



track and field



The stadium in Athens hosted the first Olympic Games of the modern era in 1896; the Olympics had last been held in this very stadium 1,502 years before. In front of a crowd of 70,000, 311 athletes from 14 countries competed in 9 events.

Track and field is primarily an individual sport grouping together approximately 30 different events, which were formerly divided into track events (sprints, middle and long distance races) and field events (jumping and throwing). A primitive form was practiced in Egypt more than 4,000 years ago, and the Cretans became the first to engage in it systematically, around 1500 B.C., followed by the Achaean Greeks. The word athlete comes from the Greek word *athlos*, which means competition, and the word stadium comes from *stadion*, an ancient Greek measure of length equivalent to about 180 m. Modern track and field began in England, where it evolved around the end of the 17th century and the beginning of the 18th century, mostly in the form of running and walking races. The early 19th century saw the first professional meets and wagering. Oxford and Cambridge Universities entered the scene around 1860, and the first official British Championships were held in 1866. The sport then spread to the United States and continental Europe. The first modern Olympic Games, in 1896, consisted mainly of track and field events.

GENERAL RULES FOR A MEET

The order of competition is determined by random draw. Athletes who miss their turn in an event are not allowed to make it up. An athlete who is late without a valid reason may be disqualified from the contest. Athletes who are late a second time are disqualified from further turns, and only their performance prior to the disqualification counts. Judges may let an athlete take a turn over in the event of interference. Competitors wear shorts and a jersey, or a skintight suit.

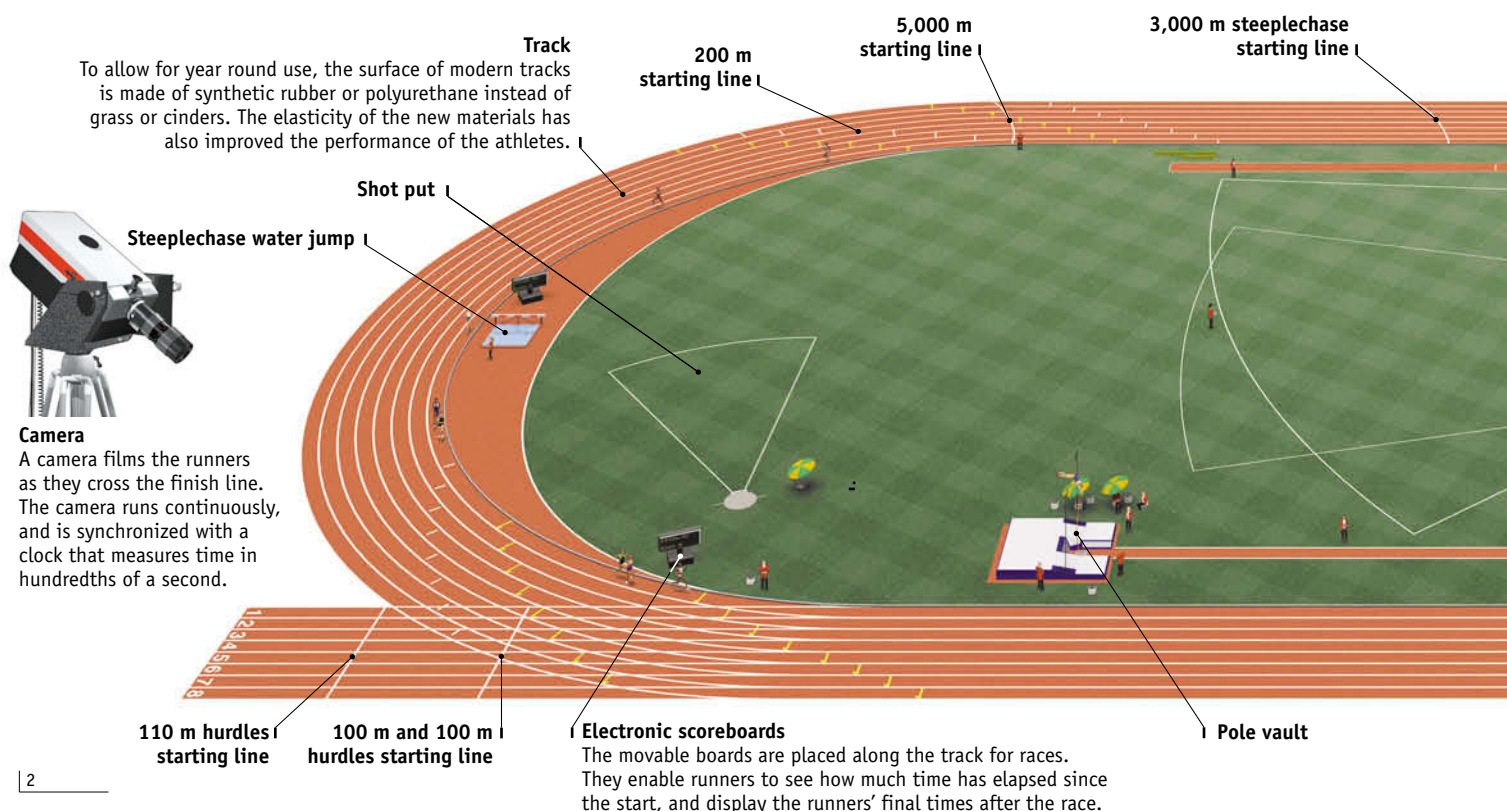
In either case, the attire must be clean and not transparent. They must also wear a bib bearing their entry number.

Athletes may wear one shoe, two shoes, or no shoes. With the exception of the marathon and walking races on public roads, footwear is light and sturdy, with a maximum of 11 spikes on each shoe to provide better traction.

STADIUM

To host an official competition, a stadium must have a 400 m track divided into 8 lanes, areas for the jumping and throwing events, as well

as a water jump for the steeplechase. Races are always run counter-clockwise, with the runners' left arms toward the inside of the track.



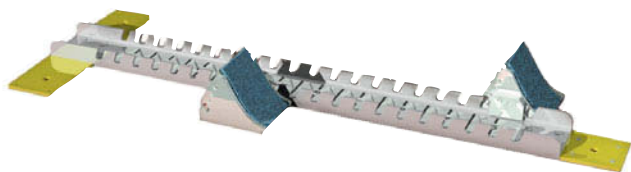
MEASUREMENTS

Because Great Britain was the birthplace of modern track and field, Imperial measurements dominated. One yard is 0.914 m, and one pound is 0.454 kg. Although most stadium tracks around the world today are 400 m long, some English-speaking countries still have tracks measuring 440 yards (402.34 m). The distance was derived from the original basic unit, the mile (1,760 yards or 1,609.35 m). Sprint races were 1/16 of a mile, or 110 yards. The growing popularity of track and field, and its expansion into continental Europe, led officials to adopt the metric system. For throwing events, three judges

measure the distance with a certified steel measuring tape. Measurements are taken from the center of the circle or the arc of the circle where the athlete was at the time of the throw to the point where the projectile hit the ground. The official registered distance is 1 or 2 cm (depending on the event) less than the actual throw. A similar system is used for measuring the long jump and the triple jump.

Starting blocks

Originally just a depression in the ground dug out by the athlete, and later made from wood, today's starting block is a portable metal device. Since 1928, starting blocks have been used in races of up to 400 m to give runners a firmer push-off, and to prevent runners from slipping during the start. In international meets, they are connected to a device that detects false starts.



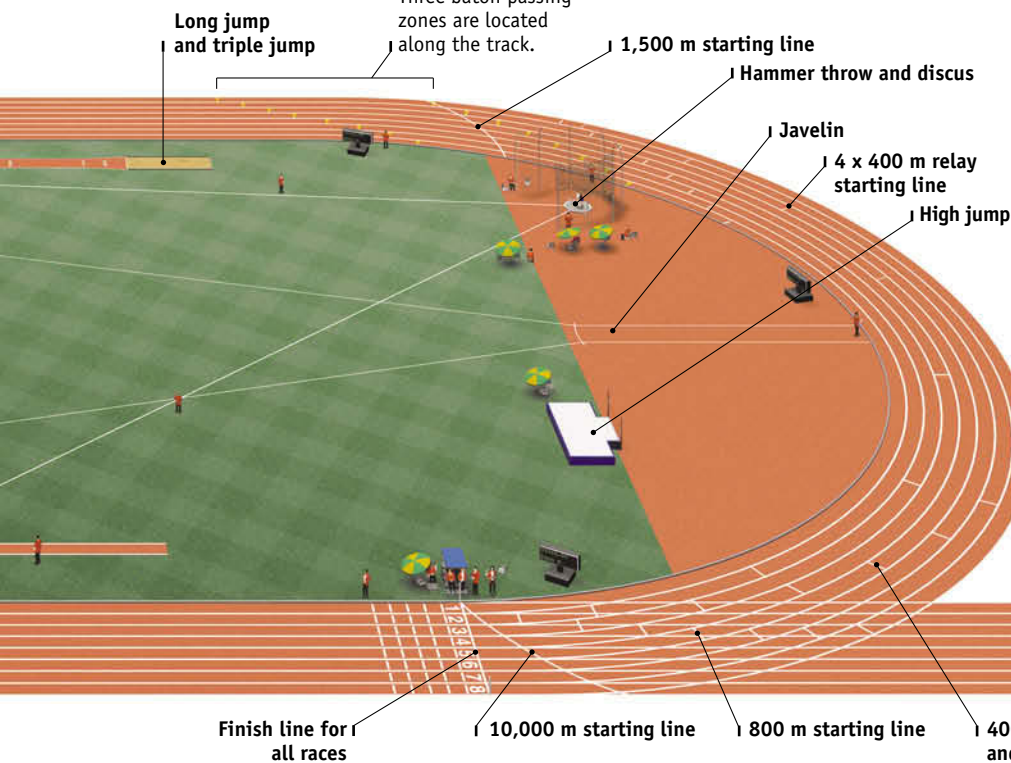
Timing

A race starts when the starter fires the pistol. An electronic timer that is activated by the pistol or an approved start device determines the official result. Moreover, three officials near the finish line time races manually with stopwatches. The results are compared if a record is set. Races up to 10,000 m are timed in hundredths of a second. Longer races are timed to the tenth of a second for races run on the track, and to the second for road races.



Relay races

Three baton passing zones are located along the track.



FIRST YEAR FOR TRACK AND FIELD EVENTS AT THE OLYMPIC GAMES

Event	Men	Women
100 m	1896	1928
200 m	1900	1948
400 m	1896	1964
100 m hurdles	—	1972
110 m hurdles	1896	—
400 m hurdles	1900	1984
4 x 100-m relay	1912	1928
4 x 400-m relay	1912	1972
800 m	1896	1928
1,500 m	1896	1972
3,000 m	—	1984–1992*
3,000 m steeplechase	1920	—
5,000 m	1912	1996
10,000 m	1912	1988
Decathlon	1912	—
Heptathlon	—	1984
Discus	1896	1928
Javelin	1908	1932
Hammer throw	1900	2000
Shot put	1896	1948
Marathon	1896	1984
10-km walk	1912–1952*	1992–1996*
20-km walk	1956	2000
50-km walk	1932	—
Pole vault	1896	2000
High jump	1896	1928
Long jump	1896	1948
Triple jump	1896	1996

* Last appearance as an Olympic event.

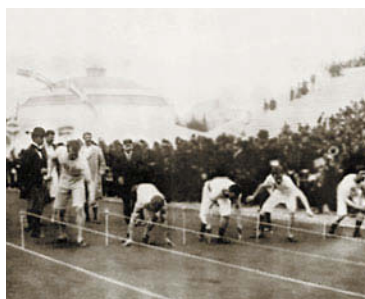
Anemometer

This device measures and records the wind speed for races of 200 m or less, as well as for the long jump and triple jump. For a record to be approved, a tailwind must be less than 2 m per second.





100 meters

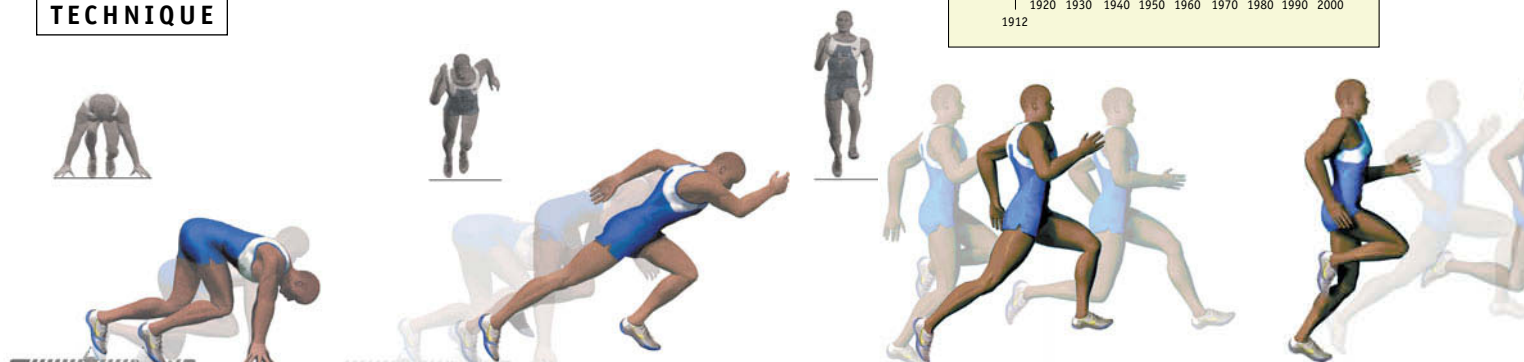
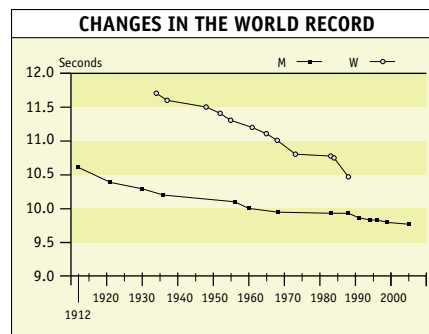


Start of the 100 m at the first modern Olympics in Athens, 1896

THE COMPETITION

The 100 m event involves several series of qualifying heats. The 8 runners with the best times in the heats run in the final. The lanes are assigned according to the best times obtained in the heats, with the fastest runners in the center lanes.

TECHNIQUE



1. Set

The runner concentrates deeply and holds his breath so that he can propel his body forward at the start. The interval between the start signal and the instant when the athlete pushes off the blocks is called the reaction time. A quick reaction time is not an absolute requirement for setting a record, since many of the athletes with the best times have had the slowest starts.

2. Start

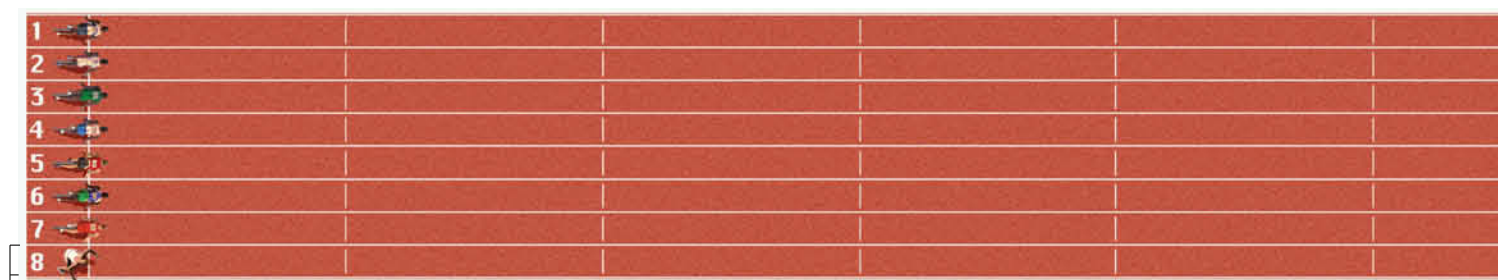
When the starter's pistol fires, the runner lets out his breath and moves his arms and legs in an explosive action that propels his body forward at a 45° angle until the back leg is fully extended. If a runner makes a false start, he gets a warning. After that, any runner in the race who makes a further false start is automatically disqualified.

3. Acceleration

The sprinter reaches his running position between the fifth and eighth stride. He runs on his toes; his heels never touch the track.

4. Maximum speed

Acceleration continues with an increase in stride frequency until maximum speed is reached, generally around the 60th meter. Among elite sprinters, the number of strides may reach 5 per second, for a speed of 12 meters per second or 40 km/h.



Starting line

Width: 1.22 m

EQUIPMENT



ATHLETE PROFILE

- In training, sprinters rarely run more than 300 m at a time, since over the long term extended exertion can impede the development and maintenance of maximum speed and power.
- A sprinter spends about 1.5 hours warming up and stretching before a race or training session.
- To increase foot speed, sprinters use elastics that pull them forward and train on treadmills and downhill slopes.
- Sprinters use restraint cables and race uphill to improve their power.
- After a sprint, athletes must recover for about 2 hours before they can achieve another maximum performance.



Shoes

They have neither a heel nor arch support. The 11 spikes must not be more than 9 mm long. Only the athlete's toes touch the ground during the race.



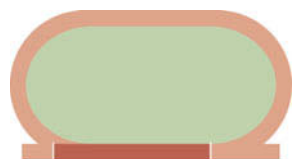
Florence Griffith-Joyner (USA)
Gold medalist in the 1988 Seoul Olympics and Olympic record holder. She ran the 100 m in 10.54 seconds.



Carl Lewis (USA)
He won 19 Olympic and world championship medals, including 17 gold medals in the 17 years of his international career.

5. Maintaining speed

At the 60th meter, stride amplitude is at its maximum.



6. Decline in speed

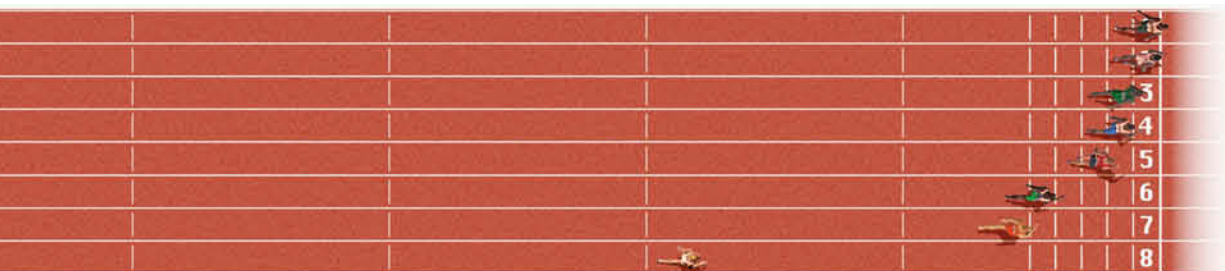
From 80 m to the finish line, the athlete tries to keep his strides fluid and maintains a very high stride rate to mitigate the inevitable loss of speed; it is physically impossible to maintain the maximum speed.

7. Finish line

The timer is stopped when the athlete's chest crosses the finish line (rule that came into effect in 1932). A record cannot be registered if there is a following wind of more than 2 m/s.

NOTABLE MALE ATHLETES IN THE 100 M

There were 109 years between Burke's race, in 1896, and Powell's, in 2005. The difference of 2.23 seconds would have left Burke more than 18 m behind Powell.



Finish line |

2005		9.77		Asafa Powell (USA)
1991		9.86		Carl Lewis (USA)
1983		9.93		Calvin Smith (USA)
1968		9.95		Jim Hines (USA)
1960		10.0		Armin Hary (FRG)
1936		10.2		Jesse Owens (USA)
1930		10.3		Percy Williams (CAN)
1896		12.0		Thomas Burke (USA)



200 meters



Jesse Owens (USA) won the gold medal with a time of 20.7 seconds in the 200 m at the Berlin Olympics in 1936.

In this race, classified as a long sprint, athletes run 200 meters as fast as possible. The ancestor of this competition, a race one-stadium (an ancient Greek measure) in length, was an event in the ancient Olympics. In 1896, at the first modern Olympic Games in Athens, the distance was officially set at 200 meters, although the race was not held. It was not until the Olympics in Paris, 4 years later, that the event was included in the men's track and field program. The women's 200 meter made its debut in the London Games in 1948.

THE RACE

1. The start

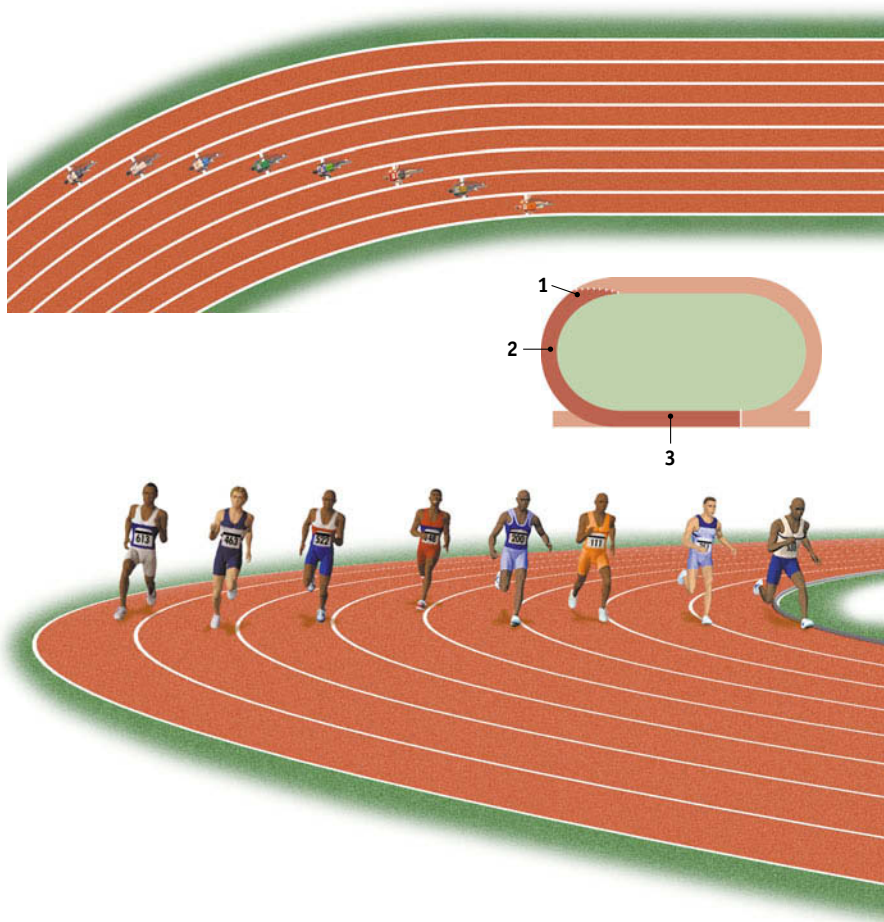
The race has a staggered start to make up for the tighter curve in the inside lanes. As in the 100 m, the athletes break out of the blocks explosively.

2. The curve

To counter centrifugal force, athletes lean toward the inside of the curve. The transition from the curve to the straightaway is the hardest part of the race. It is where runners achieve maximum speed, about 40 km/h among elite athletes, and the risk of slipping sideways due to the centrifugal force is high. Simulations show that the tighter curves have a slowing effect corresponding to 0.012 seconds, which means that the runner in the outside lane has an advantage of about 0.08 seconds over the runner in the inside lane.

3. The straightaway

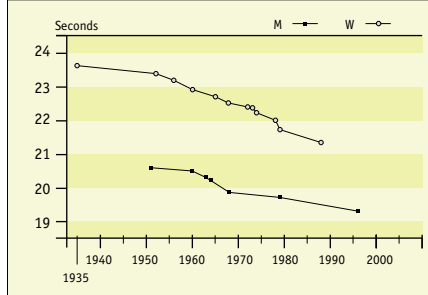
It is impossible for athletes to maintain their maximum speed all the way to the finish line. However, the second 100 m is run faster than the first because the runner does not have to overcome the inertia of the start.



ATHLETE PROFILE

- The best male 200 m runners are on average 1.80 m tall and weigh 75 kg. For women, average height is 1.70 m; average weight, 60 kg.
- This sprint requires more strength and agility than the 100 m. Because of the start on the curve and the effort produced in a leaning position, the risk of injury is higher.
- In training, starts on the curve from all lanes are practiced repeatedly. Athletes run many sprints, increase their speed over short distances (30–60 m), and work on strength on longer runs (80–200 m).

CHANGES IN THE WORLD RECORD



Michael Johnson (USA)
A dominant figure in the 400 m in the 1990s, he won five gold medals in the 200 m, 400 m, and 4 x 400 m relay in the 1992, 1996, and 2000 Olympics.

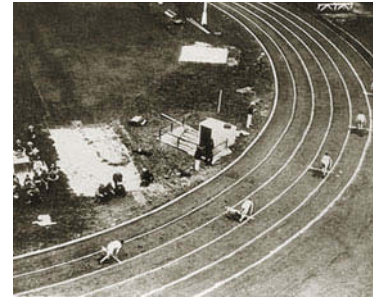


Marie-José Pérec (FRA)
She achieved an Olympic double, winning gold in the 400 m in Barcelona in 1992 and in Atlanta in 1996. In the latter Games, she also won gold in the 200 m.

400 meters



Athletes who compete in this long sprint run 400 meters as fast as possible. In 1850, the first track and field competition held at Exeter College, Oxford, Great Britain, included a quarter-mile race (402 m). This distance was dropped to 400 meters and included in the first modern Olympics in 1896. At first, the 400 meters was not run in lanes; it was a very tactical race with frequent incidents and much jostling. In 1908, the rules were changed and it became the longest race run in lanes. The women's 400 meters made its Olympic debut in Tokyo in 1964. Men's and women's 400 meter races were featured in the first world championships in 1983.



Start of the 400 m at the Amsterdam Olympics in 1928

THE RACE

1. The start

The stagger at the start is greater than for the 200 m, as the race involves 2 curves. Athletes start fast and use a long stride, but they must never surpass 90% of their maximum speed; if they go out too fast, they will run out of energy before the end of the race.

2. First straightaway

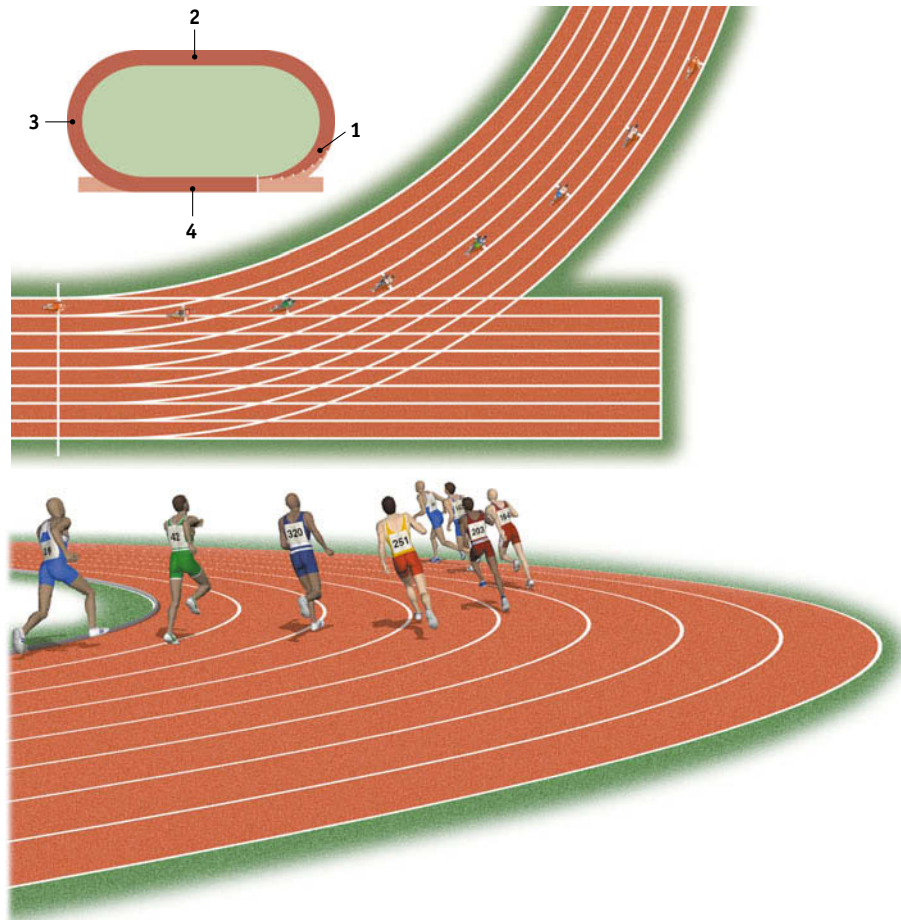
Athletes reach their maximum speed in the second half of the first straightaway. If they begin to feel tired entering the second curve, they will be even more uncomfortable leaving it. They must concentrate on keeping their speed constant and not stiffening up, which causes a loss of energy.

3. The second curve

As in the 200 m, the athlete must fight against centrifugal force by leaning toward the inside of the curve. The runner in the outside lane has an advantage of about 0.16 seconds over the runner in the inside lane.

4. Last straightaway

Athletes inevitably slow down in the last straightaway because of the effort expended in the first 300 m. They run each 100 m section in a time very similar to their best performance over that distance, 10–12 seconds.



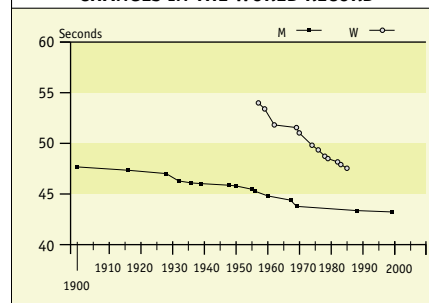
EQUIPMENT

Shoes

Identical for the 200 m and 400 m, they have no heel and a maximum of 11 9-mm cleats.



CHANGES IN THE WORLD RECORD



ATHLETE PROFILE

- Athletes must be very strong, have a high pain threshold, and be able to spread their exertion very effectively, as it is physiologically impossible to run at maximum speed for more than 7 seconds.
- The morphological profile of the 400 m racer is very similar to that of the 200 m racer, and training is also similar. For increased strength, they more frequently run distances of between 200 m and 600 m at a fast pace.



relays: 4 x 100 and 4 x 400 meter



The 1932 Olympics at the Coliseum Stadium in Los Angeles

These races are run in teams of 4 athletes, who must carry the baton one after another from the start to the finish as quickly as possible. Although in ancient times very fast runners with great stamina transmitted messages from city to city, relay races were not in the ancient Olympics. They were invented in the late 19th century, when American firefighters organized races in which teams passed a red pennant every 300 yards. The idea was taken up by two professors in Pennsylvania, who organized the first official relay in 1893. Americans loved these races, and relays over various distances were added to international track and field competitions, leading to the inclusion of the men's 4 x 100 and 4 x 400 meter relays in the Olympic Games in Stockholm in 1912. The first Olympic women's 4 x 100 meter relay was held at the Amsterdam Games in 1928, and the women's 4 x 400 meter relay made its Olympic debut in Munich in 1972.

THE RACE

Eight 4-person teams compete in the final. In the 4 x 100 m, the baton must be exchanged quickly, and dropped batons and awkward exchanges can spell disaster for the best teams. Racers pass the baton in a passing zone measured from 10 m before to 10 m after the 100 m, 200 m, and 300 m lines. Each 20 m zone is preceded by a 10 m run-up zone. Team members must remain in

their lane so that they do not impede the other competitors. In the 4 x 400 m, the speed is slower and passing the baton is less risky, but tactical considerations are more important. There is no run-up zone. Only the first lap and the first turn of the second lap are run in lanes. After the first 100 m of the second lap, the second runners break for the inside.

4 X 100 M RELAY



1. Run-up

The receiver takes 6 to 8 strides in the run-up zone. If he starts too early, the passer won't catch up to him; if he starts too late, he will be too close to the passer and time will be lost. To increase coordination, athletes often place a marker 6 to 9 m before the run-up zone. When the passer crosses the marker, the receiver begins to run.

2. Passing

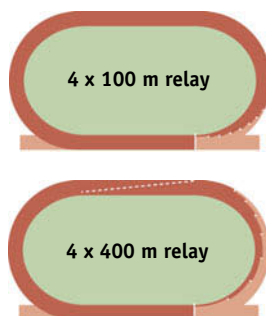
The passer shouts to the receiver indicating that he should stretch his arm behind him. When he is within reach of his teammate, he puts the baton in the palm of his hand. The receiver's hand automatically closes around the baton and holds it firmly. In a good pass, the baton is moved at a constant speed.

3. Finish of the relay

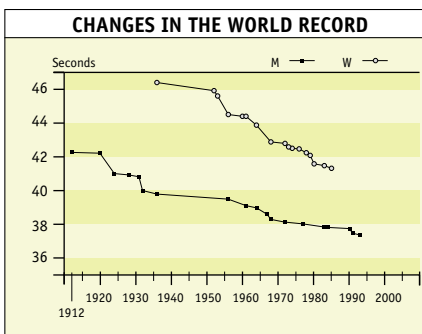
The receiver continues the sprint he started during the pass. The passer stays in his lane and does not leave the track until he is no longer in danger of impeding the other competitors.

TACTICS

In both relays, the first runner is usually known for a quick start, while the athlete with a strong finish is the last runner. In the 4 x 100 m, the first and third runners must know how to run the curves.

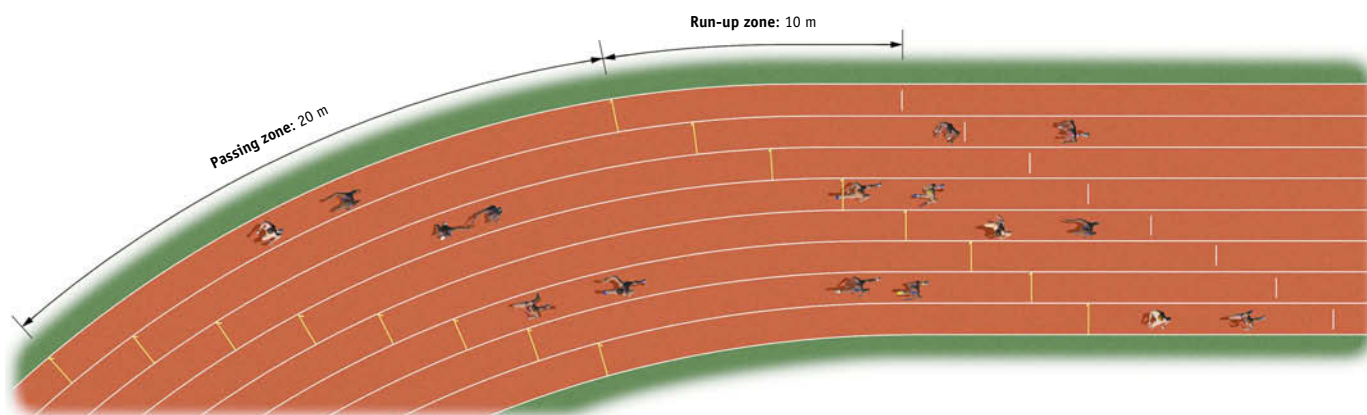


4 X 100 m



FACILITIES

Track and run-up and passing zones for the 4 x 100 m and the 4 x 400 m.



4 X 400 M RELAY

In the 4 x 400 m relay, there is visual contact between the runners rather than a blind pass. Because the passer's fatigue may affect his speed, an automatic pass is too risky.



EQUIPMENT

Shoes

Designed for sprinting, they have a maximum of 11 spikes and no heel or arch support. They are made of very light nylon.



PASSING THE BATON



American grip

When the runners are almost side by side, the baton is passed in a downward motion. This grip is popular in the 4 x 400 m.



French grip

In an upward motion, the passer places the baton in the very open hand of the receiver. Used mainly in the 4 x 100 m, this method reduces the distance covered by the baton to a minimum, but it is riskier than the American grip, because the two runners must be perfectly coordinated.



Baton

The baton is a rigid, smooth tube made of a single piece of wood or metal, weighing at least 50 g. Its circumference varies between 12 and 13 cm. If a runner drops a baton, he or she must pick it up.



In the 4 x 100 m, the United States men's team set a world record of 37.40 seconds at the 1992 Olympics in Barcelona.



In the 4 x 400 m, the Soviet women's team set a world record of 3:15:18 at the 1988 Olympics in Seoul.

ATHLETE PROFILE

- The 4 x 100 m uses sprinters who can maintain a high speed for more than 100 m, while the 4 x 400 m features specialists in the 400 m and 800 m with a very high level of stamina. In both races, the runners are psychologically strong and technically precise.
- Training is intense and frequent: speed heats, baton passing (for automatic, well-timed passes), side-by-side sprints (comparing strides to the adversary's).

4 X 400 m

CHANGES IN THE WORLD RECORD

