Olympic sport for the 2008 Summer Games in Beijing, China.

FREESTYLE ARENA

Freestyle events have five disciplines, based on where riders do their tricks: street, park, vert, trails, and flatland. Street riders improvise in the urban landscape—steps, rails, slopes—while park riders use pipes and ramps in skate parks. In vert competitions, riders use a large half pipe with vertical sides to perform jumps or do tricks on the lip of the pipe. Trails are a series of dirt jumps where riders perform tricks. Flatland is the purest form of freestyle: a bike, a rider, and a piece of flat ground with nothing to help—or hinder—him or her but imagination and skill.



Stretch out
As the descent begins, the rider uses momentum and arm strength to pull the bike beneath him

Round and round
A special rotor in the stem allows the handlebars to rotate indefinitely without tangling the rear brake cable



DIRT JUMPS

The dirt jump is a popular trails freestyle event where riders make a series of jumps over a mound of dirt. While airborne, the rider pulls a trick to impress the judges. The judges mark jumps according to the rider's style and the level of difficulty. At the end of the competition, the rider with the most points wins.

URBAN GAMES

Freestyle riders often see BMX as a way of life rather than a competitive sport, but many riders still take part in major international contests such as the BMX Freestyle Worlds, which were first held in 1986, the Metro Jams, the Backyard Jams, and the X-Games.

Pegless
Axle pegs are used for ramps and grinding

Happy landings
BMX bikes have no suspension, which makes the bike "bob" during pedaling. Riders absorb the landing in their legs



RACING RULES

In a typical track competition, eight riders race in a series of qualifying heats, called motos. The riders in each moto race against riders of a similar age and ability. In world competition, the elite or pro category consists of top-level riders aged 19 and over. Riders aged 17 and 18 compete in the junior category. After the elimination heats, the fastest four riders progress to the finals, called mains. The fastest rider in the mains wins the overall competition.

TURN A TRICK

Tricks are divided into four main styles: base, grind, aerial, and lip tricks. Base tricks are basic moves and include bunny hops, wheelies, and fakie, or riding backward. Riders use footpegs to perform grind and lip tricks on railings or the edge of a half pipe. Aerial tricks on dirt jumps and vert ramps combine huge height with acrobatic twists and turns.

FLATLAND

Flatland riding is probably the most technically demanding of all the freestyle BMX sports. The rider here is "scuffing" the rear tire to keep the bike moving as he pulls a trick.

Perfect balance
Keeping the bike in motion makes it far easier to balance than if it became stationary



INSIDE STORY

BMX was developed in the 1960s by young Americans who wanted to use their bicycles to copy motorcycle riders. The sport rapidly caught on among the skateboard generation. Today, the sport is so popular that it has spawned an industry. Many riders earn a living from their bikes, and the best pros are international celebrities, earning huge sponsorship deals from bike manufacturers and clothing companies.

Hard hat

Every rider must wear a helmet to protect the head in case of a crash. In pursuit races and individual time trials, riders wear a streamlined helmet to minimize drag

Close fit

The jersey is made from a synthetic fabric such as Lycra. The material wicks sweat from the skin to the outside, where it can evaporate without cooling the body too much

Cycling shorts

Skintight Lycra cycling shorts are padded with a synthetic chamois to cushion the groin. Shorts are anatomically designed for men and women

Clipless pedals

Pedals connect to the shoes to form a secure connection between rider and bike

Track gloves

Track gloves help the rider grip the bars—sweaty palms can slip with disastrous consequences. The gloves can also be used to clean bits of debris from the tires

RIDER PROFILE

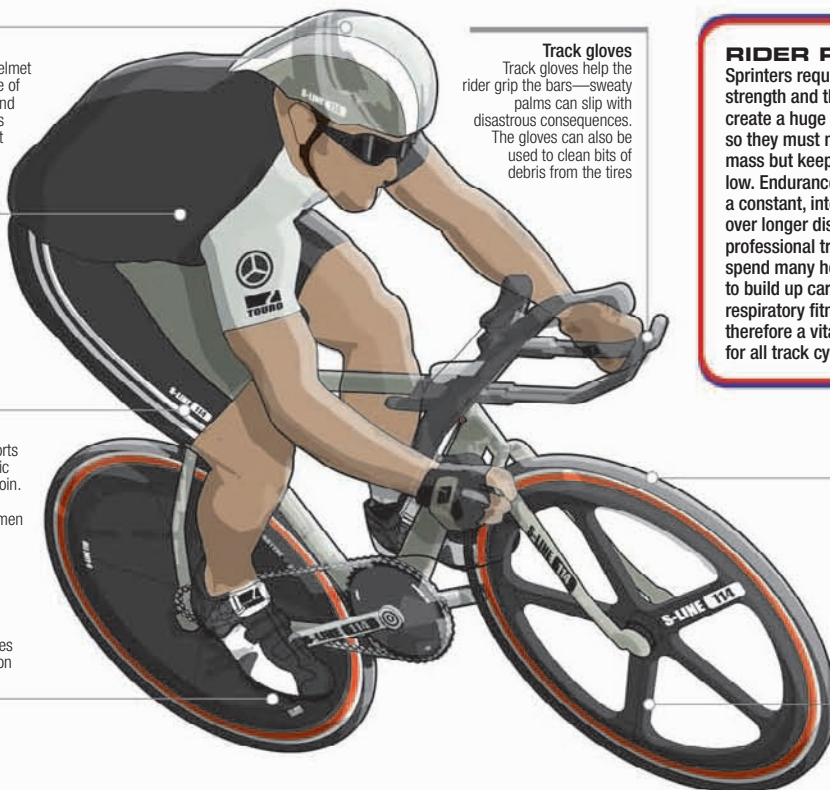
Sprinters require speed and strength and the ability to create a huge power output, so they must maximize muscle mass but keep body fat levels low. Endurance riders maintain a constant, intense effort over longer distances. Most professional track cyclists spend many hours in the saddle to build up cardiovascular and respiratory fitness. Nutrition is therefore a vital consideration for all track cyclists.

Rubber tires

Inner tubes within the tires are inflated to the requisite pressure

Wheel tech

Spoked and disk wheels made from carbon fiber are popular (see p.352)

**EVENT OVERVIEW**

Track cycling comprises a number of different races that take place on a closed, banked circuit called a velodrome. The sport originated in Europe as winter training for road cyclists but soon became a spectator-friendly sport in its own right. Today, race formats vary from individual races against the clock to group events that end in breath-taking sprints off the final bend. Short-distance events are tests of sprinting ability, while endurance events take place over longer distances.

THE HARDEST RIDE

THE MOST COVETED PRIZE IN TRACK CYCLING IS THE HOUR RECORD, OF WHICH EDDY MERCKX SAID ON HIS RECORD-BREAKING ATTEMPT IN 1972, "THAT WAS THE HARDEST RIDE I HAVE EVER DONE." COMING FROM THE WINNER OF 11 GRAND TOURS AND 3 WORLD CHAMPIONSHIPS, THAT WAS REALLY SAYING SOMETHING!

NEED2KNOW

- ➔ There are 10 track events currently on the Olympic Games program. From the London 2012 Games onward, male and female riders each compete in five events.
- ➔ The UCI organizes a series of World Cup races, and a one-off World Championships.



TRACK CYCLING

SIDELINES

9,000,000 Total cost in pounds sterling (\$13.5 million) to build the Manchester Velodrome used to host the 2002 Commonwealth Games.

42 The average steepest gradient, in degrees, of a typical track. The track is banked to allow racers to ride the 180-degree bends without slowing down.

1 The number of gears on a track bicycle. Rather than start in an easy gear and change to harder gears, riders must start the race in a high gear, requiring a huge push to get the pedals turning.

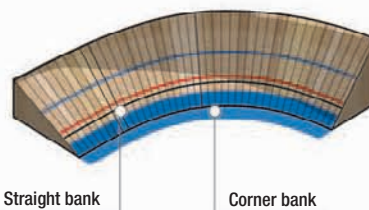


THE VELODROME

A velodrome track is a banked oval circuit, consisting of two straights connected by two 180-degree bends. The black pole line that runs around the track defines the length of circuit, which varies from 164–547 yd (150 to 500 m) and may be between 8–10 yd (7 and 9 m) in width, depending on the velodrome. Since January 2000, major events such as the Olympic Games and world championship races have been held exclusively on 273 yd (250 m) tracks.

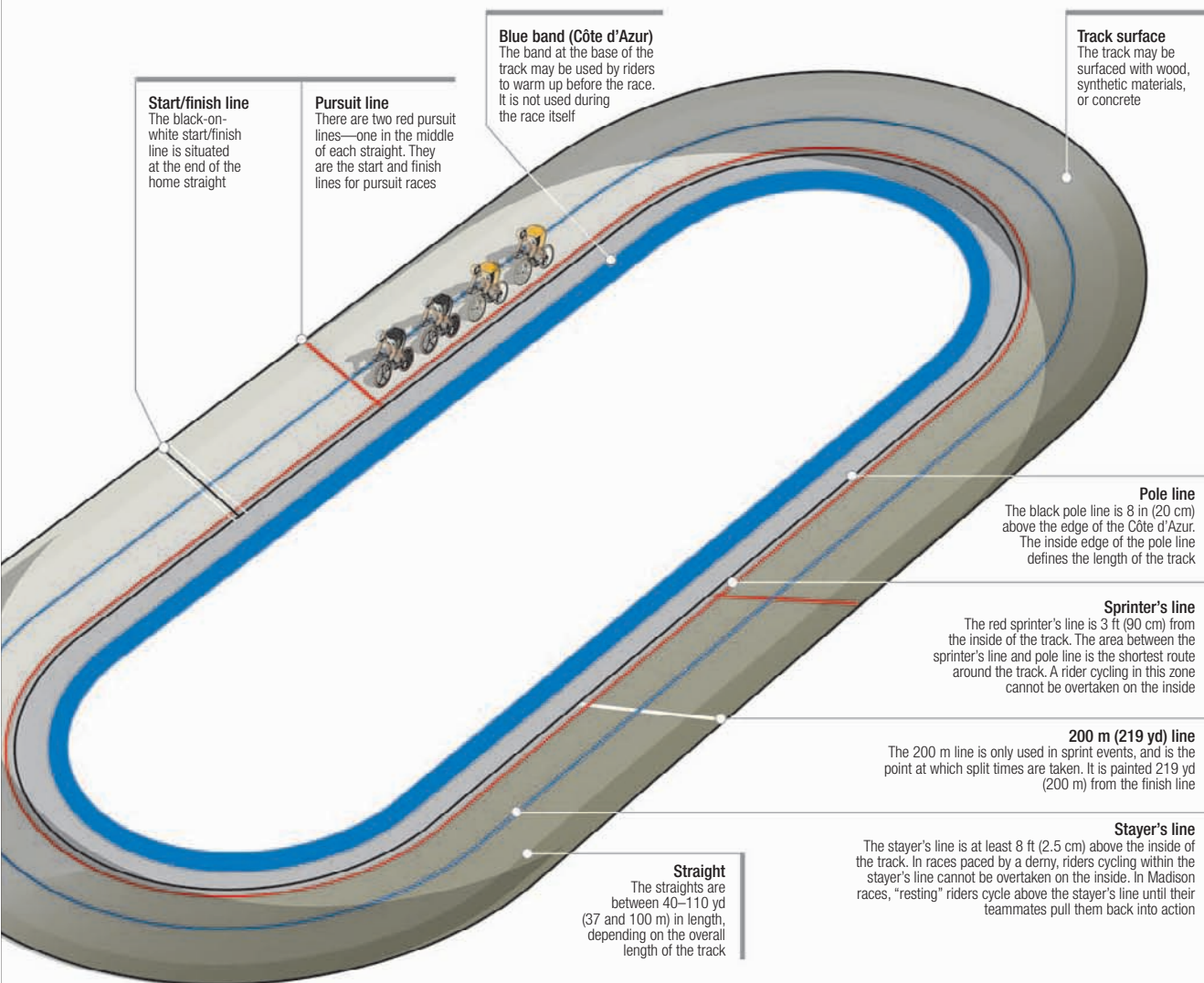
CYCLING SCIENCE

Track designers aim to build the banking of the track at precisely the right angle. Straight sections have a relatively gentle angle, but the angle must be sufficiently steep on the bends to allow riders to keep their bikes close to 90 degrees to the track surface, at speeds of up to 45 mph (70 kph). If there was no banking on the track, the riders would either be forced to deviate from the shortest path around the track, or slow down dramatically.



BANKING ANGLES

The banking angle depends on the length of the track. On a standard Olympic 250 m track, the angle can be as steep as 45 degrees, while on a 400 m track it's around 22 degrees. Even on the straights, the track slopes at an angle of about 12 degrees.



INDOORS, OUTDOORS

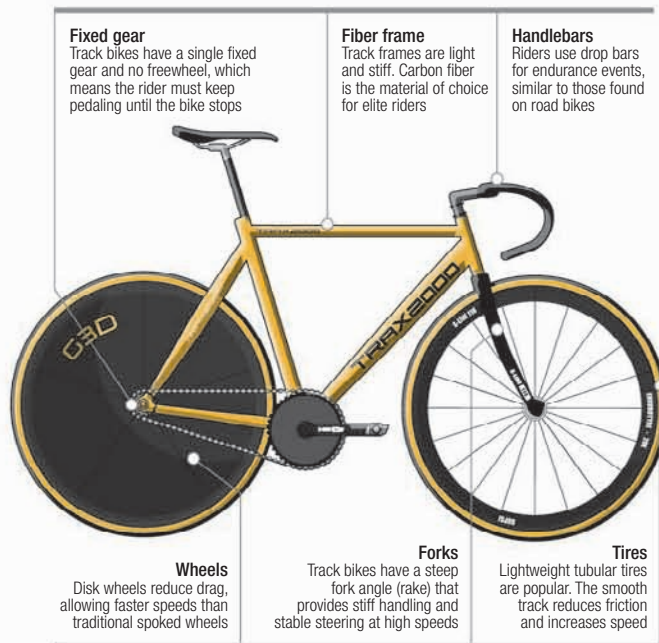
In the heyday of track cycling in the early 20th century, most velodromes were built as indoor arenas. Not only did an indoor track guard against bad weather and offer a smoother ride for the competitors, but they also made ideal venues for late-night revelers and socialites who would come and watch the six-day races in the early hours, when most pubs and bars were shut. More recently, specially built velodromes are more commonly built outdoors to reduce construction costs.

THE KEIRIN

Originating in Japan in 1948, the keirin is a sprint over 1¼ miles (2 km). Up to eight riders cycle behind a moped called a derny. The derny paces the first few laps of the race. The riders then sprint to the finish line. In Japanese, Keirin means "fight," and the races often live up to the name, with high-speed crashes common.

TRACK BIKES

Two types of bike are used on the track: a pursuit bike for endurance events and time trials, and a standard bike (shown below) for shorter sprints and points races. At the highest level of competition, bike frames are made from ultra-light carbon fiber or titanium, with a single fixed gear and no brakes. However, aluminum and steel frames are a much cheaper alternative. The main difference between the two types of bike is in the aerodynamics. Pursuit bikes generally have a highly efficient—but less comfortable—aerodynamic position, while standard track bikes are strong and lightweight and more suitable for quick sprints. Pursuit bikes may have tri-bars to help keep the front of the body as small as possible to reduce drag.



Fixed gear

Track bikes have a single fixed gear and no freewheel, which means the rider must keep pedaling until the bike stops

Fiber frame

Track frames are light and stiff. Carbon fiber is the material of choice for elite riders

Handlebars

Riders use drop bars for endurance events, similar to those found on road bikes

Wheels
Disk wheels reduce drag, allowing faster speeds than traditional spoked wheels

Forks
Track bikes have a steep fork angle (rake) that provides stiff handling and stable steering at high speeds

Tires
Lightweight tubular tires are popular. The smooth track reduces friction and increases speed

TRACK EVENTS

There is a range of formats of track races. The races are either sprint events, ranging from 550 yd (500 m) to 1.25 miles (2 km), or endurance events, which can be up to 38 miles (60 km). The Olympic program has included different events over the years, and was revised ahead of London 2012 to achieve gender parity, with men's and women's races in each of the following:

INDIVIDUAL SPRINT Also known as the "match" sprint, this race pits two riders against each other over three laps of the track. The rider who starts on the inside lane leads for the first lap. The individual sprint is a game of "cat-and-mouse" until the final 220 yd (200 m), when one rider breaks for the finish line to steal the victory.

TEAM SPRINT Two teams of three riders sprint over three laps. Each rider must lead for one complete lap.

TEAM PURSUIT Track cycling's blue-riband event, the team pursuit involves two teams of four riders racing each other over 2.5 miles (4 km), with the victorious quartet advancing to the next round.

KEIRIN A mass-start race where riders are paced by a "deryn" moped up to a speed of 31 mph (50 kph), then left to race alone for two laps.

OMNIUM In cycling's equivalent of the heptathlon and decathlon, 24 riders contest six different events—three sprints and three endurance races—with the strongest overall rider taking the win. Events included are a 273 yd (250 m) "flying lap" time trial, a points race (18 miles/30 km for men, 12 miles/20 km for women), an elimination race, a pursuit race (2.5 miles/4 km for men, 1.8 miles/3 km for women), a scratch race (9.3 miles/15 km for men, 6.2 miles/10 km for women), and a time trial (1,093 yds/1 km for men, 546 yds/500 m for women).

FROM TRACK TO ROAD

CHRIS BOARDMAN IS PERHAPS THE MOST SUCCESSFUL CYCLIST TO MAKE THE TRANSITION FROM TRACK TO ROAD. HE STARTED HIS CYCLING CAREER AS A TIME-TRIAL SPECIALIST, WINNING A HOST OF BRITISH NATIONAL TRACK TITLES BY THE AGE OF 23, AND AN OLYMPIC GOLD IN 1992 FOR THE INDIVIDUAL PURSUIT. TURNING PROFESSIONAL IN 1993, BOARDMAN WENT ON TO WIN THE PROLOGUE STAGES OF THE EPIC TOUR DE FRANCE ROAD RACE IN 1994, 1997, AND 1998. HE RETIRED FROM THE SPORT IN 1999.

TRACK RULES

In international track meets such as the Olympics and World Championships, track cycling is governed by the rules of the Union Cycliste Internationale (UCI), which is the world governing body for all cycling sports. Domestic competitions are run according to the rules of the relevant national governing body.

OUT OF POSITION

In the early 1990s, Scottish cyclist Graeme Obree developed a unique riding position with his chest tucked low over the handlebar and his elbows up at his sides. He used this "crouch" or "tuck" position to break the nine-year-old World Hour Record in 1993 and to win the individual pursuit World Championships in the same year. When the UCI banned the position, Obree experimented with a new "superman" position, in which his arms were fully extended in front of his body; in 1995 he used it to win the individual pursuit World Championships. When English cyclist Chris Boardman set a new hour record in 1996 using the same superman position, the UCI banned the superman position from competitive track cycling.

WORLD HOUR RECORD

In addition to races, velodromes also stage many cycling world record attempts. The world hour record is one of the most coveted titles. The goal is simple—cycle as far as you can in one hour—but the rules governing the record are anything but. The problem lies with the rapid advances in bike technology. When the great Belgian cyclist Eddy Merckx set a new hour record 30.715 miles (49.431 km) in 1972, he did not have aerodynamic gear such as disk wheels and tri bars. So the UCI now recognizes two hour records: the official "UCI Hour Record," which uses Merckx's bike as a standard, and an unofficial "Best Human Effort" record, which allows the use of the latest in bicycle technology.

SIDELINES

49.7 The distance in kilometers (30.9 miles) cycled by Czech cyclist Ondrej Sosenka when he broke the UCI Hour Record in 2005.

20 The distance in centimeters (8 in) a rider is legally allowed to roll back in a standstill before being disqualified from the individual sprint.

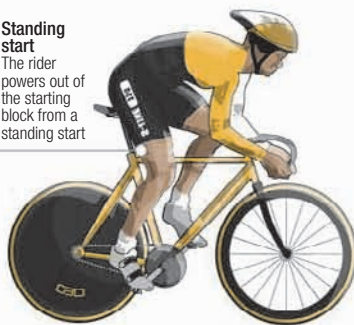
6,000 The capacity of the Olympic Velodrome in London, the venue for track cycling at the 2012 Games.



TIMING THE TIME TRIAL

The time trial is the only track event where the rider starts the race from a starting block. Once the back wheel is fixed in the starting block, a clock placed in front of the rider counts down 50 seconds before the start. At the end of the countdown, the brake on the starting block is then released, triggering the chronometer. A transponder on the bike registers the time as the rider crosses the finish line. The timings are accurate to one hundredth of a second.

Standing start
The rider powers out of the starting block from a standing start



TRACK TECHNIQUES

Riders use a range of different techniques according to the event they are competing in. Individual efforts such as the time trial are exhibitions of strength, speed, and stamina, so there is little room for tactical game play. Other races are a battle of wits, with riders jostling for the best position.



Slingshot
A slingshot effect propels the incoming rider into the race



Paceline purists
Riders race in a long line, drafting in the slipstream of the rider in front

Up to speed
The derny paces the riders at speeds of up to 28 mph (45 kph)

STANDING STILL

The individual sprint, also called the match sprint, is a three-lap race between two riders. The rider on the inside—decided by the toss of a coin—must lead the race on the first lap. Taking the lead is seen as a disadvantage, because the trailing rider then has the chance of launching a surprise attack. When the final sprint starts, the trailing rider also has the advantage of riding in the opponent's slipstream. On the second lap, therefore, the leading rider will often slow to a complete stop, balancing on the bike in an attempt to force the opponent to the front. On the final lap, one of the riders will crack and sprint for the finish line. The individual sprint is decided on the best of three heats. The winner then progresses to the next round.

DRAFTING THE DERNY

The derny, the moped that paces the first few laps of the keirin, has a flying start, so riders sprint to catch up with it. The derny steadily increases the speed, then withdraws, leaving the riders to fight it out over the last two laps.



Finely balanced
Riders balance over the bike and may gently rock back and forward

Pedal power
The pedals are kept in a horizontal position, with the bars at a slight angle

STAT CENTRAL

TRACK RECORDS

FASTEST MAN OVER 1,000 M (1,100 YD)

ARNAUD TOURNANT 58.875 SEC (2001)

FASTEST WOMAN OVER 500 M (550 YD)

SIMONA KRUCPEKAITE 33.296 SEC (2009)

GREATEST DISTANCE IN ONE HOUR

CHRIS BOARDMAN 35.030 MILES (1996)*

* UCI "BEST HUMAN EFFORT" RECORD

SLIPSTREAM

Drafting is an important element of most cycle races. When drafting, a rider sits a few inches behind the rear wheel of the leading racer. The leader does all the work to overcome the forces of drag, while the drafting rider saves up to 40 percent of his or her energy output by riding in the leader's slipstream. Sometimes, a group of cyclists will bunch together to form a "paceline." Each rider takes a turn at the front, towing the pack behind. The leader then drops off, and the rider behind takes a turn at the front, setting the pace. Riders who do not contribute get a free ride, but are likely to receive stern words from the rest of the pack.

INSIDE STORY

Track racing originated in response to the overwhelming popularity of the bicycle at the end of the 19th century. Track events brought the excitement of road racing to the confines of a closed circuit. It also became a popular method of training for road cyclists. The first documented track race took place in Saint-Cloud, France, in 1868, and velodromes soon cropped up all over Europe and the United States. Mirroring the great road races, some of the early track events were monumental challenges of endurance, including 24-hour races and the notorious Six Days, in which teams of two took turns racing over six days and six nights. Sprint events were also popular, and the individual sprint and track time-trial featured in the first Olympic Games in Athens in 1896.

UNION CYCLISTE INTERNATIONALE (UCI)

Founded in 1900, the Union Cycliste Internationale (UCI) is the governing body for all cycling, from BMX to the track. The UCI organizes the Track Cycling World Cup Classics series and the annual Track Cycling World Championships, and collaborates with the International Olympic Committee (IOC) on the Olympics. Each year, the UCI also publishes elite rider rankings for each event.

NEED2KNOW

- Road racing is popular all over the world, but the most prestigious professional races take place in continental Europe.
- There are many different road racing formats, including multi-day stage races, one-day Classics, time trials, and criterium races.
- The Union Cycliste Internationale (UCI) is the sport's international governing body.
- Elite riders compete in the UCI ProTour, a series of ranking races held around the world from January to October.

Lightweight helmet

Cycling helmets became mandatory in professional road racing following the death of Kazakh rider Andrei Kivilev in 2003

ROAD RACING



SPORT OVERVIEW

Road racing is one of the toughest of all sports. In the major stage races, such as the world-famous Tour de France, elite riders compete at the limits of physical endurance, covering thousands of miles in just a few weeks. A rider must be able to sit in the saddle for hours at a time, accelerate to speeds of 50 mph (80 kph) or more, and climb the steepest mountain slopes. But the strangest part of the sport is that most riders would sacrifice all of this effort to help a teammate win the race.

**Team jersey**

Riders wear tight-fitting Lycra jerseys in team colors. The material absorbs sweat and allows the skin to breathe

Lycra shorts

Tight-fitting Lycra shorts are aerodynamic and protect the thighs from rubbing against the saddle. Padding cushions the groin

Fingerless gloves

Riders wear gloves to cushion vibrations from the road. They can also be used to wipe sweat from the face and clean smudges off glasses

Shoes and pedals

Cyclists use clipless pedals, which attach to the shoes to give a firm connection between bike and rider

RIDER PROFILE

Road racing is an intense and demanding sport that places a huge strain on the body. Riders must be able to maintain great efforts over long distances, requiring muscular strength, a high degree of cardiovascular fitness, and mental preparation. Training and nutrition are important—riders follow a balanced diet with lots of carbohydrates, and ride hundreds of miles a week.



OPEN ROAD

A road race takes place on normal roads. With the exception of time trials, riders start together in a mass bunch. The race takes place over a set course, which varies in distance depending on the type of race. The goal is to cross the finish line first. Riders race in teams of eight to 10 cyclists, and team members cooperate to help their leader win the race.

Peloton

The peloton is the name given to the main group of riders in the race. When there is an attack, the riders in the peloton organize the chase

Lead motorcycle

A motorcycle rides in front of the leading riders to ensure that the road ahead is clear and to inform spectators that the race is approaching

Team car

The team cars carry various team personnel, as well as spare bikes, wheels, food, and water

Race director

The race director organizes the whole event and keeps track of the race from a car that follows the lead riders

TOUR CARAVAN

THE PUBLICITY CARAVAN ADDS A CARNIVAL ATMOSPHERE TO THE TOUR DE FRANCE. A PARADE OF SPONSOR VEHICLES TRAVELS THE SAME ROUTE AS THE TOUR, HANDING OUT FREE GIFTS TO SPECTATORS AS THEY WAIT FOR THE RACERS TO ARRIVE.

Breakaway

A handful of riders work together to try to pull away from the field

BIKE TECHNOLOGY

Form and fitness are the benchmarks of success in the ProTour, but riders also owe much to developments in bike technology. Carbon fiber and high-grade metals, such as titanium, are commonly used for the bike frame, reducing weight but retaining stiffness and strength. For the time trial, riders use certain bikes that offer greater aerodynamic advantage over conventional road bikes.

COMMUNICATION

The directeur sportif radios orders to the team during the race. Riders strap a radio under their jersey and place an earpiece in one ear.

ROAD BIKE

Professional road racers use bikes that are built to be light and strong, and comfortable enough to be ridden for hours on end. Quick-release attachments allow wheels to be swapped quickly in case of punctures.

TIME-TRIAL BIKE

Used for individual and team time-trial races, time-trial bikes are built for out-and-out speed. Comfort is sacrificed for an aerodynamic riding position, while bigger gears are used to enable the rider to go faster.

Lightweight wheels

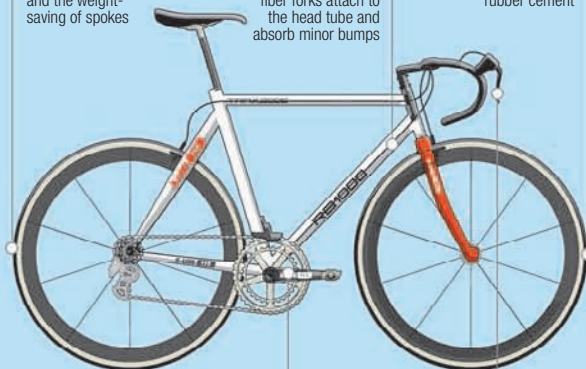
Deep-section rims combine the aerodynamics of disks and the weight-saving of spokes

Frame and forks

Most road bikes use the diamond-frame design. Stiff, carbon-fiber forks attach to the head tube and absorb minor bumps

Tubular tires

The inner tube is sewn into the tire and glued to the wheel rim with rubber cement



Clipless pedals

Cleats on the soles of the shoes clip into the pedals to allow maximum energy transmission for each pedal stroke

Brake/gear shifters

Integrated brake/gear levers allow braking and gear-shifting with minimum effort

Disk wheel

Disk wheels offer an aerodynamic advantage over the traditional spoked variety

Seat tube

Steeper seat-tube angles on a road bike help the rider tuck into an aerodynamic position

Tri bars

Tri bars help to keep the front of the body as small as possible, to reduce drag



Gear ratio

Riders match the ratio to the course profile. A low ratio is suitable on the flat, while a high ratio is best for hills

Easy-access shifters

Bar-end shifters help the rider maintain an aerodynamic position while changing gear

STAT CENTRAL

TOUR DE FRANCE WINNERS

WINS	WINNER (COUNTRY)
7	LANCE ARMSTRONG (USA)
5	JACQUES ANQUETIL (FRA)
5	EDDY MERCKX (BEL)
5	BERNARD HINAULT (FRA)
5	MIGUEL INDURAIN (SPA)
3	PHILIPPE THYS (BEL)
3	LOUISON BOBET (FRA)
3	GREG LEMOND (USA)
3	ALBERTO CONTADOR (SPA)
2	LAURENT FIGNON (FRA)
2	BERNARD THÉVENET (FRA)
2	FAUSTO COPPI (IT)
2	GINO BARTALI (IT)
2	SYLVERE MAES (BEL)
2	ANTONIN MAGNE (FRA)

UCI MEN'S WORLD CHAMPIONSHIPS

YEAR	WINNER (COUNTRY)
2010	THOR HUSHOVD (NOR)
2009	CADEL EVANS (AUS)
2008	ALESSANDRO BALLAN (ITA)
2007	PAOLO BETTINI (ITA)
2006	PAOLO BETTINI (ITA)
2005	TOM BOONEN (BEL)
2004	ÓSCAR FREIRE (ESP)
2003	IGOR ASTARLOZA (ESP)
2002	MARIO CIPOLLINI (ITA)
2001	ÓSCAR FREIRE (ESP)
2000	ROMANS VAINSTEINS (LAT)
1999	ÓSCAR FREIRE (ESP)

MEN'S OLYMPIC ROAD RACE

YEAR	WINNER/NATIONALITY
2004	PAOLO BETTINI (ITA)
2000	JAN ULLRICH (GER)
1996	PASCAL RICHARD (SUI)
1992	FABIO CASARELLI (ITA)
1988	OLAF LUDWIG (GDR)
1984	ALEXI GREWAL (USA)
1980	SERGEY SUKHORUCHENKOV (URS)
1976	BERNT JOHANSSON (SWE)
1972	HENNIE KUIPER (NED)
1968	PIERFRANCO VIANELLI (ITA)
1964	MARIO ZANIN (ITA)
1960	VIKTOR KAPITONOV (URS)

MEN'S OLYMPIC TIME TRIAL

YEAR	WINNER/NATIONALITY
2004	TYLER HAMILTON (USA)
2000	VYACHESLAV EKIMOV (RUS)
1996	MIGUEL INDURAIN (ESP)

RACE FORMATS AND SERIES

There are several different race formats, ranging from 3-week stage races to hour-long criteriums. The most prestigious elite races are grouped together in the UCI ProTour, including the Grand Tours, the spring Classics, as well as some smaller races. Riders and teams accumulate points in the series, and at the season's end, those with the most points take the win. The other major contests are the UCI World Championships, which takes place annually, and the Olympics, contested every four years.

STAGE RACES

Stage races are the ultimate in cycling endurance. Each stage is either a day-long point-to-point race or a team or individual time trial. The rider who completes all the stages in the quickest time is the winner. The most prestigious 3-week stage races—the Giro d'Italia, Tour de France, and Vuelta a España—are known as the Grand Tours.

CLASSICS

The Classics are one-day, one-time races held in the spring, before the Grand Tours take place. They are usually long races, up to 170 miles (270 km) in length, and often feature grueling climbs or difficult surfaces, such as the cobblestones of Paris-Roubaix.

TIME TRIALS

There is no hiding in the bunch in this so-called "race of truth." In the individual time-trial, competitors ride individually, against the clock. Most stage races also include team time trials, in which the whole team races as a unit.

CRITERIUMS

A criterium, or crit, is a high-speed race held in a closed-off city center or on a specially built cycling circuits. The circuit is usually less than 3 miles (5 km), and the race is held over a set time (commonly one hour) or a set number of laps. In addition to the overall victory, riders can win cash prizes, called primes, for intermediate sprints.

THE TOUR DE FRANCE

The Tour de France is the original, toughest, and most prestigious cycling race on the planet. First raced in 1903, it consists of 21 day-long stages over flat, fast roads or vertigo-inducing mountain passes, circumnavigating the French nation and covering around 2,175 miles (3,500 km) in the process. The ultimate prize is the "maillot jaune"—the yellow jersey worn by the rider who completes all the stages in the shortest accumulated time.

FASHION STATEMENT

The leading rider in each category wears a colored jersey and defends it until the peloton finishes the Tour in Paris. The strongest riders go for the overall victory, climbers focus on the "king of the mountains," sprinters challenge for the points competition, and riders under 25 fight for the best young rider award.



YELLOW JERSEY
The maillot jaune is awarded to the highest placing rider in the general classification.



GREEN JERSEY
The green jersey goes to the rider with the most points in the sprint competition.

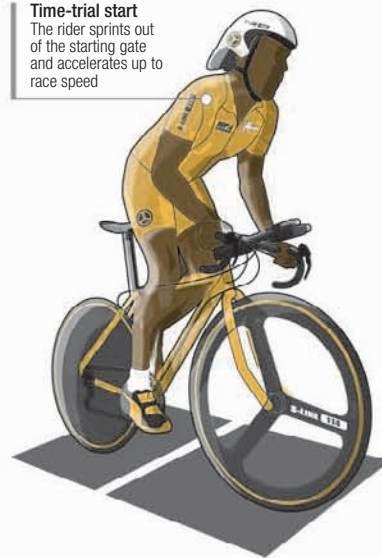


POLKA DOT JERSEY
The polka dot jersey is awarded to the king of the mountains—the best climber.



WHITE JERSEY
The white jersey goes to the highest placing young rider in the general classification.

Time-trial start
The rider sprints out of the starting gate and accelerates up to race speed.



INDIVIDUAL TIME TRIAL
The individual time trial is a tough test of strength and endurance, fought against the clock.



MEET THE TEAM

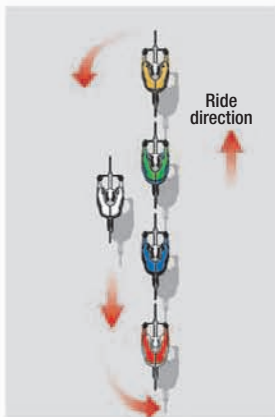
Most teams are organized around the leader, a dominant rider who has the best chance of winning the race. The priority for the other riders in the team is to support their leader. Within each team, there will be strong climbers and sprinters, time-trial specialists, and domestiques—the workers who guard against breakaways and supply the team with food and water during the race. Top-level teams also have a range of support personnel, including the directeur sportif, mechanics, doctors, and general assistants called soigneurs.

CONTROLLING TACTICS

Road racing is as tactical as it is physically demanding. In a typical race, one or a group of riders may launch a breakaway, in which they cooperate to escape from the peloton and gain as much time as possible. Cooperation in the peloton then plays an important part in determining the result of the race. Riders from some teams will organize a chase, while other teams may slow the pace deliberately to help a teammate in the breakaway gain ground.

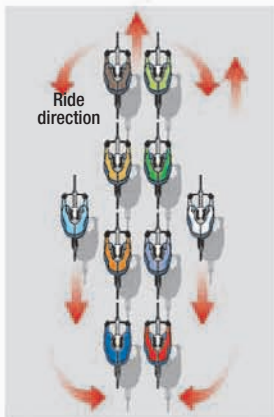
DRAFTING

Drafting is the most important way to save energy during a race. The rider at the front of a group uses up a lot of energy to overcome the forces of drag. By sitting on the back wheel of the leading bike, the drafting rider can save as much as 40 percent of the energy used to cycle at exactly the same speed. Cycling etiquette demands that each rider takes a turn at the front to share the workload, forming what is known as a paceline (see below).



SINGLE PACELINE

In a single paceline, all the cyclists ride in single file. One rider takes a turn at the front and then drops to the back. The next rider then moves up to take his or her place.

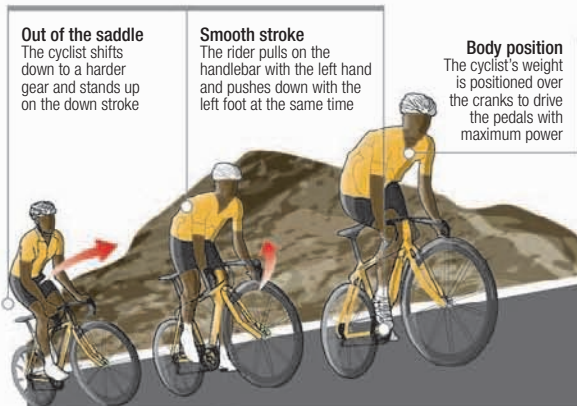


DOUBLE PACELINE

Most common in team time trials, double pacelines have two parallel lines of riders. Two riders take a turn at the front and then peel off. The riders behind move up to take their place.

HILL CLIMBING

Good climbing ability is crucial in multiday stage races, since inclines are the most likely point at which time may be lost or gained. How well a rider climbs depends largely on their power-to-weight ratio. A lighter rider does not need to generate as much power as a heavier rider because they carry less weight to up the hill. For this reason, most of the top climbers are lean and light, whereas specialized sprinters are more muscular, and tend to suffer on mountain stages. On long climbs, riders generally stay seated and maintain a high cadence (pedal rate) all the way up the hill. Climbing out of the saddle is reserved for short hills, steep gradients, or an attack to drop a weaker rider.



Out of the saddle
The cyclist shifts down to a harder gear and stands up on the down stroke

Smooth stroke
The rider pulls on the handlebar with the left hand and pushes down with the left foot at the same time

Body position
The cyclist's weight is positioned over the cranks to drive the pedals with maximum power



ECHELON

The echelon is a type of paceline used in strong crosswinds. Riders form diagonal lines across the road and peel away from the direction of the prevailing wind.

THE TOUR OF SHAME

ONE OF THE BIGGEST DOPING SCANDALS IN CYCLING INVOLVED THE FESTINA TEAM IN THE 1998 TOUR DE FRANCE, WHICH LATER CAME TO BE KNOWN AS THE "TOUR OF SHAME." TEAM MASSEUR WILLY VOET WAS ARRESTED WHEN PERFORMANCE-ENHANCING DRUGS WERE FOUND IN HIS TEAM CAR. POLICE THEN RAIDED SEVERAL TEAMS IN THEIR HOTELS, AND AN INVESTIGATION REVEALED SYSTEMATIC DRUG USE AMONG MANY RIDERS.

SIDELINES

34 The record number of Tour de France stage wins, held by Eddy Merckx, the Belgian cyclist and all-around cycling legend.

38,155 The minimum wage (in dollars) for a pro cyclist. Top riders earn \$1 million or more.

123,900 The average number of calories burned by a typical racer during the three-week-long Tour de France.

6.8 The minimum permitted weight in kg (15 lb) of a professional road bike, according to UCI regulations.

INSIDE STORY

The history of road racing is almost as long as the history of the bicycle itself. The first road race took place in 1869, between Paris and Rouen in France. By the time the first Tour de France was held in 1903, road racing was already a men's Olympic sport, and its popularity had spread across Europe. Following on from the success of riders from the United States and Australia, road racing has reached out to a wider audience, but recent doping scandals have brought the sport into disrepute.

UCI

Founded in 1900, the Union Cycliste Internationale (UCI) is the international governing body for all cycling sports. The UCI is based in Aigle, Switzerland.

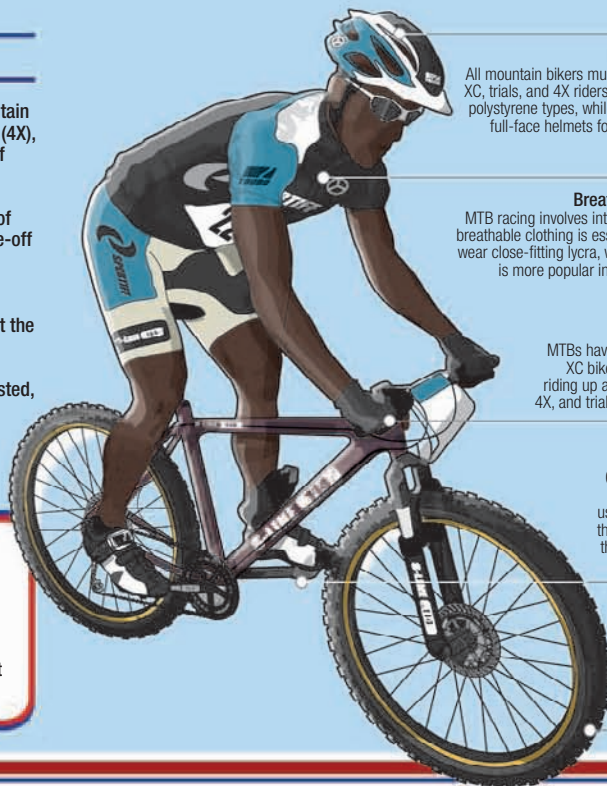
NEED2KNOW

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- There are four main disciplines of competitive mountain biking: cross-country (XC), downhill (DH), four-cross (4X), and trials. Endurance racing, a long-distance form of cross-country racing, is also growing in popularity.
- Each discipline has an annual World Cup—a series of races held in locations around the world—and a one-off annual World Championship. Both are sanctioned by the UCI (Union Cycliste Internationale).
- XC racing has been an Olympic sport since 1996, but the other disciplines aren't included in the Olympics.
- The origin of the mountain bike (MTB) is hotly contested, with cyclists in several countries claiming it as their own. But most accept that the "clunker" bikes built by Californian cyclists in the late 1970s were the creative impetus behind the birth of the sport.

RIDER PROFILE

Each branch of mountain biking requires different physical attributes. XC racers need a high level of cardiovascular fitness and stamina to last the whole race. DH and 4X racers must have good upper- and lower-body strength for jumping the bike and delivering intense bursts of pedaling, and trials riders need perfect balance and impeccable bike-handling skills.



Lightweight lid

All mountain bikers must wear a helmet. XC, trials, and 4X riders wear lightweight polystyrene types, while DH racers wear full-face helmets for extra protection.

Breathable clothing

MTB racing involves intense exercise, so breathable clothing is essential. XC racers wear close-fitting lycra, while baggy attire is more popular in other disciplines.

Multiple gears

MTBs have up to 27 gears. XC bikes have more (for riding up and downhill); DH, 4X, and trials bikes have less.

Clipless pedals

Mountain bikers use clipless pedals that fix their feet to the bike, similar to a ski binding.

Fat tires

Tires with big knobs give extra grip for riding over loose surfaces.

MOUNTAIN BIKING



SPORT OVERVIEW

Mountain biking is the most recent form of cycling to emerge. From its late-1970s origins to the experimentation of the 1980s and the first UCI-sanctioned World Championships in 1990, it has rocketed in popularity and became an Olympic sport in 1996. Although the sport has diversified, its essence is in pitting the rider's technical and physical skill against the trail.

HI-TECH GEAR

In its short lifetime, mountain biking has seen more technological quantum leaps than any other branch of cycling. From carbon fiber and titanium frames, to hydraulic disc brakes and internal gearbox transmissions, the quest for lighter, faster bikes has fueled huge innovation. Nothing epitomizes this more than suspension—once dismissed as heavy and unnecessary, no bike is now complete without it.



Big travel
Dual-crown forks are designed to take big hits.

SUSPENSION FORK

Front suspension allows the bike to be ridden faster over rough terrain.

HARD-TAIL MTB

Bikes with suspension forks but no rear shock are known as hard tails. They're great for XC and 4X riding.



Swift stoppers

Hydraulic disc brakes, similar to motorbike brakes, give reliable braking.

FULL-SUSPENSION MTB

Long-travel suspension forks, a rear shock, and hydraulic disc brakes make it fun to ride downhill hard and fast.



Fully sprung

The heart of a full-suspension bike is the shock, which absorbs bumps from the rear wheel.



CROSS-COUNTRY

Racing cross-country is arguably the most popular type of competitive grass-roots mountain biking, due to the lack of specialist equipment and skills compared to other disciplines. Riders race against each other over an undulating circuit for a fixed number of laps—first across the line takes the victory. A recent variant of XC racing is the mass-start endurance event, ranging from 6-, 12-, and 24-hour races, to nighttime “dusk till dawn” races, 25-, 50-, 75-, and 100-km “marathons,” and multi-day multi-stage events.

SIDELINES

0 the best score for a trials rider, awarded for a “clean” round. Dabbing the ground with one or both feet, or running out of time, carries a penalty of 5 points—the worst possible score.

19,500 the vertical height gain in meters (63,980 ft) of the TransAlp race—more than twice the height of Mount Everest. One of the toughest multiday mountain bike stage races, competitors race for eight days across the Alps.

10 the amount of suspension travel, in inches (254 mm), of a typical downhill full-suspension mountain bike.

DOWNHILL AND 4X

Downhill racing is the mountain biking equivalent of downhill skiing—each rider races individually, against the clock, down a course that runs from the top to bottom of a hill, and the rider with the fastest time wins. Choice of tires and suspension can be crucial, as can the precise line taken over the course—seconds can be won and lost by cutting corners or jumping obstacles. Four-cross is a DH variant with four riders racing against each other on a short, downhill course, with jumps, drops, and bermed corners thrown in to test the riders’ skill.

TRIALS

Mountain bike trials is a form of competition that tests poise, nerve, and artistry. Riders compete in two classes, for bikes with 20” or 26” wheels, and negotiate a series of obstacles without touching the floor with their feet, using bunny hops, wheelies, stationary trackstands, and other balletic maneuvers. Riders are judged for skill, style, and invention, and penalized for dabbing their feet.

ARISE, SIR BART

THE FIRST MAN TO BECOME AN OLYMPIC CHAMPION WAS BART BRENTJENS, AT THE ATLANTA GAMES IN 1996. HE WENT TO THE GAMES A COMMONER, BUT SOON AFTER RETURNING TO HIS NATIVE HOLLAND WITH THE GOLD MEDAL, HE WAS REWARDED WITH A KNIGHTHOOD.

BUNNY HOPPING

One of the most fundamental techniques of mountain biking is the bunny hop. It can be used in any riding situation to jump over rocks, logs, or other obstacles, saving valuable time in a competitive race. It’s also crucial for trials riding, as it allows the competitor to hop from one obstacle to the next.



COAST ALONG

Ride along at a steady speed, level your cranks and stand up out of the saddle in a crouched position.



LIFT THE FRONT WHEEL

Push on the bars then pull up sharply in one smooth movement, and throw your weight to the rear of the bike.



TUCK THE BACK WHEEL

To clear the obstacle, lift the back wheel by tucking your feet up beneath you and toward the back of the bike.



TOUCH DOWN SMOOTHLY

Land with both wheels touching the ground at the same time. Absorb the impact with your elbows and knees.

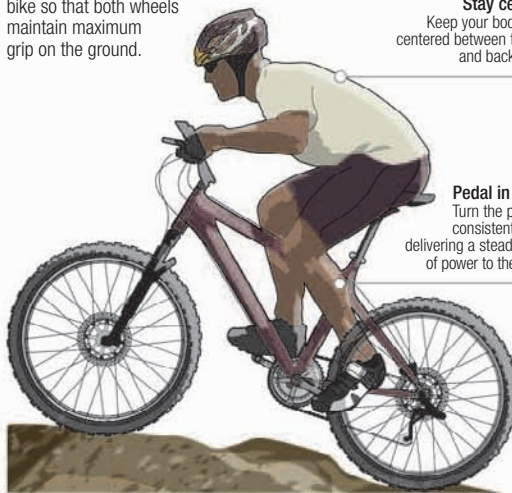
CLIMBING HIGH

Cross-country mountain biking takes place on hilly, often mountainous terrain, so riders must be able to climb efficiently as well as descend quickly. Although standing up while pedaling delivers short bursts of speed, the best method is to stay seated and pedal smoothly, conserving energy.

EFFICIENT ASCENDING

The key to efficient climbing is to distribute your bodyweight over the bike so that both wheels maintain maximum grip on the ground.

Stay centered
Keep your bodyweight centered between the front and back wheels



Pedal in circles
Turn the pedals in consistent circles, delivering a steady supply of power to the wheels

INSIDE STORY

Competitive mountain biking is governed by the UCI, which is based in Switzerland. It organizes the international World Cup and World Championships, while national series are organized by the relevant national body, which must be affiliated with the UCI.

SIDELINES

16.2 The number of seconds Gregory Duggento (Italy) took to skate 656 ft (200 m) at the World Speed Skating Championships in 2006, breaking the world record.

8,000 The number of participants who competed over 24.8 miles (40 km) in the 2007 World Inline Cup curtain raiser in Seoul, South Korea.

12,000 The number of square feet in the world's biggest skate park, complete with bowls, banks, and rails, that was opened in Shanghai, China, in 2005.

24.1 The number of Americans in millions who participated in inline skating in 1999 (according to statistics from the National Sporting Goods Association).

ROLLER SKATING



SPORT OVERVIEW

From its humble beginnings in the 19th century, roller skating has evolved into a remarkable number of disciplines. These include inline skating, speed skating, quad skating, aggressive skating, roller derbies, roller hockey, freestyle, and artistic skating. Roller skaters practice on city streets or on country roads, on indoor or outdoor tracks or trails, either recreationally or professionally in races and championships organized on a local, regional, or international level.

SPEED AND STAMINA

Inline roller skaters who want to compete with others as opposed to enjoying the leisurely recreational activities can enter into sprint races to test their speed or into marathons that explore the limits of their stamina and endurance.

Sharp angles

As they skate around a bend on a track, speed skaters will adopt sharper angles to maintain their momentum.

Socks

Speed skaters often wear special socks that are durable and comfortable but not bulky.

Streamlined helmet

Speed skaters wear streamlined helmets to reduce air resistance—they also offer protection for the head in case of accidents.

Close-fitting strip

Speed skaters reduce air resistance by wearing a tight-fitting jersey and shorts.



SPEED TRACKS

Speed skaters often race on indoor and outdoor tracks, with two straightaways of the same length and two symmetrical bends of the same diameter. The tracks can be level or have banked bends.

Total length

The minimum length of a track is 410 ft (125 m) and the maximum length is 1,312 ft (400 m).

Track surface

Any material can be used for the track surface as long as it is smooth and not slippery.

NEED2KNOW

- ➔ Quad roller skates, invented by James Plimpton in 1863, had two sets of parallel wheels that enabled skaters to go backward, make turns and move in a smooth curve.
- ➔ After Scott Olson founded Rollerblade Inc. and mass produced skates, the term "rollerblading" has been synonymous with inline skating.

TYPES OF SKATES

Variations in the boot, frame, and wheels mean that skates are available in many types and can be made to suit the kind of roller skating and the conditions of the surface where they are used. Inline skates have aluminum frames that are usually fitted with a maximum of six wheels. Polyurethane wheels vary in diameter between 3.12 in (78 mm) and 4 in (100 mm). Skates can be fitted with a brake.

AGGRESSIVE SKATES

Aggressive skaters use inline skates that are tough and equipped with grind plates because of the regular impact of their various tricks and stunts.

Protective boots

Aggressive skate boots are durable and protective, providing support and comfort, as well as the necessary flexibility

Smaller wheels

Aggressive skate wheels are harder than those of speed skates. They are smaller, giving the skater more maneuverability



SPEED SKATES

Skaters make sure they customize their skates to suit their needs, but overall they are lightweight and as close-fitting as possible.

Close-fitting boot

The soft boots that speed skaters wear are usually made of leather and have a lower ankle height

Harder wheels

The wheels on speed skates are harder than those on recreational skates, giving the skater greater speed



WORLD SPEED RACING

The World Championships in inline speed skating are organized by the International Speed Skating Committee (known as Comité International de Course, or CIC). CIC is a technical body of the Fédération International de Roller Sports (FIRS). Inline speed skating competitions, which are held for men and women in junior and senior categories, include sprints, time trials, elimination races, relays, and marathons. Team races include time trials, pursuits, and relays.

AGGRESSIVE INLINE SKATING

For years, the extreme sport of aggressive inline skating has been an underground culture with groups and communities existing and competing on a local and national level. It is popular in the US, Australia, Brazil, Japan, and various European countries, such as The Netherlands, Spain, and the UK. Inline skating events, such as vert, street, and downhill, used to happen at the X Games—a competition of action sports in the US that is held in winter and summer—but was eventually removed from the competition in 2005. In that year, about 50 aggressive skaters and promoters from 9 countries set up the International Inline Stunt Association to develop the sport.

MASS STREETSKATING THROUGH THE CITY

SKATERS IN CITIES REGULARLY MEET FOR MASS PARTICIPATION EVENTS THAT FOLLOW A COURSE THROUGH BUSY METROPOLITAN STREETS. IN THE LONDON STREETSKATE, WHICH BEGAN IN 2000, AS MANY AS A THOUSAND SKATERS ARE LED BY UP TO 50 TRAINED MARSHALS WHO KEEP THE TRAFFIC AT BAY. THE LARGEST STREET SKATE IN THE WORLD IS THE PARI ROLLER, WHICH STARTED IN 1994.

VERT, STREET, AND PARK

There are three kinds of aggressive inline skating. Vert usually involves aerial tricks done on a half pipe. Street needs obstacles, such as curbs, rails, and steps. Park is performed in skate parks, often beside skateboarders and BMX bikers.

TRICKS AND STUNTS

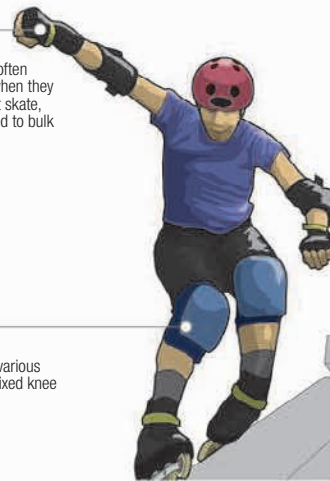
A feature of aggressive skating, also called freestyle rollerblading, is the wide repertoire of tricks and stunts, many of which are dangerous. These include grinds, which are sliding maneuvers along the top of an obstacle such as a handrail or concrete ledge.

Wrist guards

Aggressive skaters often wear wrist guards when they ramp skate or street skate, or if they simply need to bulk up their protection

Knee pads

Skaters attempting various stunts wear velcro-fixed knee pads that don't slip



STANDING AND MOVING

Individual inline skaters develop their own techniques, depending on what they are trying to do and how experienced they are. However, there are a few basic techniques that are universal. These include standing, stopping, turning, striding, and gliding. Many skates have a heel brake at the back—some are equipped with a leash which is pulled by the skater. Learning to use the brake can help to avoid accidents.

SKATING FASTER

Speed skaters in motion rarely have both feet on the ground at the same time. They do not twist or turn their shoulders but move their arms forward or backward to add to their momentum. They have mastered the art of using their legs independently. As they stride forward they set each skate down in turn on a line that is central to their body and then push their feet out to the side—rather than pushing backward behind them. At the end of the stride they flick their heel outward and begin the cycle again in a relaxed, effortless motion.

INSIDE STORY

Inline skaters from many teams compete for the annual World Inline Cup, which is organized under the auspices of Fédération International de Roller Sports (FIRS). Competitors accumulate points as they move from one location to another through the year. Whoever has the most points by the end of the year is the champion.

COMPETITOR PROFILE

Roller hockey is a very fast sport and players need to be fit, agile, and aggressive to compete. They need to balance and perform complex maneuvers on the skates, with sudden stops, starts, and turns throughout the game.

Playing gear

Rink hockey players wear lightweight, short-sleeved tops and shorts, similar to those worn in soccer

Leg protection

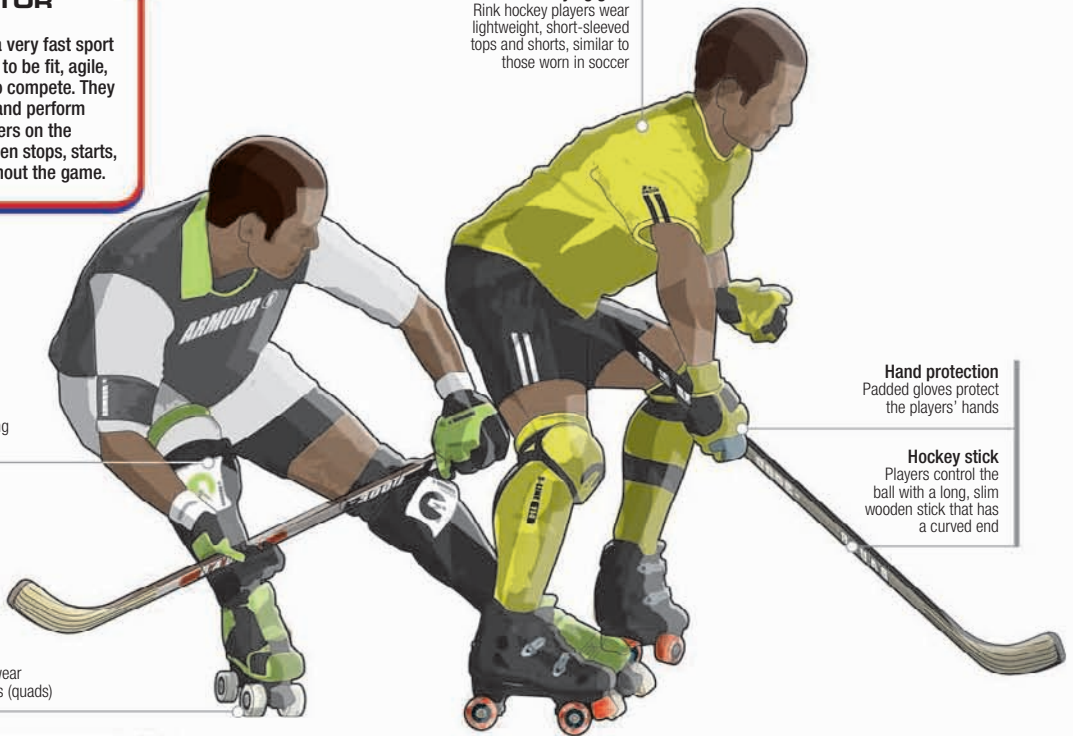
Players wear shin guards under their long socks, and knee pads

Hand protection
Padded gloves protect the players' hands

Hockey stick
Players control the ball with a long, slim wooden stick that has a curved end

Skates

Rink hockey players wear traditional-style skates (quads)



ROLLER HOCKEY

**NEED2KNOW**

- British teams dominated the sport internationally until World War II, when Latin countries such as Spain and Portugal took over.
- Rink hockey has a huge following in Spain, Italy, Portugal, Argentina, and Brazil.
- Inline hockey originated in the United States and gave ice hockey players a means of training during their off season.

SIDELINES

60 Number of countries where roller hockey is played.

15,000 Number of spectators who watched the roller hockey final when it was a demonstration rollersport at the Barcelona Olympics in summer 1992.

15 Number of times Portugal, the most successful team, has won the World Championships in rink hockey.

SPORT OVERVIEW

Roller hockey is a fast, exciting game played on skates. There are two types: rink hockey and inline hockey. They have similar tactics and principles—two teams compete to score goals by hitting a ball or puck into the opposing team's goal—but differences in rinks and equipment. Rink hockey is a popular professional sport in southern Europe while inline hockey is more common in North America.

INLINE HOCKEY EQUIPMENT

There are differences between inline and rink hockey equipment. Inline players wear helmets and skates with wheels in a line. They use longer sticks and a puck or a ball. Inline goalkeepers use a glove for catching rather than a flat glove for rebounding.

INLINE SKATES

Inline hockey skates have a metal chassis usually fitted with four wheels, but may have five. The wheels at the back may be larger than those in the front. Unlike normal inline skates there is no brake.

**PUCK AND STICK**

Players use a hard puck made of plastic or other material or a ball between 2.54 in cm (6.35) and 2.8 in (7 cm) in diameter. The stick can be made of wood, aluminum, carbon composite, or graphite.

3 in (7.62 cm)



2 in (5 cm) and 3 in (7.5 cm)



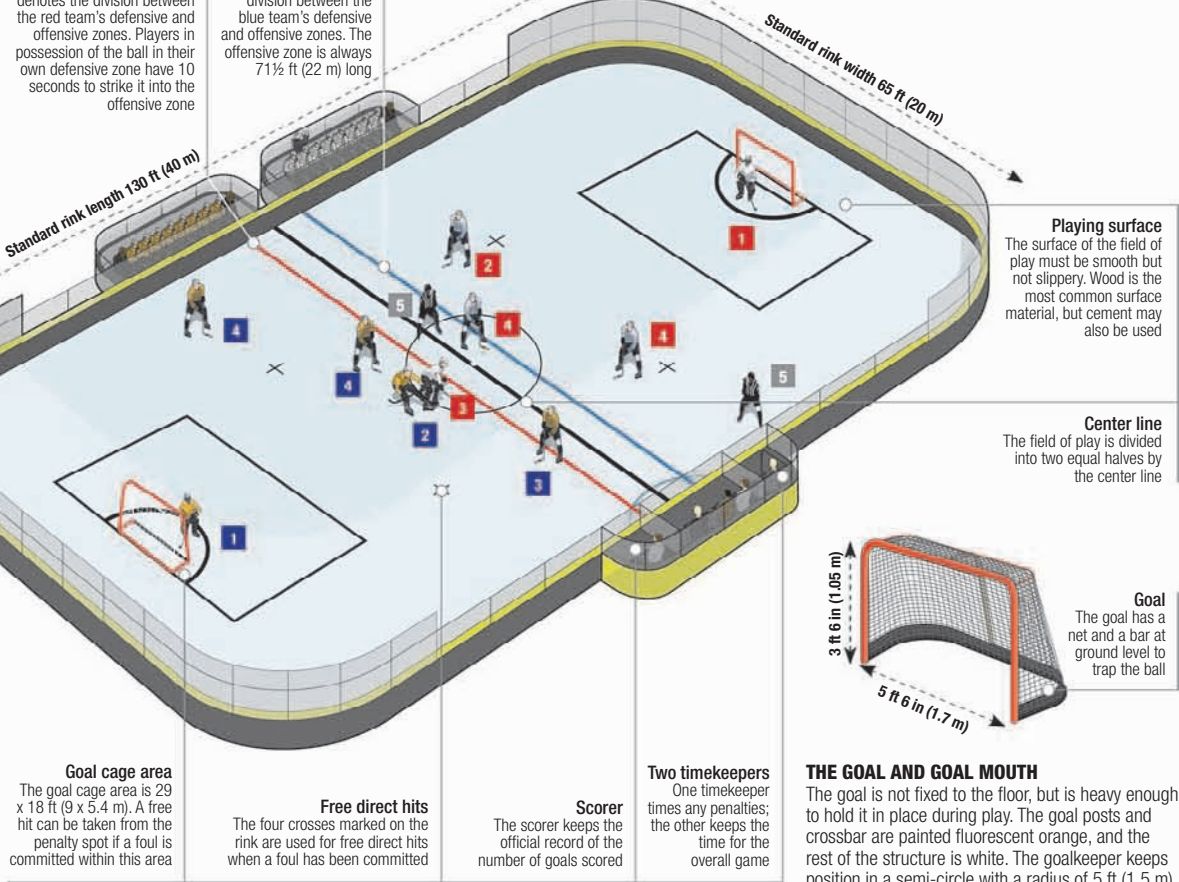
FIELD OF PLAY

Inline roller hockey is played on rinks with the same dimensions as ice hockey rinks (see pp.144–49). The standard size of the rink for rink hockey is shown below. This rink has rounded corners and is surrounded by a wall about 3 ft (1 m) high.

The thin red line
This marking on the rink denotes the division between the red team's defensive and offensive zones. Players in possession of the ball in their own defensive zone have 10 seconds to strike it into the offensive zone.

Blue frontier
This line indicates the division between the blue team's defensive and offensive zones. The offensive zone is always 71½ ft (22 m) long.

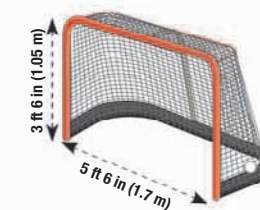
- 1 Goalkeeper**
The heavily padded goalkeeper (the only player to wear a helmet in rink hockey games) attempts to block the opponent's ball from entering the goal.
- 2 Center**
The center is an attacker who takes part in face-offs on the center line at the start of a match and after a goal is scored.
- 3 Winger**
The winger is the main attacker and is the most likely player to score goals.
- 4 Defenders**
The two defenders try to prevent the opposing team from scoring.
- 5 Referees**
Two referees are present on the field of play during the match to administer the rules and award penalties.



Playing surface
The surface of the field of play must be smooth but not slippery. Wood is the most common surface material, but cement may also be used.

Center line
The field of play is divided into two equal halves by the center line.

Goal
The goal has a net and a bar at ground level to trap the ball.

**THE GOAL AND GOAL MOUTH**

The goal is not fixed to the floor, but is heavy enough to hold it in place during play. The goal posts and crossbar are painted fluorescent orange, and the rest of the structure is white. The goalkeeper keeps position in a semi-circle with a radius of 5 ft (1.5 m).

RINK HOCKEY

Rink hockey is played with two teams of five players (one goalkeeper and four skaters—a center, a winger and two defenders). A team can have a maximum of ten players, including a back-up goalkeeper, which means that substitutions are frequent. Rink games are played in two halves of 25 minutes each, with a 10-minute half-time break. Offside rules vary from country to country—for example, there is no offside in the US.

INLINE HOCKEY

Inline hockey also has five players per team on the field, with a maximum of 14 players on the team. Matches are played in two 20-minute halves with a five-minute half-time. In the event of a tie, overtime is played, followed by a shoot-out if the match is still undecided. Inline hockey has similar rules to ice hockey (see pp.144–49) but has no offside, resulting in more free-flowing play. As with rink hockey, players can incur penalties for fouls such as intentional body-checking and physical contact.

ROAD HOCKEY

ROAD HOCKEY IS A VARIATION ON ROLLER HOCKEY THAT EVOLVED AS A GAME PLAYED IN THE STREETS OF THE UNITED STATES AND CANADA. ALSO KNOWN AS DEK HOCKEY AND BALL HOCKEY IT STARTED AROUND 1970 AND HAS BEEN ORGANIZED INTO LEAGUES AND CHAMPIONSHIPS AND CAN BE PLAYED MORE FORMALLY ON INDOOR AND OUTDOOR RINKS.

INSIDE STORY

The sport of roller hockey dates back to the 1870s and 1880s in Britain. By 1901, teams were playing throughout Europe. Inline roller hockey developed in the 1990s, following the invention of inline skates in the 1980s. The first World Inline Roller Hockey Championship for Men took place in Chicago in 2005, while the first such championship for women took place in Rochester, New York, in 2002. Inline roller hockey was introduced to the World Games in 2005.

FEDERATION INTERNATIONALE DE ROLLER SPORTS (FIRS)

FIRS is the governing body for both rink hockey and inline roller hockey (it also governs speed skating and artistic skating). The World Championship for rink hockey takes place every two years, and that for inline roller hockey annually.

SKATEBOARDING



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EVENT OVERVIEW

Millions of people worldwide skateboard as a hobby or even a means of transport; an elite few also participate in skateboarding as a competitive sport. Individual athletes in skateboarding competitions are judged on their ingenuity and skill at performing inventive acrobatic tricks and flips, or their balance and control at negotiating a field of obstacles. Skateboarding is a media-friendly and well-sponsored sport, and high-profile international competitions attract large audiences both at the venue and on television.

HALF PIPES & RAILS

There are various types of skateboard competitions, each taking place on a different field of play. Perhaps the most spectacular is the half pipe. This is a U-shaped trough with steeply sloping walls called verts (short for verticals). Skaters ride back and forth along the half pipe, propelling themselves off the verts and performing tricks while airborne. Freestyle contests are also a showcase for tricks, but take place on a flat surface. Street competitions test skaters' skills on features such as curbs and handrails. There are also slalom contests, in which skaters maneuver around courses set by cones.

NEED2KNOW

- ➔ Rudimentary skateboards were improvised in the 1940s and 1950s by fixing roller skate wheels to boards, or taking the handlebars off scooters.
- ➔ Skateboarding surged in popularity in California in the 1950s and 60s. It had strong ties to surfing culture, and was often called "street surfing" or "sidewalk surfing."
- ➔ Skateboarding as a sport really took off in the 1970s, when innovations in manufacture gave skaters more mobility and control, leading them to develop more daring and inventive acrobatic stunts.

SIDELINES

12,500,000 The estimated number of people who take part in skateboarding worldwide (according to a US report in 2002).

10 The number of gold medals Tony Hawk has won for vert skating at the X Games, one of the most high-profile competitions. Hawk is probably the world's best-known and most successful skater.

900 The first 900-degree turn was performed by Tony Hawk in 1999. 720- and 540-degree turns are more common.

THE ZEPHYRS

THE Z-BOYS OF CALIFORNIA, MEMBERS OF THE LEGENDARY ZEPHYR TEAM OF THE 1970s, USED THE WALLS OF EMPTY SWIMMING POOLS TO PRACTICE THEIR TRICKS—AND INTRODUCED VERT SKATING TO THE WORLD.

GRAB 540 BACKSIDE TRICK

The trick illustrated here is the grab 540 backside. The skateboarder performs a 540-degree turn while airborne, with one hand holding onto the board and the other arm providing the impetus for the rotation. The board is released before the skater comes back into contact with the half pipe.

Vert lip

Some skateboarders perform tricks on the lip of the vert, such as grinds or one-handed handstands.

Vert walls

The total height of the vert (short for vertical) section is usually 10–13 ft (3–4 m).

Half pipe surface

The half pipe is usually a wooden frame covered with a smooth surface of masonite (fiberboard).

Protective helmet

A crash helmet is essential to prevent injury. Most consist of a rigid plastic exterior with a padded interior to fit closely to the skull.

Knee pad

Knee pads consist of a flexible foam part that extends from below the knee to above it, with a tough plastic part to protect the knee itself.



COMPETITOR PROFILE

Skateboarders need a great sense of balance, perfect timing, coordination, and muscle control to perform the technically demanding tricks. They also need creative flair and imagination to come up with original tricks to impress contest judges. Skateboarders are often fairly lightly built rather than muscle-bound, which gives them greater mobility and control, particularly when airborne.

**Skateboard**

Skateboards are typically 30–31 in (76–79 cm) long and 8 in (20 cm) wide. The deck is surfaced with grip tape to prevent the skater from slipping off the board.

Elbow pads

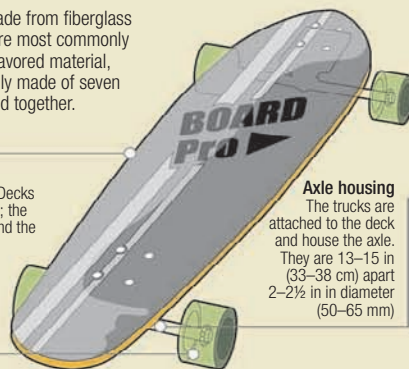
Elbow pads have a similar construction to the protective knee pads. Many skaters also wear wrist guards.

BOARDS & PROTECTION

Developments in competitive skateboarding have evolved as the technology has evolved. The introduction of polyurethane wheels in the early 1970s was a landmark that significantly improved the performance of skateboarders and helped popularize the sport. Apart from the skateboard, protective gear is essential equipment as injuries are common; a helmet, knee pads and elbow pads, and shoes or trainers with a good grip are all key items.

SKATEBOARD

Skateboards can be made from fiberglass or polypropylene, but are most commonly wooden. Maple is the favored material, and boards are generally made of seven layers of veneer pressed together.

**Curved deck**

The deck is the board. Decks have a rise at each end; the front rise is the nose, and the back rise is the tail.

Small wheels

The polyurethane wheels are 2–2½ in (5–6.5 cm) in diameter.

Axle housing

The trucks are attached to the deck and house the axle. They are 13–15 in (33–38 cm) apart 2–2½ in in diameter (50–65 mm).

TRICKS OF THE TRADE

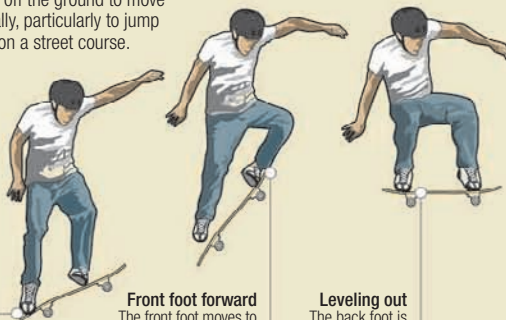
Street skateboarding techniques appear less spectacular than half pipe tricks, because they take place on a flat plane, but still require supreme technical ability. The ollie (described below) and grind are core tricks. The grind involves ollieing onto a rail and sliding along it on the trucks of the skateboard.

THE OLLIE

The ollie is a trick in which the skater propels himself off the ground to move airborne vertically, particularly to jump over obstacles on a street course.

Popping the tail

The skater lifts into the air by putting pressure on the tail.

**Front foot forward**

The front foot moves to the nose of the deck to pull up the board.

Leveling out

The back foot is lifted up to level out the skateboard.

INSIDE STORY

There is no international governing body for skateboarding, and there has been some resistance within the community to having a regulating body for a sport with such strong roots in nonconformist youth culture. However, competitions are vital to the sport. The first official contest was held in California in 1965, and the first European event took place in Germany in 1977. Today the X Games are one of the most popular events.

X GAMES

The X Games are one of the most high-profile international contests featuring skateboarding along with other "extreme" sports such as snowboarding. The games began in 1995 and take place annually.

The image features a stylized logo for 'Motor Sports'. The background is divided into three main color sections: a teal section at the bottom, a purple section on the left, and a light grey section on the right. A yellow border separates the teal and purple sections. The text 'MOTOR' is in a bold, black, sans-serif font, and 'SPORTS' is in a white, outlined, sans-serif font. The text is positioned in the center of the light grey area.

MOTOR
SPORTS

10

NEED2KNOW

- ➔ Each Grand Prix is watched by enormous crowds of enthusiastic spectators and by hundreds of millions of television viewers in nearly every country in the world.
- ➔ Formula One was established in 1946 and the first race was in 1947. The first Formula One World Championship was held in 1950.
- ➔ The Fédération Internationale de l'Automobile (FIA) is the governing body of Formula One racing.

DRIVER PROFILE

Drivers need to be physically fit and mentally tough to cope with the rigors of competing at high speed in hot, cramped, noisy, and extremely dangerous conditions. Together with supreme driving skills, great courage, and rapid reflexes, drivers need to work closely with their teams and quickly adapt their tactics to the circumstances of a race.

Gripping tires

Precision molding of tires increases grip and improves cornering speeds

Rear wing

The aerodynamic effect of a rear wing increases the downward force on the car

Air intake

The engine's air intake is just above the driver's head

Safety cell

Built into the chassis, the safety cell contains the cockpit with the fuel tank behind and a protective structure in front

Under the suit

Underwear beneath the suit provides more fireproof protection

Braking system

Carbon fiber disc brakes enable the driver to stop a car traveling at 70 mph (110 kph) within 60 ft (18 m). Cars are fitted with a failsafe back-up braking system

Powerful engine

A four-stroke V-8 engine has 2.4 liters of displacement

Front suspension

The front suspension supports the front of the car and determines how the tires contact the road

SPORT OVERVIEW

The pinnacle of the motor sport calendar, Formula One is an annual series of thrilling, high-speed Grand Prix races held on circuits around the world. Car constructors and drivers conform to a strictly enforced set of regulations—a formula of specifications that is continually adapted to the changing needs of safety and fairness—as they compete for the technological edge that sees them triumph over their rivals. The drivers and constructors who accumulate the most points throughout the season are crowned Formula One World Champions.

DRIVER SAFETY

Racing regulations make driver safety a top priority. The safety cell, seatbelts, and the carbon fiber chassis and body protect drivers from injury in the event of an accident. Drivers have to wear suits and other gear made out of Nomex, a remarkable flame-resistant fabric that withstands hydrocarbon fires

THE FORMULA ONE CAR

The product of brilliant engineering design and cutting-edge technology, Formula One cars rely on a finely tuned balance of aerodynamics, electronics, tires, and suspension.

BOW TIE

FLAMBOYANT BRITISH DRIVER MIKE HAWTHORN, WHO BECAME FORMULA ONE CHAMPION IN 1958, OFTEN COMPETED IN RACES WEARING A BOW TIE TO GO WITH HIS DISTINCTIVE SMILE



Driving gloves
Fireproof gloves are thin to give the driver the feel of the wheel

Crash helmet
Helmets and visors can withstand an object traveling at 300 mph (480

Shoulders
Handles on the shoulders enable the driver to be lifted free

Racing boots
Fireproof shoes have a good grip and are thin to give the best control of the pedals



FORMULA ONE

SIDELINES

5 Number of seconds it takes a car to accelerate from a standing start to 100 mph (160 kph) and then decelerate to 0 again. A Formula One car traveling at 186 mph (300 kph) can come to a complete stop in less than 3.5 seconds.

22 The age of the youngest driver—Lewis Hamilton—ever to lead the Formula One World Championship. At the same age, Hamilton won his first Grand Prix.

320 The speed in kph (200 mph) which Formula One cars can reach on a straight track.

20 The number of Grand Prix races in Formula One's 2011 season, 12 of which—including Turkey, Malaysia, China, the United States and Bahrain—are outside of Europe.

7 The record number of times Michael Schumacher has been Formula One World Champion. Statistically he is the greatest driver the world has ever seen.

INTERACTIVE STEERING WHEEL

Inside the cockpit the interactive steering wheel provides the driver with various details about the car's performance, as well as the ability to fine-tune and control a number of settings, and the means to communicate via radio with his team in the pits.

Light sequence

A sequence of lights helps the driver time a gear change to perfection

Main display

Information about gears, temperatures and brakes appear on a large screen. At the bottom of the screen the FIA can show the driver the color of a flag (such as yellow, red, or black) which trackside marshals might be waving



Right button bank

The buttons on the right side of the wheel include the pit lane speed limiter (LIM) and the radio (RAD) which connects the driver with engineers on the pit wall

Gear change/clutch

Drivers can change gear easily by flicking a paddle behind the steering wheel with their fingers. There are usually eight gears (seven forward and one reverse)

Left button bank

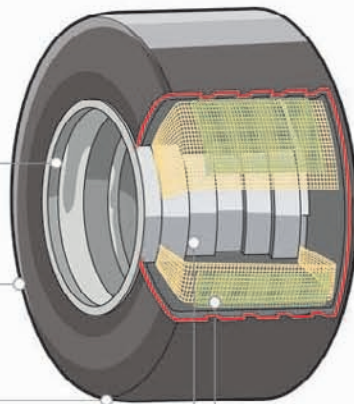
The buttons on the left side of the wheel include the neutral setting (N) for the gearbox, the calibration (CAL) of the clutch, menu display on the screen, and the ACK button, which the driver presses when he is unable to talk but wants to acknowledge a radio message he has received from the pits

Traction control

This alters the traction control settings during the race, depending on the grip level required and the changing track conditions

POINTS OF CONTACT

Formula One cars are fitted with tires that maximize the points of contact with the track surface while withstanding massive downforce loads. Hard tires are more durable and longer lasting than soft tires, which give more grip. Tires work best at certain temperatures and are designed to last for one race at the most. Restrictions tend to be reviewed regularly and may change from year to year. Treadless, or slick, tires were previously the best for dry conditions but they have been replaced by tires with grooves. For the 2007 season, the teams had to use a hard and a soft compound during each race.



Wheel dimensions

The maximum diameter of wheels with wet tires fitted is 26½ in (66 cm) and 26¾ in (67 cm)

Tire dimensions

The maximum width of front tires is 1¼ in (35.5 cm) and of rear tires is 1½ in (38 cm)

Contact surface

The outer surface of the tire is made of a rubber compound

Bracing plies

In the middle layer bracing plies are embedded in rubber

High-tech mesh

The inner layer is a high-tech mesh of polyester and nylon

CHOOSING TIRES

Some of the most important decisions a Formula One team must make are focused around knowing which tires to choose and when is the best time to change them. At the start of a race weekend teams have a supply of ready-to-go sets of tires: seven sets of dry weather tires, four sets of intermediates and three sets of full wet (monsoon) tires.



Dry-weather tires

These are "slicks," meaning that they have no tread at all. There are two kinds of dry-weather tire—soft rubber and hard rubber.



Wet-weather tires

For wet conditions, teams keep tires with a tread at the ready. They keep a close eye on the forecast in case rain is on its way.



Extreme-weather tires

Tires for very wet conditions have a deep tread, which improves grip by clearing water from the tire where it meets the track.

STICKS LIKE GLUE

Designers of Formula One racing cars aim to create a light car that increases mechanical grip and "sticks like glue" to the track. This is achieved by minimizing wind resistance and aerodynamic drag and maximizing the downward force on the car. Over the years, design innovations included the upswept tail, small wings either side of the nose, flexible skirts, and rear wings. In the 1980s, the whole car became like a wing, creating a "ground effect" that increased speeds dramatically but made cornering dangerous, so it was banned. Almost every surface on a modern Formula One car is designed to produce downforce.

Front aerofoils

Aerofoils at the front of the car create downforce on the front tires and aerodynamically channel the air flow to the rest of the car

Barge boards

On the side of the car barge boards shape air flow and reduce turbulence

Shaped helmets

Aerodynamically shaped helmets can improve the air flow into the air intake above the driver's head

Rear wing

The downward force from the adjustable vanes on rear wing increases the grip between rear tires and track



RACE WEEKEND

Each of the season's Grand Prix races takes place over a weekend. On Friday (Thursday in Monaco), drivers have two free practice sessions. On Saturday, they have another practice, then qualifying sessions to determine where they start Sunday's race. The rules stipulate that there must be a minimum of 20 cars and a maximum of 24 cars in a race.

FREE PRACTICE

The goal of the practice sessions is to give teams experience of the particular circuit: drivers become familiar with the track's idiosyncrasies while engineers and directors make critical tire and fuel decisions, and adjust the settings of their cars and adapt them to the local conditions.

QUALIFYING FOR THE RACE

In three 15-minute qualifying sessions the drivers compete against the clock to complete the fastest lap and establish the order of the starting line-up for Sunday's race. All the drivers race against each other in the first session—the slowest (usually six) occupy the last places on the grid and take no further part in qualifying. In the second session, the slowest (usually six) go on to occupy the next places (usually 11 to 16) on the grid. In the third session, the remaining drivers compete for the top places on the grid, with the fastest taking pole position.

THE CIRCUITS

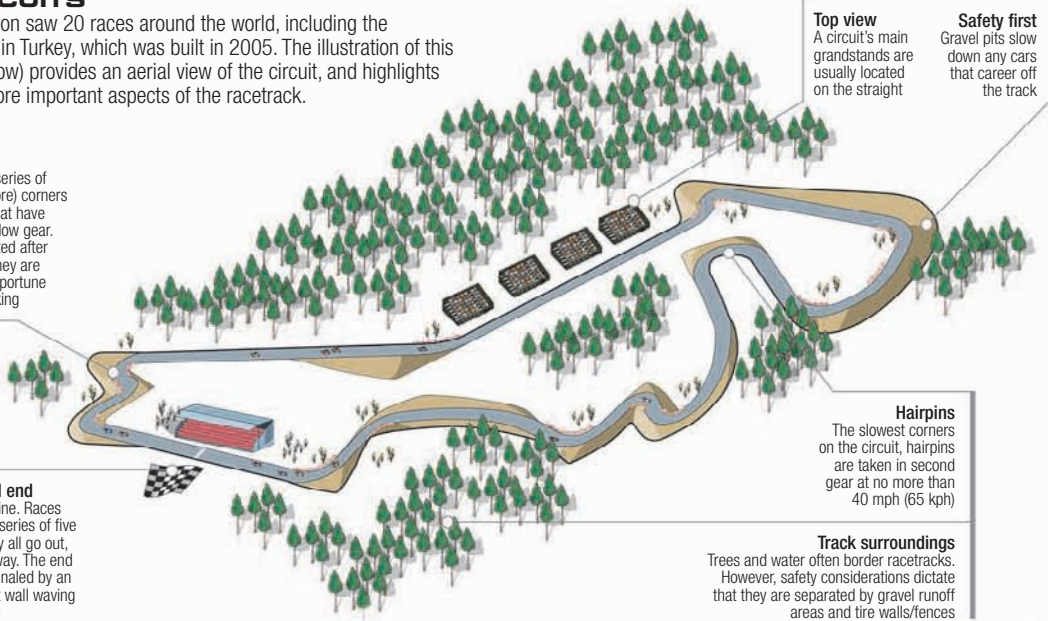
The 2011 season saw 20 races around the world, including the Istanbul circuit in Turkey, which was built in 2005. The illustration of this circuit (see below) provides an aerial view of the circuit, and highlights some of the more important aspects of the racetrack.

S-shape

Chicanes are a series of two (possibly more) corners in an S-shape that have to be taken in a low gear. Sometimes located after a long straight they are potentially an opportune place for overtaking

Beginning and end

The start/finish line. Races are started by a series of five lights. When they all go out, drivers speed away. The end of the race is signaled by an official on the pit wall waving a checkered flag



Top view

A circuit's main grandstands are usually located on the straight

Safety first

Gravel pits slow down any cars that career off the track

Hairpins

The slowest corners on the circuit, hairpins are taken in second gear at no more than 40 mph (65 kph)

Track surroundings

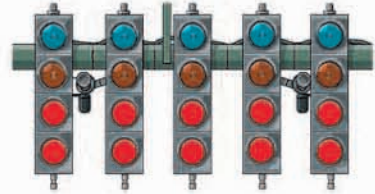
Trees and water often border racetracks. However, safety considerations dictate that they are separated by gravel runoff areas and tire walls/fences

THE RACE BEGINS

Drivers and cars must be on the grid 15 minutes before the start of the parade lap. During this time, refueling is finished, tires are put on the cars, engines are running, and the track is cleared. Two green lights signal the start of the parade lap, which ends with drivers taking up their allotted grid positions. The countdown to the race begins.

GO! GO! GO!

At one-second intervals, red lights come on from left to right and one at a time. After a few seconds all five go out simultaneously—and the sprint for the first corner begins.



SCORING

Drivers are awarded points if they finish a Grand Prix race in the top eight positions. The winner in first place receives 10 points, the runner-up in second place receives 8 points, third place gets 6 points, with fourth place 5 points through to eighth place with one point. Constructors that have two drivers in a race are awarded their points according to how many their drivers score together. A team that comes first and second is awarded 18 points, for example.

SIGNAL FLAGS

Marshals are stationed at various points around a track, ready to wave flags to attract the drivers' attention. Flags are colored differently according to the particular signal they are sending, such as danger on the track ahead, an interruption to the race, or all clear.



14 DANGER ON TRACK

Single yellow means danger; drivers slow down and don't overtake.



14 DIRTY TRACK

Yellow with red stripes means a slippery track surface ahead.



14 SLOW CAR

White warns of a slow-moving vehicle on the track; drivers slow down.



14 ALL CLEAR

Green means all clear and yellow flag warnings have been lifted.



14 LET CAR PASS

Blue warns of a faster car behind; driver to let the car pass.



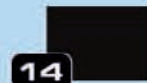
14 TECHNICAL PROBLEM

Black with orange circle and car number warns a driver to return to his pit.



14 WARNING

Black and white with car number warns of unsporting behavior.



14 DISQUALIFICATION

Black with car number orders a driver to his pit; possible disqualification.



14 RACE INTERRUPTED

Red means the race, practice, or qualifying session is stopped.



14 RACE OVER

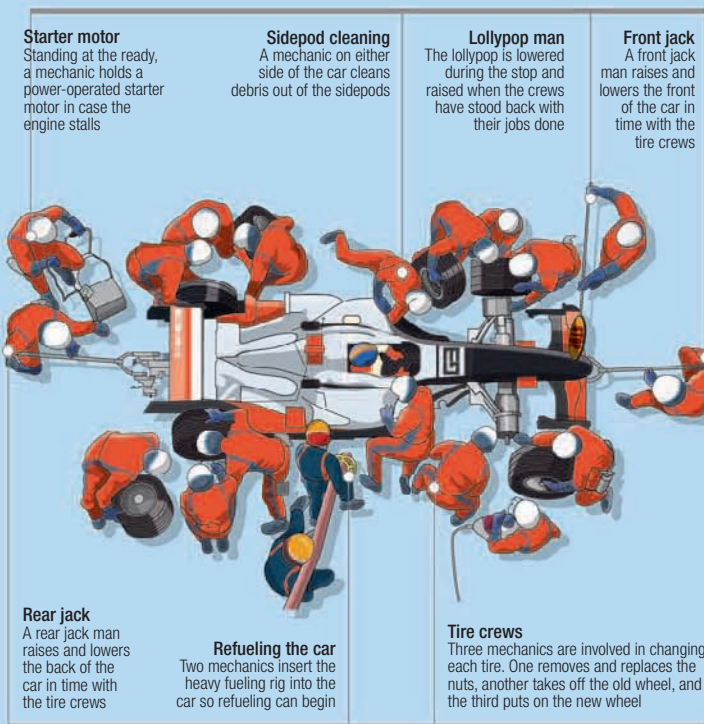
Checkered means the race has ended; shown first to the winner.

TEAM WORK

Many people contribute their services and expertise to the smooth running of a Formula One team. The drivers may become the most visible member, but everybody—from senior managers, designers, and engineers to test drivers, logistical support, and pit crew—is crucial to the team's success.

PIT CREW

When a driver brings his car into the pits for a pit stop, a large team of helmeted mechanics swarms around him in a carefully synchronized flurry of activity. Every split second counts. Each mechanic knows exactly what to do, such as filling up the tank with fuel, jacking up the front, or changing a tire.



Starter motor

Standing at the ready, a mechanic holds a power-operated starter motor in case the engine stalls

Sidepod cleaning

A mechanic on either side of the car cleans debris out of the sidepods

Lollipop man

The lollipop is lowered during the stop and raised when the crews have stood back with their jobs done

Front jack

A front jack man raises and lowers the front of the car in time with the tire crews

Rear jack

A rear jack man raises and lowers the back of the car in time with the tire crews

Refueling the car

Two mechanics insert the heavy fueling rig into the car so refueling can begin

Tire crews

Three mechanics are involved in changing each tire. One removes and replaces the nuts, another takes off the old wheel, and the third puts on the new wheel

THE PIT LANE

The pit lane separates the pit wall from the team garages and is divided into two lanes—the fast lane nearest the pit wall and the inner lane beside the garages. The pit crew emerges from the garages when one of their cars arrives on the inner lane during a pit stop. Teams install their control centers beside the pit wall. These centers become the hub of the team's activity during the race—directors, engineers, and others discuss tactics and strategy, refer to computers, watch monitors and screens, and use the communications equipment that keeps the team in touch with a driver and with analysts back at headquarters.



PIT-BOARD

The pit board tells a driver his race position, laps completed, and the time between him and the car in front and the car behind.



TIMING WALL

Each Formula One team is equipped with a timing wall in the pits where computers analyze the performance of their cars. The team monitors lap times, telemetry, and television feeds on a bank of screens. Between test laps, drivers can watch displays of their laps. The brightness of the screen images is unaffected by strong sunlight or the smoky atmosphere of the garages and pit lane.

STAT CENTRAL

DRIVERS CHAMPIONSHIP

YEAR	NAME	COUNTRY
2009	JENSON BUTTON	(GBR)
2008	LEWIS HAMILTON	(GBR)
2007	KIMI RAIKKONEN	(FIN)
2006	FERNANDO ALONSO	(ESP)
2005	FERNANDO ALONSO	(ESP)
2004	MICHAEL SCHUMACHER	(GER)
2003	MICHAEL SCHUMACHER	(GER)
2002	MICHAEL SCHUMACHER	(GER)
2001	MICHAEL SCHUMACHER	(GER)
2000	MICHAEL SCHUMACHER	(GER)
1999	MIKA HÄKKINEN	(FIN)

CONSTRUCTORS CHAMPIONSHIP

YEAR	NAME	POINTS
2009	BRAWN	172
2008	FERRARI	172
2007	FERRARI	204
2006	RENAULT	206
2005	RENAULT	191
2004	FERRARI	262
2003	FERRARI	158
2002	FERRARI	221
2001	FERRARI	179
2000	FERRARI	170
1999	FERRARI	128

ALL-TIME RACE WINS

WINS	NAME	COUNTRY
91	MICHAEL SCHUMACHER	(GER)
51	ALAIN PROST	(FRA)
41	AYRTON SENNA	(BRA)
31	NIGEL MANSSELL	(GBR)
27	JACKIE STEWART	(GBR)
26	FERNANDO ALONSO	(ESP)
25	JIM CLARK	(GBR)
25	NIKI LAUDA	(AUT)
24	JUAN MANUEL FANGIO	(ARG)
23	NELSON PIQUET	(BRA)

INSIDE STORY

Retired Formula One drivers started competing against each other in 2005 in a series of races called the Grand Prix Masters. Driving identical open-wheel vehicles based on the 1999 Reynard Champ cars and powered by 3.5-liter V-8 engines, all entrants must be medically fit, more than 45 years of age, and veterans of two or more Formula One seasons. Nigel Mansell won the inaugural event at Kyalami, South Africa.



NEED2KNOW

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- Indy car racing is the American equivalent to Formula One.
- Indy car racing gets its name from the sport's most prestigious race—the Indianapolis 500.
- Most Indy car racing takes place in the United States, but there are also races in Australia, Brazil, Canada, and Japan.

Two-element wing

This type of rear wing is used to increase downforce and drag, limiting the speed of the car and holding it to the road.

Air intake

Air feeds directly into the V-8 engine block through the airbox.

Smooth tires

The tread is only the thickness of a credit card. Front tires have a diameter of 26 in (66 cm), and those at the rear are 27½ in (70 cm). They reach 212°F (100°C) during a race.

Front wing

Guides the air over the car to produce the downforce needed to keep it on the track.

Carbon fiber chassis

This material is strong and light. The minimum weight for an oval-racing car is 1,530 lb (708 kg) and for a road-racing car 1,600 lb (726 kg).

BUILT FOR SPEED

Indy cars are open-wheel single seaters with an open cockpit and outboard wings at front and rear. Chassis and engine manufacturers supply vehicles on three-year cycles. Restrictions are placed on the power output of the engine and the weight and dimensions of the cars. Engines are 3.5 liter V-8s, fueled by ethanol. The chassis can be no longer than 16 ft (4.88 m) and no wider than 6½ ft (1.98 m).

DRIVER PROFILE

Some qualities seem obvious: excellent concentration, vision, and coordination; ample supplies of courage; and long experience of race conditions. Additionally, a driver needs staying power for a long race in a hot car, with toned neck, forearm, and leg muscles to deal with hours of steering, braking, and gear changing.

Suspension

Springs and shock absorbers support the weight of the car and smooth out bumps on the road.

Cockpit cushion

A cockpit head guard protects the head by absorbing the impact of a collision.

Spectator seating

Depending on the circuit, crowds of 100,000 or more can watch from grandstands placed around the circuit.

Pits area

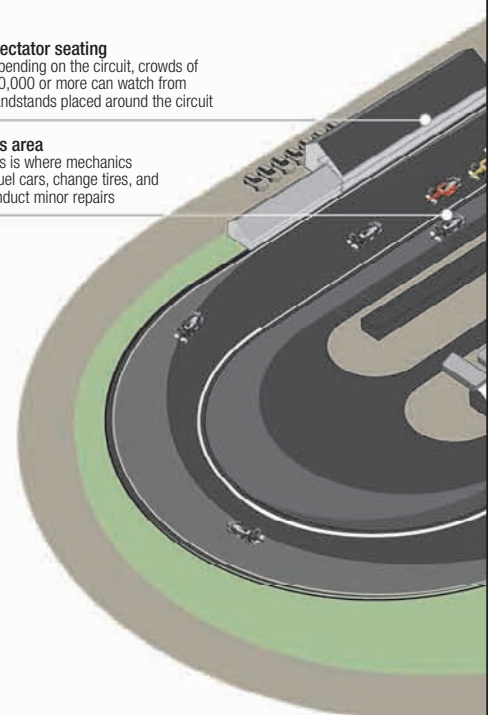
This is where mechanics refuel cars, change tires, and conduct minor repairs.

EVENT OVERVIEW

The Indy car format is overwhelmingly a North American phenomenon that involves open-wheel cars racing at tremendous speeds, often on compact, steeply banked oval tracks but also on road and street courses. The IndyCar (R) Series is one of the most popular spectator motor sports in the United States, with races attracting sold-out crowds to watch exciting and often hard-fought competitions. Races vary in length, the longest being the internationally famous 500 mile (800 km) Indianapolis 500.



INDY CAR RACING



RACE CIRCUITS

Indy car races are contested on three main types of race track: ovals (speedways), longer superovals (superspeedways), and street circuits. Drivers may cover up to 500 miles (800 km) in the longest races. The most famous of all the Indy car circuits is the Indianapolis Motor Speedway, where drivers battle it out over 200 laps of the 2½ miles (4 km) superoval to become the Indy 500 champion. The streets of St. Petersburg, Florida, provide an urban circuit for another leg of the IndyCar Series calendar. This series also features a race in Japan—at the Twin Ring Motegi, which includes both an oval speedway and a road course.

POLE POSITION

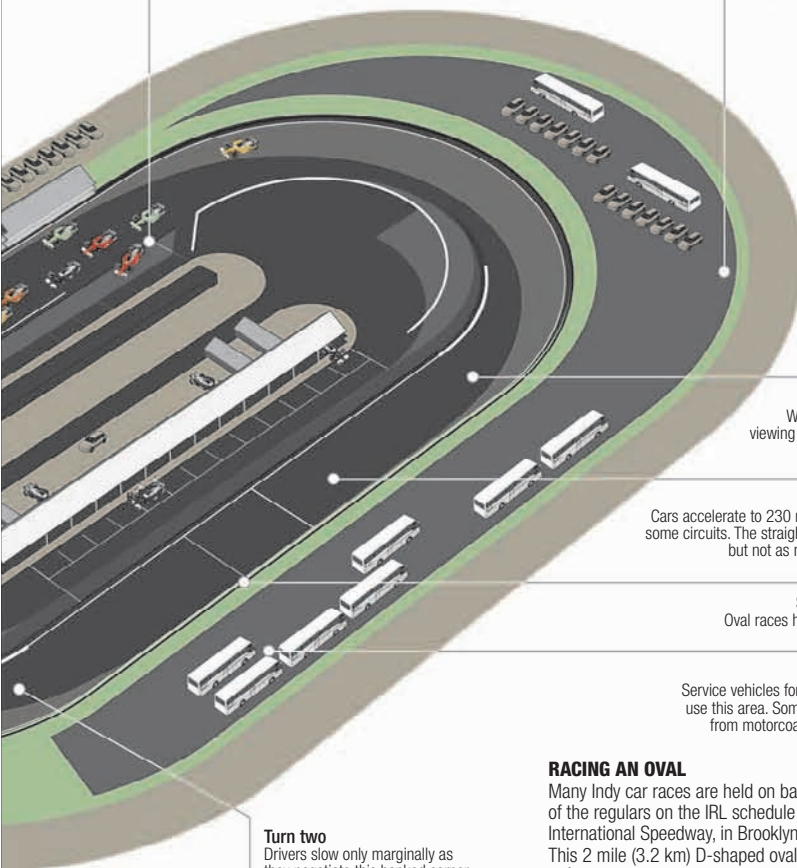
During qualification, drivers race against the clock to earn a spot on the starting grid. The rules for qualification vary from race to race. For oval races, drivers complete up to three qualification laps. The driver who records the fastest lap takes pole, the next fastest takes second spot, and so on until the starting grid is full. After a couple of warm-up laps, the race has a rolling start behind a pace car. For road races, the six fastest drivers in the qualification laps race head to head to determine the first three rows on the starting grid.

Pit lane entrance

Drivers leave the track here to make a pit stop

Turn three

The sweeping turns are angled at 18°, allowing drivers to corner at maximum speed



In-track area

Within the track are viewing areas, campsites, and parking

Home straight

Cars accelerate to 230 mph (370 kph) on some circuits. The straight is often banked but not as much as the turns

Start and finish

Oval races have a rolling start

Service area

Service vehicles for the huge crowds use this area. Some spectators view from motorcoaches parked here

Turn two

Drivers slow only marginally as they negotiate this banked corner. Steel and foam energy reduction (SAFER) barriers cushion the impact of cars during crashes

RACING AN OVAL

Many Indy car races are held on banked ovals. One of the regulars on the IRL schedule is Michigan International Speedway, in Brooklyn, Michigan. This 2 mile (3.2 km) D-shaped oval has turns with 18° banks, a front straight cambered at 12°, and 5° banking on the back straight. On some circuits, drivers' speeds never fall below 200 mph (320 kph), with faster top speeds on straights.

SIDELINES

314,980

The capacity of the stadium at Indianapolis Motor Speedway, the home of the Indianapolis 500.

675

The number of horsepower generated by the 3.5-liter, methanol-powered engine of an Indy car.

5,000

The number of pounds of downforce produced by an Indy car traveling at 220 mph (350 kph).

INDY CAR VERSUS FORMULA ONE

There are a number of differences between Indy car racing and Formula One racing (see pp. 368–371). Indy Car races are usually held on oval circuits and begin in a flying start with the cars in position but on the move. Formula One races are held on non-oval circuits and begin from a standing start with all the cars in position on a formal grid. Indy cars are heavier but faster on the straights than Formula One racers, but the latter are more agile and accelerate more quickly. Indy cars can use slick tires that are flat and without grooves, whereas Formula One dry weather tires must have grooves. Traction control and semi-automatic gearboxes are permitted in Formula One cars but not in Indy cars, which have engines limited to 10,300 rpm. Indy cars have been fueled with methanol or a mixture of methanol and ethanol, but in 2007 switched to 100% ethanol. Formula One cars are fueled with unleaded racing gasoline.

STAT CENTRAL

DRIVER WITH MOST IRL VICTORIES

WINS	DRIVER	(COUNTRY)
23	SCOTT DIXON	(NZL)
19	SAM HORNISH JR.	(US)
19	HELIO CASTRONEVES	(BRZ)
16	DAN WHELDON	(GBR)
16	DARIO FRANCHITTI	(GBR)
14	TONY KANAAN	(BRZ)
9	SCOTT SHARP	(US)
8	BUDDY LAZIER	(US)
5	GIL DE FERRAN	(BRZ)
5	GREG RAY	(US)

INSIDE STORY

Indy car racing has its origins at the Indianapolis Motor Speedway course. For many years, Championship Auto Racing Teams (CART) ran Indy car racing, but after an acrimonious split in 1994, the “Indy” name was taken by the Indy Racing League. CART now runs the Champ Car World Series, an Indy format similar to F1.

GOVERNING BODY

The Indy Racing League (IRL) is the North American organization that sanctions the IndyCar Series. It also runs the developmental Indy Pro Series.

GP2



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NEED2KNOW

- Televised GP2 races take place in Bahrain, Turkey, and European countries such as Spain, Italy, France, Hungary, Germany, Belgium, Monaco, and the UK.
- GP2 cars can reach speeds of 200 mph (320 kph). They can travel from 0–62.5 mph (100 kph) in 2.95 seconds and from 0–123 mph (200 kph) in 6.70 seconds.

V8 engine

A 4-liter engine produces around 600 horsepower

6-speed gearbox

The driver operates the sequential gearbox via a paddle shift on the steering wheel

HANS device

Every driver wears a HANS device to protect and support the head and neck

DRIVER PROFILE

The young competitors who participate in GP2 races need driving skills and talent above all else because the car they drive has no additional technological advantages to help them with handling.

Rear wing

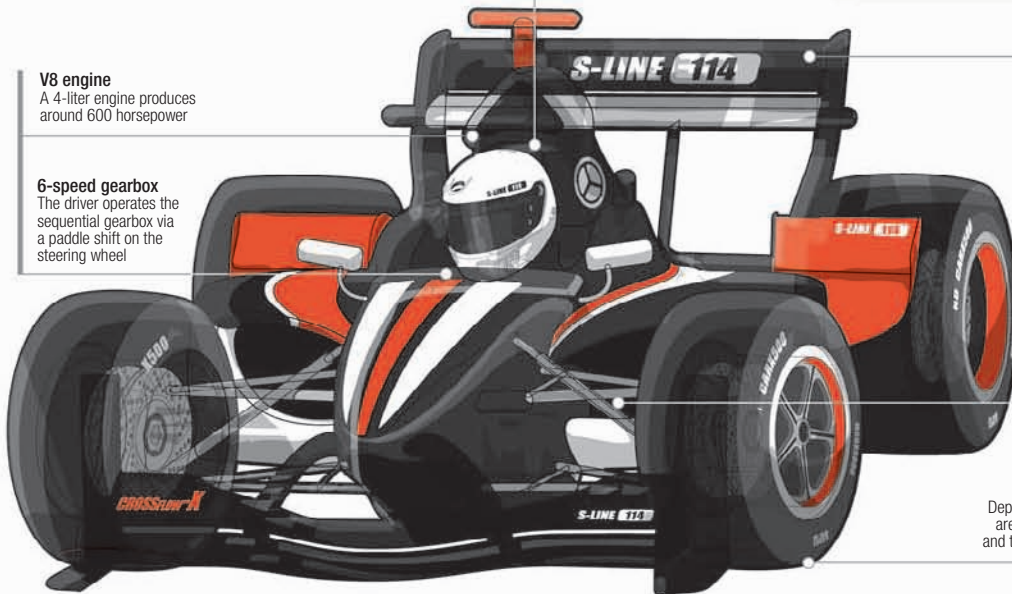
A biplane rear wing improves aerodynamics at the rear of the car

Suspension

Double wishbone suspension features at the front and rear

Slick tires

Depending on conditions, tires are selected for wet surfaces and three types of dry surfaces



WEEKEND FORMAT

Drivers compete in races which take place in 11 locations. There are two races on each weekend of the series—these follow the same pattern (except at Monaco, which has no Sunday race). Drivers practice and then qualify for their grid position on the Friday, race for 112 mi (180 km) on Saturday and then for 75 mi (120 km) on Sunday. The top 8 results on Saturday determine the order of Sunday's grid in reverse order—8th takes pole position and the winner starts in 8th place. In Saturday's race there is one mandatory pit stop where teams must change at least two tires.

POINT SCORING

In the Saturday race, 2 points are awarded for achieving pole position and then 10 points to the winner, with 8, 6, 5, 4, 3, 2, and 1 point going to the following 7 finishers. In the Sunday race, the winner receives 6 points, with 5, 4, 3, 2 and 1 point going to the next 5 finishers. In each race, 1 point is awarded for the fastest lap. When Lewis Hamilton won the series in 2006, he amassed 113 points, 12 ahead of Nelson Piquet Jr.

SPORT OVERVIEW

Introduced to the motor sports calendar in 2005, the GP2 Series—often abbreviated to GP2—is a new form of motor racing that replaces Formula 3000 as a means of preparing drivers and their teams for life in the fast lane of Formula One. The GP2 championship is an annual series of races that accompany Formula One races in certain countries. To ensure the best driver prevails in the series, each participating team shares the same engine, chassis, gearbox, and tires.

SERIES WINNERS

GERMAN DRIVER NICO ROSBERG WAS THE CHAMPION IN THE INAUGURAL GP2 SERIES IN 2005 AND BRITISH DRIVER LEWIS HAMILTON WON IN 2006. BOTH HAVE GRADUATED TO FORMULA ONE. ART GRAND PRIX WON THE TEAM PRIZE IN BOTH YEARS.

INSIDE STORY

Five essential values help to shape GP2 racing and the regulations that govern it. These are high performance of the GP2 car, control of competition costs, driver safety, training of every team member, and, finally, putting on an entertaining and exciting show. Controlling costs became vital with the demise of Formula 3000, which became too expensive for teams to enter. The GP2 series is the first motorsport with a fully integrated strategy—for example, centralized purchasing enables teams to buy cheaper parts.

DTM RACES

The Deutsche Tourenwagen Masters (DTM) is hugely popular in Germany and features a top-class international grid driving works-backed touring cars with V8 engines generating a maximum of 470 hp. The cars share standardized tires, brakes, transmissions, dimensions, and aerodynamics.

DRIVERLESS CAR

SEAT UNVEILED THE WORLD'S FIRST DRIVERLESS TOURING CAR IN 2007. DRIVEN BY REMOTE CONTROL FROM THE PITS, THE CAR CAN PRODUCE CONSISTENTLY FAST LAPS WHILE ELIMINATING HUMAN ERROR.

BRITISH TOURING CAR CHAMPIONSHIP

Since its inauguration in 1958 the British Touring Car Championship (BTCC) has been attracting large crowds eager to watch their favorite production models speed around race tracks with top drivers at the wheel. Manufacturers were equally keen to showcase their new models, especially with regular television coverage bringing the championship to millions of viewers. Teams using 2-liter saloon cars compete in three races at each of 9 tracks in the UK and the Republic of Ireland. In 2007, the touring cars were required to conform to the FIA's Super 2000 regulations as a step toward harmonizing the technical specifications across the sport.

SPORT OVERVIEW

Touring cars are essentially 4-door saloon cars or 2-door coupés that have been thoroughly modified for competitive racing on road courses and street circuits. The touring cars are different from sports cars, which are often purpose-built. Various types of touring cars compete in a number of major championships and series around the world, especially in Britain, Germany, and Australia.

INSIDE STORY

In 2005, the Fédération Internationale de l'Automobile (FIA) replaced the European Touring Car Championship with the World Touring Car Championship. Drivers compete on 11 tracks in various countries such as Brazil, Italy, and the UK. The races are usually for Super 2000, Diesel 2000, and Super Production cars.

NEED2KNOW

- ➔ Some touring car races last for 24 hours and are tests of endurance for crew and driver.
- ➔ Drivers coming to touring car racing from Formula One include Mika Häkkinen and Jean Alesi. Drivers who raced in touring cars and graduated to Formula One include Michael Schumacher and Alexander Wurz.

TOURING CAR RACING



Rear wing

The adjustable rear wing has a number of different settings

Traction

Cars can be front-wheel, rear-wheel, or four-wheel drive

Driver safety

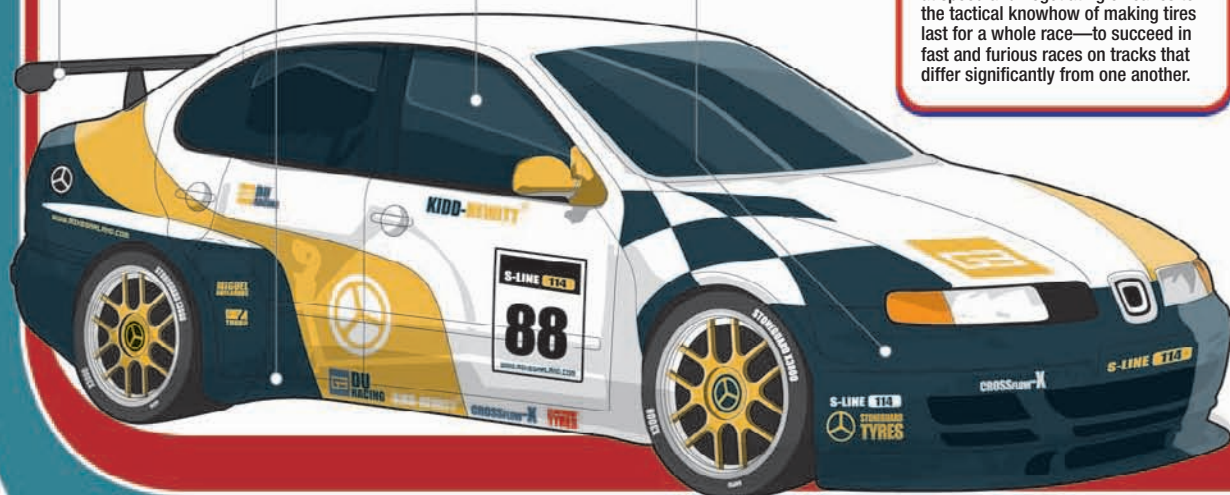
A roll cage protects the driver in the event of an accident

Front splitter

The aerodynamic front splitter protruding from the front of the car helps to direct air flow

DRIVER PROFILE

Drivers need to be physically fit and mentally tough, with a range of skills—from close-quarter cornering at speed and negotiating chicanes to the tactical knowhow of making tires last for a whole race—to succeed in fast and furious races on tracks that differ significantly from one another.



NEED2KNOW

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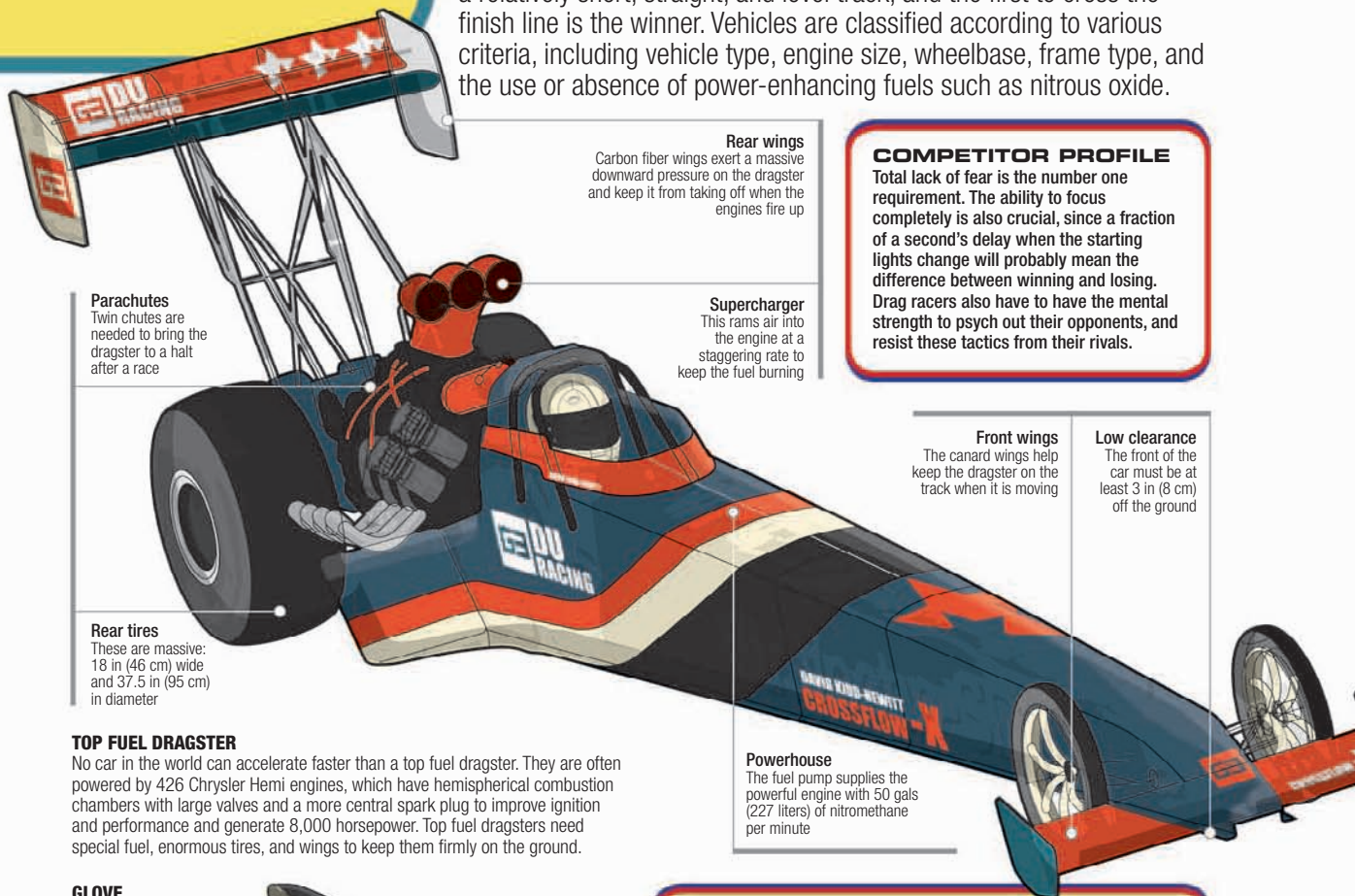
- Drag racing originated in the United States and is still most popular in North America. It also has a big following in many European countries, Brazil, Mexico, Canada, South Africa, and Australia.
- Worldwide, there are more than 300 drag strips.
- The annual U.S. Nationals six-day event organized by the National Hot Rod Association (NHRA) at Indianapolis attracts more than 100,000 spectators and is the richest drag racing competition in the world.

DRAG RACING



EVENT OVERVIEW

Drag racing is about speed, pure and simple. It is the fastest land-based sport. The competition is simple: two motor vehicles race along a relatively short, straight, and level track, and the first to cross the finish line is the winner. Vehicles are classified according to various criteria, including vehicle type, engine size, wheelbase, frame type, and the use or absence of power-enhancing fuels such as nitrous oxide.



Parachutes

Twin chutes are needed to bring the dragster to a halt after a race

Rear wings

Carbon fiber wings exert a massive downward pressure on the dragster and keep it from taking off when the engines fire up

Supercharger

This rams air into the engine at a staggering rate to keep the fuel burning

COMPETITOR PROFILE

Total lack of fear is the number one requirement. The ability to focus completely is also crucial, since a fraction of a second's delay when the starting lights change will probably mean the difference between winning and losing. Drag racers also have to have the mental strength to psych out their opponents, and resist these tactics from their rivals.

Rear tires

These are massive: 18 in (46 cm) wide and 37.5 in (95 cm) in diameter

Front wings

The canard wings help keep the dragster on the track when it is moving

Low clearance

The front of the car must be at least 3 in (8 cm) off the ground

Powerhouse

The fuel pump supplies the powerful engine with 50 gals (227 liters) of nitromethane per minute

TOP FUEL DRAGSTER

No car in the world can accelerate faster than a top fuel dragster. They are often powered by 426 Chrysler Hemi engines, which have hemispherical combustion chambers with large valves and a more central spark plug to improve ignition and performance and generate 8,000 horsepower. Top fuel dragsters need special fuel, enormous tires, and wings to keep them firmly on the ground.

GLOVE

The gloves offer all-around, fire-resistant protection for the hands and wrists.



Wrist protection

The glove extends well up the arm

LAYERED HELMET

The helmet has three layers to protect the head from trauma and fire: an outer shell, a foam liner, and an inner fire-resistant layer. To help counter the massive G forces, a 360° neck collar provides vital support for the head.

Foam liner

A thick layer of foam helps absorb any impact to the helmet

Outer shell

Provides trauma protection



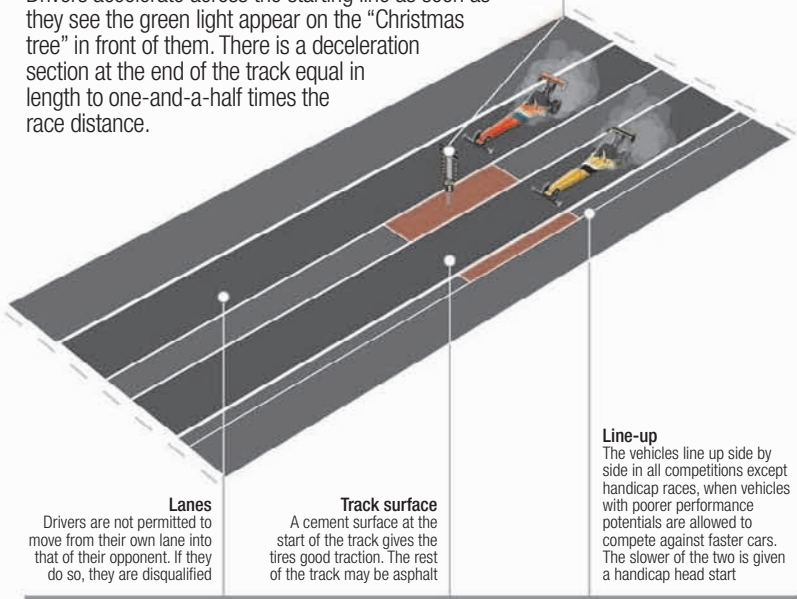
SIDELINES

3.58 The time in seconds it took Sammy Miller to complete the Santa Pod strip in England in 1984 when he broke the world record in his car Vanishing Point. His average speed over the 1/4 mile (400 m) course was 386.26 mph (621.61 kph).

14 The number of times American driver John Force has been crowned winner in the NHRA's Funny Car championship. With more than 120 career victories and the holder of the record for qualifying in 395 consecutive events, he is one of the sport's most successful competitors.

SPEEDWAY

The racing speedway strip is straight, level, and short. A special seal applied to the surface of the track increases tire traction. The standard strip lengths are ¼ mile (400 m) or ½ mile (200 m). Electronic beams at the start and finish record the times of contestants. Drivers accelerate across the starting line as soon as they see the green light appear on the “Christmas tree” in front of them. There is a deceleration section at the end of the track equal in length to one-and-a-half times the race distance.



Christmas tree
Drivers prepare to move when the last of the orange lights comes on. A split second later, the green light shows and the race is underway

Line-up
The vehicles line up side by side in all competitions except handicap races, when vehicles with poorer performance potentials are allowed to compete against faster cars. The slower of the two is given a handicap head start

Lanes
Drivers are not permitted to move from their own lane into that of their opponent. If they do so, they are disqualified

Track surface
A cement surface at the start of the track gives the tires good traction. The rest of the track may be asphalt

ROCKET RACERS

THE FASTEST TOP FUEL DRAGSTERS COVER A ¼ MILE (400 M) COURSE IN LITTLE MORE THAN FOUR SECONDS, HITTING 330 MPH (530 KPH) OR MORE. THE 5G DECELERATION EXPERIENCED BY DRIVERS AS PARACHUTES SLOW THEM TO A STOP CAN CAUSE EYE PROBLEMS.

CHRISTMAS TREE

An array of signal lights—from yellow to orange to green—in front of the starting line let the driver know when the race is going to begin.

Yellow lights

These light up when the vehicles are in their starting positions

Orange lights

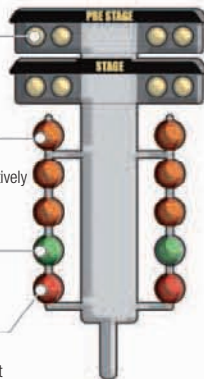
These light up consecutively immediately before the race starts

Green light

This indicates the start

Red light

This signals a false start



WHAT THEY DRIVE

There are more than 200 different vehicle classes, each with different requirements in terms of engine size, weight, fuel, and chassis style. The main classes are: top fuel dragsters (see p376), pro stock cars, pro stock bikes, top fuel funny cars, top methanol dragsters, and pro modified cars.

PRO STOCK CAR

Vehicles must resemble production models but can cover ¼ mile (400 m) in six seconds. NHRA cars are allowed an engine capacity of up to 500 in³ (8.2 l), and IHRA engines may be up to 820 in³ (13.1 l).



Broad tires

The rear tires are almost as large as those of dragsters, 17 in (43 cm) wide and 33 in (0.82 m) in diameter

PRO STOCK BIKE

Heavily modified motorcycles race in NHRA competitions. Most pro stock bikes are powered by 1,500cc Suzuki engines that can generate 300 horsepower and rev to 13,500 rpm.



Wheelie bar

The long aluminum wheelie bar keeps the bike from flipping over backward when it accelerates

TOP FUEL FUNNY CAR

These vehicles vaguely resemble production cars, but they are nearly as fast as the dragsters. The chassis is light fiberglass and the body is made of aerodynamically enhanced carbon fiber.



Nitromethane fuel

The supercharged, fuel-injected engine runs on nitromethane

THE RACE IS ON

Typically, pairs of drivers race against each other, with winners proceeding to future rounds to battle it out in a knockout. There are few rules, but a driver is disqualified for a foul start or for crossing lanes. Once the green light goes on, the tactic is maximum speed as fast as possible until the first car crosses the finishing line. Sometimes, an engine blows before the vehicle reaches the end of the track, but it can still coast home before its rival. This is called “heads-up racing” and is relatively common.

JUMPING THE LIGHTS

Technically, the car should not move before the green light comes on the Christmas tree. In practice the driver starts to move his car in the fraction of a second between the last orange light going out and the green flashing on. However, if the car passes the electronic eye in front of the start before the green shows, the driver is said to have “red-lighted” and is disqualified. In the event that both drivers “red-light” then only the first to cross the beam is disqualified.

GOVERNING BODIES

In North America the sport is governed by The National Hot Rod Association (NHRA) and the International Hot Rod Association (IHRA). Elsewhere, it is governed by the Fédération Internationale de l'Automobile (FIA). These bodies organize championships for various vehicle classes. For example, the NHRA, the world's biggest drag racing organization, organizes the POWERade series of races in the United States.

NEED2KNOW

- The engine sizes of karts range from 80cc to the 250cc of superkarts, some of which have two engines. Two-stroke engines are more widely used than four-stroke engines as they provide a good power-to-weight ratio and are mechanically simple.
- Karting began in the 1950s when enthusiasts wanted to make the thrill of motor racing accessible for young people and successfully assembled homemade machines from lawn mower engines, simple steering equipment and small wheels.
- Formula One champions Fernando Alonso, Michael Schumacher, and Ayrton Senna all began their racing careers in karting.

KARTING



SPORT OVERVIEW

In karting, which is also called go-karting or kart racing, drivers speed around a track and compete with each other to be the first past the finish line. Often thought of as the simplest form of motor racing yet an important stepping stone for aspiring Formula One drivers, karting is an ideal recreation for both young and old, men and women. Seasoned drivers can take part in junior or senior competitions in which races are organized according to a range of different divisions and classes.

COMPETITOR PROFILE

Drivers need to be fit, mentally strong, and be determined to win. They need to develop plenty of skill in techniques such as accurate steering, cornering, acceleration, overtaking, and braking.

Special suits

Drivers wear outfits that resist abrasion and are flame retardant

Engine type

Kart engines are either two-stroke or four-stroke

Head protection

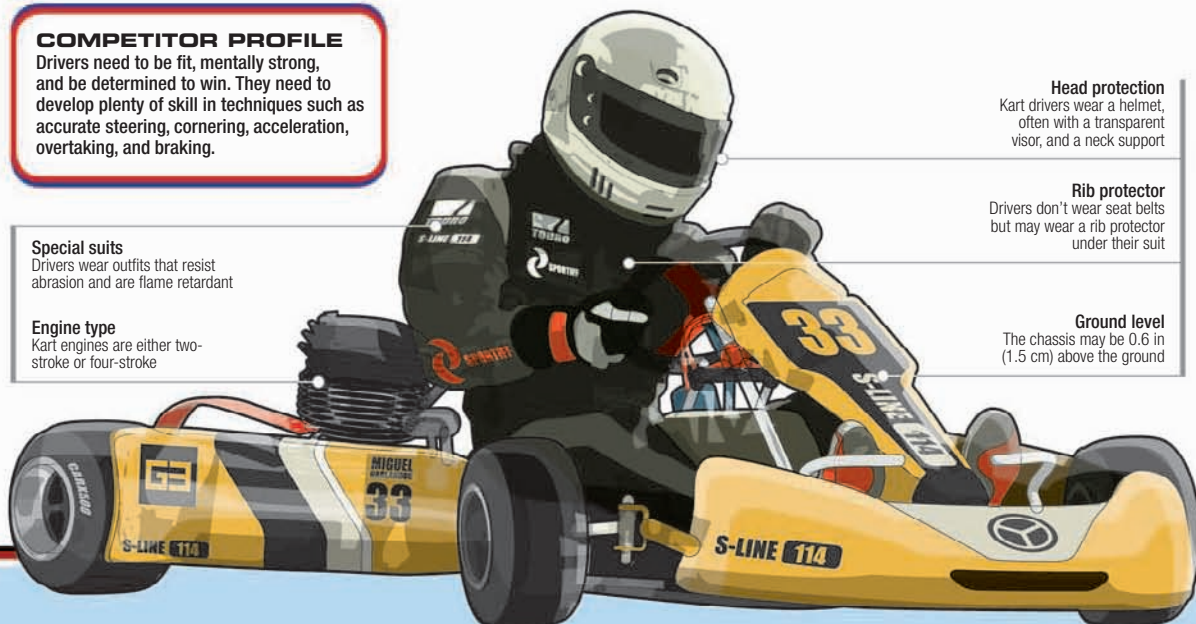
Kart drivers wear a helmet, often with a transparent visor, and a neck support

Rib protector

Drivers don't wear seat belts but may wear a rib protector under their suit

Ground level

The chassis may be 0.6 in (1.5 cm) above the ground



TYPES OF KARTING

The most common type is sprint karting, in which drivers compete on twisty tracks between 0.25 mi (400 m) and 0.82 mi (1.5 km) in length. Road-racing karts reach higher speeds and are used on larger tracks with longer straights. Shifter karts have a sequential gearbox and are usually raced on sprint tracks.

INTERNATIONAL COMPETITIONS

International karting competitions, such as the World Championship and the European Championship, are organized by the Commission Internationale de Karting (CIK). This sanctioning body is associated with the Fédération Internationale de l'Automobile (FIA), which organizes Formula One and many other races.

SPEEDWAY KARTS

SPEEDWAY KARTING RACES ARE HELD ON SHORT OVAL TRACKS WITH A DIRT OR ASPHALT SURFACE. KARTS ARE PURPOSE-BUILT FOR LEFT-TURN ONLY RACING—THE REAR IS NOT ALIGNED WITH THE FRONT AND THE OUTSIDE REAR WHEEL IS LARGER THAN THE INSIDE REAR WHEEL.

SIDELINES

19 The thousands of rpms that some two-stroke engines can reach

8 The minimum age for driving a kart in most countries.

80 The speed, in kph (50 mph), of a kart on a short track. On longer straight tracks karts may reach twice this speed.

4.5 The number of seconds a 100cc 2-stroke engine, weighing 330 lb (150 kg), takes to go from 0–60 mph.

INSIDE STORY

Traditionally, karts need to be started by an external starter or a push start. By contrast, touch-and-go (TaG) karts are equipped with a push-button starter, are longlasting, and used in clubs worldwide. The Rotax Max was the first successful TaG kart, and the Austrian manufacturer organizes national competitions in various countries and a World Final every year.

COMPETITOR PROFILE

Stock car drivers need to be tactically clever during a race so they can judge the most opportune moments to overtake, to fall in line to reduce drag, and to break out of the group to win the race.

Powerful engine

Stock car engines have a large displacement, generate as much as 750 brake horsepower and reach speeds of 200 mph (320 kph)

Roll cage

The middle section of the car has a roll cage that keeps its integrity to protect the driver in the event of an accident

Roof flaps

If a car spins out of control, a set of flaps at the back of the roof reduces lift and prevents the car from taking to the air

Radial tires

Stock cars have radial tires that are stable at high temperatures and give good traction—many are filled with nitrogen instead of air

**SPORT OVERVIEW**

Stock car racing is a predominantly North American motor sport in which drivers in various vehicle categories compete on oval tracks. Originally, the cars had to be models that were part of the stock that manufacturers sold to the public. Since 1973, the rules changed so that cars could look like production models but their specifications conform to the standards laid down by NASCAR, the governing body.

STOCK CAR RACING

**NEED2KNOW**

- ➔ Stock car races organized by NASCAR are extremely popular. In 2002, they were 17 of the best-attended 20 US sporting events.
- ➔ As well being the US' second most watched sport on TV after football, NASCAR races are broadcast to more than 75 countries.

NASCAR RACES

The National Association for Stock Car Racing (NASCAR) was formed in 1948 and regulates the sport in the US. It organizes the two main series of races—the Nextel Cup (which includes the Daytona 500) and the Busch series—and sanctions 1,500 races at 100 tracks in the US, Canada, and Mexico.

OVAL TRACKS

Races are usually held on oval tracks between 0.25 mi (400 m) and 2.66 mi (4.26 km) in length. Some are banked and others, known as dirt tracks, are unpaved short tracks. Long tracks, such as the one at Talladega in Alabama, are called superspeedways.

IN THE SLIPSTREAM

During a race drivers tend to make the best use of the aerodynamics of slipstreaming. They bunch together or follow each other closely in a line to reduce the drag on their vehicles and save fuel. Such dangerous maneuvers make the sport exciting and entertaining. Although accidents are common, severe injuries to the drivers are rare.

WIN ON SUNDAY, SELL ON MONDAY

THE FIRST MODERN OVERHEAD VALVE ENGINE TO GO ON SALE TO THE GENERAL PUBLIC WAS THE OLDSMOBILE ROCKET V8. ITS SUCCESS IN THE STOCK CAR RACES OF 1949 AND 1950 ENCOURAGED MORE AND MORE PEOPLE TO BUY THE CAR, LEADING TO THE SAYING "WIN ON SUNDAY, SELL ON MONDAY."

INSIDE STORY

Stock car racing arrived in Great Britain in 1954, using slightly modified saloon cars. Contact between cars became a part of the sport, so bumpers and roll bars were added. The British Stock Car Association (BriSCA) is the sport's governing body. Formula One stock cars look nothing like the manufacturer's standard production models; they have open wheels, for example, as well as a centrally located driver.

➔ The Fédération Internationale de l'Automobile (FIA) sanctions the Cross-Country Rally World Cup, which is made up of a maximum of eight events each season.

➔ Early cross-country rally events included the Peking to Paris race of 1907, which involved just five cars covering the 60,000 mile (96,560 km) distance in 60 days.

➔ Although it is no longer a World Cup event, the Dakar Rally remains the biggest, most dangerous, and most prestigious of all cross-country rallies. In 2007, 180 cars, 245 motorcycles, and 85 trucks started the race.

ROUGH RIDES

In cross-country rallying, anything goes. From the sands of the Sahara to the rocky terrain of the Atlas Mountains and the savannas of the Pampas, it's a test of endurance and navigation—the tougher the better.

Helmet

Along with a neck brace, provides rider with head protection

In the frame

A robust frame provides optimal weight distribution



DESERT BIKES

Off-road motorcycles need to have a combination of robustness, power, and light weight. Ground clearance is high to avoid hitting obstacles such as rocks, while the suspension is beefed up to enable riding over rough terrain.

Survival aids

Water, food, shovels, and distress flares are kept in the trunk



KEEP ON TRUCKIN

For most cross-country endurance rallies, trucks are defined as vehicles with a total weight of 3.5 tons or more. They can carry up to three people and have a fuel capacity in excess of 217 gallons (820 liters).



OFF-ROAD RALLYING

SPORT OVERVIEW

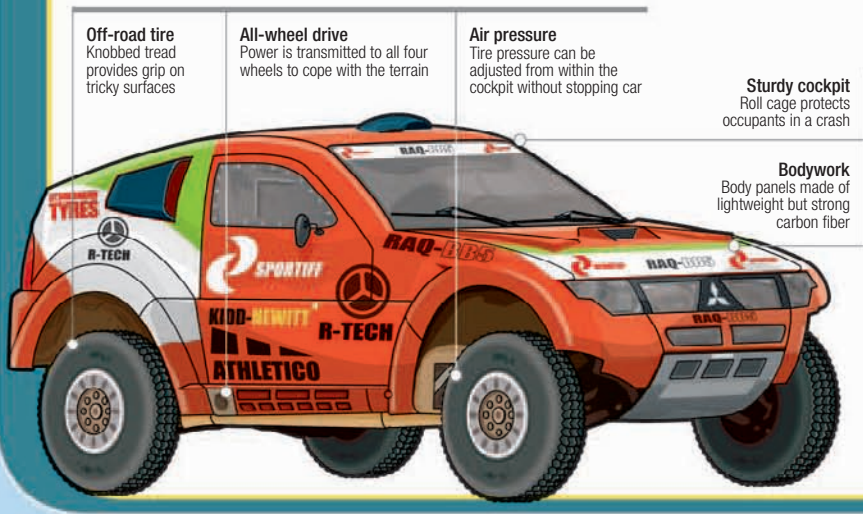
This is the ultimate form of endurance racing, requiring the spirit of an adventurer as much as that of a sports person. Once exclusively a car sport, motorcycles and trucks now also race point-to-point routes that traverse hundreds or thousands of miles of desert, mountain, or other wild terrain. Winning drivers are those with the quickest aggregate times over several legs, sometimes raced daily over a week or more. The most famous event is the Dakar Rally, which starts in Europe and ends in Dakar, Senegal.

PENALTIES

Drivers do not have to follow precisely the same route, but they must get from the start to the finish of a section by passing one or more checkpoints. A failure to do so results in time penalties.

DRIVER PROFILE

Drivers, co-drivers, and riders in this motor sport all need the attributes of adventurers as well as athletes.



Off-road tire
Knobbed tread provides grip on tricky surfaces

All-wheel drive
Power is transmitted to all four wheels to cope with the terrain

Air pressure
Tire pressure can be adjusted from within the cockpit without stopping car

Sturdy cockpit
Roll cage protects occupants in a crash

Bodywork
Body panels made of lightweight but strong carbon fiber

SIDELINES

48 The number of competitors who have died in the Dakar Rally since its first running in 1978.

1,000,000 The number of Portuguese spectators who came to watch the 2007 Dakar Rally over its first two days as the race left the capital Lisbon and worked its way across into Spain.

14,437 The number of people who have participated in the Dakar Rally since 1979. The race has taken place in South America since 2009 due to fears of terrorist attacks along the route through North Africa.

DAKAR INSPIRATION

FRENCHMAN THIERRY SABINE CAME UP WITH THE IDEA OF THE DAKAR RALLY AFTER GETTING LOST IN THE LIBYAN DESERT DURING THE 1977 ABIDJAN TO NICE RALLY. HE ORGANIZED THE FIRST DAKAR RALLY IN 1978. THERE WERE 170 ENTRIES. THIERRY WAS KILLED IN A HELICOPTER CRASH DURING THE 1986 EVENT.

NEED2KNOW

- ➔ When European truck racing started in the 1980s, road-going, working vehicles were used.
- ➔ The Craftsman Truck Series first began in 1995.
- ➔ A racing truck can accelerate to 100 mph (161 kph) quicker than a Porsche 911 sports car.
- ➔ The minimum weight for a truck is 6 tons (5,500 kg).
- ➔ For safety reasons, there is a maximum speed limit of 100 mph (160 kph).

RULES OF THE ROAD

The European race series is controlled by the Fédération International de l'Automobile (FIA), and it has limited the top speed of the trucks to 100 mph (161 kph). Rather than the static grid used in other types of motor sports, races commence with a rolling start and last for a predetermined number of laps. Points are given to trucks finishing in the top positions and are accumulated from the two races held at each circuit over one weekend.

DRIVER PROFILE
 Driving a 6-ton truck around a racing circuit at high speeds is not for the fainthearted. Lightning-quick reactions and nerves of steel are essential requirements. To race a truck, drivers must be at least 21 years old and hold a race license.

TRUCK TRACKS

In both Europe and the US, truck racing is held at a variety of tracks, from "road courses" that incorporate both left- and right-handed turns to oval circuits that only include left-handed bends. Less than 10 tracks host the European Truck Racing Cup (ETRC) each season, but the Craftsman Truck Series visits up to 25 circuits a year.

RULE BOOK

In addition to conventional motor sport penalties such as for speeding in the pit lane, truck racing drivers are disciplined for infringements like emitting excessive exhaust smoke and exceeding the 100 mph (161 kph) speed limit.

WHEEL TO WHEEL

While truck racing is not meant to be a contact motor sport, the massive size of the vehicles and limited width of the tracks produces plenty of close-quarter action.

- Racing tire**
Special "sticky" rubber is used to help grip the track.
- Pulling power**
Turbocharged diesel engine is able to generate 1,050 bhp
- Driver safety**
The cab has a built-in roll cage to protect the driver
- Modified suspension**
Racing shock absorbers enable the truck to corner at high speed



Vehicle weight
European racing trucks must weigh at least 12,125 lb (5,500 kg)

Tuned up power
Most trucks have 12 liter turbo charged diesel engines

Truck stop
Water-cooled disc brakes are needed to slow the truck down



TRUCK RACING

SPORT OVERVIEW

Truck racing may not be the most high-profile of motor sports but it is certainly one of the most exciting. The European Truck Racing Championship (ETRC) takes place on some of the world's best-known motor-racing circuits such as the Nürburgring in Germany and Le Mans in France. In the United States, the Craftsmen Truck Series draws massive crowds to tracks all over the country to watch modified pick-up trucks go head-to-head in races of up to 250 miles (400 km).

TOP TRACK

THE NÜRBÜRGING IN GERMANY IS THE LONGEST AND MOST EXCITING TRACK IN EUROPE. IT IS A VENUE FOR THE BRITISH TRUCK RACING CHAMPIONSHIP (BTRC) DURING WHICH OVER 150,000 FANS GATHER TO WATCH THE ACTION.

RALLYING

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SPORT OVERVIEW

Rallying is a fast and furious point-to-point motor sport raced on public and private roads, usually against the clock. The World Rally Championship (WRC) is the sport's premier event, featuring races on a wide range of courses all around the world that test the reliability of the cars and the nerves and skills of the driver and co-driver.

DRIVER PROFILE

Controlling a 300bhp rally car takes more than just technical driving ability. A rally-car driver needs to have quick reactions to adjust to the ever-changing terrain, high concentration levels to cope with testing conditions, and complete trust in the co-driver.

Crew protection
Extra-strong roll cage is welded into the frame of the car

Removable panels
Body panels are made of pressed steel and can be replaced during a race

Onboard data
Crew can access technical data about the car



Rallying powerplant
All WRC cars incorporate two-liter, turbocharged engines

Braking system
Massive ventilated disc brakes provide the stopping power

Racing rubber
Tires can be up to 18 in (46 cm) wide to provide extra grip

Transmission
Six-speed gearbox is operated via a semi-automatic shifter

Racing chassis
Hand-built chassis is stiffened to create a rigid car able to withstand the extreme forces of a rally

Aerodynamic aid
Rear spoiler creates downforce that helps to control the car when cornering at high speeds

NEED2KNOW

- ➔ Until private routes were used in the 1950s, rallying events took place on public roads.
- ➔ Swede Björn Waldegard won the first World Rally Championship for Drivers in a Ford Escort in 1979.

CLASSIC RALLY

LAST RUN AS A WRC EVENT IN 2002, THE SAFARI RALLY IS REGARDED AS THE TOUGHEST OF THEM ALL. HELD ON THE OPEN ROADS OF EAST AFRICA, HAZARDS INCLUDED WILD ANIMALS AND SEVERE DUST STORMS.

ALL-TERRAIN DRIVING

From the icefields of Sweden to the high-altitude mountain passes of Argentina and the forest tracks of Wales, WRC races take place over every conceivable type of course. Only by being able to master terrain as varied as ice, mud, gravel, and sand do drivers stand a chance of challenging for the Championship. The rallies are made up of short, timed special stages where the points are won, and liaison stages that enable the manufacturer-backed teams to get to the start of the next special stage.

RALLY FORMAT

Each rally has up to 25 special stages, ranging in length from just a few miles up to 37 miles (60 km). Stages have a staggered start, with cars sent off at a time interval of one or two minutes to race over a mixture of (closed) public and private roads. Drivers aim to cover the course as quickly as possible, with the winning car the one that completes all the stages in the least overall time.

TIME PENALTIES

Rallying has a strict system of time penalties. These are imposed on drivers for reasons such as being late for the start of a stage and if team mechanics spend longer than the allotted time allowed to check a car at the end of a stage.

THE CO-DRIVER

The eyes of a rally car team, the co-driver provides his or her driver with all the navigational information needed to complete a stage. Before a stage, the co-driver surveys the course and takes detailed notes on the location of bends, type of road surface, and any potential hazards. These are then read out to the driver during the race.

CARS UNDER SCRUTINY

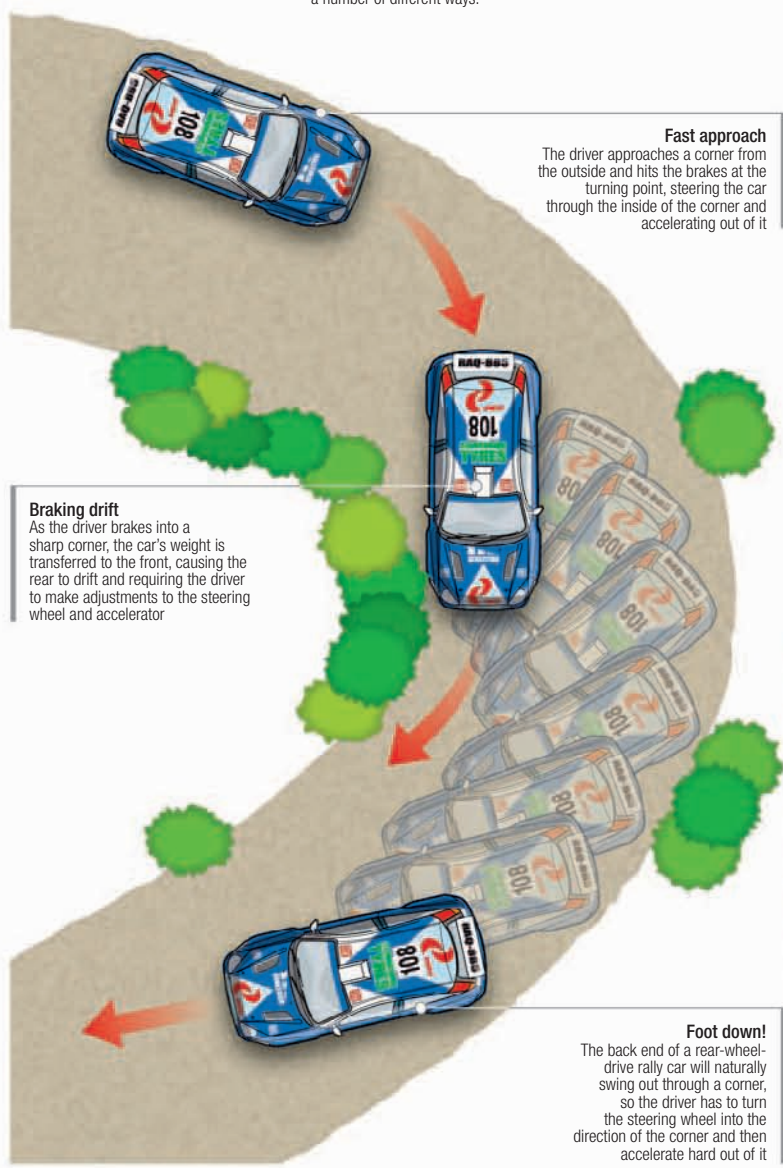
According to the rules laid down by the sport's governing body, the Fédération Internationale de l'Automobile (FIA), World Rally cars must be based on their passenger car equivalents and be available—albeit in limited numbers—to the public. But that's where similarities end, as teams then modify the cars within the limits set by the FIA. At WRC events, a team of official scrutineers checks the cars for legality before, during, and after the race, with drivers sometimes disqualified from a rally for contravening technical regulations.

SPEED BREAKS

Maintaining momentum is the key to fast times out on the course. Accelerating into jumps and water troughs keeps the car "nose up," which is vital if the driver is to execute a safe landing. Drivers take advantage of the extra traction in dips and troughs to use heavier braking and steering to maintain a smooth line through the course. Most rally cars incorporate four-wheel drive, where power is transmitted to each wheel, and this provides extra traction for the tires to grip to the surface.

CORNERING TECHNIQUES

Cornering is a fine balance of play between the brakes, throttle, accelerator, and clutch. The art of drifting—setting a car sideways through a corner to enable a faster exit—is a crucial rally technique, and it can be carried out in a number of different ways.



Fast approach

The driver approaches a corner from the outside and hits the brakes at the turning point, steering the car through the inside of the corner and accelerating out of it

Braking drift

As the driver brakes into a sharp corner, the car's weight is transferred to the front, causing the rear to drift and requiring the driver to make adjustments to the steering wheel and accelerator

Foot down!

The back end of a rear-wheel-drive rally car will naturally swing out through a corner, so the driver has to turn the steering wheel into the direction of the corner and then accelerate hard out of it

STAT CENTRAL

MOST WRC WINS—DRIVER

WINS	DRIVER
60	SEBASTIEN LOEB
30	MARCUS GRONHOLM
26	CARLOS SAINZ
25	COLIN MCRAE
24	TOMMI MAKINEN
23	JUHA KANKKUNEN
20	DIDIER AURIOL
19	MARKKU ALEN
18	HANNU MIKKOLA
17	MASSIMO BIASION

MOST WRC WINS—MANUFACTURER

WINS	MANUFACTURER
76	FORD
74	LANCIA
68	CITROËN
48	PEUGEOT
47	SUBARU
43	TOYOTA
34	MITSUBISHI
24	AUDI
21	FIAT
9	DATSUN/NISSAN

BEHIND THE SCENES

PROFESSIONAL TEAMS ENTER UP TO THREE CARS IN A RACE, AND THEY ARE ALL BACKED UP BY A TECHNICAL SUPPORT CREW THAT KEEPS THEM AT PEAK PERFORMANCE DURING THE RALLY. BETWEEN STAGES EACH CAR IS INSPECTED BY THE SUPPORT CREW.

INSIDE STORY

The concept of rallying dates back to competitions between the first "horseless carriages" in the 19th century. Early motorized rallies included the Monte Carlo Rally, which was first held in 1911 and is still raced today. Longer events then sprang up such as the 10,000-mile (16,000-km) Méditerranée-le Cap held in Africa in the 1950s. It is a far cry from professional modern rallying and its highly tuned cars racing over short distances.

GOVERNING BODY

Rallying comes under the auspices of the FIA World Motor Sport Council that governs all motor sports. The Council organizes the WRC that takes place annually over 15 or 16 courses worldwide.

RACER PROFILE

With races running for roughly an hour, endurance is a necessity, along with strength and low body weight. Riders also need the courage to take their bikes to speeds up to 200 mph (320 kph) or more.

Engine power

Engine size varies according to the race specs. For MotoGP races they are state-of-the-art 800cc four-stroke engines

One-piece suit

A padded, abrasion-resistant, one-piece bodysuit and gloves are necessary

Safety Helmet

These are designed to absorb one incident only

**Aerodynamic design**

A powerful engine and aerodynamic design allow MotoGP bikes to hit speeds of 215 mph (350 kph)

Broad tires

Rear tires are wider than the front for extra grip, since all the power goes through this wheel

NEED2KNOW

- Track motorcycle racing is a massively popular spectator sport around the world, particularly on TV. The final MotoGP race of the 2006 season was watched by 9 million viewers in Italy alone.
- The most prestigious races are those of the MotoGP world championship, which is contested in 18 circuits around the world every year.
- In 2001, Valentino Rossi, conqueror of the 125, 250, and 500 World Championships in his second season in each class, became only the second rider in history (after Phil Read) to achieve this feat.

THE CIRCUIT

Circuits are usually specially built tracks, and while each one has its own layout and special character, they all have common features. These include gentle and hairpin bends, straights, ascents and descents (sometimes), a run-off area, and gravel beds for safety. The track must be sufficiently wide for bikes to corner and pass each other, and barriers and off-track emergency zones are placed appropriately. Spectators watch races from grandstands, and safety marshals are positioned around the track.

OTHER COURSES

Road races are not always held on specially built circuits. Races sometimes take place on public roads, airfields, or a combination of public roads and off-road tracks.

DRAG RACING Two contestants race each other along a straight, paved strip of road, such as a dragster track, that is commonly ¼ mile (400 m) long.

HILL CLIMB Single riders race the clock along uphill stretches of road.

ROAD RALLY Competitors drive along open public roads between a fixed start and finish, visiting checkpoints along the route. The riders must obey speed restrictions and other rules of the road.

PUSHING TOO HARD

ON MARCH 7, 2007, SHINYA NAKANO CRASHED DURING A PRACTICE SESSION AT THE SPANISH GRAND PRIX. TRAVELING OVER 200 MPH (320 KPH), HE LOST CONTROL OF HIS BIKE GOING INTO A TURN. LUCKILY, HE DID NOT SUFFER ANY SERIOUS INJURIES.

ROAD RACING

**EVENT OVERVIEW**

The most popular road racing events involve competitors riding motorcycles on tarmac circuits or closed public roads. The most illustrious circuit races are the 125cc, 250cc, 800cc GP World Championships, and the World Championships for Superbike, and Supersport, Endurance, and Sidecar categories, but Motocross and Supercross events have increased in popularity, especially in the US.

Long straight

Riders can really burn rubber on the longest straight on the course, reaching speeds of 215 mph (350 kph). The straight, which is about $\frac{3}{4}$ mile (1 km) long, is where races start and finish

Circuit speed

The average speed on the circuit cannot exceed 124 mph (200 kph)

Spectator seating

A raised, angled grandstand affords views for thousands of spectators over the whole circuit—in safety and relative comfort

Gravel skirt

The surface of the gravel beds must be completely flat and without undulations

Circuit length

The length of the circuit must be between $1\frac{3}{4}$ and 6 miles (3.5 km–10 km)

Track width

The width of a track cannot be less than 33 ft (10 m) wide

The curbs

Curbs help the rider identify the edge of the track; each individual block of colored curb must be $2\frac{1}{2}$ ft (80 cm) long.

Hairpin turn

Hairpins are the slowest parts of a circuit. Riders have to move into 2nd gear and slow to around 90 mph (45 kph)

MANX RACERS

The most famous road race is the Isle of Man TT (Tourist Trophy) competitions, which have been held on the Mountain Course since 1907. The senior event is six laps of the 38 mile (61 km) course. The lap record of 17 minutes 12 seconds was set by John McGuinness in 2009, and in 2007, Bruce Anstey achieved the top speed ever reached—206 mph (332 kph).

EQUIPMENT

Protective clothing is not optional: all racing motorcyclists crash, and most suffer injuries from time to time. Wearing the proper gear can make the difference between some bad bruising and broken bones, or worse. A full-face helmet, one-piece racing leathers, gloves, knee sliders, and boots are all mandatory, and all racers must wear a metal identification tag with blood type details. Riders must be in peak physical condition to race with all the required safety equipment.

GLOVES

The outer leather skin is reinforced, and a foam lining gives extra protection and comfort. There can be sticky-grip material on the palms.

**HELMET**

In addition to absorbing impacts and shielding the face, the helmet is designed to draw in fresh air and allow exhaled air and humidity out.

**BOOTS AND KNEE-SLIDERS**

Made up of a number of independent plates that offer special protection for the Achilles heel, ankles, toes, and lower shins. These give extra protection for the vulnerable knees and shins.



Stick-ons
The knee-slider pad is attached to the leg with velcro



Shin covers
Give extra protection to one of the most damaged parts of the body

Tough panels
Carbon fiber sole inlays provide additional safety

Shoulder pad

Titanium shoulder pads are necessary insurance against a broken clavicle or shoulder bone

Chest protector

Integrated panels guard against impacts around the chest and rib areas

Elbow guard

A damaged elbow will hamper a rider's ability to race, so they must be protected

ADDITIONAL PROTECTION

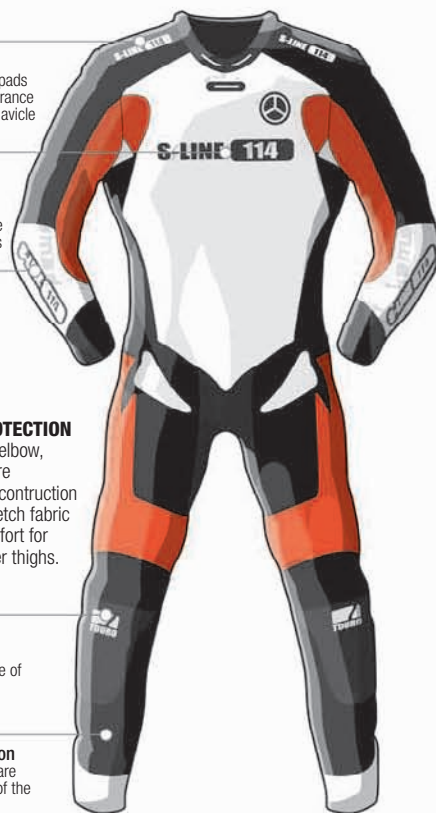
Titanium shoulder, elbow, and knee guards are integrated into the construction of the leathers. Stretch fabric provides more comfort for the crotch and inner thighs.

Knee protection

Knee sliders are attached to the side of the knee pad

Damage limitation

Shin-length boots are worn over the top of the full-length suit



RULES OF THE ROAD

World championship 125cc, 250cc, and MotoGP races, run by the Fédération Internationale de Motocyclisme (FIM), are between 59–81 miles (95 and 130 km) long. The number of laps to be raced will depend on the length of the track. Positions on the starting grid are decided by the fastest lap time recorded during qualifying and to qualify for the race, a rider must achieve a time at least equal to 107 percent of the time recorded by the fastest rider of his class. Before the start, race officials declare a race “dry” or “wet” so riders can decide which tires to use. Tires can be changed on the grid before the start of the race. After one warm-up lap, the race is started by lights. A red light will be displayed for between 2 and 5 seconds, and when it goes out, the race will start. If two riders cannot be separated at the finish, the one who achieved the fastest lap time during the race, wins.

TAKING A CORNER

While overtaking is the skill that marks out a championship winner from an also-ran, cornering hard and fast will enable a rider to achieve top lap times. The more time the bike spends upright, the quicker it will go, so being able to get in and out of corners quickly will allow the rider to improve on lap times, and therefore be competitive in a race.

STAT CENTRAL

GRAND PRIX WINNERS

RIDER (NATIONALITY)	TITLES	WINS
GIACOMO AGOSTINI (ITALY)	15	122
ANGEL NIETO (SPAIN)	13	90
VALENTINO ROSSI (ITALY)	9	105
MIKE HAILWOOD (UK)	9	76
CARLO UBBIALI (ITALY)	9	39
JOHN SURTEES (UK)	7	38
PHIL READ (UK)	7	52
GEOFF DUKE (UK)	6	33
JIM REDMAN (RHODESIA)	6	45
MICK DOOHAN (AUSTRALIA)	5	54
ANTON MANG (GERMANY)	5	42

Hitting the corner

When back in an aerodynamic riding position, shift over to the left of the seat while turning into the corner. This helps to increase the traction. Always look ahead to where you want to go.

Full tilt

As the bike hits the inside of the bend, it tilts even further. The rider moves his inside knee down to contact the ground and keeps his hips to the outside of the bike.

Apex of the turn

Power should be maintained in the corner. The front brake should not be touched, otherwise the front end of the bike may buckle. At the apex of the turn start to accelerate.

Pulling away

Get the bike upright as soon as possible, then gradually get on the power and shift up through the gears.

Front brake
The main brake is for the front tire, not the rear.

Lean angles
A bike can lean to a 60° angle without falling over.

VALENTINO, NUMERO UNO

ITALIAN RIDER VALENTINO ROSSI IS THE WORLD'S NUMBER ONE MOTORCYCLING SUPERSTAR. NICKNAMED “THE DOCTOR” FOR HIS CLINICAL DISMANTLING OF OPPONENTS, ROSSI HOLDS THE RECORD FOR THE MOST CONSECUTIVE PODIUM APPEARANCES. FROM SEPTEMBER 8, 2002, TO APRIL 18, 2004, HE WENT TO THE PODIUM ON 23 OCCASIONS. HIS SUCCESS ON THE TRACK HAS BROUGHT HIM FORTUNE AS WELL AS FAME, AND BY 2009 HIS ANNUAL EARNINGS AMOUNTED TO A MONUMENTAL \$35 MILLION. THAT'S AN AWFUL LOT OF LOOT.

INSIDE STORY

The origins of road racing go back to 1894, and the Paris–Rouen race, which saw motorcycles and cars racing side by side, and the first Isle of Man TT that took place in 1907. Circuit racing did not start until 1949, when the FIM launched the Road Racing World Championship Grand Prix for 125cc, 250cc, 350cc (now discontinued), and 500cc bikes, and sidecars. The early years were monopolized by Italian and British riders, but Australians, Americans, and Spanish riders now dominate the sport. The Superbikes (1000cc) championship began in 1988, and MotoGP, which replaced the 500cc class, was launched in 2002.

GOVERNING BODY

The FIM was founded in 1904 by representatives of motorcycle clubs from Austria, Belgium, Denmark, France, Germany, and Great Britain. Today, it represents 98 national motorcycle federations, divided into six regional groups: Africa, Asia, Europe, South America, North America, and Oceania. The FIM is recognized by the IOC.

EVENT OVERVIEW

Off-road motorcycle racing includes any competition that is not raced on tarmac circuits or roads. The most popular events are motocross (MX), supercross (SX), speedway, enduro, cross-country, and trials. In recent years, variants such as beachcross have developed a large following. Aside from the race surface, the big difference from track racing is the style of the bikes.

OFF-ROAD MOTORCYCLE RACING



NEED2KNOW

- ➔ Speedway took Britain by storm when it was introduced in the 1920s. In its heyday, crowds of 80,000 or more attended races. Today, a popular GP series takes place throughout Europe.
- ➔ In North America, indoor supercross is more popular than motocross, attracting massive crowds at indoor arenas on man-made courses. More than 70,000 spectators have packed the Georgia Dome for a World Supercross Series event.
- ➔ In the early years of motocross, the 500cc class was considered the premier division. However, as technology progressed, the 250cc bikes became faster and more manageable, and eventually superseded the 500cc bikes to become the premier class event.

RIDER PROFILE

Off-road racing requires skill, strength, stamina, and concentration. Riders must be prepared to take hits and get muddy. Trials riders must be especially skillful, have tremendous balance, throttle control, and vision to negotiate the demanding obstacles, steep slopes, and sharp turns.

Head gear

Riders cannot compete without an approved helmet

Goggles

Must be removable since they are likely to get muddy

Body protection

The body armor that is worn outside of the jersey is commonly made from a hard plastic

Lever setup

The clutch lever and brake lever should be angled down slightly so that the forearms are in a straight line with the levers when attacking the course

Controlling suspension

Rebound dampening controls how fast the suspension returns to its full length after it's been compressed by hitting an obstacle or bump. If your rebound dampening is set too fast, the bike may have a tendency to kick up when accelerating out of corners

Deep blocks

Tire patterns differ depending on the terrain. For deep mud, tall blocks give good grip and resist slippage when the bike is cornering. On front tires, the blocks are sometimes turned 45° to evacuate mud quickly

Engine power

Motocross bikes are usually powered by single-cylinder, two- or four-stroke engines

Quick change

Wheelbase is the measure of the distance between the front wheel and back wheel. Bringing the rear wheel forward will decrease the bike's wheelbase and will make the bike corner more quickly.



POSTWAR COMPETITION

A TEAM MOTOCROSS COMPETITION TOOK PLACE IN HOLLAND IN 1947. THE RACE COMPRISED TWO HEATS OF EIGHT LAPS EACH OVER A 2-MILE COURSE, WITH TEAM SCORES BASED ON THE TIMES OF THE THREE FASTEST RIDERS. THE BRITISH TEAM WON BY JUST NINE SECONDS OVER BELGIUM.

WHAT THEY RIDE

Off-road bikes come in many different sizes and shapes, but all need super-responsive engines for quick acceleration, tires that can grip difficult terrain, and suspension that is able to cope with the bumps and jolts. Race classes generally divide on the basis of engine size.

ENDURO

The biggest difference between an enduro bike and MX and SX machines is that enduros have to be street-legal. Engine size ranges from 100cc to 650cc, and races are classified accordingly.

Lit up

Front and rear lights are fitted for safe racing at night

Narrow handlebars

These give the bike a little more versatility when racing through obstacles

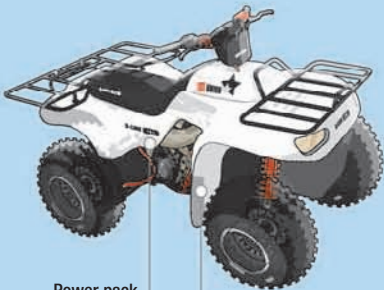


TRIAL BIKES

Trial motorcycles are extremely lightweight, are designed to be ridden standing up, and have suspension travel that is short, relative to a motocross or enduro motorcycle.

ALL-TERRAIN VEHICLES

Riders of all-terrain vehicles (ATVs) have their own motocross competition. Engines used in sanctioned competition must be production model ATV engines available to the general public.



Power pack

A four-stroke engine and electronic fuel injection provide top performance

Super-shocks

Sport ATVs have shock absorbers with a much-needed 10 in (25 cm) of travel

MX CIRCUIT

Races are held on a marked and fenced circuit, often 1–1¼ miles (1½–2 km) long, that combine steep drops and climbs, with fast straights, artificial jumps, and steep turns to create a varied and exciting racing environment. In accordance with FIM rules, the track materials should be natural and must be capable of retaining water, easily maintained, and give traction. Races run for a fixed period, usually 30 minutes plus two extra laps, with a maximum of 30 competitors riding in each race.

The straight

The only relief on a course that is packed with obstacles

Multiple jumps

A long series of ups and downs provides a stern test of both biker and bike

Steep spines

With near-vertical sides and a frame-busting summit, these features are the ultimate test for a dirt bike racer

Table top

The entrance to and exit from this feature are as steep as a bike can negotiate

Track width

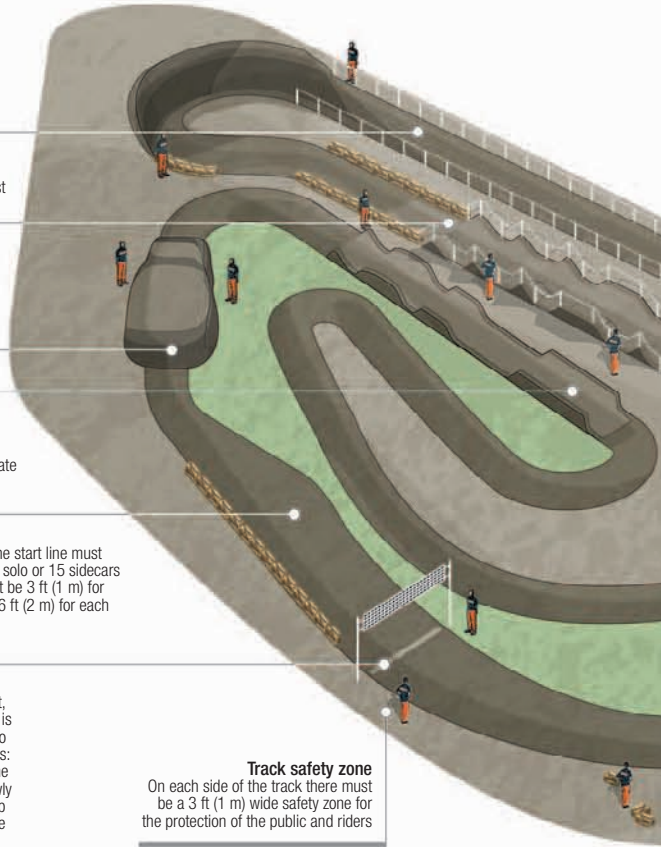
The width of the track at the start line must permit a line of at least 30 solo or 15 sidecars or quad racers. There must be 3 ft (1 m) for each solo motorcycle and 6 ft (2 m) for each sidecar/quad racer

Starting gate

In MX there is a mass start, and without a good start it is always going to be tough to win. The standard routine is: advance to the gate; rev the engine; move forward slowly with the front brake on; slip the clutch; then as the gate drops—take off!

Track safety zone

On each side of the track there must be a 3 ft (1 m) wide safety zone for the protection of the public and riders



MAYHEM ON FOUR WHEELS

All-terrain vehicle (ATV) racing is especially popular in North America, with engine size starting at 50cc. Four-wheeled ATVs are raced in a similar format to their two-wheeled equivalents: MX, MS, enduro, and hare and hounds. Additionally, ATV tourist trophy scrambles are held on prepared dirt tracks with right and left turns and jumps, and on a short track. The racing is similar to speedway, with competitors battling it out on oval tracks roughly ¼ mile (400 m) long. For the really brave, there is ATV racing on ice!

KEY SKILLS

The skills required to be a off-road racer are numerous, but a must-have is the ability to corner at speed on a surface with little traction. Particularly hard to negotiate are turns without a camber, such as those of a speedway circuit or an MX course. For MX, SX, and any cross-country discipline, the ability to negotiate the jumps skilfully is especially crucial.

TAKING OFF

To be an effective jumper, the rider has to be able to generate enough lift to get over an obstacle. They also need to land without breaking the momentum of the bike. Skilled riders can alter their direction in midair, making the jump look even more spectacular.

OTHER COURSES

A number of new motor sports developed from speedway and arguably from the exploits of Evel Knievel. What they have in common is that the races (usually) take place on dirt courses with various obstacles in the form of jumps. Different courses require different bikes.

SUPERCROSS SX is indoor MX and has all the features of the latter—climbs, jumps, hairpin turns, and fierce racing competition—packed into a tight stadium circuit. This derivative of MX provides spectacular viewing. Qualifying rounds are followed by semifinals and the “main event.”

ENDURO Riders are timed over a rough course of up to 100 miles (160 km) long. Racers set off at intervals along boulder-strewn riverbeds, along forest tracks, and up steep muddy banks, checking in at time stations along the route. Penalties are awarded for slow times.

TRIALS Each course is different and is designed to challenge riders’ bike control to the limit. Competitors have to negotiate a circuit of large boulders, ledges, water, logs, and pallets without touching their feet on the ground. If they do touch, the “dab” or “prod” is penalized.

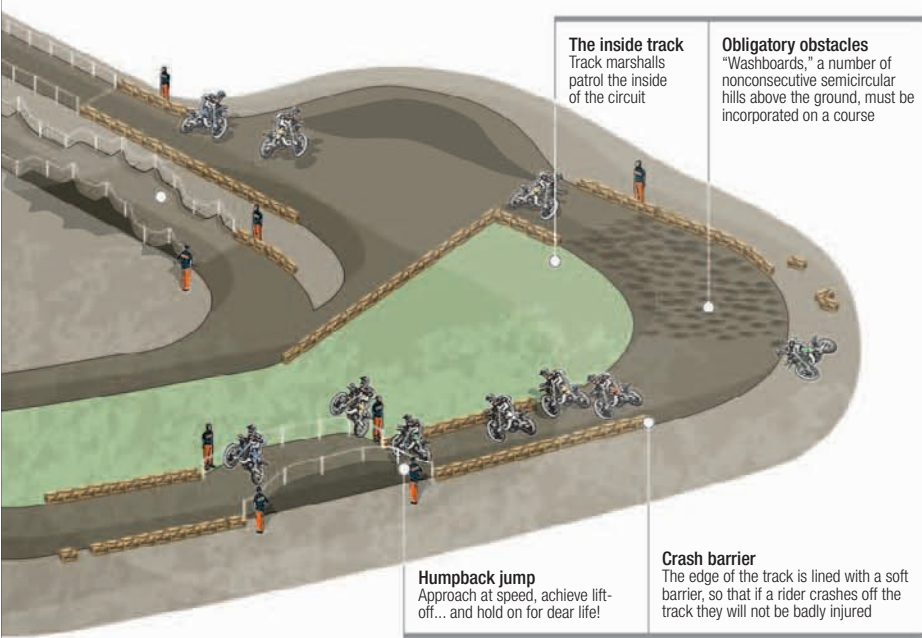
SPEEDWAY Four riders, two from each team, keep turning left over four laps of an oval track and each race is over in less than a minute. They race 500cc single-gear machines with no brakes.

DIRT BIKE RULES

Each discipline has its own rulebook which is administered by the governing body (the FIM), but foul, unfair, or dangerous riding always results in disqualification. Exact regulations control the machines ridden, the equipment worn by the racer, and the fuel used. In six-day enduro events, the bikes are in the possession of the race organizers; this is called *parc fermé*, or closed control, and prevents work being carried out on vehicles between different days of a race. Starts vary between disciplines, so MX and speedway have mass starts, but solo racers start at timed intervals in enduro.

STAT CENTRAL

WORLD MOTOCROSS CHAMPIONS		
TITLES	RIDER	(COUNTRY)
FIM MX1 WORLD MOTOCROSS (250cc)		
7	STEFAN EVERTS	(BEL)
6	JOEL ROBERT	(BEL)
4	TORSTEN HALLMAN	(SWE)
FIM MX2 WORLD MOTOCROSS (125cc)		
3	ALESSION CHIODI	(ITA)
3	HARRY EVERTS	(BEL)
FIM MX3 WORLD MOTOCROSS (500cc)		
5	ROGER DE COSTER	(BEL)
5	PAUL FRIEDRICH	(GER)
3	GEORGES JOBE	(BEL)
AMA USA MOTOCROSS (125cc)		
3	RICKY CARMICHAEL	(US)
3	BROC GLOVER	(US)
AMA USA MOTOCROSS (250cc)		
7	RICKY CARMICHAEL	(US)
4	GARY JONES	(US)



The inside track
Track marshalls patrol the inside of the circuit

Obligatory obstacles
“Washboards,” a number of nonconsecutive semicircular hills above the ground, must be incorporated on a course

Humpback jump
Approach at speed, achieve lift-off... and hold on for dear life!

Crash barrier
The edge of the track is lined with a soft barrier, so that if a rider crashes off the track they will not be badly injured

JUMPING TECHNIQUE

There are quite a few different types of obstacles found on a track, but the basic skills remain the same regardless of what is being jumped.

The approach
When approaching dirt bike jumps, stand up on the bike in a crouched position gripping the bike with the legs



The takeoff
Pick the line on the up ramp and keep an even throttle on approach. Some dirt bike jumps, like tabletops or gap jumps, need to be hit at a certain speed to clear them, so speed should be up before the approach



Hit the ground racing
Once in the air, look to the landing spot. If the landing spot is flat, land with the rear wheel down first. If the landing is on a down ramp, land the bike at the same angle as the down ramp. Throttle just before landing

INSIDE STORY

Motocross was first known as a British off-road event called Scrambles, which were themselves an evolution of Trials events popular in northern Britain. During the 1930s, the sport grew in popularity, especially in Britain. In 1952, the FIM created an individual European 500cc Championship and in 1962, a 250cc world championship was created. It was in the smaller 250cc category that came into its own. The sport has evolved with sub-disciplines such as stadium events known as Supercross and Arenacross. Freestyle (FMX) events where riders are judged on their aerial acrobatic skills have gained popularity, as has Supermoto (Motocross style racing on both tarmac and off road).



NEED2KNOW

390

- Powerboat racing is an expensive sport—the cost of equipment, fuel, and maintenance can reach seven-figure sums.
- Formula One powerboat races attract live audiences of up to 70,000 spectators—who all get to watch for free.
- Some powerboats can accelerate to 100 mph (160 kph) in 4 seconds.
- Crews all need a license to thrill. Part of the exam requires them to escape from a cockpit that has been submerged in water, and they must also undergo a rigorous medical examination.

CREW PROFILE

Formula One and Class 1 powerboats have two-person crews of a driver and a throttle operator. Although life jackets are required, the crew should be strong swimmers and have fast reactions to maneuver the craft safely at high speeds. The ability to “read” the water is essential, as is having a constant awareness of the boat’s position on the course.

Propeller

Various types are used depending on the condition of the water; propellers are made of stainless steel, and can have three, four, or six blades

Design values

The two main construction criteria of a modern powerboat are aerodynamic efficiency (hence the streamlining), and safety

Adjustable wings

The crew can adjust the angle of the wings on each of the parallel hulls to control the amount of lift created by the oncoming air

Cockpit

This self-contained protective “cell” is made of carbon fiber and Kevlar®, and is not part of the boat’s structure to reduce the effects of an impact on the crew

Auxiliary power

Two batteries are located in the left picklefork (hull), one to start the engine and another main battery to provide electrical power for the engine

Nose

The nose is filled with plastic foam that enables the boat to absorb the energy created by rough water



POWERBOAT RACING

EVENT OVERVIEW

With vessels able to reach speeds up to 140 mph (225 kph), powerboat racing is the fastest, most dangerous, and most glamorous of all watersports. Boats race in various classes depending on their engine size and travel around a defined course—either circular or point-to-point. Other races focus on endurance and are designed to test the resilience of vessels and crews. Crashes are rare, but can be fatal.

WATER COURSE

Powerboat races can be held on any suitable expanse of water such as a bay, fjord, lake, or river, or sometimes the open ocean. The course may be around natural landmarks, such as rocks and islands, or marked out with buoys.

Boats usually go around a course counterclockwise, but the direction may be reversed if tide or weather conditions dictate. At inshore races the starting jetty must be no less than 246 ft (75 m) long, and should be positioned at least 984 ft (300 m) from the first turn for safety reasons. No straight should be longer than 2,789 ft (850 m).

On a straightforward race course, the winner is the boat that first crosses the finish line after completing a certain number of laps. Slalom courses have a much larger number of buoys that mark out all the necessary turns.



FORMULA ONE POWERBOAT RACING

Formula One (F1) is the most prestigious competition in powerboat racing, with events taking place in countries around the world that include France, Portugal, China, and the United Arab Emirates (UAE). It attracts thousands of spectators to each event.

COURSE LAYOUTS

Although F1 courses vary in type, they are all about 6,560 ft (2,000 m) long. Each circuit incorporates at least one long straight where the boats reach their top speeds, with Doha in Qatar even having two 2,133 ft (650 m) straights. Other circuits include hairpin turns that test the ability of drivers to steer their boats around buoys without the assistance of brakes or gears.

SHARJAH CIRCUIT

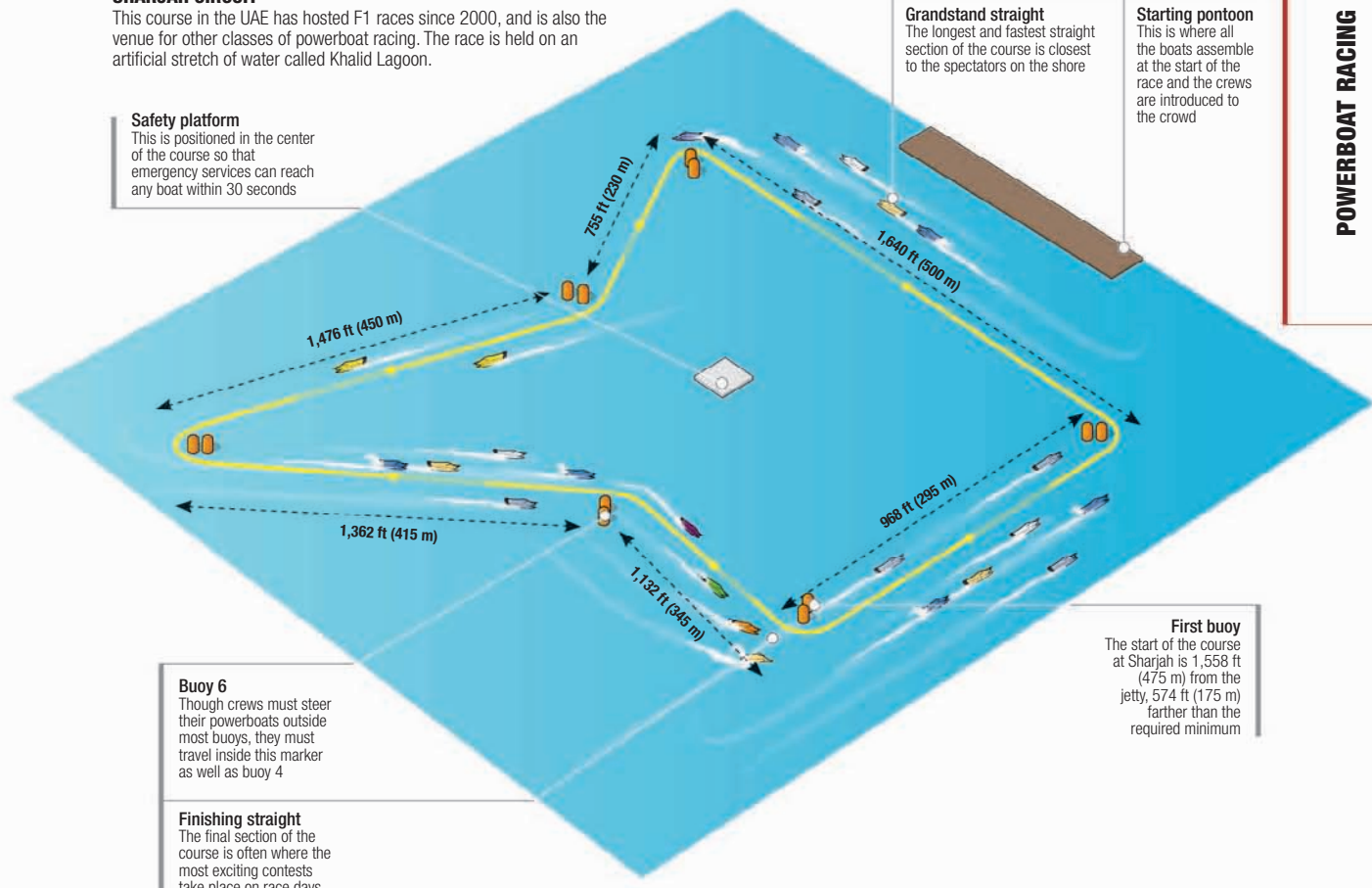
This course in the UAE has hosted F1 races since 2000, and is also the venue for other classes of powerboat racing. The race is held on an artificial stretch of water called Khalid Lagoon.

RACE QUALIFICATION
Each F1 event runs over two days, with the first day set aside for teams to post the fastest time possible during time trials. This generally determines the grid positions in the main race on day two, though an extra race (a "shootout") is held at the end of the first day between the top six boats to see which one starts on pole.

Safety platform
This is positioned in the center of the course so that emergency services can reach any boat within 30 seconds

Grandstand straight
The longest and fastest straight section of the course is closest to the spectators on the shore

Starting pontoon
This is where all the boats assemble at the start of the race and the crews are introduced to the crowd



Buoy 6
Though crews must steer their powerboats outside most buoys, they must travel inside this marker as well as buoy 4

Finishing straight
The final section of the course is often where the most exciting contests take place on race days

First buoy
The start of the course at Sharjah is 1,558 ft (475 m) from the jetty, 574 ft (175 m) farther than the required minimum

F1 BOATS

The catamarans that compete in F1 races are 20 ft (6 m) long and 7 ft (2.1 m) wide. Their design allows the hulls to lift out of the water at high speeds, with just a small section of the boat actually remaining in the water. This enables the powerful 350bhp engines to propel the boat to exceptionally high speeds, and has led some people to say that the sport has almost as much in common with flying as it does with boating. In addition, the structure of the boat—as well as the crew—has to be strong enough to cope with the large G-forces that it will encounter in the turns.

SAFETY FEATURES

As well as operating the boat from inside a strengthened cockpit "capsule," the crew is protected by safety belts, head and neck harnesses, and an airbag system that inflates if the vessel crashes. As recently as the 1980s, F1 boats were made of fragile plywood and the unharnessed crew sat in open cockpits.

STAT CENTRAL

FORMULA 1 WORLD CHAMPIONS		
YEAR	WINNER	(COUNTRY)
2009	GUIDO CAPPELLINI	(ITALY)
2008	JAY PRICE	(US)
2007	SAMI SELIO	(FINLAND)
2006	SCOTT GILLMAN	(US)
2005	GUIDO CAPPELLINI	(ITALY)
2004	SCOTT GILLMAN	(US)
2003	GUIDO CAPPELLINI	(ITALY)
2002	GUIDO CAPPELLINI	(ITALY)
2001	GUIDO CAPPELLINI	(ITALY)
2000	SCOTT GILLMAN	(US)
1999	GUIDO CAPPELLINI	(ITALY)



EQUIPMENT

Although the various types of boats have different technical and safety specifications, all use a global positioning system (GPS) as the standard method for navigation. Timing equipment is installed into the cockpits, as is a system of lights that are activated by race coordinators in the event of all boats having to slow down—or even stop completely—after an incident or rule violation. The crew members themselves must wear clothing that is both waterproof and fireproof, as well as protective helmets and life jackets.

BOAT TYPES

Powerboats come in various designs, with the smallest vessels found in Formula One (F1). Offshore racing uses the largest boats with the most powerful engines, some of which are made by the Italian supercar manufacturer, Lamborghini. For speed, nothing can beat unlimited hydros, which can reach 187 mph (300 kph).

FORMULA ONE OUTBOARD

At the heart of the catamarans used in F1 are 2-liter gas-powered engines that can generate up to 425 bhp. The boats have a crew of two, weigh 860 lb (390 kg) and are able to carry 26 gallons (120 liters) of fuel.



Bodyshell

Made of carbon fiber and other composite materials

Windscreen

Material is the same as that used in military aircraft windscreens

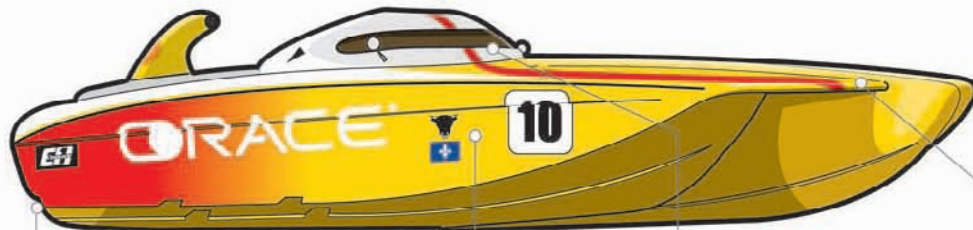
Picklefork

The two forks are designed to crumple in the event of contact with another boat

19.7 ft (6 m)

OFFSHORE CLASS 1

Boats racing in this class can be monohulls or catamarans. Powered by two or three 8-liter gas engines or 10-liter diesel units, they are able to average 125 mph (200 kph) over a race and hit maximum speeds of 156 mph (250 kph). The crew is made up of a driver and a throttle controller.



Propellers

Before a race, the crew check the state of the water before deciding which one to use

Convex profile

The longitudinal curve of the deck is designed to force air up over the cabin, then fall directly behind it

Cockpit safety

Some boats incorporate an escape hatch on the floor of the cockpit

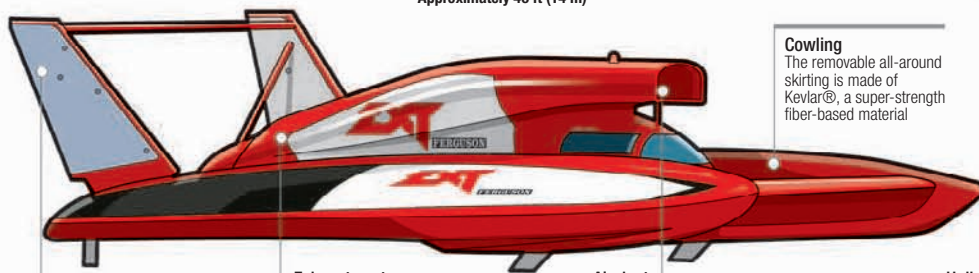
Pontoon

The transverse section of the deck that joins the two sections of a catamaran hull

Approximately 46 ft (14 m)

UNLIMITED HYDRO

These boats are propelled by inboard turbine or piston engines similar to those used in aircraft. The adjective refers to their top speed of 187 mph (300 kph), which makes them the fastest of all powerboats. What is not unlimited, however, is the size of their propellers, which may be no more than 16 in (40 cm) in diameter.



Cowling

The removable all-around skirting is made of Kevlar®, a super-strength fiber-based material

Rear wing

Similar to the spoiler on the rear of some sports cars, this fixture is essential for stability at high speeds

Exhaust vent

Having been heated by the motor amidships, the air is then released at the stern of the craft

Air duct

Air forced into this opening goes through the motor before being expelled at the rear

Hull

The hulls usually have a honeycomb construction, consisting of separate aluminum box sections which combine structural strength with lightness

28–32 ft (8.5–9.75 m)

SIDELINES

511.11

The highest speed in kilometers per hour (317.6 mph) ever achieved in a powerboat. The record, set in 1978, belongs to Ken Warby of Australia.

40

The distance in nautical miles (46 miles/74 km) over which motor boats raced at the 1908 Olympics, the last time the sport was included in the Games. There were three events—under 60 ft (18 m), 26 ft (8 m), and open—and in each there was only one finisher.

12

The number of victories achieved by American Lee Edward “Chip” Hanauer since 1982 in the Gold Challenge Cup. This prestigious American Power Boat Association (APBA) event is held annually in the United States, often on the Detroit River.

BIRTH OF INTERNATIONAL POWERBOATING

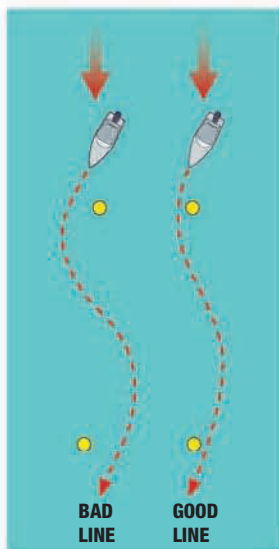
THE FIRST ANNUAL INTERNATIONAL POWERBOAT COMPETITION, THE HARMSWORTH CUP, WAS SET UP IN 1903 BY THE OWNER OF THE BRITISH *DAILY MAIL* NEWSPAPER, ALFRED HARMSWORTH, DURING THE 1920s. THE ANNUAL RACE WAS WON NINE TIMES BY GAR (SHORT FOR GARFIELD) WOOD, AN AMERICAN INVENTOR WHO AT HIS DEATH IN 1971 HELD MORE PATENTS THAN ANYONE ELSE IN HISTORY. WOOD LOOKED OLDER THAN HIS YEARS, AND SPORTS JOURNALISTS DUBBED HIM "THE GREY FOX."

AQUA TACTICS

While in Formula One motor racing, it is advantageous to tuck in close behind a rival and overtake as late in the race as possible; the wake of a speeding launch makes powerboat racing a sport in which it is desirable to lead from the front.

BUOY-WATCHING

Drivers must not give buoys or markers too wide a berth, for fear of losing precious time (see the Bad Line in the illustration on the right), but equally they should not touch them. If they go inside a course marker that should have been rounded they are given a penalty that can range from a one-lap deduction to disqualification from the race. As in motor racing, there is an art to cornering efficiently, with drivers attempting to travel in as straight a line as possible around the buoys while at the same time maintaining a high speed.



FULL THROTTLE

There is a lot more to powerboat racing than merely steering the vessel in the right direction, and flooring the throttle in order for the boats to work effectively and go as quickly as they can. Crews must constantly balance the power generated by the extremely powerful engine against the angle of the bow or bows and the propeller, adjusting the former to maximize the benefits of the latter. The revs generated by the motor count for nothing if the bow is hitting, rather than cutting through, the air and water ahead. Energy will also be wasted if the propeller is not cutting as deep as possible below the surface of the water.

MONEY MATTERS

Although there are some similarities between powerboat racing and motor sport, especially in the way they are marketed, there is one major difference—fans of the water-based sport don't have to pay to spectate. For most events, they can just show up on the shoreline to watch the time trials and main races for free.

At the top level of the sport, vast sums of money are generated by television deals secured with broadcasters around the world and through the sponsorship of teams by some of the world's most high-profile companies. The globalization of Formula One really began in the early 1990s when Nicolo di San Germano took over as head of marketing for the discipline—he oversaw the expansion of the sport into new, untapped areas of the world such as Asia.

RULING THE WAVES

Competitions are held in various categories, often according to engine size. What is common to all events is that races begin on a jetty away from the circuit and engines must remain switched off until officials give a green light for the start.

FORMULA ONE

Formula One events are for boats with 2000cc engines. There are up to ten Grand Prix a year, each with 24 participating boats. The top ten boats that post the most amount of laps after 45 minutes get points on a sliding scale, from 20 points for a win to 1 point for coming in tenth.

CLASS 1

The Class 1 World Offshore Championship is contested over ten events spread throughout the year. Each race is over approximately 100 nautical miles (115 miles/182 km) around a circuit measuring 5 nautical miles (5¾ miles/9 km) for a period of no more than one hour. The points system is the same as in Formula One.

HARMSWORTH CUP

Among the many regional races held around the world is the Harmsworth Cup, which is held over point-to-point courses such as Cowes–Torquay–Cowes along the south coast of England. There is no limitation on engine size, and the most successful boats in the modern era have been powered by units based on helicopter engines.

OTHER RACING TYPES

Hydroplane racing takes place on relatively short courses in the United States and Australia, while P1 is a Europe-based endurance series made up of races that cover 80 nautical miles (92 miles/148 km).

KING OF THE WATER

GUIDO CAPPELLINI IS REGARDED AS ONE OF THE ALL-TIME GREAT DRIVERS IN F1 POWERBOAT RACING. THE FORMER SHIPBUILDER FROM COMO IN ITALY BEGAN HIS RACING CAREER IN LAND-BASED GO-KARTS AND HAS WON MORE INDIVIDUAL F1 GRAND PRIX RACES AND MORE WORLD CHAMPIONSHIPS THAN ANY OTHER COMPETITOR. HE SECURED HIS FIRST WORLD TITLE IN 1993 AND HAS SO FAR WON ANOTHER EIGHT WORLD CHAMPIONSHIPS.

INSIDE STORY

Powerboat racing changed radically in 1981 when the International Powerboating Union recognized the Formula One class. What had previously been a minority sport was quickly transformed into a major attraction for spectators and sponsors alike. Races that had formerly been held on any suitable body of water now had to take place in sight of a shore that housed the full range of service industries—such as hotels, restaurants, and marine engineering works—and which had good transport links.

AMERICAN POWER BOAT ASSOCIATION (APBA)

The first official powerboat race took place in 1903 on New York's Hudson River under the auspices of the American Power Boat Association (APBA). The APBA held sway in the United States, but it had very little influence in the rest of the world, and this schism was probably the reason for the slow growth of the sport in the international arena.

UNION INTERNATIONALE MOTONAUTIQUE (UIM)

The Union Internationale Motonautique (UIM) was the rest of the world's response to the APBA. Formed in 1927, its founder members were Argentina, Belgium, France, Germany, United Kingdom, Holland, Ireland, Monaco, Norway, Poland, and Sweden. The United States finally joined on the eve of World War II.



AIR RACING

394

NEED2KNOW

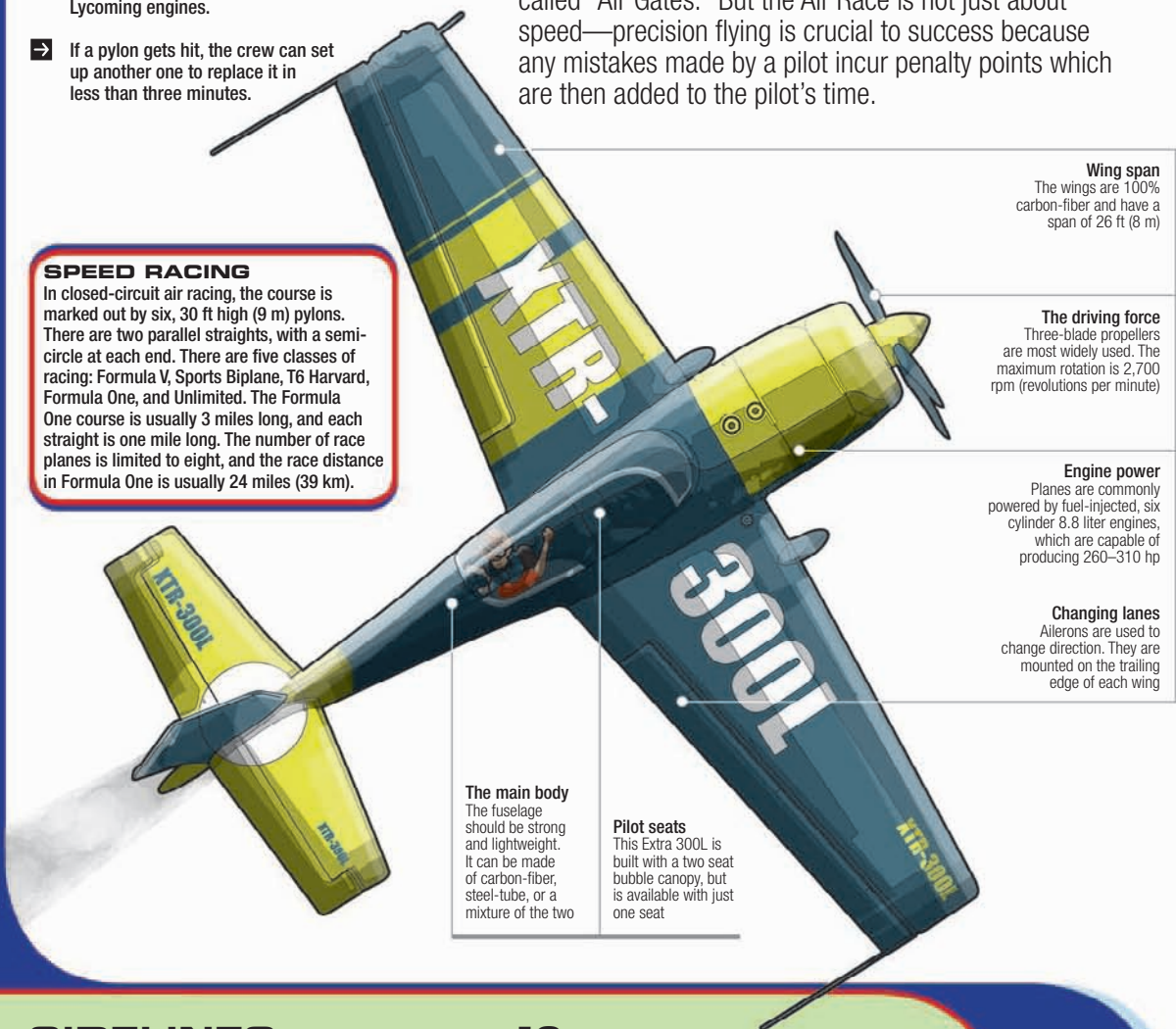
- ➔ The first event in air racing history was held in 1909; the Reims Air Race from Reims, France to England.
- ➔ The competitors use high-end aerobatics planes all of which are equipped with Lycoming engines.
- ➔ If a pylon gets hit, the crew can set up another one to replace it in less than three minutes.

SPEED RACING

In closed-circuit air racing, the course is marked out by six, 30 ft high (9 m) pylons. There are two parallel straights, with a semi-circle at each end. There are five classes of racing: Formula V, Sports Biplane, T6 Harvard, Formula One, and Unlimited. The Formula One course is usually 3 miles long, and each straight is one mile long. The number of race planes is limited to eight, and the race distance in Formula One is usually 24 miles (39 km).

COMPETITION OVERVIEW

Air racing features a dynamic new discipline of flying, where the objective is to navigate a challenging race course in the sky, in the fastest possible time. Flying individually against the clock, the pilots have to execute tight turns through a slalom course consisting of specially designed pylons, called "Air Gates." But the Air Race is not just about speed—precision flying is crucial to success because any mistakes made by a pilot incur penalty points which are then added to the pilot's time.



Wing span

The wings are 100% carbon-fiber and have a span of 26 ft (8 m)

The driving force

Three-blade propellers are most widely used. The maximum rotation is 2,700 rpm (revolutions per minute)

Engine power

Planes are commonly powered by fuel-injected, six cylinder 8.8 liter engines, which are capable of producing 260–310 hp

Changing lanes

Ailerons are used to change direction. They are mounted on the trailing edge of each wing

The main body

The fuselage should be strong and lightweight. It can be made of carbon-fiber, steel-tube, or a mixture of the two

Pilot seats

This Extra 300L is built with a two seat bubble canopy, but is available with just one seat

SIDELINES

8 The average length, in miles, over which the pilots race during each air racing session. This translates to approximately 13 km.

400 The average speed, in miles per hour, that the planes reach during the qualifying sessions, and during the race.

10 Race competitors perform challenging maneuvers and fly close to the ground. During some turns, pilots have to withstand forces of almost 10G—10 times their own bodyweight. All this must be endured without the help of a G-suit.

2003 The year that the first Red Bull air race took place. There were only two races in that first year, but the number of races has increased over the years.

RULES AND REGS

The Qualifying consists of two qualifying sessions, with the pilot's fastest result being used. The fastest 12 pilots take part in the elimination session, from which eight pilots will take part in the finals. Penalty seconds are added for an incorrect passing of a gate. A 3-second penalty is incurred when a pilot passes a gate too high, performs the wrong type of crossing, or fails to perform a turning maneuver correctly. A 10-second penalty is incurred when a pilot touches a pylon, or if the course is flown incorrectly.

SAFETY AND SUPERVISION

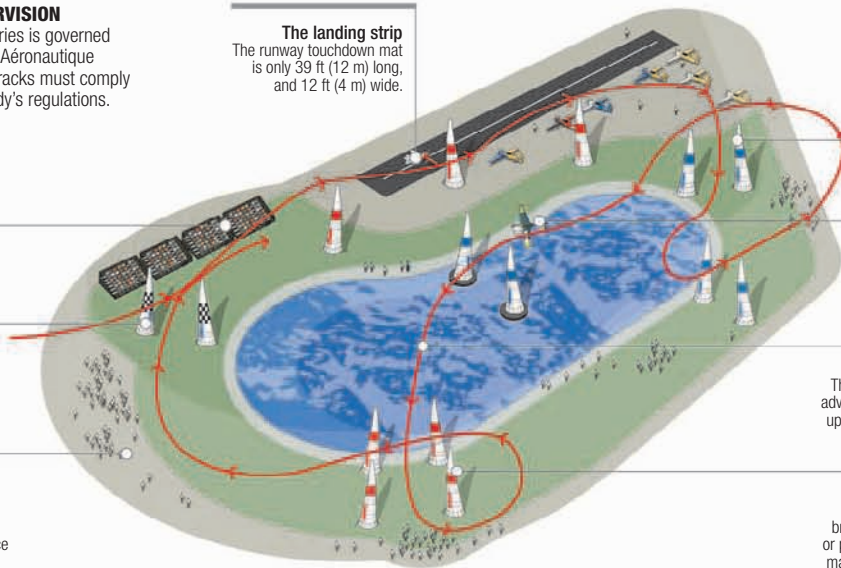
The Air Race World series is governed by the FAI (Fédération Aéronautique International). All the tracks must comply with the governing body's regulations.

The landing strip
The runway touchdown mat is only 39 ft (12 m) long, and 12 ft (4 m) wide.

Watching the sky
Spectators can watch the action from the stands

Start/finish gate
Planes must pass through this gate to both start and finish

Crowd
Spectators are not restricted to watching from the stands, but must be a safe distance from the flight path



Through a blue gate
A pilot will incur a 3-second penalty for deviating from level flight by 10° or more

Getting too high
Flying too high above a gate will cost the pilot a 3-second penalty

Flight path
The flight path is agreed in advance of the race, but it is up to the pilots how they fly the course

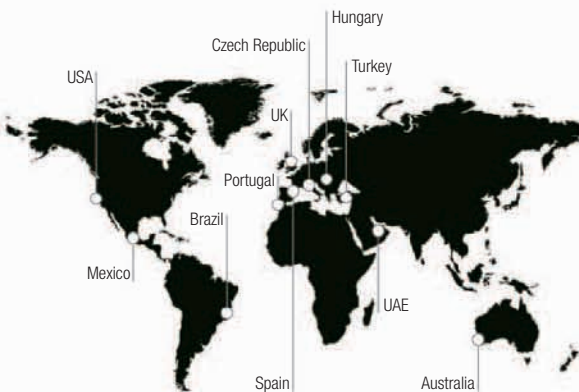
Breaking a pylon
If the pilot touches and breaks a pylon with a wing or propeller, they will incur a massive 10-second penalty

THE COURSE

The race track is approximately 1 mile (1.4 km) long and consists of a series of inflatable gates (air gates). Pilots complete 1 of 3 predetermined flight plans in each session. They must pass between the gates, making either a horizontal crossing (through gates marked in blue) or a vertical crossing (through gates marked in red). Pilots must fly through the slalom gates that consist of three single Air Gates. The courses will differ slightly from event to event as each round will have new challenges and varying environmental factors.

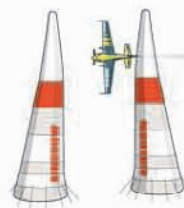
A WORLDWIDE EVENT

Air racing is truly a worldwide event. From its humble beginnings in 2003, when there were only two events, this World Series of air racing has become a global phenomenon that has been taken on tour to some of the most exciting cities in the world. The locations for the 2007 series is shown below. New locations are being added every year as the popularity of the sport increases. In the US, however, closed-circuit racing still dominates (see opposite page).



AIR GATE

Standing at 66 ft (20 m) high, an Air Gate consists of two pylons (only the Quadro, a special Air Gate, has four), which are made of a light spinnaker material that rips if it is touched by an aircraft. Colliding with the gates is not dangerous to the pilot or the plane, but it does produce a bang, because the pylons are filled with compressed air. The Air Gates are resilient and can withstand wind-speeds of up to 34 mph (54 kph)—at their base they measure 16 ft (5 m) across, and at their tip measure 29½ in (75 cm).



ESSENTIAL FLYING TECHNIQUES

The Air Race is not just about speed, it is as much about precision. The pilots have to execute specific "turning maneuvers," such as the knife edge maneuver, the horizontal crossing, and the half Cuban eight, in order to navigate the track. The slightest mistake in the execution of the maneuver can result in penalty points being incurred. Other maneuvers include tailslides, vertical roll, horizontal round, and the Loop.

BLUE COLORED PYLONS

When positioned parallel to each other, the blue-colored pylons which stand approximately 46 ft (14 m) apart, form an Air Gate. The pilots must fly through the blue gates horizontally. This is called a horizontal crossing.



THE KNIFE EDGE MANEUVER

The red-colored pylons that stand just 33 ft (10 m) apart, form an even tighter Air Gate that pilots must pass in a "knife edge" (or vertical) position—with one wing pointed toward the sky and the other toward the earth.



THE HALF CUBAN EIGHT

This maneuver is used to reverse the direction of the plane. To execute the maneuver, the pilot performs a pullup and five-eighths inside loop to 45°, followed by a half roll, and a one-eighths inside loop to level flight.



SNOWMOBILING



396

SPORT OVERVIEW

In the snowbelt communities of the Northern hemisphere, particularly the United States and Canada, snowmobiling is a popular motor sport with exciting—and fiercely competitive—winter races held on ice ovals and over cross-country trails. Snowmobiles grew in popularity when the invention of the Ski-doo in the late 1950s brought smaller and lighter engines to the rear-track, front-ski system of the earlier and larger snow vehicles that had been used by the military, postal services, ambulances, and the forestry industry.

Banked corners

At each end of the ice oval, heavily cambered corners keep the snowmobiles on track

ICE OVAL

At many venues, including the famous Eagle River in Wisconsin, snowmobilers compete in races around oval ice tracks.



NEED2KNOW

- ➔ The average age of a snowmobiler is 41 years. Around 17 percent of all snowmobilers are 60 or older.
- ➔ In summer, instead of missing their sport, many snowmobilers modify their vehicles for racing on grass or water.

COMPETITOR PROFILE

Snowmobile races can be hard work, so riders must be physically fit with the strength to control a powerful precision machine at high speeds. Mental alertness and cool nerves are also needed to cope with the thrills and spills of racing on snow and ice over often hazardous terrain.

Snowmobile windshield

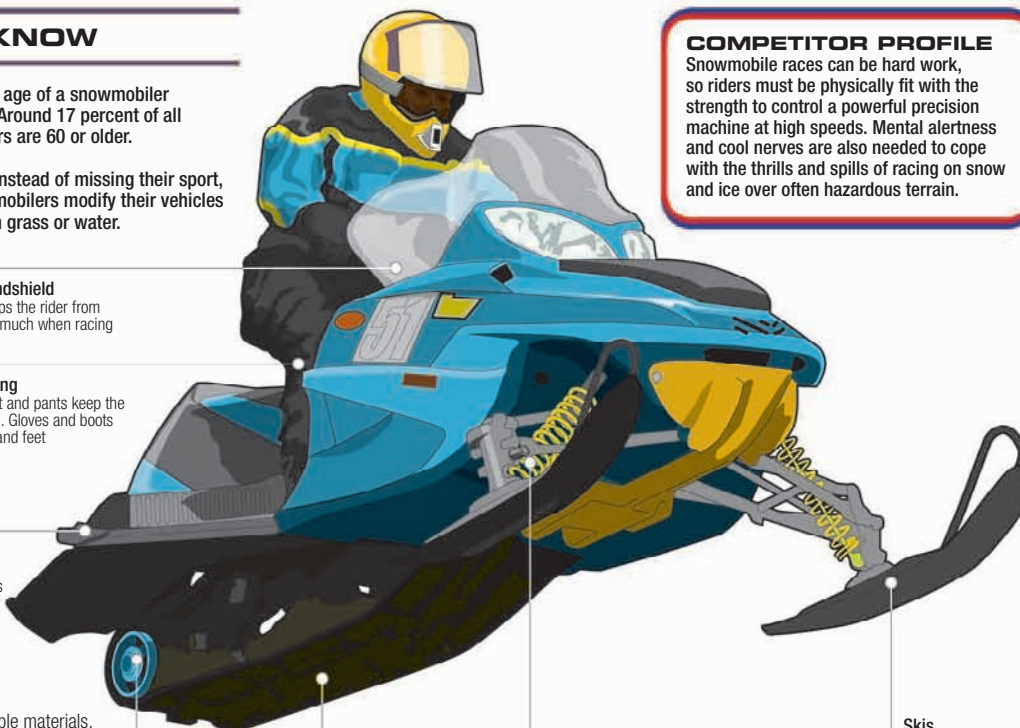
The windshield stops the rider from being buffeted too much when racing

Protective clothing

A waterproof jacket and pants keep the rider dry and warm. Gloves and boots protect the hands and feet

Driving force

The two-stroke or four-stroke engines that power modern snowmobiles are increasingly clean and efficient



SNOWMOBILE

Made of light, durable materials, modern snowmobiles accelerate quickly and can reach speeds of 120 mph (190 kph). The vehicles are noisy and there are concerns about the impact of their exhaust fumes on the environment.

Track drive

The engine is connected to the track drive which, in turn, moves the tracks

Light tracks

The tracks, which are made of a light material such as rubber, spread out the weight to stop the snowmobile from sinking

Comfort and stability

Shock absorbers, springs, and dampers fitted to each ski provide a comfortable and stable ride

Skis

The skis can be either double or single, and are produced in various sizes and widths for different terrains

SIDELINES

163,753

The number of snowmobiles sold throughout the world in 2008: 79,552 of them in the United States and 50,556 in Canada.

1,593

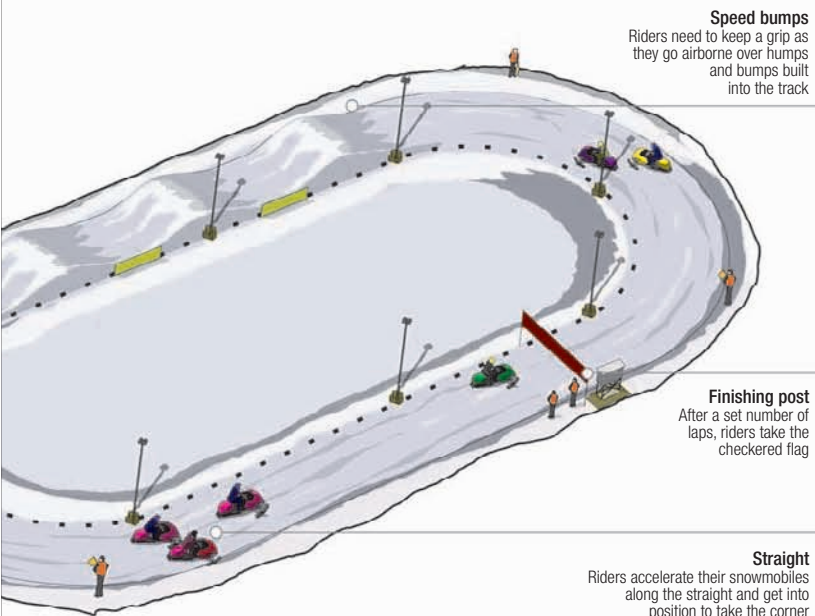
The approximate number of kilometers (990 miles) per year an average snowmobiler rides. In the same period, he or she spends \$4,000 on the sport.

80

The percentage of snowmobilers who use their snowmobile for trail riding or touring on the many trails that have been specially groomed and marked. Around 20 percent use their snowmobile for transportation, fishing, or work.

28

The billions of US dollars that snowmobilers in the United States and Canada spend annually on their sport. In Scandinavia, the corresponding figure is \$1.6 billion.



Speed bumps
Riders need to keep a grip as they go airborne over humps and bumps built into the track

Finishing post
After a set number of laps, riders take the checkered flag

Straight
Riders accelerate their snowmobiles along the straight and get into position to take the corner

EAGLE RIVER

The Derby Track at Eagle River in northern Wisconsin plays host to the annual World Snowmobiling Championships. Snowmobile racing started here in 1964, with events such as hill climbing, cross-country races, and sprint races on a track laid out on a lake and drawing a crowd of around 3,000. As the years went by, new courses and facilities attracted prize money, television coverage, professional riders, and crowds of 50,000 or more. In the 40th Eagle River World Championship, which was held over seven days, riders competed for the World Championship Oval, the World Championship Snocross, and the Vintage World Championship. In 2007, Eagle River held the 44th World Championship Derby, the Loadmaster Classic Vintage weekend, and a World Power Sports Association National Snocross event.

SNOCROSS

The thrilling sight of snowmobiles negotiating a snocross course (a track resembling a motocross course with snow) attracts large numbers of spectators. The short track, which is composed of various bumps, banked corners, and tight turns, encourages the riders to catch "big air" and perform breathtaking aerial maneuvers. Snocross classes may vary from region to region. In some championships, the classes cater to a whole range of abilities from Mini, designed for children up to the age of 11, to Pro, for entrants who already have experience of competing at expert level (see stat table below).

TYPES OF SNOWMOBILE

There are five main types of snowmobile, starting with the light, easy-to-handle, entry-level machines (also called trail models). Performance machines are heavier, have a little more horsepower (85+hp) and are more responsive. Touring snowmobiles are even larger and heavier, have longer tracks, and can carry two people in comfort over long distances. Mountain snowmobiles are longer, narrower, more powerful, and have special tracks that enable various maneuvers in deep powder snow. Utility machines, which are heavier, longer, and a little wider than other types, are good for trails and working in heavy snow.

TREK OVER THE TOP

Each February snowmobilers can trek along 200 miles (322 km) of groomed trails from Tok in Alaska to Dawson City in Yukon. Also called the Tok to Dawson Poker Run, the trek allows touring snowmobilers to travel along the Top of the World Highway, with steep hills, howling winds, twisting turns, and breathtaking views.

IRON DOG CLASSIC

RENOWNED AS THE LONGEST AND TOUGHEST SNOWMOBILE RACE IN THE WORLD, THE IRON DOG GOLDRUSH CLASSIC IS CLOSE TO 2,000 MILES (3,220 KM) LONG AND LINKS WASILLA WITH NOME AND FAIRBANKS IN ALASKA. COMPETITORS RIDING SNOWMOBILES USING SPECIAL FUEL TRAVEL AT SPEEDS OF UP TO 100 MPH (160 KPH) ACROSS EXTREMELY RUGGED TERRAIN IN TEMPERATURES FAR BELOW ZERO.

GROOMING THE TRAILS

Throughout the snowbelt of North America, an army of volunteers from snowmobiling clubs and other organizations work with provincial, state, or local governments, and private landowners to design, map, construct, and groom marked trails. It has been estimated that more than 225,000 miles (362,000 km) of groomed—and maintained—trails are accessible to the 4 million or more snowmobilers in Canada and the United States.

STAT CENTRAL

SNOCROSS CLASSES		SNOWMOBILE ENGINE	
CLASS	AGE RANGE	CYLINDER VOLUME	
MINI	5–11 YEARS	125CC (MAX SPEED OF 10 MPH/15 KPH)	
YOUTH 1	9–13 YEARS	500CC MAX (INC. LIQUID COOLED)	
YOUTH 2	13–17 YEARS	500CC MAX (PRO UP TO 800CC)	
SPORT	13 + YEARS	600CC MAX (NOT LIQUID COOLED)	
PLUS 30	29 + YEARS	800CC MAX	
MASTERS	39 + YEARS		
SEMI PRO	13 + YEARS		
PRO	13 + YEARS		

INSIDE STORY

The United States Snowmobiling Association (USSA) is the sports' oldest sanctioning body. Founded in 1965, it took on the organization of a chaotic sport—there were nearly 120 brands of snowmobile with more than 25 different engines, and races were held everywhere at the same time. The USSA established uniformity of rules, specifications, and track safety, and ordered the events calendar.

WORLD POWER SPORTS ASSOCIATION (WPSA)

The WPSA is a governing body that organizes, regulates, and promotes various snowmobiling competitions.

A stylized graphic on the left side of the page, consisting of a large teal shape that curves at the bottom, a yellow border following its outline, and a red background at the bottom and left edges.

ANIMAL
SPORTS

11

Crash cap

The protective crash cap is marked by the owners' colors—here a green silk.

Goggles

Eye protection is essential as galloping horses kick back dirt and mud that can obscure jumps and may cause injury.

Owners' colors

Jockeys wear the "colors" of the owner of the horse over their body protectors.

Racing saddle

Saddles are smaller and lighter than ordinary saddles. Jockeys also ride with very short stirrups.

Breast plate

Narrow horses have these attached to the saddle to prevent it from slipping back during the race.

Safety girth

A second girth helps to ensure that the saddle and weight cloth remain in place throughout a race.

Brushing boots

These wrap around the horses' forelegs and protect them if they hit a hurdle during a race.



HORSE RACING

SPORT OVERVIEW

Race competitions usually comprise six races run over various distances. In summer, all the meetings are flat; in winter there are also jump competitions in some countries. Horses are trained to race according to their age and experience; younger horses usually run shorter distances and carry less weight. Jockeys are small, light, and highly competitive, and injuries are not uncommon particularly for jump jockeys. As a spectator sport, racing is extremely popular—classic races are watched by millions, many of whom gamble on the outcome.

PROLIFIC ARKLE

ARKLE WON RACES IN THE UK AND IRELAND SO CONVINCINGLY THAT THE HANDICAPPER WAS FORCED TO ISSUE TWO WEIGHT RATINGS—ONE APPLIED IF HE RAN, AND ANOTHER IF HE DID NOT. USUALLY ARKLE CARRIED OVER 28 LB (12.7 KG) MORE THAN HIS RIVALS.

NEED2KNOW

- ➔ Most horse races are run over special courses either on the flat, over hurdles, or over jumps. The Palio horse race in Siena is held in the town square twice a year.
- ➔ Bred for its speed, the Thoroughbred horse descended from three stallions—the Byerley Turk (1689), the Darley Arabian (1704), and the Godolphin Arabian (1730).
- ➔ The most famous steeplechase is the 4½-mile (7-km) Grand National at Aintree, England, in April each year.

FLAT RACECOURSES

There are two types of flat racecourses. Grass tracks are sited on undulating natural terrain and vary considerably in shape and size. Some operate in a clockwise direction and others in a counterclockwise direction and many have straight sections that are long enough to accommodate shorter five-furlong races. All weather dirt tracks are handmade, flat, and in many countries operate only in a counterclockwise direction. The starting stalls are mobile and can be set up at the appropriate distances on race days. The finishing post is permanent and usually found in front of the grandstands. Most have a camera that photographs the first horse past the post. In a close finish, the picture is used to decide the winner.

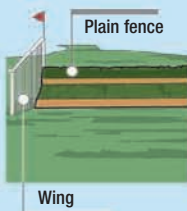
STEEPLECHASE COURSES

National hunt racing is centered mainly in the UK, Ireland, and France. Racing is on grass over either brush fences or over hurdles, which are flexible and lower in height. The two courses are usually side by side. Racing can be either clockwise or counterclockwise depending on the course, and some racecourses have both jumping and flat facilities. The amateur equivalent of the steeplechase is called a point-to-point—these courses are usually on farms and only used once or twice a year. Other countries, such as the US, do have jump races but often the fences are more varied and include natural hedges and timber obstacles.



HURDLES

A minimum of 3.5 ft (1 m) high, hurdles are made up of brush sections—three are shown here. The sections slope away from approaching horses and each will flex downward independently if a horse hits it. The “wing” to the left guides horses into the jump.

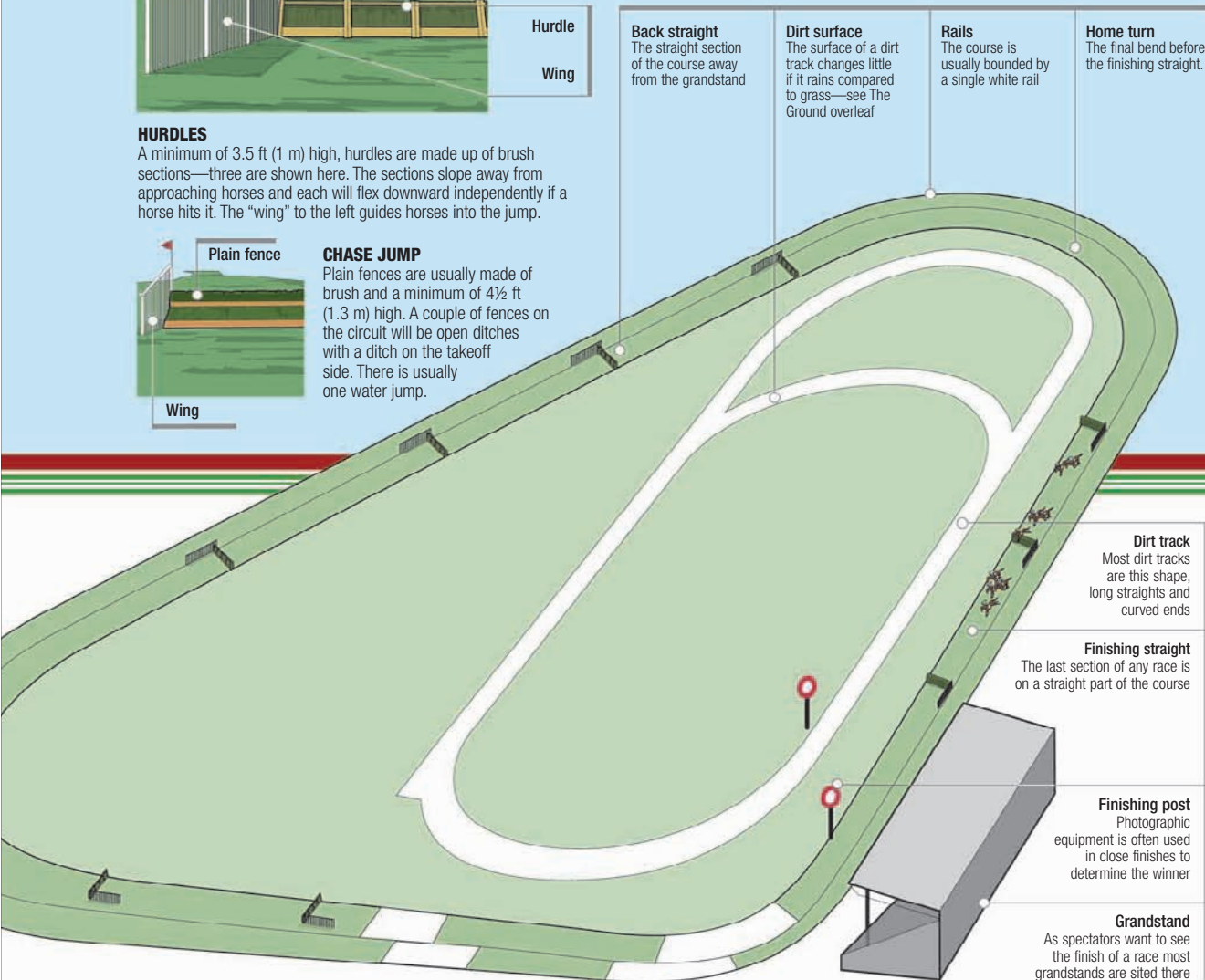


CHASE JUMP

Plain fences are usually made of brush and a minimum of 4½ ft (1.3 m) high. A couple of fences on the circuit will be open ditches with a ditch on the takeoff side. There is usually one water jump.

AMERICAN QUARTER HORSE

Most racehorses are Thoroughbreds, but Quarter Horse, Arab, and pony racing is also very popular. The Quarter Horse, named for its speed over a quarter mile, is the dragster of the horse world. It can cover 440 yards (400 m) in less than 21 seconds from a standing start, making it faster than a Thoroughbred over short distances. Quarter Horses race on the flat over one eighth to a half a mile (200 to 800 m). In contrast, Thoroughbred races range from one eighth to about 2½ miles (200 m to 4 km).

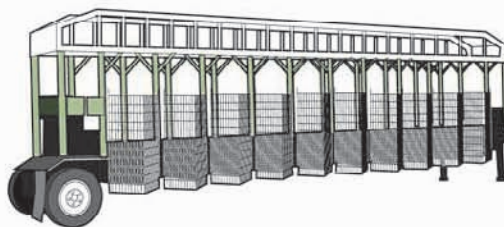


HANDICAP RACES

Horses sometimes run in handicap races which aim to give all horses entered a fair chance of winning. Essentially, more successful horses carry more weight, one pound being equivalent to about one length in distance. If necessary, lead weight is carried in a weight cloth under the saddle. Jockeys are “weighed in” with their saddles and weight cloths before and after the race to confirm the correct weight is carried.

START GATE

Used in flat racing, horses are loaded into the back of the stalls and then released together from the front when the race starts. In the US, the opening of the gates coincides with the ringing of a bell.



JOCKEY GEAR

All jockeys carry a whip and most wear goggles to protect their eyes. They wear the same basic clothing (shown here) but change their “colors” depending on the owner of the horse they are riding.

HEAD GEAR

The crash cap is designed to cushion the skull during a fall, and to protect the head from being kicked by other horses, both of which are more likely to happen in jump racing.

The helmet
The hard outer casing is padded on the inside



Chin harness
The harness holds the crash cap firmly in position

RACING SILKS

The lightweight colored silks help spectators to distinguish the runners during a race.



Owners colors

Each owner has unique colors displayed on the vest and cap cover

White breeches
All jockeys wear white breeches

Shoulder pad
Protects the upper arm



Padded panels
Protect the body but allow movement

BODY PROTECTORS

Mainly worn to help prevent back injuries, body protectors are mandatory for all jockeys.

Boot tops

White breeches tuck into the soft tops of the boots



LONG BOOTS

Soft leather hunting boots protect the lower leg and are often custom-made for extra comfort.

RULES OF RACING

Because large amounts of money can be won or lost on a single race, there are many rules and regulations in place to reduce the likelihood of fraud. For example, no race can start before the time stated, and winning horses, like athletes, are tested for drugs. Horses that are expected to do well but run badly are also tested to check they have not been “drugged” and sometimes the trainer and jockey are interviewed by the racecourse stewards to explain the poor running of a horse. Whipping is always a contentious issue, and so in the UK, excessive use of the whip carries a penalty—jockeys found guilty of this are suspended for several days.

AGES AND RACES

Thoroughbreds are all aged from January 1st of each year regardless of the month in which they are born. Flat horses can race as early as two over a distance of five furlongs (1 km) but those destined for hurdling and chasing careers cannot start racing until they are at least four years old. Some flat races are restricted to fillies only and others to colts. Maiden races are restricted to horses that have never won a race.

BREEDING

Thoroughbred bloodlines are very important in the breeding of racehorses. The matching of a mare with a stallion depends on the sort of racehorse required. For example, fast racehorses are more likely to be produced from horses that were themselves successful in sprint races. Many Thoroughbreds are sold at sales as yearlings; purchases are made on the basis of their bloodlines and conformation.

RACE TECHNIQUES

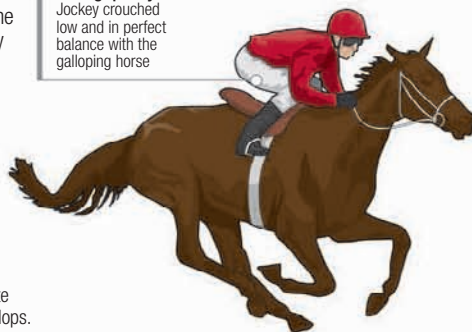
The key to racing a horse is settling it at the start of the race so it doesn't waste energy and knowing how they run best. Some are front runners, others like to make a late challenge, and saving a horse can produce a good enough finish to win the race ahead of all its rivals.

GALLOP

All races are run at a gallop. At first the pace may be quite steady, particularly if the race is a long one. The pace picks up markedly in the last mile (1.6 km), and by the final 220 yd the horses in contention will be running flat out, encouraged by the hands, heels, and whips of their jockeys.

Sitting quietly

Jockey crouched low and in perfect balance with the galloping horse



JOCKEY AND HORSE IN UNISON

During a race, the jockey crouches low over the horse, keeping his legs still, but moving his arms slightly to accommodate movements of the horse's head as it gallops.

JUMPING

Besides running quickly, jump horses also have to clear a number of fences or hurdles at high speed without falling. Even if they negotiate the fence successfully, there is also the risk that they will be brought down by another horse falling in their path.

BECHER'S BROOK

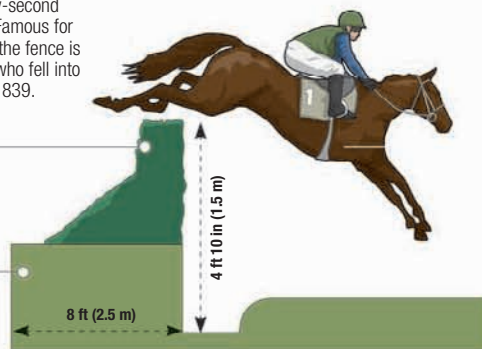
This is the second and twenty-second fence in the Grand National. Famous for the drop on the landing side, the fence is named after Captain Becher who fell into the brook during the race in 1839.

The fence

Unlike any other UK race fences, National fences are built of spruce branches

The ditch

It contains a brook and is on the landing side of the fence



WINNING WAYS

Top racehorses are the product of good teamwork. On the day of a race, a horse must be produced in peak condition and this is the responsibility of the trainer. He or she must get the horse fit and ready to race without it succumbing to any injuries. It will be ridden almost every day on the home gallops by a stable hand and its progress is carefully monitored. The amount and type of work a racehorse does depends on the distance of the races it is going to run in and when in the racing season the races take place. Each horse has a stable boy or girl, who is responsible for its care. They groom the horse to tone its muscles, and keep it relaxed and happy. If the slightest thing is wrong, such as a horse not eating its food, it is their job to make the trainer aware of it. If everything goes to plan, the horse will be ready to race.

THE GOING

Some horses run better on hard ground than on soft and so the "going" is an important consideration when deciding to run a horse. Trainers will often enter horses for races at different courses or on different days of the same meeting, so they can run the horse where the going suits it best. It also allows the trainer flexibility if a race meeting is abandoned.

THE JOCKEYS

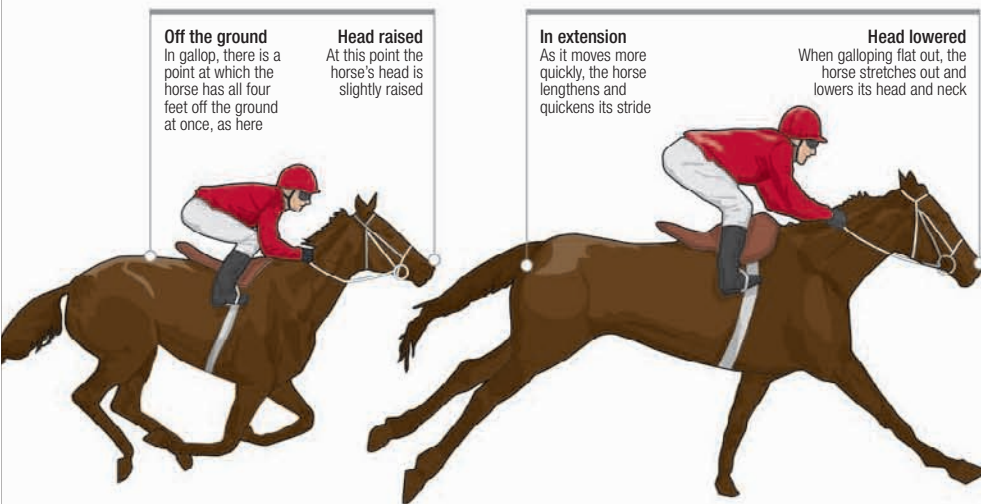
The jockey is an experienced rider who guides the horse through the race and ensures it has the best chance of winning when the time comes. "Stable jockeys" are retained by a particular stable to ride all their horses, other jockeys have agents and are booked to ride for a variety of owners and trainers. The jockey who rides the most winners in a single season becomes the champion jockey of that year.

THE WEIGHTS

In some flat races, all horses carry the minimum 110 lb (50 kg), but in handicaps the weight carried ranges from 116 lb (53 kg) to 140 lb (64 kg). Jump horses carry a minimum weight of 117 lb (53 kg) while the top weighted horse may carry 176 lb (80 kg). Most professional jockeys are men, but there are a few women who hold licenses.

CHAMPION JOCKEY LESTER PIGGOT

CHAMPION JOCKEY ON ELEVEN OCCASIONS, LESTER PIGGOT IS ONE OF THE GREATEST FLAT RACING JOCKEYS OF ALL TIME. HE RODE HIS FIRST WINNER WHEN JUST TWELVE YEARS OLD AND RETIRED ON A TOTAL OF 4,493 WINNERS, WHICH INCLUDED 9 DERBYS.



Off the ground

In gallop, there is a point at which the horse has all four feet off the ground at once, as here

Head raised

At this point the horse's head is slightly raised

In extension

As it moves more quickly, the horse lengthens and quickens its stride

Head lowered

When galloping flat out, the horse stretches out and lowers its head and neck

RACE TACTICS

Race riding is very tactical but success also depends on finding an opening between tiring horses when making the final challenge. Tactics are more extreme in valuable races where a trainer may enter a horse purely to make the pace for another more favored runner. Sometimes jockeys are given precise instructions by a trainer on how to ride a race but others are left to decide for themselves as the race develops.

SETTING THE PACE

The leading horse in a race sets the pace. Jockeys on following horses must be mindful that their horses are not tempted to run faster than they would like, or get left too far behind and lose their chance of winning.

A GOOD START

A good start is essential particularly in shorter races that include bends. Getting away swiftly allows a jockey time to cross to the inside rails and take the shortest track without impeding other runners in the race.

USING WHIPS

The use of whips in horse racing, like racing itself, varies from country to country, and there are strict regulations regarding its length and weight. Whether hitting a horse makes it go faster or not is much debated. However, "showing" the whip to a horse in the final stages of a race and moving it back and forth without actually making any contact can help to keep a tiring horse running straight.

INSIDE STORY

People have raced horses since they were first domesticated over 4,000 years ago. Flat racing started in the UK when knights brought small, swift arab horses back from the Crusades. It became more popular in the 1700s, possibly due to royal interest in the sport—a tradition that has continued to the present day. Early European settlers took flat racing to the US, the first race track being built on Long Island in 1665. Today it is the second most popular spectator sport.

Steeplechasing has its roots in the Irish hunting community when racing between landmarks, such as church steeples, gave the sport its name. Racing now has a worldwide following with tracks as faraway as Australia and New Zealand, Hong Kong, Dubai, and South Africa.

THE WORLD'S RICHEST RACE

The Dubai World Cup is held in late March and has prize money of six million US dollars. It is a flat race run over a 10 furlong (2 km), dirt track at Nad Al Sheba racecourse in Dubai City, United Arab Emirates. First run in 1996, The Dubai World Cup was created by Sheikh Mohammed bin Rashid Al Maktoum and attracts the best three and four year old Thoroughbreds in the world.

NEED2KNOW

- ➔ The International Equestrian Federation (FEI) is the governing body for Olympic equestrian sports. Dressage has been an Olympic sport since 1912.
- ➔ Dressage grew out of the training methods used to prepare horses for the battlefield.

SPORT OVERVIEW

Dressage has been called “horse ballet.” It is the ultimate exhibition of horsemanship. In this centuries-old sport, horse and rider are tested on a series of precise movements, with the horse responding to the rider’s slightest commands or “aids.” Horse and rider are also expected to be dressed well. Dressage has a long military tradition, and riders from the armed forces may compete in uniform.



DRESSAGE

RIDER PROFILE

Dressage requires concentration, patience, and supreme horsemanship. The rider must exhibit complete control over the horse using the most subtle commands. The horse must be obedient, but the rider should not force it against its will. This can only be achieved over years of intensive training.

Formal attire

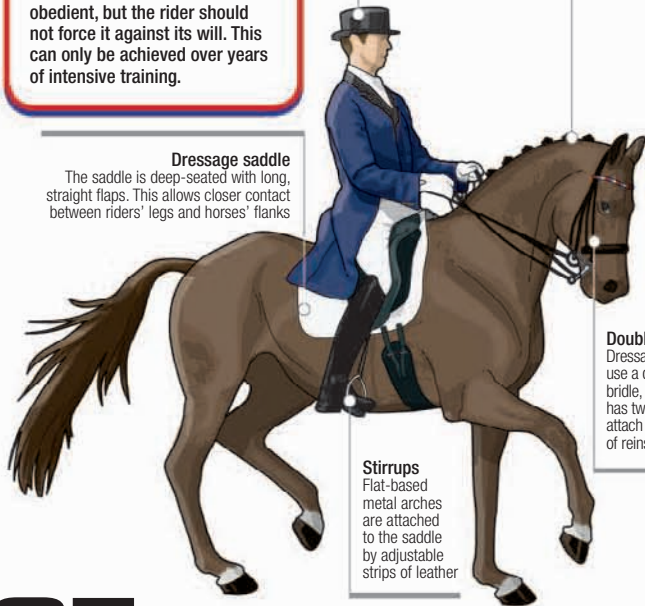
Military riders may compete in uniform, otherwise riders wear formal attire as stipulated by the FEI and may consist of a top hat and tail coat with white or cream jodhpurs and long leather boots. Gloves are required.

Good grooming

The horse should be immaculately groomed with the mane plaited.

Dressage saddle

The saddle is deep-seated with long, straight flaps. This allows closer contact between riders’ legs and horses’ flanks.



Double bridle

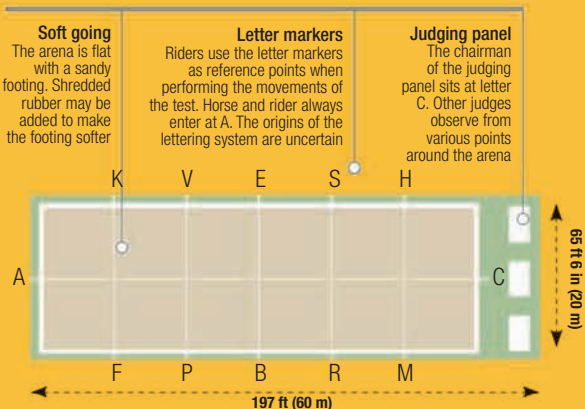
Dressage riders use a double bridle, which has two bits that attach to two sets of reins.

Stirrups

Flat-based metal arches are attached to the saddle by adjustable strips of leather.

THE ARENA

The standard dressage arena is a flat rectangle, usually of sand. Letters mark the points in the arena at which particular movements are made. Those around the edge of the arena are visibly marked. The letters that run down the center line of the arena are not visibly marked, but are used in the same way.



THE RIGHT MOVES

Each dressage test consists of up to 35 movements. A test is ridden from memory in a set order around points in the arena, which are marked by the letters. The test ends with a halt and salute to the head judge. Up to 20 tests are recognized in FEI international competitions.

ROUNDS AND TESTS

In advanced dressage tests, horse and rider perform a series of movements in an arena like that illustrated (see left). The horse has to show three paces—walk, trot, and canter—as well as smooth transitions within and between these paces. Five judges assess each of the movements from different angles and award a score from one to ten. Once added, these scores produce a percentage, and the rider or team with the highest marks is the winner. Olympic and World Championship competitions include Grand Prix, Grand Prix Special, and Grand Prix Freestyle (Kür) tests.

THE SPANISH RIDING SCHOOL

THE STALLIONS AND RIDERS OF THE SPANISH RIDING SCHOOL IN VIENNA ARE FAMOUS FOR THEIR PERFORMANCES OF CLASSICAL HORSEMANSHIP. THE HORSES ARE SAID TO DANCE TO THE MUSIC THAT ACCOMPANIES THEIR QUADRILLE RIDES DURING WHICH A GROUP OF HORSES PERFORMS A NUMBER OF DRESSAGE MOVEMENTS IN FORMATION. ONLY OLDER STALLIONS ARE TRAINED TO PERFORM THE COMPLEX MOVEMENTS OF HAUTE ÉCOLE OR “AIRS ABOVE THE GROUND.” THE HORSES ARE CHARACTERIZED BY THEIR GOOD NATURE, STAMINA, PERFECT PHYSIQUE, GRACE, AND INTELLIGENCE.

EVENTING



SPORT OVERVIEW

Eventing is the triathlon of equestrian sports. Often taking place over three days, it combines the horsemanship of dressage with the endurance of cross-country and the skill of show jumping—all ridden on the same horse. As with many equestrian sports, eventing has a strong military tradition. In recent times, a shorter event has evolved, which has a reduced cross-country section and can be completed in a single day.

NEED 2 KNOW

- ➔ Before the 1952 Olympics, eventing was only for military athletes. Today men and women compete against each other on an equal footing.
- ➔ The cross-country tests the courage of both horse and rider over 30 to 40 jumps.
- ➔ The most accomplished riders come from Australasia, Europe, and North America.
- ➔ Eventing can take place over one, two, or three days.



PENALTY POINTS

Since 1971, the overall winner of an eventing competition has been decided using a system of penalty points. Penalty points accumulated during the dressage are added to jumping and time faults accrued in the cross-country and show jumping tests. A rider receives time faults for each second by which he or she exceeds the time limit in each test, while jumping faults are given for knocking down or refusing to jump an obstacle. Depending on the ground—wet or dry—the cross-country test can be very influential when it comes to scoring the competition. The winner is the rider with the least number of penalty points in all three tests.

ELITE COMPETITION

The numerous competitions in FEI's international eventing calendar are categorized by their star rating, four stars being the highest level of competition, one star the lowest. The most advanced and keenly contested are the four-star Concour Complet International (CCI) events. There are only six four-star events in the world: Adelaide in Australia, Badminton and Burghley in Britain, Kentucky in the United States, Luhmühlen in Germany, and Pau in France. The Olympics and World Equestrian Games are equivalent to four-star CCI events.

A SPORT OF PRINCESSES

IN GREAT BRITAIN, EVENTING HAS A NOBLE PEDIGREE. BOTH THE PRINCESS ROYAL AND HER DAUGHTER ZARA PHILLIPS HAVE WON MAJOR EVENTING COMPETITIONS, INCLUDING THE WORLD CHAMPIONSHIPS.

THREE-DAY EVENTING

Eventing is a complete test of horse and rider over three days of competition. Dressage takes place on the first day, followed by cross-country on day two, with the jumping test on the third and final day. Dressage is covered in detail on the opposite page, and show jumping on pp. 406–407.

CROSS-COUNTRY

This is the most demanding test in the competition during which the fitness of horse and rider are tested. Competitors gallop over a set distance jumping a variety of solid obstacles, including water hazards and drop fences.



Natural obstacles
Drystone walls often feature in the cross-country test

JUMPING

Each rider guides his or her horse through a course that includes up to 16 jumps. The course tests the jumping skills of the horse and rider as well as the fitness and stamina of the horse, which will be recovering from the exertions of the previous day.



Show jump
The poles used in show jumping fall when knocked by the horse.

RIDER PROFILE

Eventing is demanding on both horse and rider. The different phases test different skills, and riders must show complete control in the saddle. Each rider develops a close relationship with a horse through many years of training.

Body protector

Rules require riders to wear a body protector to protect the upper body from injury during a fall

In the saddle

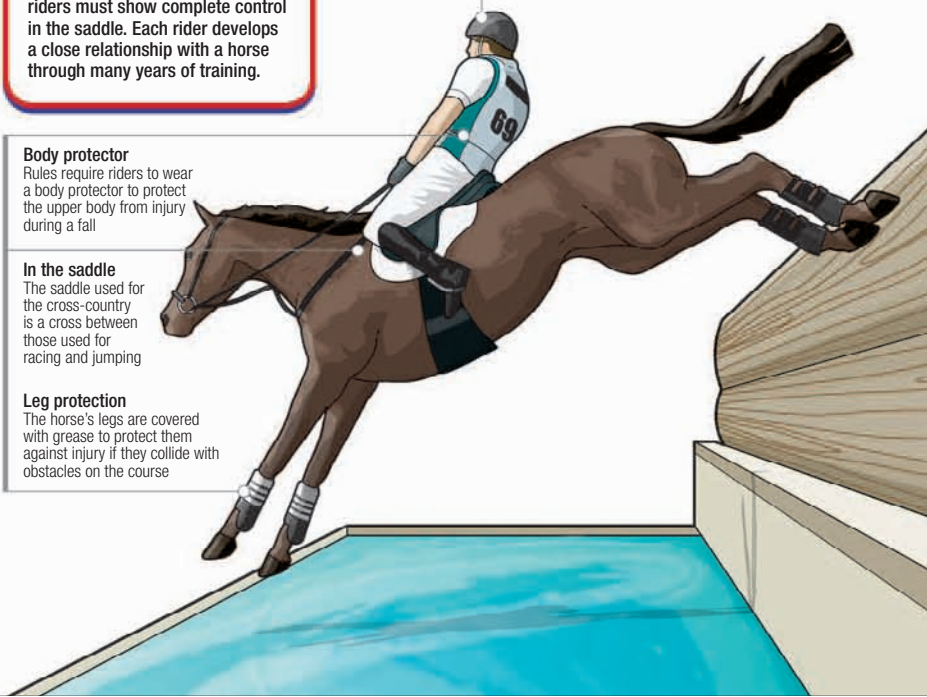
The saddle used for the cross-country is a cross between those used for racing and jumping

Leg protection

The horse's legs are covered with grease to protect them against injury if they collide with obstacles on the course

Head protection

During the cross-country phase, riders must wear a helmet fastened with a chinstrap



SHOW JUMPING



406

SPORT OVERVIEW

Show jumping involves horse and rider partnerships jumping over a course of obstacles in an arena. The rider has to present the horse at the jump (or fence) at a suitable speed and in balance, while the horse has to jump and land cleanly. There are usually two rounds. The second one, the jump-off, involves only those who cleared all the fences the first time and is held against the clock. Competitions range from small local events to the Grand Prix, World Cup, and Nations Cup.

THE ARENA

There is no standard arena size, and courses can be indoors or outside, on sand, earth, or grass. Grand Prix are contested over courses of up to 15 obstacles and a distance of up to 3,330 ft (1,000 m). The course design includes a variety of set fences. For example, there will usually be a solid-looking wall, which is intimidating for both horse and rider. The prescribed route involves tight cornering and taxing takeoff points. Time penalties increase the pressure.

NEED 2 KNOW

- Show jumping has been on the Olympic schedule since 1912.
- The sport is popular in North America, Australasia, and Europe.
- Men and women compete against each other as equals in show jumping.
- The Grand Prix events are the highest level of competition with the most prize money.

Saddle up

A jumping saddle has flaps that are widely curved at the front to allow the stirrup leathers to be short, while still providing knee support for the rider.

Belly pad

A wide belly pad protects the horse's underside from damage by the shoe studs when the horse tucks up its front legs to jump.

Dress up

Riders usually wear white jodphurs, long boots, and a red or black jacket. Many carry a crop to encourage the horse to make the jump.

Head protection

The helmet is an essential item to protect the rider's head from injury in the event of a fall.

RIDER PROFILE

An excellent sense of balance, good physical fitness, and the ability to judge distances are crucial in a rider. Determination and boldness are also important as the fences are often designed to be intimidating and can look very high, even from the back of a horse. Close rapport with the horse is essential.

Leg protection

The legs are usually fitted with boots to protect against bumps and tendon damage.

Reining in

The bridle is often fitted with a running martingale, which prevents the horse from raising its head too high.



**Judging panel**

A panel of jump judges calculates the results of the competition. In national and international competitions, the panel is headed by a chairperson, approved by the national governing body or by the FEI (International Equestrian Federation)

Water jump

Many larger events include a water jump, either on its own or with a fence over the top. It is tempting for both horse and rider to look at the water, which disrupts the flow of the jump. The horse must clear the fence without touching the water

Jump crew

Members of the jumping crew work under the direction of the course steward. They rebuild any obstacles that have been knocked down. When a competitor is on the course, the jumping crew remains out of sight to avoid causing a distraction

Double bounce

Two fences with space for only a single canter stride between, the double bounce calls for accurate riding and athletic ability

Oxer

A square oxer is two poles of equal height placed together to make the jump wider. A horse finds the width of this type of fence difficult to judge and, therefore, harder to clear cleanly

A TINY HERO

STROLLER (1950–1986) IS ONE OF THE MOST FAMOUS SHOW JUMPERS. A PONY OF ONLY 14.2 HANDS (4¾ FT/1.47 M) HIGH, HE COMPETED SUCCESSFULLY AGAINST HORSES OVER 16.2 HANDS (5½ FT/1.68 M) HIGH. IN 1967, HE AND HIS RIDER MARION COAKES WON THE HICKSTEAD DERBY AND IN THE 1968 MEXICO OLYMPICS THEY WON A SILVER MEDAL. THEY WON 61 INTERNATIONAL COMPETITIONS IN ALL.

JUMPING RULES

The basic rules of show jumping are quite simple: to clear the obstacles in the order dictated by the course builder. This must be done without the horse knocking down any poles or putting its feet into the water jump, stopping in front of a jump (a refusal) or running to one side of the jump (a run out): any of these earn four penalty points (faults). A second refusal results in elimination, as does following the wrong route, or the rider falling off. The course must be completed within a set time. Those riders with the fewest faults at the end of the first round go on to the jump-off, which is held over fewer jumps. If two or more horses jump clear, the winner is the one with the best time.

SPECTATOR SPORT

With its straightforward rules and fast, furious pace, show jumping makes a good spectator sport. Individual rounds last a matter of seconds and the variety of horses and personalities of the riders add to the interest.

SADDLE WORK

Competitive jumping is done at a canter, a fast, bouncy pace that the rider can adjust to achieve a longer or shorter stride. The comparatively short stirrup leathers allow the rider to move fluidly in the saddle. Leaning forward over the jump has the dual effect of taking the rider's weight off the horse's back and loosening the reins very slightly, both of which allow the horse to bascule (arc over the jump) more easily.

MAKING A GOOD JUMP

A jump can be broken down into five elements: approach, take-off, jump, landing, and getaway. Each one plays a key part in whether the horse jumps successfully or not.

Controlled approach

Impulsion (power in the horse's legs) is crucial in the approach. The rider may also alter the horse's stride length to arrive at the best takeoff point

Taking off and jumping

At takeoff, the horse tucks its front legs up and powers off with its hind legs. The jump is an extended canter stride

Landing and getaway

On landing, the horse and rider move on to the next jump as smoothly and efficiently as possible

**SIDELINES****5**

The Olympic record for show jumping golds, held by German Hans Gunther Winkler.

2.47

The FEI high jump record in meters (8 ft) set by Alberto Morales of Chile in 1949.

8.4

The longest jump over water in meters (27 ft) set by Andre Ferreira of South Africa in 1975.

50,000

The capacity of the equestrian center built for the 2000 Olympics in Sydney.

INSIDE STORY

The origins of show jumping can be traced to 19th-century Britain when riders regularly negotiated obstacles such as fences and walls during mounted hunts. The riding style then was to have long stirrups and stay upright over the jump. Early competitions were dominated by military riders and it was Italian Captain Federico Caprilli (d.1907) of the Pinerolo Cavalry School who developed the forward seat used today.

**Mane**

The mane is clipped so it does not get caught up with the player's rein hand

Tail

The tail is braided, folded, and taped so that it does not obstruct a swinging mallet

Breastplate

The breastplate is used to secure the saddle, preventing it from slipping back

Bell boots

The bell boot protects the sensitive coronet band at the top of each hoof

Martingale

A standing martingale stops the horse from rearing its head and hitting the rider

Draw reins

The reins run on a pulley design from head to girth to allow full control on a turn

PLAYER PROFILE

Polo is a tough, physical sport that demands high levels of coordination and advanced riding skills. Players attribute much of their success to their ponies.

POLO

**Polo wraps**

The wraps are bandages that protect the cannons (lower legs) from mallet blows

EVENT OVERVIEW

Outdoor polo is an equestrian sport played between two teams of four players. The game is played in time periods called chukkas. There are six chukkas in most matches, and each one lasts for seven minutes of nonstop play. During play, the goal is to score more goals than the opposing team. A player scores using a long wooden mallet to drive the ball through the opposition's goal posts. Polo is played at a breathtaking pace and is an exhilarating sport for spectators and players alike. An indoor variation, called arena polo, is also played.

ARENA POLO

Arena polo is an indoor version of the sport played according to the same basic rules. Each team has three players, and the game is played over four chukkas of seven and a half minutes each. Since the size of the playing area is smaller, arena polo is generally much slower than its outdoor counterpart, but it more than makes up for this with its physical nature.

SIDELINES

5 The number of times polo has been included in the Olympics (Paris 1900, London 1908, Antwerp 1920, Paris 1924, and Berlin 1936).

18 The age of Argentine polo player Adolfo Cambiasso when he reached his 10-goal handicap—the youngest player ever to do so.

55 The number of polo clubs registered with the Hurlingham Polo Association—the governing body for polo in Great Britain and Ireland. It is responsible for regulating the sport, and sets player handicaps.

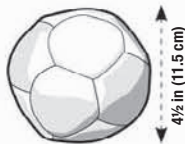
4,307 The elevation in meters (14,130 ft) of the reputed highest polo ground in the world—it is situated on the Deosai Plateau in Pakistan.

NEED2KNOW

- ➔ Polo is one of the oldest team sports in the world. It is thought to have originated in Persia around 600 BCE.
- ➔ The Federation of International Polo (FIP) is the governing body for the sport and organizes the Polo World Championships.
- ➔ Argentina dominates the world of professional polo. Most of the world's 10-goal handicap players (the highest ranking) hail from Argentina.

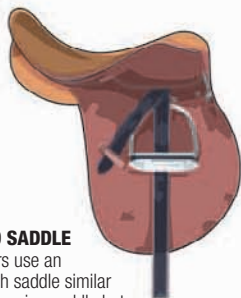
ESSENTIAL EQUIPMENT

Polo is a tough contact sport, and the saddle and tack must be able to withstand the twists and turns and high-speed chases. Players use a long-handled mallet to hit the ball. The longer sides of the mallet, not the tips, are used to make impact.



SPECIALIZED BALL

In outdoor polo, the ball is made of solid high-density plastic. In arena polo, it is inflated and made of leather (above).



POLO SADDLE

Players use an English saddle similar to a jumping saddle but without the extra padding.



Rubber grip

A rubber grip helps the player grip the mallet, and a webbed thumb sling wraps around the hand to prevent the player from dropping it.

Bamboo shaft

The shaft is made from bamboo cane and may be rigid or flexible. The length depends on the height of the mount.

Mallet head

The head is about 10 in (25 cm) long and tapered at one end to allow for a full swing flush to the ground.

MALLET CONTROL

The mallet head is weighted to give a player greater control of the pendulumlike swing. The weight of the head is called the "cigar."

WHAT THEY WEAR

Every player wears a helmet, a polo shirt in team colors bearing the number of the player's position, and traditional white polo breeches. Riding boots may include spurs. Knee pads are mandatory in some clubs, and gloves are optional.



Team colors

Players display their team colors on their helmets.



Polo shirt

The shirt indicates the player's position in the team.

HEAD PROTECTION

A flying ball could seriously injure a player, so it is necessary that all players wear a helmet.



GLOVES FOR GRIP

Most players wear at least one glove (on the right hand) to improve their grip on the mallet.



KNEE PADS

Pads protect the knees from knocks and flying balls without causing injury to the horse.



Polo boots

Leather boots offer protection from bumps and balls.

COLLARED SHIRT

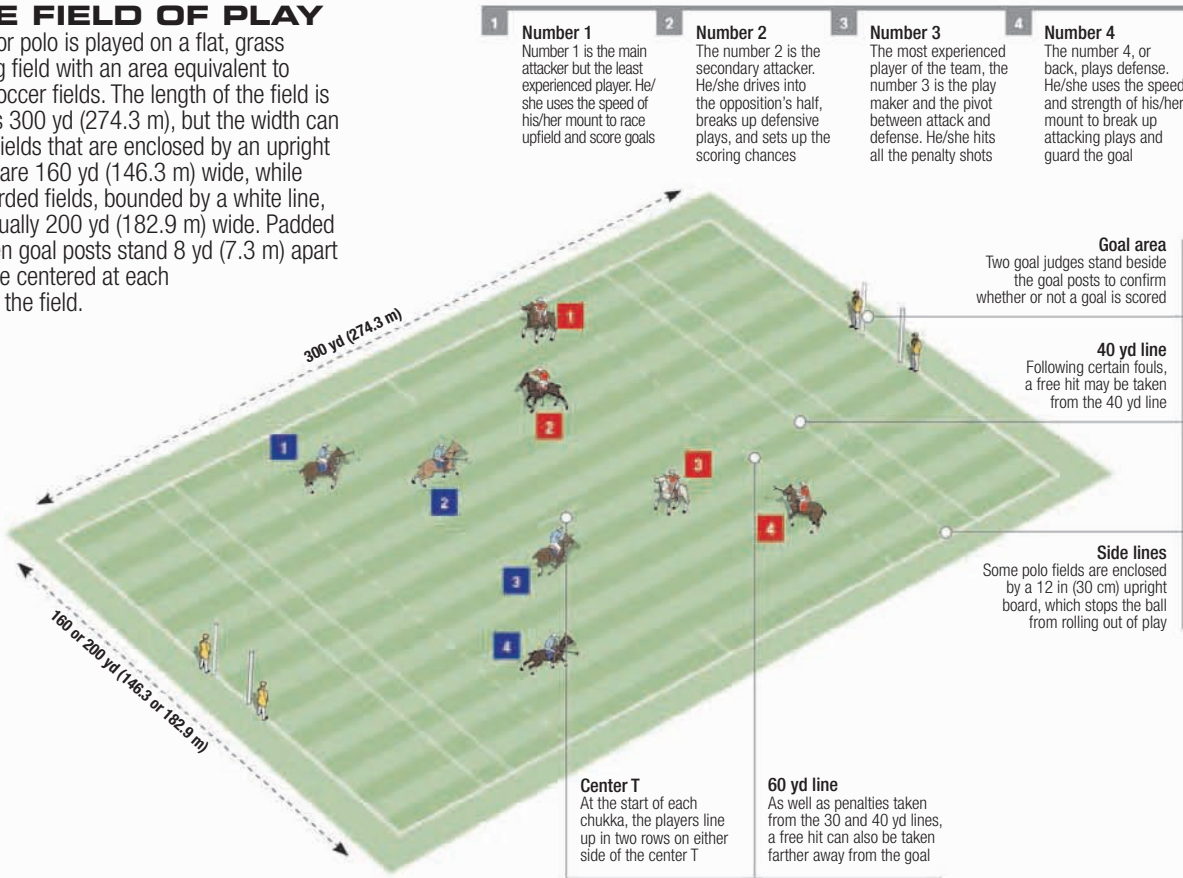
The collared polo shirt displays the team's colors, and is as popular off the polo field as it is on it.

RIDING BOOTS

Well-fitting boots cut just below the knees protect the lower legs from injury during play.

THE FIELD OF PLAY

Outdoor polo is played on a flat, grass playing field with an area equivalent to nine soccer fields. The length of the field is always 300 yd (274.3 m), but the width can vary. Fields that are enclosed by an upright board are 160 yd (146.3 m) wide, while unboarded fields, bounded by a white line, are usually 200 yd (182.9 m) wide. Padded wooden goal posts stand 8 yd (7.3 m) apart and are centered at each end of the field.



PLAY THE GAME

Polo is played at an electrifying pace. A full match may last for 8 chukkas, but most games are now played over 6 chukkas. Play is continuous. Stoppages occur only when there is an injury to a horse or player or if broken tack prevents a player from continuing. The intervals between chukkas usually last 4 minutes, which allows the riders to change their mounts (although they may do so at any point in the game). There is a longer 10-minute interval at half time.

POLO SPORTS

Many different sports go by the name of polo. One version is played using camels instead of horses, another uses elephants, and there is even a game involving yaks. Other polo sports include canoe polo and cycle polo, but these are generally played for fun. Water polo is a competitive team sport and is played at Olympic level.

HANDICAPS

Polo has adopted a handicap system so that two teams fielding players of differing abilities have an equal chance of winning the game. The handicap is based on a standard 6-chukka match and runs on a scale of -2 to +10 goals, with -2 being the lowest and +10 the top end of the scale. A player with a handicap of 4 is good enough to play in international matches. Before the start of the game, the handicap of each player in the team is added to give the overall team handicap. The difference in the total between the two teams is given as a goal advantage to the team with the lowest handicap. So a team with an overall handicap of 30 playing a team with a handicap of 35 starts the match with a 5-goal advantage.

LEFT OUT

ALTHOUGH THERE ARE A FEW LEFT-HANDED POLO PLAYERS ON THE INTERNATIONAL CIRCUIT, THE MALLET MUST ALWAYS BE HELD IN THE RIGHT HAND—LEFT-HANDED PLAY WAS OUTLAWED IN 1975 AS IT WAS DEEMED TOO DANGEROUS.

PENALTIES

If one member of a team commits a foul, one of the umpires may call for a free hit or a penalty hit. Minor fouls are usually penalized by a free hit from the 40 yd line or the 60 yd line, depending on the level of the offense. If the foul prevents a player from scoring a goal, the umpire will call for a penalty hit from the 30 yd line. Penalties are usually taken by the most experienced player at number 3, who gallops up to the ball on the line and drives it between the goal posts. The opposing team cannot interfere with play during a penalty hit.

RULES OF THE GAME

The rules of polo are complex and govern everything from the size of the goal to the team colors. Various field rules cover playing situations. The main goal is to ensure the safety of the players and their ponies. The most common rules cover riding violations and dangerous use of the mallet. Three officials enforce the rules. Two mounted umpires follow the game on each side of the field. A referee presides off the field and settles any disputes between the umpires by watching a video replay of the game.

STARTING PLAY

At the start of each chukka, and after each goal is scored, the teams line up in two rows on either side of the center T. One of the mounted umpires then rolls the ball in between the two teams to start the game. When the ball goes out of play at the side line, the two teams line up 5 yd (4.6 m) from the spot where it went out, and the umpire restarts the game in the same way. If an attacking player knocks the ball out past the end line, a defending player hits the ball back into play from the spot where it went out of play.

ATTACKING SHOTS

A professional polo player can hit the ball the full length of the field in just two powerful strokes. Standing in the stirrups increases the power of the shot. A player may hit the ball in any direction. Some shots are much more difficult than others, so polo players of all levels practice their technique on a wooden horse. The hardest shot to play is known as the "millionaire's hit," which is taken under the horse's belly and involves considerable risk of injury if the mallet gets caught in the pony's legs.

FOREHAND

A forehand shot is played with the ball on the offside (right-hand side) of the polo pony. The ball is struck in the direction of travel.



Offside forehand

The offside forehand is the most powerful and widely used shot in polo.

Nearside backhand

This is the basic backhand stroke, and is the second most powerful shot in the game.



BACKHAND

Backhand shots are played with the ball on the nearside (left-hand side) of the polo pony. The ball is struck backward, opposite to the direction of travel.

DEFENSIVE PLAY

A variety of defensive techniques are used to contest for the ball in open play. The number 4, or back, is the key defensive player. He or she maintains a solid defense with support from the number 3. Most of the back's shots are backhand strokes to drive the ball away from the goal.

Hooking the ball

A player can use his or her mallet to hook the mallet of an opposing player and block their strike.

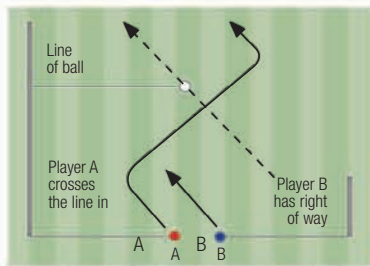


FOULS AND PENALTIES

Polo is a tough, physical sport and, with ponies traveling at full gallop, the safety of both rider and horse is always paramount. For this reason, the use of excessive force is considered to be unsporting conduct. A player may not use his or her elbows, for example, when riding another player off the ball. This will generally result in a free hit from the spot where the foul took place.

CROSSING THE LINE

The most important principle in polo is the "line of the ball." This imaginary line represents the path of the ball each time it is hit by a player, and it establishes the right of way for all the players on the field. When a player has the line of the ball, he or she has the right of way—which usually belongs to the player who last struck the ball. If another player crosses the line of the ball in front of the player with the right of way, the umpire will call a foul and award a penalty.



DANGEROUS RIDING

Dangerous riding is a catch-all for any riding behavior that is likely to put another player or pony in serious danger. Any exhibition of dangerous riding is strictly prohibited and heavily penalized by the umpires. Examples of dangerous riding include crossing in front of a player riding at a gallop, riding off at an angle greater than 45 degrees, pulling across another player's pony, crossing the hind legs of an opponent's pony, or riding in a generally intimidating manner.

TACTICS AND TECHNIQUES

Polo is as much a game of tactics and strategy as it is an exhibition of strength and stamina. A team rarely works out an advanced game plan, but the players do take time to learn about the opposition's strengths and weaknesses in the hope of exploiting them during the match. Players save their best polo ponies for the 4th or 6th chukkas, which are generally the most crucial in deciding the outcome of the game.

TAILING THE BALL

Tailing, or backing, the ball is a backward pass to a teammate. The player who receives the pass can turn into the ball and then drive it into an attacking position. Tailing the ball is an easier option than turning the ball and may also be used when a player steals the ball from an opponent. After the steal, the player may tail the ball to turn it back in the direction of his or her opponent's goal.

TURNING THE BALL

Turning the ball allows a defending player who is chasing a ball in the direction of his or her own goal to turn and get into an attacking position. A player may also turn the ball to allow teammates to get into better positions. The turn involves cutting the ball back upfield and then turning the horse back onto the new line. This takes time so it is best avoided if opposing players are close to the play.

RIDING OFF

In some circumstances, a player may decide to ride another player off the ball rather than try to hit or chase it themselves. This tactic is often used if a teammate is in a better field position to take the shot. Riding off is allowed as long as the angle of attack is less than 45 degrees. Although the polo ponies do most of the hard work, each player may also use his or her body to shove the opponent off the ball.

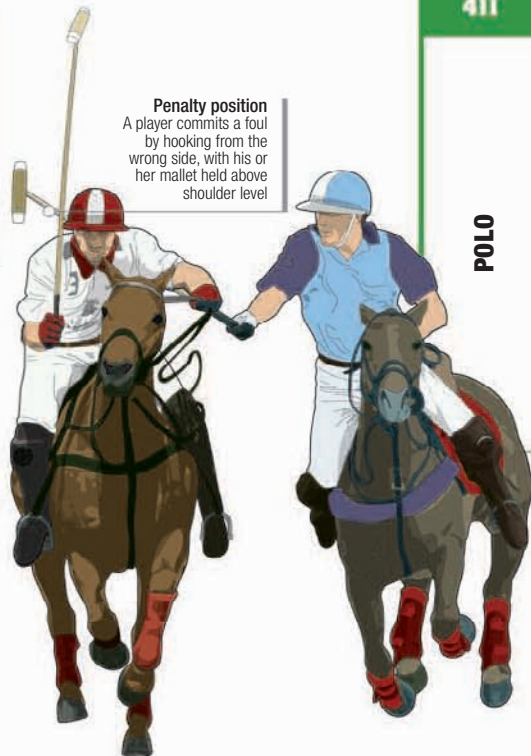


RIDING A PLAYER OFF THE BALL

The player in blue is attempting to ride his opponent off the ball. A player may use his or her mount to physically push an opponent off the ball. Riding off is a defensive move that can be used to prevent an opponent from striking the ball, or to allow a teammate a clear shot.

FOUL HOOK

If a player tries to hook by reaching over his opponent's mount, the umpire will call a "cross hook" foul. The hook must be attempted from the same side of the opponent's pony as the ball. Hooking above shoulder level or in front of the horse's legs will result in a penalty call.



INSIDE STORY

Known as the "sport of kings" thanks to its association with royalty, polo is a sport with a long history. The exact origins of polo are unknown, but it is certainly true that a version of the sport was being played in the Middle East as early as 600 BCE. Over the centuries, polo spread throughout Asia and eventually reached Britain through India. The sport was included as an Olympic event from 1900 to 1939, but has since enjoyed limited growth due to the cost of competing at a serious level.

WORLD BODY

Founded in Argentina in 1982, the Federation of International Polo (FIP) is the world governing body for the polo-playing countries of the world. One of the FIP's main goals is to restore the sport's Olympic status.

BRITISH BODY

The Hurlingham Polo Association (HPA) is the ruling body for polo in Britain, Ireland, and 27 overseas associations. The HPA is the oldest polo club in Britain. It drew up the first set of British rules in 1875.

GREYHOUND RACING

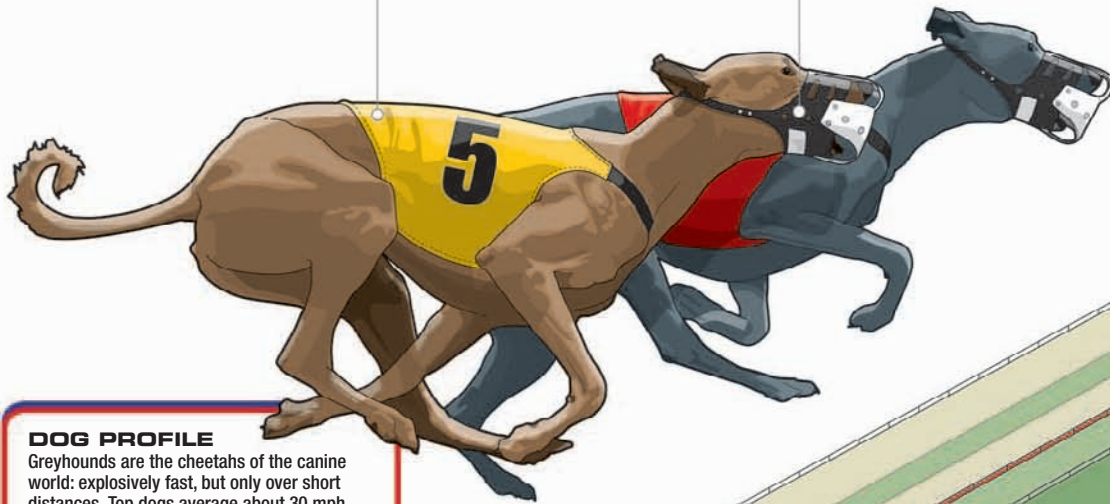


Identity jacket

Each dog wears a jacket of a different color, depending on its trap number (see opposite)

Snout muzzle

Mandatory for all runners to prevent the dogs from snapping at each other



DOG PROFILE

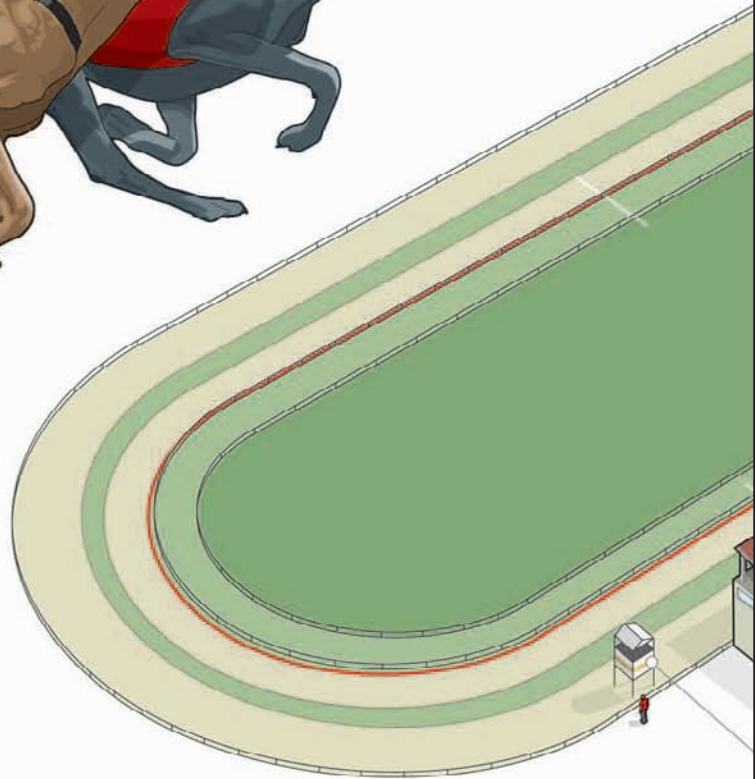
Greyhounds are the cheetahs of the canine world: explosively fast, but only over short distances. Top dogs average about 30 mph (48 kph) over a mile (1.6 km), and champions can achieve speeds of 45 mph (72 kph).

SPORT OVERVIEW

Greyhound racing is exciting to watch, even for spectators who don't wager on the outcome. Most of them do, though: it is a major gambling sport in many countries. Dogs are released simultaneously from starting traps, then chase a lure (an artificial hare or rabbit) around a track. The dog that reaches the finish line first is the winner.

COURSE OF EVENTS

Dog races are held over distances of between 690 ft (210 m) and 3,624 ft (1,105 m). A rubber track surface is covered with a mixture of sand and a binding material, such as polyurethane, that prevents the grains from blowing away.



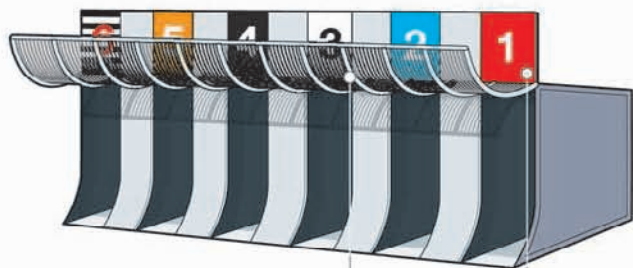
NEED2KNOW

- ➔ Greyhound racing is popular in many countries, but is a major betting sport in Britain, Australia, Ireland, New Zealand, and the United States.
- ➔ An evening at "the dogs" is a popular social activity, with up to a dozen races and abundant food and drink.
- ➔ Other racing dogs include whippets and, mainly in the United States, dachshunds.

SIDELINES

29.36 The number of seconds taken by the legendary Mick the Miller to complete the 525 yd (480 m) Greyhound Derby course at London's White City Stadium in 1929. The half-minute barrier had previously been regarded as unbreakable.

16 The maximum number of characters permitted in the name of a racing greyhound; that includes spaces between the words. "Mick the Miller" was only one letter under the limit.

**IN THE TRAP**

The dogs are loaded into the starting gate according to a draw or current form. When they are in safety, the starter gives the order to start the hare.

Gates

Open automatically to release the dogs after the lure has passed

Numerical significance

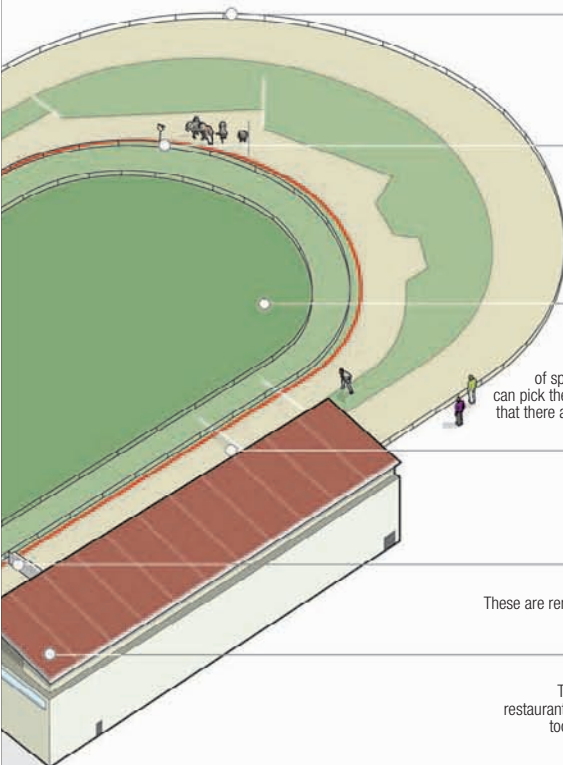
The trap and the dog closest to the inside rail always have the number one

COLOR CODING

Every dog wears the appropriate jacket for his or her starting trap. Most races have six competitors, but in a seven- or eight-dog race, No.7 wears a leaf green jacket, and No.8 has a coat with yellow and black halves.



Number one
Often believed to be the best position, because it is on the shortest inside track. In reality, many dogs perform better from a wider start

**Outside rail**

The greyhound with the highest number starts from the trap closest to this perimeter fence

Speeding lure

Runs on a rail that encircles the outer perimeter of the track; when it reaches a certain point beyond the starting gates, it goes over a tripswitch that opens the gates and lets the dogs out

Paddock

Between the weigh-in and the start, all runners must remain in plain view of spectators and officials so that the former can pick the likely winner and the latter can ensure that there are no attempts to tamper with the dogs

Finish line

Cameras are mounted on the line to help judges call close decisions

Starting traps

These are removed from the track once the race has started and the dogs are clear

Grandstand

The site of most of the amenities—bars, restaurants, toilets. There are betting kiosks here, too, as well as stalls all round the stadium

THE HARE

The lure is electrically powered and runs on a rail around the edge of the course. Although they are known as hares, lures may come in any shape, within reason.

**Starter's rostrum**

It is from here that the main course official gives a plainly visible signal to start the hare

34,000,000

The number of spectators who paid to attend greyhound races in Britain in 1946, an all-time high.

34-36

The weight, in kilograms (75-80 lb), of a racing greyhound at the peak of its career, between two and three years of age.

13

The number of US states with greyhound racing tracks: Alabama, Arizona, Arkansas, Colorado, Florida, Iowa, Kansas, Massachusetts, New Hampshire, Rhode Island, Texas, West Virginia, and Wisconsin.

DOG TAGS

Every greyhound must have an identity book that gives its sex, color, and markings (including earmarks) to prove that it really is the dog its owner says it is. This ID system is employed to prevent "ringing" (unauthorized substitutions).

RACE REGULATIONS

Every greyhound must be a registered weight, which is notified by the owner and agreed in advance by the race organizers. If the dog is more than 2.2 lb (1 kg) over or under at the weigh-in, two hours before the start, it will be withdrawn from the race.

Some events are open; others are graded. In graded races, the best dogs are seeded, and given the starting trap that most suits their racing style. Those in the outside lane have a "W" (for "wide runner") marked on their trap or beside their name on the race card. Seeded greyhounds with a known preference for the middle of the course are denoted by the letter "M."

No dog may run in more than one race per meeting. In the event of a dead heat, the winner may be decided by drawing lots.

OBSTACLE COURSE

Some dog races are held over a variable number of hurdles, usually between five and seven. Each jump is 2 ft 6 in (75.8 cm) high, and slants forward perpendicularly at 20-25 degrees. Like horses, greyhounds tend to be suited to one form of racing or the other, and rarely excel in both. In most dog-racing nations, the premier hurdle event is the Greyhound Grand National; flat-track equivalents are known as Greyhound Derbys.

INSIDE STORY

Greyhound racing has its roots in hare coursing, but it had detached itself from bloodsports by the late 19th century. In Britain, attendances at meetings peaked after World War II, but declined dramatically when off-course betting was legalized in 1961 (the sport still has a huge following among gamblers). Dog racing is also big business in Australia, the United States, and, increasingly, South Africa. In several European countries, races are popular but less commercial: greyhounds that compete in Belgium, France, Germany, and the Netherlands are still principally pets rather than investments.

NEED2KNOW

- ➔ Almost all harness races are run over 1 mile (1.6 km). In Australia, race distances are sometimes a little longer.
- ➔ Most harness races begin with a running start behind a mobile start gate mounted on the back of a motor vehicle.
- ➔ The major international races are the Roosevelt International in New York, the Prix d'Amérique in France, and the Trot Mondial in Canada.

Sulky carriage

The sulky is a lightweight, two-wheeled cart with an aluminium frame

Wheel discs

The wheels are a standard size. They are covered with plastic discs to reduce drag around the spokes

Safety first

The rider's safety gear includes a body protector and helmet

Driving lines

The rider controls the horse using leather or synthetic driving lines, which attach to the bit in the horse's mouth

COMPETITOR PROFILE

Most harness racing drivers train their own horses. They focus on getting the horse to master its gait, lengthening the stride to increase its speed across the ground.

Overcheck

The overcheck attaches to the bit and lifts the head to keep the horse balanced in the trot

Martingale

The martingale is an attachment that stops the horse from throwing its head upward

Horse's harness

The harness is all the gear worn by the horse when racing. It comprises the saddle, girth, crupper, bridle, and driving lines

Leg protection

Brace bandages stick to and protect the legs. Quarterboots protect the top of the hooves. Knee boots are worn to protect the insides of the knees



HARNESS RACING

SPORT OVERVIEW

Harness racing is a popular form of horse racing in Europe and the United States. Each horse pulls the driver in a cart called a sulky. Races take place at a trot or pace, and the horse must not change its gait. The winner is the first horse past the finish post.

DUST TRACKS

In the United States, almost all harness races take place on flat dust tracks. The track must form a circuit, but otherwise there are no rules about its shape or dimensions—straights can be long or short, and curves can be tight or sweeping. The mile is widely regarded as the classic distance. In Europe, racetracks are usually covered with grass and can be up to 1½ miles (2.2 km) long.

SPECTACULAR STARTS

In the United States, some races have spectacular running starts behind a mobile starting gate. The drivers get their horses up to speed as the gate approaches the starting line. Then, as the gate passes over the starting line, the two wings of the gate fold forward, leaving the horses free to battle it out over the racetrack.

BREAKING THE GAIT

The most important rules govern the horse's gait during the race. Assisted by the race stewards, the gait judge is responsible for checking gait. He or she follows the race in a car and may use video footage to see if any horse breaks gait. In European races, breaking gait results in immediate disqualification. In the United States, the horse must move to the outside of the track and resume the required gait before continuing to race. The horse then drops one place overall.

HORSE'S GAIT

Harness racing takes place in one of two different gaits, or stride patterns. European races are exclusively trotting. In North America and elsewhere, the faster pacing gait is much more common than trotting.

THE PACE

In pacing, the left front and left hind legs touch the ground at the same time, then the right front and right hind legs.

THE PACE

In the pace, the left front and left hind legs touch the ground at the same time, then the right front and right hind legs. Unlike the trot in which diagonal pairs of legs move together, the pace involves coordination of the limbs on each side of the horse in turn. This is not a natural pace for most horses and so it has to be taught or bred to move in this way. To help maintain the pace during races, many horses wear an additional piece of tack called a hobblehanger, which fits loosely around the upper leg.

Lateral legs

The left front and left hind legs touch the ground together



RODEO

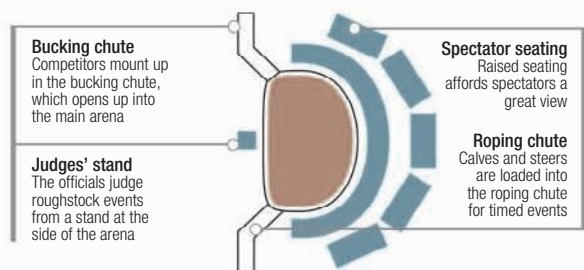


SPORT OVERVIEW

Modern rodeo is an American creation with Mexican origins. There are seven standard events in most professional rodeos. The roughstock events are judged, and the competitor with the most points wins. The timed events are races against the clock, and the fastest competitor wins.

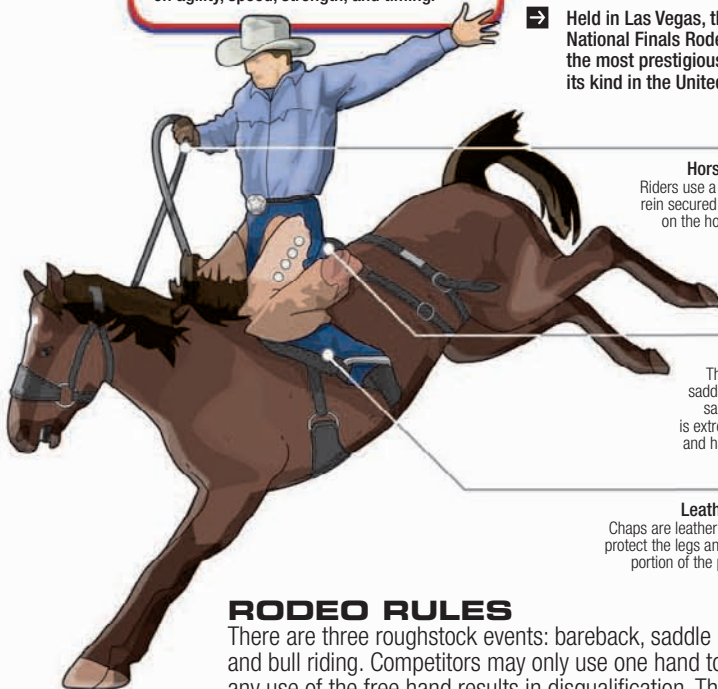
THE ARENA

A rodeo takes place inside a fenced dirt arena. There is no standard size for the arena, which may be indoors or outdoors. At one end is a bucking chute, where competitors mount for the ride. A gate opens up into the arena when the competitor is ready. The roping chute is a three-sided pen at the opposite end of the arena. It is used to load the animals used for the timed roping events.



COMPETITOR PROFILE

Different rodeo events require different skills. Roughstock events are the most physically demanding and require great strength and agility—and an equal measure of courage! Roping events rely on agility, speed, strength, and timing.



NEED2KNOW

- ➔ The Professional Rodeo Cowboys Association (PRCA) is the largest governing body for the sport.
- ➔ Held in Las Vegas, the National Finals Rodeo is the most prestigious event of its kind in the United States.

Horse control
Riders use a thick hack rein secured to a halter on the horse's head

Saddle
The Western saddle used for saddle bronc is extremely light and has no horn

Leather chaps
Chaps are leather pants that protect the legs and the front portion of the pelvic area

RODEO RULES

There are three roughstock events: bareback, saddle bronc, and bull riding. Competitors may only use one hand to ride: any use of the free hand results in disqualification. There are four timed events: steer wrestling, barrel racing, tie-down, and team roping. In all but the barrel racing event, a barrier across the bucking chute stops riders from getting a head start on the livestock. Breaking the barrier incurs a time penalty.

ROUGHSTOCK SCORING

Scoring for roughstock events is based on a ride of at least eight seconds without disqualification. There may be two or four judges, each of whom awards up to 25 points to the competitor and the animal. The score for a perfect ride is 100 points.

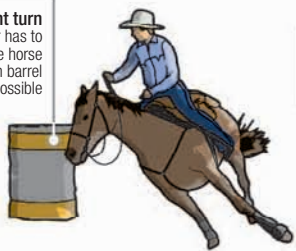
RODEO TECHNIQUES

While good riding skills are key to all the rodeo events, the tie-down and team roping events require the additional mastery of various roping techniques from the saddle (see below).

BARREL RACING

Traditionally a women's event, a barrel race is a timed race where riders complete a circuit around three barrels placed in a triangle.

Tight turn
The rider has to navigate the horse around each barrel as tightly as possible



TIE-DOWN

Tie-down involves roping a calf and tying its legs together. The calf must remain tied for six seconds or the competitor will be disqualified.

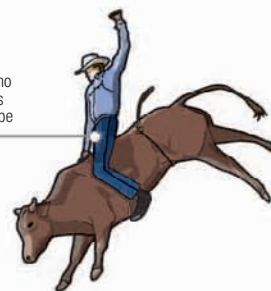
Off the side
The rider may have to leave the saddle when trying to rope a calf



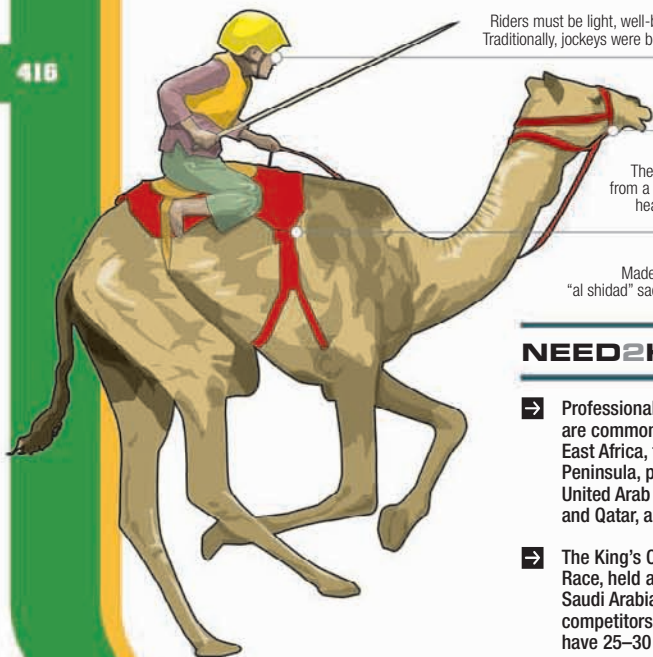
BULL RIDING

Bull riding is a bareback form of riding using only a thick bullrope to stay on the bull. The event requires coordination and courage.

No saddle
A bull rider has no saddle and holds on with just a rope



CAMEL RACING



Jockey

Riders must be light, well-balanced, and brave. Traditionally, jockeys were boys of 6–7 years old

Racing bridle

The "al khidham," made from a rope tied around the head, provides steering

Racing saddle

Made from a blanket, the "al shidad" saddle is light and soft

NEED2KNOW

- ➔ Professional camel races are common in North and East Africa, the Arabian Peninsula, particularly in the United Arab Emirates (UAE) and Qatar, and in Australia.
- ➔ The King's Cup Camel Race, held annually in Saudi Arabia, has 2,000 competitors. Most races have 25–30 entrants.

SPORT OVERVIEW

This popular spectator sport, which originated centuries ago among the Bedouin tribes, attracts large prizes. Female camels are preferred for racing. When trained they can sprint at up to 40 mph (64 kph) and maintain speeds of 18 mph (28 kph) for an hour.

RACE TRACK

In the United Arab Emirates, races are held over 2½–6¼ miles (4–10 km) on specially built, circular sand tracks. Australian races are typically "quarter-milers" over 440 yds (400 m), but longer races are increasingly common as the sport's popularity grows. Tracks can be grass or sand.

ROBOTS AND CAMELS

A racing camel is long-legged and slender. Its hump is much reduced due to the animal's extreme fitness. Camels begin training at about 13 months old and start racing at 3 years old. Controversy over the use of child riders has led to the development of tiny robotic jockeys, complete with whip, which are controlled from vehicles following behind.

DOGSLEDDING



SPORT OVERVIEW

Sprint or endurance dogsledding races are held worldwide (on wheeled carts if there is no snow). The sled is pulled by teams of up to 24 dogs, usually hitched in tandem. The driver rides behind and directs the dogs.

NEED2KNOW

- ➔ Organized dogsled racing began in Nome, Alaska in 1908.
- ➔ The Yukon Quest, said to be the toughest race, covers 1,020 miles (1,643 km).

RACE TRAILS

Trails are marked out and have regular checkpoints and "dog drops," where tired or injured dogs can be left. Teams are normally started one after the other at timed intervals.

DOGS AND MUSHERS

Endurance, speed, and a close team spirit are key qualities in the dogs. They are trained to work in a specific position in the group and look on the musher as their pack leader.



Musher

The driver is known as the "musher," from the French "marcher," once the command for the dogs to begin pulling

Racing sled

The short-bodied sleds are often wooden. They have carbon fiber runners and aluminum fittings

Sprint team

Each dog wears a well-fitted "X-back" harness with padding over the chest

IDITAROD RACE

THIS ALASKAN RACE IS 1,150 MILES (1,852 KM) LONG. MARTIN BUSER SET THE RECORD OF 8 DAYS, 22 HOURS, AND 46 MINUTES, IN 2002.

HORSEBALL



A suitable horse

Any horse can play horseball, as long as it can cope with having other horses at close quarters and is fast and active in character

Hats and boots

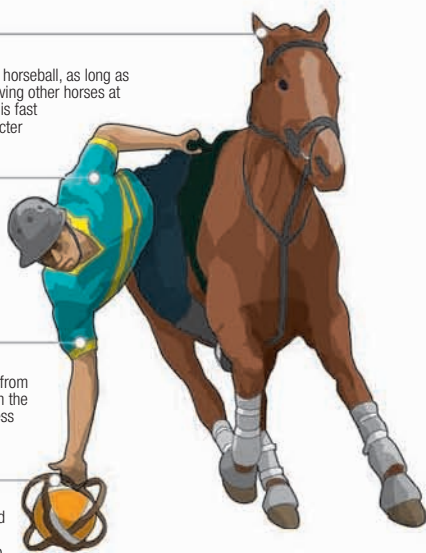
Riders wear a safety helmet, and the horse's legs are usually well protected with boots, as in polo

Playing arm

Picking up the ball from the ground while on the move requires fitness and agility

The ball

The harness around the ball enables players to pick it up, pass it, and catch it



SPORT OVERVIEW

This comparatively new equestrian sport has been likened to a combination of polo, rugby, and basketball. It is played by two sides of four mounted players who can be of any sex and any age over eight years old. The winner is the team that scores the most goals.

FIELD OF PLAY

The arena is 65 x 200 ft (20 x 60 m). The two goals are 3 ft (1 m) circles, fixed vertically, the base 11½ ft (3.5 m) high. The game has two 10-minute halves; players pass the ball with the goal of scoring—three passes must be made between three team members before scoring.

HORSE AND RIDER

Originally developed to inject new life into riding schools, horseball's fast pace requires good balance and excellent communication between horse and rider. Riders have to be able to control the horse with their legs and without using the reins. The horse must be responsive and fit. Some dressage training is ideal as this increases its agility and suppleness.

NEED2KNOW

- ➔ Horseball was first played in the 1970s in France.
- ➔ Two important events are the World Championship, the European Horseball Championships, and the Champions League.
- ➔ The International Horseball Federation has 17 members.

HORSE DRIVING



NEED2KNOW

- ➔ Harness racing, an ancient sport dating to Roman chariot races and before, involves racing around a sand or dirt track. Speed is key.
- ➔ Trial driving is newer and consists of teams competing in three events—speed, agility, and obedience are important.

SPORT OVERVIEW

There is a wide variety of driving activities, ranging from trotting races where horse and driver teams race each other, to trial driving where teams of four horses complete various tests, including dressage.

HORSE AND DRIVER

Because of its diversity, there is a type of driving to suit any horse, from pony to heavy horse. Pacing races are fast and use ultra-light buggies, while a full-size coach drawn by a team of four horses is slower but requires just as much care and coordination on the part of the driver. Britain's Prince Philip was a competitive driver for many years.

Harness

This is a simple harness with a wide breastplate for comfortable pulling

Team of two

While the driver steers, the "groom" helps to balance the vehicle

Four wheeler

A low center of gravity and strong suspension are necessary





SEA MATCH FISHING

SPORT OVERVIEW

Competition fishing from the shore is the logical progression for many pleasure fishermen looking for a competitive side to the sport. Shore-based competitions tend to be split into two distinct types: pegged/fixed venue, and roving, defined boundary/area events, depending very much on the area in which they are held. More so nowadays these competitions are fished in the most conservation-minded way possible, in which fish are caught, quickly measured, and then returned alive to the sea (especially the pegged, fixed venue matches). Various fish are assigned certain numbers of points according to species and length.

COMPETITOR PROFILE

Sea fishing is a sport where often lengthy periods of inactivity (waiting for fish to bite) are punctuated by short bursts of frenetic activity (when fish are caught, reeled in, weighed, and released in a matter of a few seconds) so anglers need excellent concentration, patience, and quick reflexes. Good upper body strength and balance is important, especially when reeling in (some fish are extremely heavy), as is a willingness to experiment with different equipment, types of bait, and locations to get the best catches.

NEED2KNOW

- ➔ Modern sea match fishing grew out of the "birth" of technically advanced shore fishing in the 1960s. Modern rod building methods came from the use of fiberglass and this gave rise to pioneering long range shore fishing techniques to more successfully fish certain coastal areas.
- ➔ Due to the need to catch all kinds of fish in front of you, sea match fishing tends to be a very technically advanced arm of the sport. These highly specialized fishing methods in turn filter down to certain parts of the pleasure fishing market (rig, rod, transport, and shelter developments for example).

Keeping warm

A snug fleece is usually preferred on cold days when the wind blows in from the sea

Hold tight

Fishermen keep a firm grip on the base of the rod, with the other hand supporting

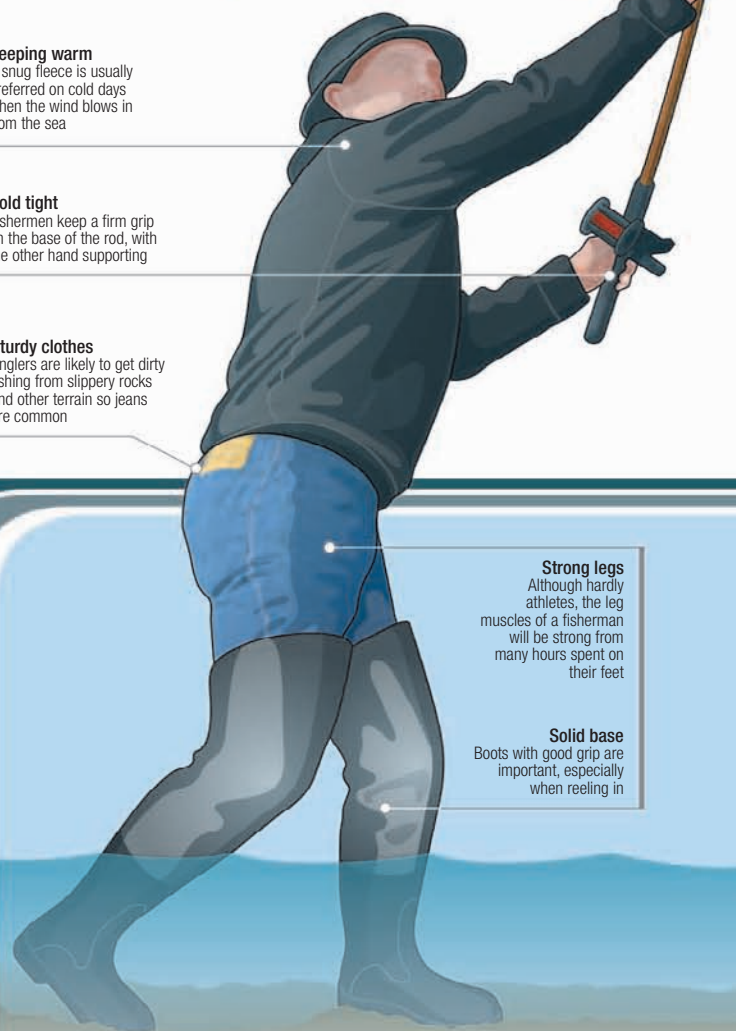
Sturdy clothes

Anglers are likely to get dirty fishing from slippery rocks and other terrain so jeans are common

SIDELINES

3,000 The number of competitors who took part in the sea match fishing World Games in Portugal in 2006. The World Games is the flagship event of the sport, held every five years at different venues around the world.

14 The total number of world championship medals won by England's Chris Clark—more than any other sea fisherman. Chris retired from competitive fishing in 2006 and is now a member of the international board and a leading referee.



Strong legs

Although hardly athletes, the leg muscles of a fisherman will be strong from many hours spent on their feet

Solid base

Boots with good grip are important, especially when reeling in

TECHNIQUES AND TACTICS

There are a number of fundamentals that are of great importance for successful competition fishing, two of which are described below.

CASTING

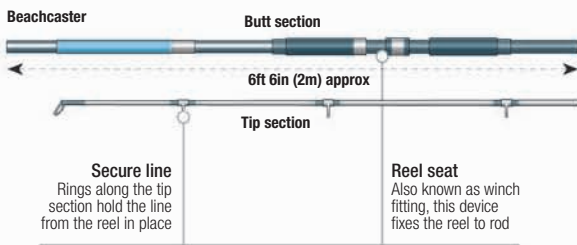
The art of using the rod and reel to cast the baited rigs out to sea, sometimes at very long range. The ability to be able to cast further, often into deeper water, can be an advantage. A safe, reliable, and efficient casting technique will pay dividends.

PLAYING THE FISH

Often when a fish is snared the angler will not reel it in right away. He will allow it to take the line against the reel's drag until it runs out, and then recover line when the fish tires. This allows for heavy fish to be successfully landed.

EQUIPMENT

The majority of shore fishing is carried out using a 12–14 ft (3.66 m–4.27 m) fishing rod, most commonly known as a beachcaster. They are designed to cast around 4–6 oz (113–170 g) of lead weight plus bait; the fisherman then watches the rod tip for any sign of a bite. Many open beach, and estuary style match fishermen will also carry a slightly lighter rod (rated 2–4 oz/56–113 g) and reel, principally for fishing at close to medium range for smaller species (called “scratching”).



TRIPOD

A large part of shore fishing, both match and pleasure, is about casting out and waiting for the fish to come to the bait. Hence the need for placing fishing rods in a purpose-built tripod, and watching the tips for signs of a bite.

RULES

There are two different types of sea match fishing—one based on the sizes (length) of the fish caught, the other on the total weight of all fish caught by the individual fisherman.

ROVING, DEFINED AREA MATCHES

These style of matches tend to be fished in areas where suitable venues for large scale, fixed venue matches do not exist, generally along areas of the coastline made up of rocks, small bays, cliffs and headlands. The competition is again run to specific times, but due to the roving nature of them, more often than not the fish will be brought back to a central weighing station at the end. The winner tends to be the person with the heaviest “bag” of fish; note that once again the competition will be run on strict size limits of fish.

PEGGED, FIXED VENUE MATCH

A suitable venue is chosen by the committee, often an open beach with sufficient space to be split up into zones and pegs (specific location for the fisherman to fish from). Fishermen tend to gather beforehand at a designated location to pay their subs and pick their peg numbers

FISH TO THE CLOCK

Once the baited rig is cast out, the rod tends to be placed in the tripod. In areas where there are plenty of small fish, many fishermen will “fish to the clock”, whereby they reel in at their own set time intervals. This serves both to bring the fish in for measuring and also for a continual changing and renewal of the baits (to keep the freshest, most inviting scent trail out there as possible). But often the fisherman will wait for the rod tip to signal a bite (when the fish picks up a baited hook the movement “rattles” the rod tip) before reeling in the fish.

RIGS

There are countless varieties of rigs for match fishing, mainly working on the principal of baiting up the hooks, casting out the baited rig, and letting the weight (grip or plain) settle on the bottom. Fish home in on the scent from the bait.

BAIT

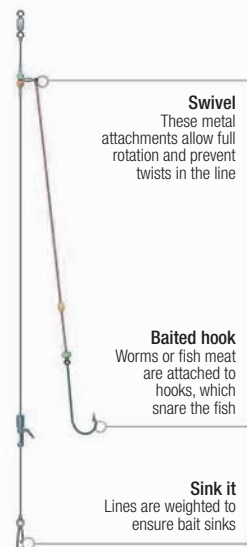
The successful match fisherman will access the best quality bait, often carrying many varieties and with plenty of research into local preferences and recent trends. Baits might include various worm species (lugworm, ragworm, white ragworm etc.), crab, fresh and blast-frozen fish (mackerel, sandeel), and squid.

REELS

The reel is a device used for the deployment and retrieval of fishing line, using a spool mounted on an axle. In sea match fishing, small multipliers or medium- to large-sized fixed-spool reels are used, depending on preference.

Bail arm

This is flicked back to allow line to flow off the spool when casting; it flips forward when handle is wound on



on a random basis. From here they will spread out to their pegs and await the start time. Once underway, on a measure and release competition the fisherman will measure any fish with a fellow competitor or steward as a witness and then return the fish alive before casting out again. Points are awarded on lengths, bearing in mind that species of fish have to attain certain minimum lengths to count. The winner is the fisherman who records the greatest length total at the designated finishing time. There are often cash prizes for zone winners as well as the overall winner.

INSIDE STORY

Match angling is governed by the International Angling Federation (CIPS) which was formed in 1952. A subdivision of CIPS, the International Sea Sport Fishing Federation (FIPS-M), organizes a variety of annual World Championships (shore, boat, big game, long-casting etc) for men, women, and junior competitors. Each competing nation submits a five-man team. There are also prizes for individuals.



EXTREME
SPORTS

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SPORT OVERVIEW

Street luge is an extreme version of the Olympic winter sport luge (see p302). Riders hurtle down a concrete track or road on a glorified skateboard, at speeds of up to 70 mph (110 kph), lying just inches above the ground. Street luges do not have brakes: riders must use their feet to slow down. The objective is simple: to get to the end of the course first. Every course is different, but most are ½–3 miles (1–5 km) long. There are several types of competition, all equally hair-raising. In dual competition, two racers compete for the right to progress to the next round, and there are also competitions where four or six lugers race each other, with frequent crashes.

SPEEDING TICKETS

IN THE EARLY DAYS OF STREET LUGE, RACERS OFTEN COMPETED ON PUBLIC HIGHWAYS IN CALIFORNIA. THERE WERE NUMEROUS CRASHES INVOLVING SPECTATORS AS WELL AS COMPETITORS, AND THE CALIFORNIA HIGHWAY PATROL EVEN HANDED OUT SPEEDING TICKETS. EVENTUALLY, LOS ANGELES AND OTHER CITIES BANNED RACING ON STREETS WITH A GRADIENT STEEPER THAN 3 PERCENT.

RULES OF THE ROAD

There is no single governing body and no one set of rules, although competitors are never allowed to push or kick each other out of the way. Luges must have bumpers at the front and rear, but regulations governing the weight, length, and width of the luge vary between sanctioning bodies. For example, Gravity Sports International disallows lugers heavier than 55 lb (25 kg).

STREET LUGE

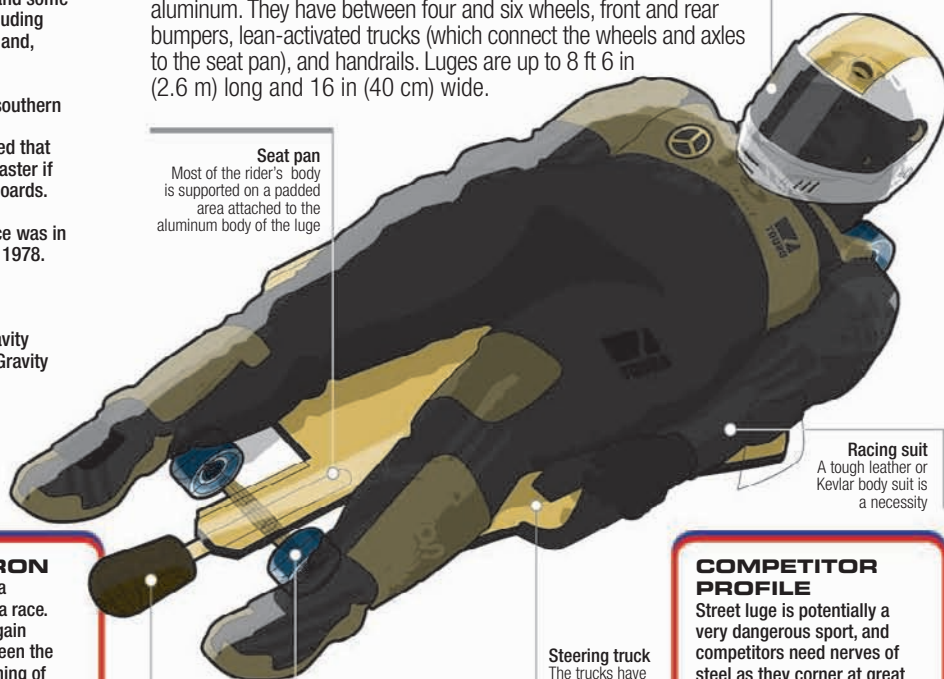


NEED2KNOW

- Street luge is most popular in the United States, Canada, and some European countries, including Austria, France, Switzerland, and Britain.
- The sport originated in southern California in the 1970s. Skateboarders discovered that they could go downhill faster if they lay down on their boards.
- The first competitive race was in Signal Hill, California, in 1978.
- The two major street luge sanctioning bodies are the International Gravity Sports Association and Gravity Sports International.

GEAR AND WHEELS

Riders often come off their lugers and need to be well-protected. Helmets, full leather suits, gloves, and boots are standard. The luge design varies greatly. Some are made of wood, but most are aluminum. They have between four and six wheels, front and rear bumpers, lean-activated trucks (which connect the wheels and axles to the seat pan), and handrails. Luges are up to 8 ft 6 in (2.6 m) long and 16 in (40 cm) wide.



Head shell

Racers wear a hard shell helmet with a face shield and chin strap.

Seat pan

Most of the rider's body is supported on a padded area attached to the aluminum body of the luge.

Racing suit

A tough leather or Kevlar body suit is a necessity.

PUSH-OFF APRON

A good start is essential if a competitor is going to win a race. Racers use their hands to gain momentum in a zone between the starting line and the beginning of the road course called the push-off apron. Once speeding downhill, experienced racers take advantage of the slipstreams behind other racers to maintain speed.

Safety bumpers

Luges have a bumper at the front and rear.

Small wheels

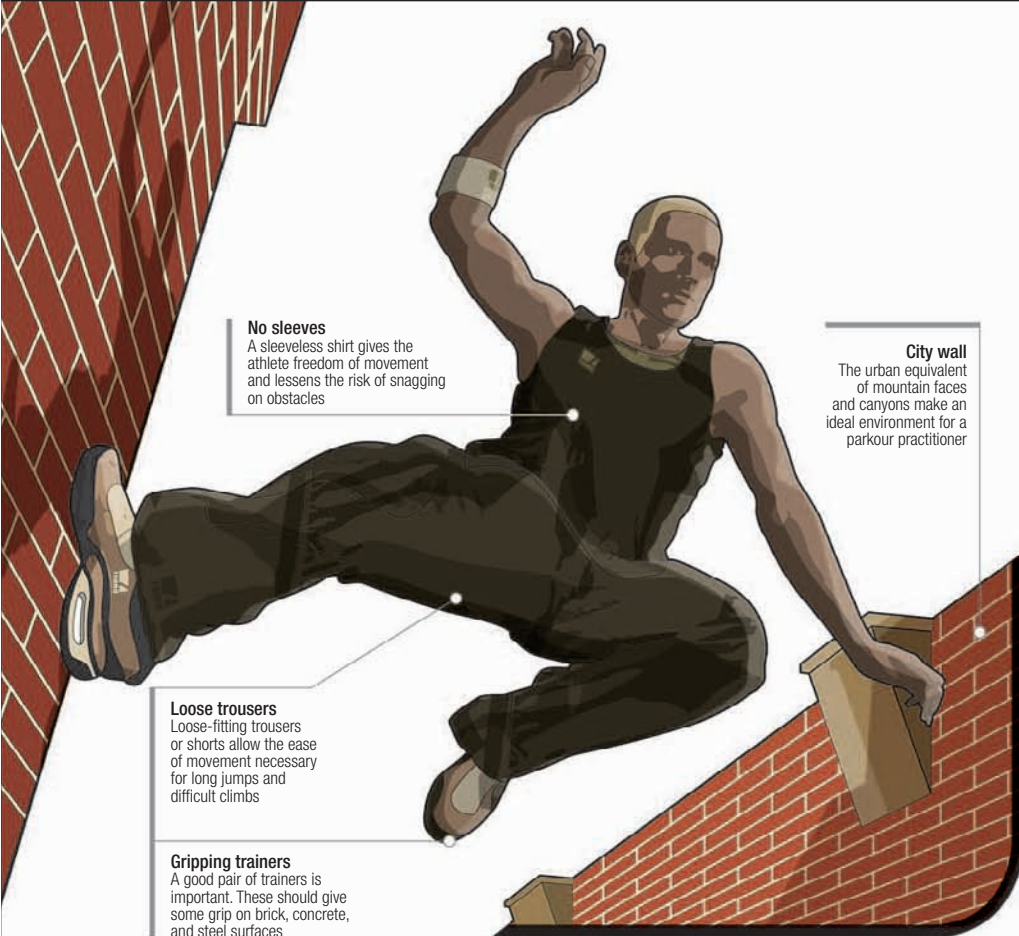
There are four front wheels attached to the truck. The wheels are about 4 in (10 cm) in diameter.

Steering truck

The trucks have lean-activated steering. By leaning the body one way or the other, the rider can change the luge's direction.

COMPETITOR PROFILE

Street luge is potentially a very dangerous sport, and competitors need nerves of steel as they corner at great speed. Racers must be totally focused on the course ahead and their fellow racers, since any lack of concentration can result in a costly crash.

**No sleeves**

A sleeveless shirt gives the athlete freedom of movement and lessens the risk of snagging on obstacles

City wall

The urban equivalent of mountain faces and canyons make an ideal environment for a parkour practitioner

Loose trousers

Loose-fitting trousers or shorts allow the ease of movement necessary for long jumps and difficult climbs

Gripping trainers

A good pair of trainers is important. These should give some grip on brick, concrete, and steel surfaces

NEED2KNOW

- ➔ The word parkour comes from the French *parcours du combattant*, the obstacle courses used by French soldiers in training in the early 20th century.
- ➔ Parkour movements have featured in many films, including *Casino Royale* and *Breaking and Entering*, and in the BBC TV trailer *Rush Hour*.
- ➔ Organizations such as Urban Freeflow offer advice and training to aspiring traceurs.

COMPETITOR PROFILE

Before an aspiring traceur attempts a difficult route, he or she must train for months, if not years. Physically, the sport requires strength throughout the body, balance, and agility. But parkour is just as much about mental strength—the ability to be totally aware of the surrounding environment and the judgement to decide in a split second whether or not a move is feasible.

PARKOUR



SPORT OVERVIEW

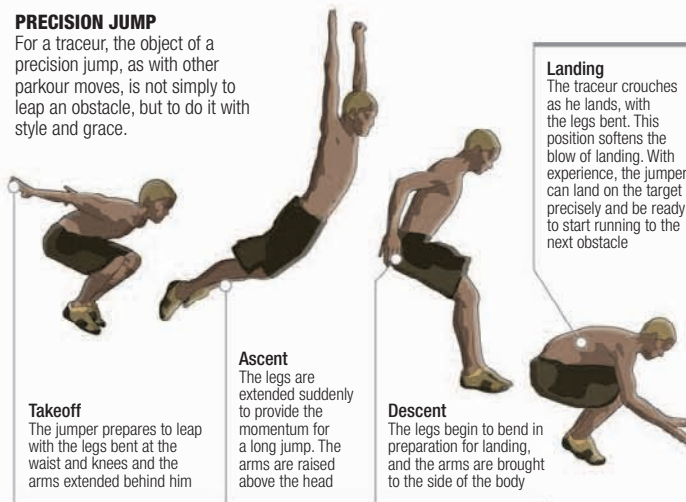
Demanding the agility of an acrobat and the spirit of a warrior, parkour has attributes of the martial arts and of dance. It involves uninterrupted motion around, under, over, and through physical obstacles—usually the city environment. The practitioners of parkour are called traceurs. There are no fixed courses, but experienced traceurs stretch themselves by climbing walls, jumping obstacles, and running along the tops of rails. Each new obstacle presents a new challenge. Parkour demands more than simply strength, stamina, and agility. Its adherents also believe it should involve grace and beauty. Most do not compete against each other but against themselves in a constant struggle for self-improvement.

LEAP OF FAITH

Each route presents a different set of difficulties, and an experienced traceur must know hundreds of moves. However, the core skills—jumping, landing, and rolling to absorb impact—are just as important. Precision jump, or *saut de precision* is a jumping move that combines power, grace, and accuracy (see below).

PRECISION JUMP

For a traceur, the object of a precision jump, as with other parkour moves, is not simply to leap an obstacle, but to do it with style and grace.

**Takeoff**

The jumper prepares to leap with the legs bent at the waist and knees and the arms extended behind him

Ascent

The legs are extended suddenly to provide the momentum for a long jump. The arms are raised above the head

Descent

The legs begin to bend in preparation for landing, and the arms are brought to the side of the body

Landing

The traceur crouches as he lands, with the legs bent. This position softens the blow of landing. With experience, the jumper can land on the target precisely and be ready to start running to the next obstacle

EXTREME CLIMBING



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SPORT OVERVIEW

Extreme climbers tackle rock and ice faces that look impossible even to regular climbers. Climbs are divided into aid and free. Aid climbing uses artificial devices for support whereas free climbing uses only natural features. Both free and aid climbers use ropes, although in free solo climbing, often only climbing shoes and hand chalk are used. The main challenge for most extreme climbers is tackling new and more difficult routes, or completing a route in a faster time.

NEED2KNOW

- Ice climbing is especially popular in North America, with 220,000 enthusiasts in the US alone. Ice Climbing World Cup events are held in North America and Europe.
- A survey in the United States showed that climbing is one of the most popular extreme sports. The average age of climbers was found to be 23 years.

ATHLETE PROFILE

Climbers need great leg and arm strength, muscle coordination, endurance, flexibility, and excellent balance. The ability to remain relaxed and confident on vertical faces and overhangs is equally vital.

Helmet
Protects the climber's head from falling ice and stones

Clothing
This needs to be light and unrestrictive, but also warm and waterproof to protect against harsh mountain conditions

Rope
Made of nylon, this is both strong and flexible, with a woven sheath

Ice ax
Thrust into ice to provide an extra point of support for the climber

Crampon
A spiked steel framework attaches to the outside of the boot, providing grip on the ice

Carabiners
These aluminum devices are light and strong. They attach the rope to a piton or nut hammered or screwed into the rock or ice

WHERE THEY CLIMB

Anything goes, especially uncharted territory. Vertical faces, crumbling rock, overhangs, and harsh weather all represent new challenges to be overcome. Climbs are graded for difficulty. For example, an A6-graded climb on the "new wave" system is so treacherous that if one member of the team falls, the mistake may kill the whole team.

INSIDE STORY

People have climbed mountains for thousands of years, but the first recorded climb of a major peak was of Mont Blanc, France, in 1786. Competition climbing first developed in Russia in the 1970s.

GOVERNING BODIES

Competitive ice climbing is governed by the International Mountaineering and Climbing Federation (UIAA). Indoor sport climbing is governed by the International Federation of Sport Climbing (IFSC), formed in 2007.

EQUIPMENT

Equipment varies according to the type of climb. A free climber may use only climbing shoes, gymnastic chalk to dry sweat from his or her hands, and lightweight, nonrestrictive clothing. Aid climbers use ropes, carabiners, pitons, and more. Ice climbers wear crampons over their climbing shoes and carry ice screws and ice axes. If a climber is planning to camp overnight on a mountain, he or she will need a sleeping bag or down jacket; a bivy bag is also useful.

CLIMBING SHOE

The tongue of a climbing shoe is made of supple leather or synthetic material with a sticky rubber sole and toes and heel-liners made of rubber. They should fit snugly around the foot.

Strap in
Tight-fitting shoes are essential



ICE SCREW

These are tubular and can be screwed in and out of the ice for the secure attachment of carabiners through which a rope can pass.

Grip it
Some ice screws are as long as 9 in (23 cm). Long, thick, threads ensure a solid grip



NEED2KNOW

- ➔ More than 70,000 men and women participate in ultramarathons, races defined as longer than the standard 26 mile (42 km) marathon.
- ➔ The International Association of Ultra Runners (IAU) organizes annual World Championships for a variety of races, including 30 miles (50 km), 60 miles (100 km), 24 hour, and 48 hour.
- ➔ It is unquestionably one of the world's most demanding sports, both physically and mentally.

RUNNING BY THE RULES

Rules vary from event to event, but given the high risk of fatigue it is usual for each runner to have his or her own support crew to administer to them during breaks. Runners must progress entirely under their own power and are prohibited from wearing artificial cooling systems, but can and should wear lightweight running gear, a hat and sunglasses, and carry ample water—for obvious reasons. In some races, participants are allowed to have a fellow runner to set a pace for them. On cross-country courses, where it is impossible to continually monitor the progress of competitors, runners are required to check in at regular time stations along the route.

SIDELINES

12,000 Total number of competitors in the annual Comrades Marathon—the world's oldest and largest ultramarathon held in Cape Town.

5,022 The length in kilometers (3,100 miles) of the world's longest certified ultramarathon, the Self-Transcendence in New York. The record for completing the course is 41 days.

9,000 The total ascent, in feet (2,744 m), of Cumbria's Wasdale Fell Race.

AROUND-THE-WORLD RUN

DANISH ULTRA LONG DISTANCE RUNNER JESPER OLSEN RAN AROUND THE WORLD IN 22 MONTHS IN 2004–2005, ON A ROUTE COVERING 16,250 MILES (26,000 KM). FOR MOST OF THE RUN HE PUSHED A BABY-JOGGER STROLLER THAT CONTAINED FOOD, BEVERAGES, A TENT, AND OTHER EQUIPMENT.

WHERE THEY RUN

Ultramarathons are run on athletics tracks, roads, dirt tracks, or open terrain. Some are simply tests of distance endurance while others offer additional challenges. The 135 mile (215 km) Badwater Ultramarathon, held in searing temperatures, starts in Death Valley, California, and climbs more than 8,600 ft (2,600 m). Participants in the Four Deserts series must complete 156 mile (250 km) races across the Sahara, Gobi, and Atacama deserts before being eligible for the last race—in Antarctica!

EVENT OVERVIEW

Ultra running takes many forms. The most popular races are ultramarathons, extraordinary feats of endurance over distances longer than the traditional 26 mile (42 km) marathon, and sometimes over extreme terrain. Events are either run over a fixed distance, for example, 31 miles (50 km), or a fixed time period, such as 24 hours, three days, or six days.



ULTRA RUNNING

Shades
These protect the eyes from bright sunshine as well as from any stones or grit that might fly up when negotiating rough terrain

Hat
This should have a broad peak and protection from the sun for the back of the neck

Backpack
Contains food supplements and a GPS to give the runner his or her position in featureless terrain

Water bottle
This is vital to keep a runner hydrated on a long race

Number's up
A runner is assigned a competitor number that is attached to their clothing

Shorts
These should allow unrestricted leg movement but be largely skin tight to avoid repetitive chaffing

Sunblock
High exposure to the Sun's rays is one of the many problems faced by the long-distance runner. High SPF sunblock, liberally applied, is vital

Weather gaiters
They keep water (sweat and rain) and loose debris like mud and twigs from getting into the runner's shoes

Shoes
Comfort is as important as durability for footwear

ATHLETE PROFILE
Physical and mental stamina are critical. Training over ever-longer periods of time, and in harsher environments, conditions the heart and muscles. Carrying weights also helps to build strength. Acquiring the mental stamina to be able to run for hours or days is not so easy. But without it even the fittest individual will fail an ultra-distance challenge.

Guideline
It is essential in all record free diving to use a dive-line to measure the depth of the dive. The line/rope also works as the main safety to pull the diver up if there is a problem

Nose Clip
This helps the free diver equalize the ears, leaving hands free to control the sled

Wet suit
In order to maintain a stable body temperature during the descent, divers wear a wet suit

Weight belt
To achieve a faster descent, the diver wears a weight belt

DIVER PROFILE

Exceptional lung and anaerobic capacity are prerequisites for any diver. Free divers also have streamlined, muscular physiques that allow them to cut through water to extreme depths. Psychological control and the ability to remain calm are also essential.

Fins
Divers utilize either bi-fins (double) or a mono-fin (single) in some free diving disciplines to provide greater propulsion

Sleds
The feet first sled is used by the diver to descend in the Variable Weight and No Limit disciplines

SPORT OVERVIEW

Free diving is a dangerous sport in which competitors attempt to attain great depths, times, or distances on a single breath, either in open water or a swimming pool. Free divers expose themselves to numerous dangers, like deep-water blackout and drowning, in pursuit of new records and greater extremes. Free diving is a sport based on individual achievement, with disciplines conducted as either record attempts or competitions where the best individual performances determine the winners.



FREE DIVING

DIVING DISCIPLINES

There are five depth disciplines recognized by the International Association for the Development of Apnea (AIDA), the official governing body of free diving. Constant Weight with fins is the most common free diving event and involves the diver descending to depth with the aid of fins and a set weight. Constant Weight without fins is the most difficult depth discipline and operates under the same rules as Constant Weight with fins, but without the use of swimming apparatus. In the Free Immersion discipline, divers use a guideline to pull themselves to depth and back to the surface. The Variable Weight discipline involves the diver using a weighted sled to descend and their own strength to resurface, either by swimming or pulling on the guideline. No Limit is the absolute depth discipline, where the diver descends using a weighted sled and ascends using a method of their choice.

POOL DISCIPLINES

There are three recognized pool disciplines, and two of these must be conducted in a pool at least 82 ft (25 m) in length. Dynamic Apnea is swimming underwater to attain the greatest distance; this discipline is divided into two categories: with and without fins. The third discipline, Static Apnea, is timed underwater breath-holding.

NEED2KNOW

- The first Free Diving World Championship in 1996 involved teams from Germany, Belgium, Colombia, Spain, France, and the inaugural winner Italy.
- The current world record for the No Limit discipline stands at a staggering 702 ft (214 m). It was set by Austrian Herbert Nitsch.

THE BIG BLUE

THE SPORT OF FREE DIVING WAS IMMORTALIZED IN THE 1988 FILM *THE BIG BLUE*. THE FILM DEPICTS A FICTIONALIZED ACCOUNT OF THE REAL LIFE RIVALRY BETWEEN TWO FAMOUS FREE DIVERS: FRENCHMAN JACQUES MAYOL AND ITALIAN ENZO MAIORCA.

TRAINING

Free divers undertake underwater and out-of-water training. One out-of-water exercise is the "Apnea walk." The athlete executes a short breath hold (typically one minute) taken at rest, followed by a walk whilst maintaining the hold. This exercise accustoms their muscles to anaerobic (meaning "without air") conditions.

INSIDE STORY

Jacques Mayol and Enzo Maiorca were the inspiration for organized competitive free diving. The two athletes frequently broke each other's record attempts and increased public interest in the sport during the 1960s and 1970s. In 1976 Mayol became the first to descend to 328 ft (100 m). Maiorca held as many as 13 world records between 1960 and 1974. In 1983, at the age of 56, Mayol dove to 345 ft (105 m).

CLIFF DIVING



SPORT OVERVIEW

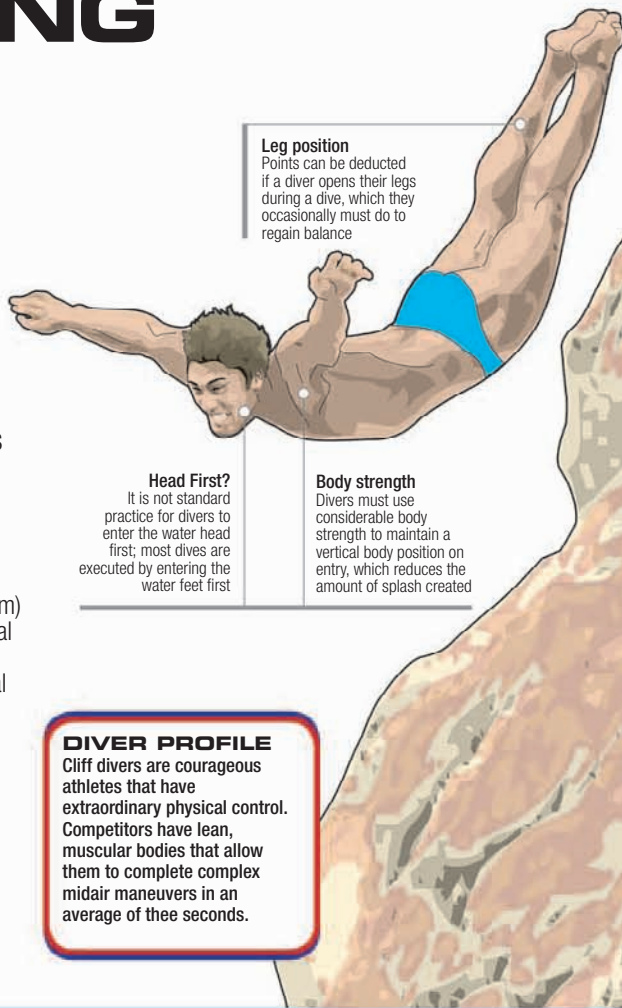
Described by the World High Diving Federation (WHDF) as “the acrobatic perfection of diving into water,” cliff diving is a high-risk sport that involves athletes leaping from a steep cliff and performing difficult combinations of twists and somersaults as they plummet to the water below. Competitors aim to execute dives according to a strict criterion that is assessed by a panel of judges, who award points after the successful execution of each dive.

COMPETITION LOCATIONS

Cliff diving events are held at locations that have a sheer vertical cliff face and water with a minimum depth of 16 ft (5 m). The standard height regulations are 75–92 ft (23–28 m) for men and 59–75 ft (18–23 m) for women. For international events, the take-off platform usually stands 3 ft (1 m) out from the cliff face, although it is common at non-international events for divers to launch directly from the cliff face.

DIFFICULT COMBINATIONS

To gain maximum points, a diver must execute difficult combinations of somersaults and twists while performing a dive. Important elements in a successful dive are the height, angle, and position of the takeoff; the clear demonstration of announced positions during the dive, such as the “pike,” “tuck,” or “split”; and the limited amount of splash created on water entry.



Leg position

Points can be deducted if a diver opens their legs during a dive, which they occasionally must do to regain balance

Head First?

It is not standard practice for divers to enter the water head first; most dives are executed by entering the water feet first

Body strength

Divers must use considerable body strength to maintain a vertical body position on entry, which reduces the amount of splash created

DIVER PROFILE

Cliff divers are courageous athletes that have extraordinary physical control. Competitors have lean, muscular bodies that allow them to complete complex midair maneuvers in an average of three seconds.

NEED2KNOW

- The inaugural WHDF World Championship was held in Switzerland in 1997. Dustin Webster from the US emerged the victor with a total score of 248.04.
- The water entry speed of a cliff diver ranges from 46 to 62 mph (75 to 100 kph) and has an impact nine times greater than that caused diving from a standard 33 ft (10 m) platform.
- The highest score ever received for a single dive is 168.00, recorded by Russian Artem Silchenko at a WHDF International Event in 2006. Silchenko performed a back three somersaults pike with two twists, which has a 5.6 degree of difficulty.

A PERFECT DAY

Colombian Orlando Duque, considered to be one of the most elegant cliff divers ever, performed what has been labeled “the perfect dive” on his way to victory at the 2000 WHDF World Championship in Kaunolu, Hawaii. Duque performed a double back somersault with four twists to receive a perfect “10” from all five judges. Duque’s victory was the first of three consecutive world titles from 2000 to 2002, making him the only athlete to accomplish this feat to date.

RULES AND REGULATIONS

A standard event contains three rounds, with each diver allowed one dive per round. A dive is awarded a score out of ten by a panel of five judges. The highest and lowest marks are eliminated, and the sum of the three remaining scores is multiplied by the degree of difficulty ascribed to the dive attempted. The degree of difficulty for a dive is determined by adding preset scores attributed to five different categories: takeoff; somersaults; twists; number of midair positions; and water entry. At the end of the three rounds, the diver with the highest combined total is declared the winner.

INSIDE STORY

King Kahekili (1710–1794), the last independent king of Maui, was renowned for *lele kawa*, which in English means: “leaping off high cliffs and entering the water feet first without a splash.” A generation later, Hawaiians began practicing *lele kawa* as a sport, with judgment passed on the style of the jump and the amount of splash on entry.

WHDF

The World High Diving Federation (WHDF) was founded in 1996 and has its headquarters in Avegno, Switzerland. The WHDF is the current, official governing body of international cliff diving.

FREERIDE MOUNTAIN BIKING



NEED2KNOW

- ➔ The Red Bull Rampage is the gold standard event for the sport, and has been contested at Virgin, Utah, on six occasions between 2001 and 2010.
- ➔ More than 6,000 spectators gathered to watch the Monster Park Slopestyle freeride competition in Dana Park, California, in 2004.

SPORT OVERVIEW

Just like freeride snowboarding and freeskiing, freeride mountain biking encompasses a range of riding styles that are all linked by a single theme—riding without boundaries. Bikes with more and better suspension enable longer and faster descents, ever-larger jumps, and more extreme lines to be taken.

FREERIDE BIKES

Full-suspension bikes allow massive shock absorption at high speeds and are capable of traversing obstacles large and small.

Body armor

Riders wear full-finger gloves and padded protection on the body, especially on the knees and elbows. This will limit injury but not necessarily prevent it.

Aluminum frame

Freeride bikes are not the lightest, typically weighing 30–45 lb (14–20 kg).

Flat pedals

Lightweight, strong alloy pedals provide a stable riding platform.

Long-travel suspension

Most designs feature around 9 in (23 cm) of front and rear wheel travel.

Tough tires

Designed to withstand extreme pressure, the tires have tread that allows great lean angles.



Total protection

A full-face helmet is essential to protect the head and face in case of a crash.

Gear control

Most freeride bikes have just nine gears; normal mountain bikes have 27.

GRABBING BIG AIR

Freeriding is about riders spontaneously pulling jumps and tricks over natural terrain or on urban courses, so it does not lend itself easily to organized contests. The flagship events are invite-only contests where top freeriders compete for cash, and judges award marks for difficulty, speed, fluidity, tricks, and style. One such event was the Red Bull Rampage (last held in 2004), which was contested on a natural course. Urban events over human-made courses are also increasingly popular.

NORTH SHORE NIRVANA

An offshoot of freeriding that has grown rapidly is the North Shore style, named after the area of Vancouver where it first emerged. The style involves riding over human-made wooden boardwalks, originally built to convey walkers over densely vegetated areas of the forest floor, and has evolved into riding narrow planks called “skinnies,” tree trunks, jumps, and drops, and even massive see-saws. The influence of North Shore riding can be seen in mainstream freeriding, with many wooden features evident in freeride contests.

RIDER PROFILE

Riders need upper- and lower-body strength, a large lung capacity, and technical bike-riding skills—namely balance, jumping technique, the ability to pick a line, and timing. Competitors also need lots of confidence and to be in total control of their bike at all times—one mistake could result in broken bones.

Approach work

Approaching the jump, the freerider brakes and swings the rear wheel around.

In rotation

As the rider launches over the edge of the rock, the bike is already rotating. It continues to turn throughout the jump.

In control

The rider must maintain control over the bike as it descends and spins.



360° DOWNHILL JUMP

Not content to race over the edge of near-vertical rocks up to 30 ft (9 m) high, top freeriders manage to perform aerial stunts at the same time—and come back down to earth with both bike and body intact.

Rear landing

The rider must keep his weight over the bike's rear to ensure the rear wheel touches down first. Front and rear shocks help to absorb the impact.

NEED2KNOW

- ➔ Competitive land yachting is most popular in Europe and North America. France dominated the medal ceremonies at the 2010 world championships—held at De Panne, Belgium—winning three of the six racing categories.
- ➔ The International Land and Sandyachting Federation (FISLY), the sport's governing body, organizes world championships every two years.

RULES OF THE BEACH

Pilots must not let their yachts obstruct or touch other craft. If two racers are approaching each other from different angles, the one on the right has priority, and the other must slow down or move aside. An overtaking yacht must not force the slower vehicle to move aside, but the yacht being overtaken is not allowed to maneuver into the path of the faster craft.



STARTING FLAG

The race starts when the red flag is lowered near the starting line. Pilots then battle for position.



TURNING MARKER

The layout of the course for a land yacht race is marked by flags, which indicate where pilots have to turn.



FINISH FLAG

The race finishes when the checkered flag is raised as the first competitor crosses the line.

LIE OF THE LAND

Good competition requires two things—a large, relatively flat, open space, and wind—so anywhere that fits this description could host land-yacht racing. Beaches, salt flats, frozen lakes (with skates used instead of wheels), and airfields are all suitable. The beaches at De Panne (Belgium), Le Touquet (France), and Terschelling (Netherlands), and the dry lake at Ivanpah, Nevada (United States), are popular competition venues. Races are usually contested on closed circuits, with turning markers (a flag with red and white diagonals) used to indicate the extremities of the course. The distance between markers must be at least 1¼ miles (2 km), and obstacles are coned off.

SPORT OVERVIEW

Pilots race three-wheeled, wind-propelled vehicles across large expanses of flat ground. The pilot steers from a prone position, with the use of pedals or levers. By controlling the angle of the sail, a skilled pilot can attain speeds several times faster than the prevailing wind. With no brakes, pilots must use the wind to stop. Land yachts often turn over, so the sport is potentially dangerous.



LAND YACHTING

AS FAST AS A SPEEDING... DUCK?

AMERICAN PILOT BOB SCHUMACHER STEERED HIS UNLIKELY SOUNDING CRAFT "IRON DUCK" TO A TOP SPEED OF 116.7 MPH (187.7 KPH) ON MARCH 20, 1999, ON A DRY LAKE IN THE UNITED STATES. THIS STOOD AS THE WORLD SPEED RECORD FOR A WIND-POWERED CRAFT ON LAND UNTIL RICHARD JENKINS PILOTED "GREENBIRD" TO A SPEED OF 126.1 MPH (202.9 KPH) ON MARCH 26, 2009.

LAND YACHT CLASSES

Several different classes of land yacht are recognized for competitions, including:

CLASS 2 The largest and most powerful class, with a fiberglass hull, a wing-shaped mast up to 25 ft (8 m) high, and a wooden rear axle. Not always the fastest craft, they are sailed mostly in Europe.

CLASS 3 Similar in appearance to Class 2 but smaller, this class of yacht is the most popular craft, and is capable of reaching speeds of 70 mph (110 kph) or more.

CLASS 5 A smaller class of craft than Classes 2 and 3, the pilot lies in a fiberglass seat suspended from a tubular steel or aluminum chassis, rather than inside the hull.

STANDART Standart yachts are similar to Class 5 craft, with one crucial difference—every yacht is identical. Designed so that pilots cannot rely on technological advantage, Standart yachts allow racers to compare their own performance rather than that of their craft.

PILOT PROFILE

Pilots must have a thorough knowledge of how to harness the wind's energy to best effect, and this skill is not learned overnight. They must also be aware of the dangers inherent in the wind, the surface they are "sailing" over, and other yachts. Lightning reflexes, physical strength, total focus, and lots of courage are also crucial.

BUILT FOR SPEED

Since they do not move through water, land yachts do not experience the hull drag of waterborne yachts. With wheel bearings that are almost friction free, these vehicles can reach astonishing speeds, even in light winds.

Mast restrictions

For Class 3 yachts, like this one, the mast may not be more than 20 ft (6.1 m) tall. It has to be both strong and flexible.

Sail area

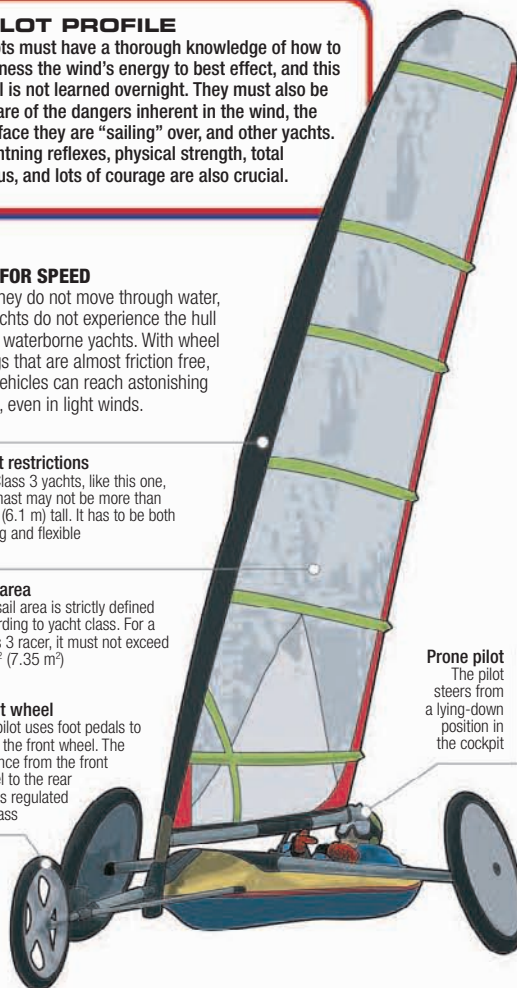
The sail area is strictly defined according to yacht class. For a Class 3 racer, it must not exceed 79 ft² (7.35 m²).

Front wheel

The pilot uses foot pedals to steer the front wheel. The distance from the front wheel to the rear axle is regulated by class.

Prone pilot

The pilot steers from a lying-down position in the cockpit.



WHITewater RAFTING

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SPORT OVERVIEW

Whitewater rafting is an exciting and potentially dangerous recreational and competitive sport in which a small crew uses paddles or oars to control an inflatable raft along a stretch of a turbulent river. Clubs or commercial operators offer adventurous types of all ages the unique opportunity to safely tackle fast-flowing currents and to shoot the rapids on out-of-the-way rivers all over the world. More experienced rafters can compete in national, continental, or international events, including the World Rafting Championships.

TYPES OF RAFT

Paddle boats are the most common type of raft for those who want to participate in directing the craft through the foaming waters of the river. Oar boats use oars to navigate rapids and are generally larger, heavier, and more stable than paddle boats. Another type is the cataraft, which is composed of two parallel pontoons connected by a metal frame and is paddled by a crew of two people.

WORLD CHAMPIONSHIP

Every two years, the International Rafting Federation organizes the World Rafting Championship for men and women. Teams of six rafters compete for points across three disciplines—sprint, slalom, and downriver—to decide the overall winner. They sprint down powerful rapids, slalom through 12 upriver and downriver gates, and finally race downriver for almost an hour.

NEED2KNOW

- ➔ Whitewater rafting grew in popularity during the 1970s after slalom canoeing was included in the 1972 Munich Olympic Games.
- ➔ In the 2005 World Rafting Championship, Russia was the men's overall team winner and the Czech Republic was the women's overall team winner.

CLASSES OF WHITewater

Whitewater is graded according to an International Grading System, from the smooth flowing water of Class One, to the extreme water of Class Six, which can only be tackled by teams of experts. Class Two is rougher than Class One, Class Three has some whitewater, and Class Four has plenty of whitewater. Class Five is only for advanced rafters because it has hidden obstacles and hazards.

PACKRAFTS

ULTRALIGHT PACKRAFTS, WITH COLLAPSIBLE PADDLES, CAN BE CARRIED LONG DISTANCES ON TREKS THROUGH THE WILDERNESS AND INFLATED WHEN NEEDED FOR USE ON OPEN BODIES OF WATER AND WHITewater RIVERS.

Controlling the raft

The crew works together to control the raft, synchronously paddling and moving their bodies

Rafting gear

The crew wears safety helmets, wet suits, life jackets, and sensible footwear to protect their feet

Crew size

Between four and 12 people make up the crew, depending on the size of the raft

Running parallel

The crew tries to keep the raft running parallel with the current and to avoid wandering out of alignment

Raft construction

Made of rubberized or vinyl fabrics, many rafts are tough and multilayered with independent chambers of air

Raft size

Inflatable paddle rafts are usually between 12 ft (3.6 m) and 14 ft (4.3 m) long and between 6 ft (1.8 m) and 8 ft (2.4 m) wide



COMPETITOR PROFILE

Whitewater rafters need to be physically strong and mentally sharp to quickly shift body positions and cope with twists and turns thrown up by rushing water or by hidden obstacles.

NEED2KNOW

- ➔ The triathlon features an open water race of 1 mile (1.5 km).
- ➔ The 6¼ mile (10 km) open water race was included in the 2008 Beijing Olympics for the first time. The women's race was won by Larisa Ilchenko in a time of 1:59:27.7.
- ➔ In the men's 6¼ mile (10 km) in Beijing, 2 seconds separated first from third.

SIDELINES

5 The number of oceans (Atlantic, Arctic, Indian, Pacific, and Southern) in which the pioneering British swimmer Lewis Gordon Pugh has completed a long-distance swim. He is the first person to achieve this feat.

66 The number of days Slovenian Martin Strel spent swimming down the Amazon River—from Atalaya in Peru to the Brazilian city of Belem—in 2007, setting a new long-distance record of 3,273 miles (5,268 km).

1,175 The number of times swimmers—544 men and 262 women—had crossed the English Channel as of June 2006. Measuring 21¼ miles (35 km) at its narrowest, it is said to be “the Everest of open water swimming” because of tides, winds, and shipping. There have been 33 two-way swims.

42 The number of swimmers from 25 countries who took part in the women's 6¼ mile (10 km) race at the 12th FINA World Championships in Melbourne in 2007.

ENDURANCE RACES

Endurance swimmers compete in races of various distances, usually 3 miles (5 km), 6¼ miles (10 km), and 15½ miles (25 km). Other events involve swimmers competing for a set time, usually an hour or more. The Fédération Internationale de Natation (FINA) organizes men's and women's events at the World Championships, the Open Water World Championships, and the Marathon World Cup, which is a series of races of 6¼ miles (10 km). In open water races, each swimmer is accompanied by an escort safety craft, which contains a judge and a member of the swimmer's team who can give advice and monitor the swimmer's well-being.

SPORT OVERVIEW

Endurance swimmers take part in long-distance freestyle events in open water, such as rivers, lakes, or oceans, or in pools or other human-made bodies of water. They compete with each other in various events at local, national, or international championships, such as the biannual World Championships. Swimmers often challenge themselves to conquer a stretch of open water, such as the English Channel, the North American Great Lakes, or a Norwegian fjord.

OPEN WATER CHALLENGES

Many endurance swimmers compete in open water races such as the 12½ mile (20 km) Rottneest Channel Swim in Perth, Australia, or in the long lane swimming events in the waterways of The Netherlands. Others successfully take on some remarkable open water challenges. For example, American Lynne Cox became the first to swim the Bering Strait between Alaska and Russia. She also braved the icy waters of Antarctica to swim 1 mile (1.6 km).

ESCAPE FROM ALCATRAZ

SWIMMING FROM THE ISLAND OF ALCATRAZ TO THE SHORES OF SAN FRANCISCO IS A COMMON OPEN WATER EVENT THAT SOME DETERMINED SWIMMERS HAVE COMPLETED MORE THAN 100 TIMES.

ENDURANCE SWIMMING

**Bright cap**

A brightly colored cap stands out clearly and can be seen by judges and safety crews

Goggles

Most swimmers wear goggles as well as nose clips and ear plugs

Swimsuit

Swimmers often wear a swimsuit, but not a wet suit because it increases buoyancy



COMPETITOR PROFILE

Endurance swimmers need to develop a good technique with long, smooth, and strong strokes that form a consistent rhythm and a regular tempo. In addition to being physically fit, swimmers have to be mentally tough, keeping their minds active. They need to be sure they can complete the required distance and, during events in open water, cope with the cold, tides, and windy conditions.



NEED2KNOW

- ➔ In the 1890s, Otto Lilienthal made and flew pioneering hang gliders in Germany.
- ➔ In 1963, Australian electrical engineer John Dickenson constructed a portable and controllable glider. Later that year, Rod Fuller flew it in public while being towed by a motor boat, ushering in the popular era of hang gliding.
- ➔ The Fédération Aéronautique Internationale organizes a World Pilot Ranking System (WPRS) so that pilots can score points in the type of hang gliding competition they enter—Aerobatic, Class 1, Class 2, and Class 5.

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HANG GLIDING



SPORT OVERVIEW

Powered only by movements of the air, hang gliders and their pilots soar like eagles above the landscape. Either for sheer pleasure or in cross-country and aerobatic competitions, pilots fly their increasingly sophisticated gliders for long distances and to great heights.

A SINGLE WING

Hang gliders have one triangle-shaped wing composed of a fabric sail mounted on an aluminum frame, which may be strengthened with carbon fiber. An enclosed fabric harness hangs from the wing's center of gravity and fully supports the pilot's weight. The pilot is free to shift his or her weight and so direct the glider through the air.

Nonrip sail

A hang glider's sail is made of a nonrip fabric such as Mylar

Lift off

The aerofoil shape of the wing creates lift as it moves through the air—just like an airplane wing

Wing frame

The aluminum frame of the wing is both strong and light

Control bar

The pilot steers the hang glider via the control bar, which is attached to the wing

Lying prone

The harness suspends the pilot in a prone position—by moving forward and back, and from one side to the other, the pilot can alter the glider's direction

SIDELINES

5-20 The speed (in miles per hour) of the wind needed for ideal launching and landing maneuvers.

16-90 The age range for pilots learning to fly hang gliders. Women make up about 10-15 percent of hang glider pilots in the US.

55 The number of nations with pilots registered in the eight categories of competition organized by the Fédération Aéronautique Internationale.

INSIDE STORY

National and international competitions regularly take place in countries around the world. Events are organized for different hang gliding classes—flexibles (Class 1) and rigids (Class 2 and 5)—in different categories for both individuals and teams. The world straight distance record is held by Michael Barber who flew 437½ miles (704 km) in Texas in 2002.

TAKING OFF AND LANDING

Usually, pilots take to the air by foot launching. Carrying the glider on their shoulders they run down a hill or mountain until they reach a sufficient speed for takeoff. They can also be towed by a boat, truck, or ultralight aircraft, or pulled into the air by a stationary winch. Once airborne they steer the glider by moving their weight, navigating through changing air masses such as thermals, where warm air rises, or ridge lifts, where air masses encounter a cliff, hill, or mountain. To land, the pilot steers the glider earthward, then stalls the wing by rotating it upward and coming to ground on his or her feet.

SENSITIVE TO WIND

An essential instrument for many pilots is the variometer, which is very sensitive to vertical wind speeds. It may “bleep” audibly, have a visual display, and be able to assess height. It measures the rate of climb or fall, enabling a pilot to judge a thermal or ridge lift accurately. A built-in global positioning system (GPS) helps pilots—and judges—keep track of their course in competitions.



NEED2KNOW

- ➔ In 1985, paragliding was born when a number of enthusiasts launched themselves into the air off an Alpine mountainside.
- ➔ In 2006, the first true World Championships in paragliding and hang gliding aerobatics were held at Villeneuve, Switzerland.

SELF-INFLATING CANOPY

The canopy of a paraglider is designed to fill with air and inflate itself. When the wind is light, the pilot runs forward with the canopy behind so that air enters vents in a row of long “cells” that are open at the front and closed at the back. When the wind is stronger the pilot faces the canopy as if it were a kite, controlling it so that it fills with air.

SPORT OVERVIEW

As a sport, paragliding is similar to hang gliding—pilots remain airborne for hours and compete fiercely for cross-country and aerobatic awards. The sports differ in several ways. Paraglider pilots are usually suspended in a sitting position under a canopy, which is inflated by air pressure and controlled by lines. Paragliders are lighter, more portable, and easier to assemble than hang gliders—but fly more slowly and have lower performance.



PARAGLIDING

PARAHAWKING

PARAGLIDERS IN NEPAL HAVE DEVISED A UNIQUE DOUBLE ACT KNOWN AS PARAHAWKING, WHICH OFFERS A REMARKABLE AEROBATIC ADVENTURE OF SOARING WITH KITES, EAGLES, AND VULTURES.

DESIGNED FOR SOARING

Paragliders are perfect for effortlessly soaring on air currents, whether they are thermals or ridge lifts. Experienced pilots often stay airborne for three hours on average and may reach altitudes of more than 9,842 ft (3,000 m). The duration record for staying aloft is 11 hours and the longest distance recorded by a paraglider is 186 miles (300 km).

**Web of lines**

The canopy, harness, pilot, and harness are linked with a web of strong lines

Control lines

The pilot holds control lines attached to the back ends of the canopy

Easy chair

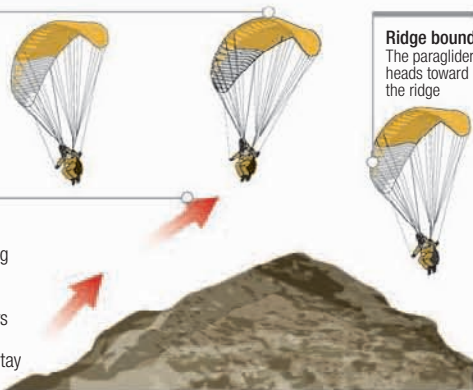
The pilot sits in a harness that consists of a comfortable, lightweight seat and shoulder and side-chest straps

Held aloft

The paraglider rides upward on the air currents

Rising air

Air rises as it approaches high ground

**Ridge bound**

The paraglider heads toward the ridge

INSIDE STORY

Like hang gliding, there are both national and international paragliding competitions throughout the world. There are individual and team events for cross-country paragliding, paragliding accuracy, and paragliding aerobatics, each with a World Pilot Ranking System (WPRS) organized by the Fédération Aéronautique Internationale (FAI). The 11th FAI World Championships were held in 2009 in El Peñon, Mexico. Switzerland's Andi Aebi won the overall cross-country event, and Elisa Houdry of France won the cross-country women's event. The inaugural FAI Asian Paragliding Championship was held in Hadong, Korea, in 2004.

SPORT OVERVIEW

Launching themselves into thin air from a great height, usually from an airplane, skydivers go into free-fall for a period of time before opening a parachute to enable them to land in a drop zone at a safe speed. It is usually a recreational sport but experienced skydivers take part in competitions and may engage in variations, such as freestyle, formation skydiving, skysurfing, blade running, and freeflying.

SKYDIVING



Strong footwear

Skydivers generally wear strong footwear so they are supported when they come into land—but also light in weight to prevent them interfering with aerodynamics

GOING FOR A DIVE

Skydivers usually jump out of a plane and, generally, need clear skies. Skydivers take off from a small airfield and jump from a plane at about 13,000 ft (4,000 m). For a while they freefall, often flying in the “belly to earth” position. They may perform aerobatic maneuvers, such as loops and turns. Eventually, they open their parachutes so that they are fully inflated at about 2,500 ft (760 m). Skydivers aim to land in an organized drop zone.

PARACHUTES

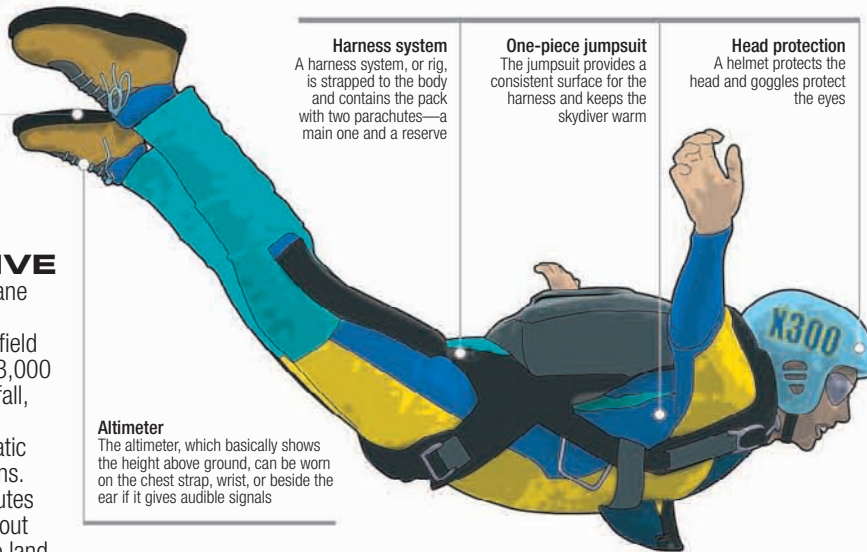
Freefalling skydivers travel at speeds of 120 mph (190 kph) or more. The parachutes they use, which are usually self-inflating ram-air wings, are designed to cope with opening in these conditions. The parachutes have steering lines and toggles which the skydivers use to control their flight and to land safely.

Aerofoil shape

The canopy of the parachute is aerodynamic like an airplane's wing

Flight control

The skydiver controls the parachute's angle of attack



Harness system

A harness system, or rig, is strapped to the body and contains the pack with two parachutes—a main one and a reserve

One-piece jumpsuit

The jumpsuit provides a consistent surface for the harness and keeps the skydiver warm

Head protection

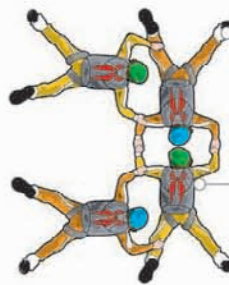
A helmet protects the head and goggles protect the eyes

Altimeter

The altimeter, which basically shows the height above ground, can be worn on the chest strap, wrist, or beside the ear if it gives audible signals

FORMATION SKYDIVING

During the period of freefall skydivers can get together to perform formation skydiving, also called relative work. They come together—sometimes in their hundreds—for a short time and form various patterns which they have first practiced carefully on the ground. Canopy formation, also called canopy relative work, is another skill in which skydivers open their canopies as soon as they jump. They come together to create a stack with formations such as biplane and diamond.



Getting to grips

Jumpsuits for formation skydiving have grips on the arms and legs

Right angles

Skydivers learn the angles which they must fly relative to their teammates

COMING TOGETHER

Formation skydivers come together in a prearranged picture. They know exactly the right angle in which to arrive, where to grip the teammate next to them and what the signals are to progress to the next stage.

INSIDE STORY

World, regional, and national skydiving competitions take place in a number of parachuting disciplines—from artistic events, such as freestyle, skysurfing and freeflying, to canopy formation, accuracy landing and formation skydiving. There are usually categories for men, women, teams, and juniors.

INTERNATIONAL PARACHUTING COMMISSION (IPC)

Skydiving and parachuting activities are governed by the International Parachuting Commission, one of several air sports commissions run by the Fédération Aéronautique Internationale (FAI). The IPC organizes international championships and is responsible for verifying world records.

NEED2KNOW

- ➔ There are more than 450 skydiving drop zones around the world, including 214 in the US.
- ➔ Skydivers can also jump from helicopters and hot air balloons.
- ➔ If the main parachute malfunctions or fails to open the skydiver jettisons it and instead deploys their reserve parachute.

NEED2KNOW

- ➔ A range of conditions prevents people from bungee jumping safely. These include high blood pressure, heart problems, back problems, epilepsy, excess weight, and pregnancy.
- ➔ Bungee jumping is practiced in many countries around the world, from the US, the UK, and most of Europe to South America, Australia, New Zealand, India, Japan, and Korea.

Swallow dive
A leap with arms stretched out is a popular way to jump

Head protection

Bungee jumpers sometimes wear a helmet to protect their heads

Body harness

Straps and webbing provide a secure and comfortable jump

Free arms

With their arms free jumpers can perform twists and turns



BUNGEE JUMPING

EVENT OVERVIEW

Bungee jumping is a thrill-seeking event in which individuals dive from a high point (such as a bridge) towards the ground, only to be pulled back by an elastic rope. Described by many as the ultimate adrenalin rush, this event is almost exclusively a recreational pastime and is rarely a competitive sport.

HIGH POINTS

Bridges, balloons, cranes, and towers are some of the high points that bungee jumpers use for their dives. Some of the most famous include the Bloukrans Rivers Bridge in South Africa, the Verzasca Dam in Switzerland, and the Kawarau Bridge in New Zealand. Commercial bungee operators often use mobile cranes that provide high points of about 164 ft (50 m).

TAKING THE PLUNGE

Totally reliable elastic ropes are vital to the safety of an event that is fraught with danger. Cords made of strands of latex rubber are either enclosed or exposed depending on the kind of extension and bounce required. Bungee jumpers are weighed carefully and equipped with body harnesses before going to the platform where they take the plunge. The jump lasts a few seconds and includes a few rebounds. The cord absorbs most of the g-forces so that the jumper slows down steadily without experiencing a sharp jolt to the system.

STAT CENTRAL

HIGHEST BUNGEE JUMPS

HEIGHT	LOCATION
321M	ROYAL GORGE BRIDGE COLORADO, US
233M	MACAU TOWER MACAU, CHINA
220M	VERZASCA DAM LOCARNO, SWITZERLAND
216M	BLOUKRANS RIVER BRIDGE WESTERN CAPE, SOUTH AFRICA

Leg harness

Straps of the leg harness are usually attached to both legs—leg harnesses used alone can provide a genuine feeling of flying

High platform

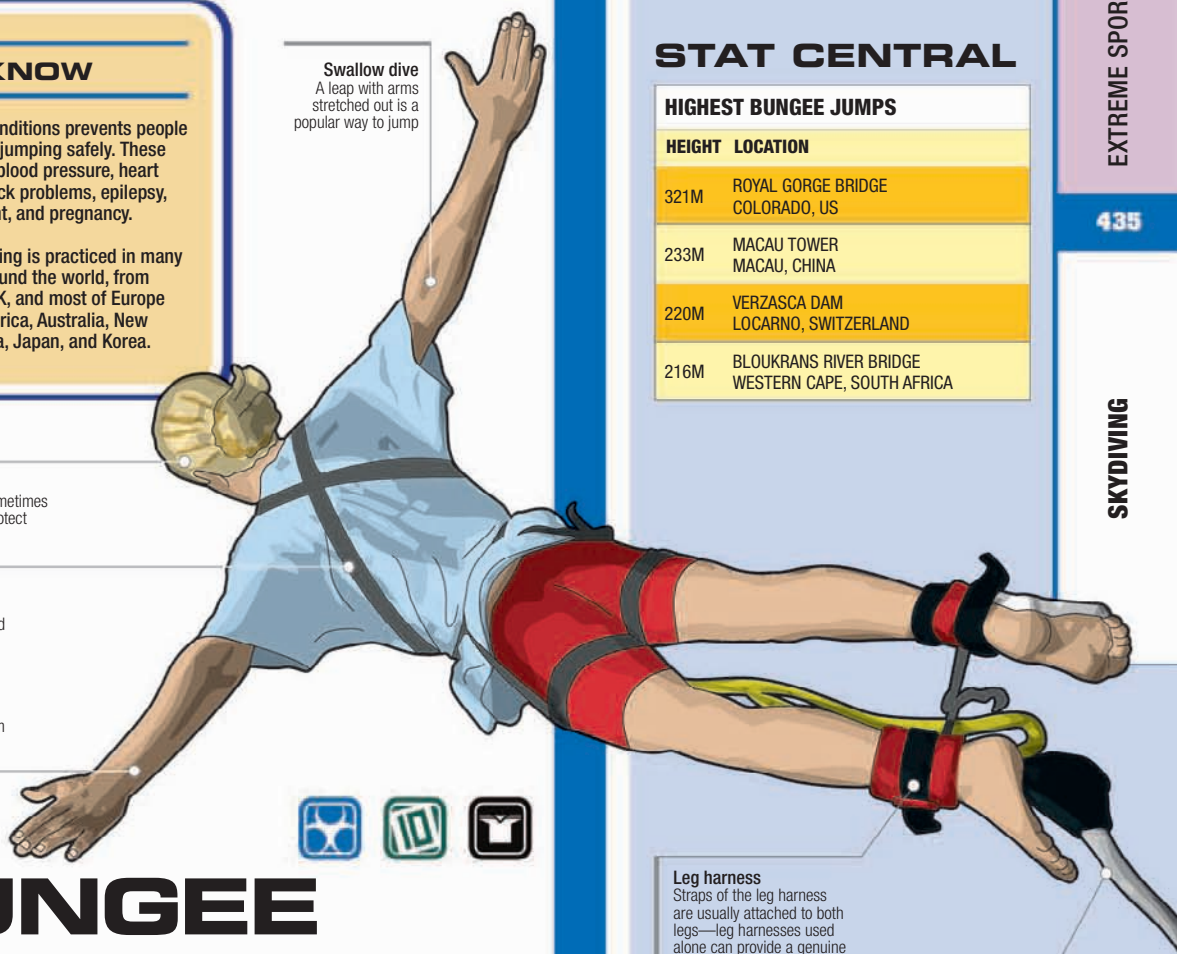
The bungee cord is safely and securely attached to a high platform

INSIDE STORY

Inspired by the land divers of Pentecost Island in the Pacific islands of Vanuatu, four members of the Dangerous Sports Club tied elastic rope to their ankles and jumped off the Clifton Suspension Bridge in England in 1979, so initiating the modern era of bungee jumping.

PROMOTING SAFETY

Many bungee jumping clubs around the world have extremely good safety records because they have introduced failsafe mechanisms to protect their jumpers. In some countries, the sport is regulated. For example, clubs in Great Britain are affiliated to the British Elastic Rope Sports Association (BERSA), which is an organization that promotes safety, training, and licensing.



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Powerboat Racing
Union Internationale Motonautique
www.uimpowerboating.com

American Powerboat Association
www.apba-racing.com

Air Racing
Royal Aero Club Ltd
www.royalaeroclub.org

Snowmobiling
Powersports Entertainment
www.powersportstour.com

Horse Racing
International Federation of
Horseracing Authorities
www.horseracingintfed.com

National Thoroughbred Racing Association
www.ntra.com

Dressage
International Equestrian Federation
www.horsesport.org

Eventing
International Equestrian Federation
www.horsesport.org

Showjumping
International Equestrian Federation
www.horsesport.org

Polo
Federation of International Polo
www.fippolo.com

Hurlingham Polo Association
www.hpa-polo.co.uk

Greyhound Racing
British Greyhound Racing Board
www.thedogs.co.uk

Harness Racing
Harness Racing in Australia
www.harness.org

Rodeo
Australian Professional Rodeo Association
www.prorodeo.asn.au

Horseball
International Horseball Federation
www.fihb-horseball.org

Horse driving
British Horse Driving Trials Association
www.horse-drivingtrials.co.uk
Camel Racing
Imparja Camel Cup Committee
www.camelcup.com.au

Dog Sledding
International Federation of Sleddog Sports
www.sleddogsport.com

International Sled Dog Racing Association
www.isdra.org
Street Luge
Gravity Sports International
www.gravitysportsinternational.com

Parkour
American Parkour
www.americanparkour.com

Extreme Climbing
International Mountaineering and Climbing

Federation
www.uiaa.com

Ultra Running
International Association of Ultra Running
www.iau.org.tw

Free Diving
International Association for the Development
of Free Diving www.aidainternational.org

Cliff Diving
World High Diving Federation
www.whdf.com

Mountain Biking
International Mountain Bicycling Association
www.imba.com

Land Yachting
International Land and Sand yachting Federation
www.fisly.org

White Water Rafting
International Rafting Federation
www.intraftfed.com

Endurance Swimming
Midmar Mile
www.midmarmile.co.za

Hang Gliding
British Hang gliding and Paragliding Association
www.bhpa.co.uk

Paragliding
British Hang gliding and Paragliding Association
www.bhpa.co.uk

Skydiving
British Parachute Association
www.bpa.org.uk

Bungee jumping
www.bungeezone.com/orgs/bersa.shtml

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