

Swimming



I. INTRODUCTION

Swimming, act of moving through the water by using the arms, legs, and body in motions called strokes. The most common strokes are the crawl, backstroke, breaststroke, butterfly, and sidestroke. Swimming is an integral part of almost all water-based activities. It is also a competitive sport itself.

Some scientists believe that human beings are born with an instinctive ability to use their arms and legs to stay afloat. That instinct, however, disappears within a few months after birth. Later in life many children and adults learn to swim in order to be safe around the water, to have fun, and to participate in competition.

II. SWIMMING FUNDAMENTALS

People can swim in any body of water large enough to permit free movement. These areas include ponds, lakes, rivers, the ocean, and pools. Most people enjoy swimming in water that is between 18° and 29°C (64° and 84°F).

A. Learning to Swim

In many parts of the world, people learn to swim by imitating others, most often their parents, brothers, sisters, and friends. Most youngsters in North America also take lessons at swim clubs, community centers, schools, or recreational facilities. In addition, the American Swimming Coaches Association (ASCA) and the American Red Cross sponsor programs that teach children about water safety.

Instructors teach students skills that will make them safe, efficient, and confident swimmers. Beginners first put their heads in the water and blow bubbles by exhaling. Gradually, students progress to floating, treading water, and ultimately, learning the techniques of the major strokes.

Students use various pieces of equipment during these lessons. Water-wings are inflatables worn around the upper arms; they allow children to float easily. Kickboards are buoyant boards that students can rest their arms on; this keeps their upper bodies afloat and allows them to concentrate on kicking correctly. Pull-buoys are foam floats that swimmers hold between their thighs to keep the lower body high and flat on the surface of water; using them, students can learn the arm and upper body movements of various strokes. Paddles are small, firm boards fitted over the hands; they force students to pull their arms through the water correctly. Fins worn on the feet allow swimmers to go faster and to develop proper body position and power.

B. Hazards and Safety Measures

Individuals should not swim in conditions that their ability and experience will not allow them to handle. For inexperienced recreational swimmers, many safety hazards exist—even in a pool. These hazards include misjudging a dive and hitting one's head on the bottom, holding one's breath too long, becoming exhausted, and experiencing sudden cramps while too far from shore or other swimmers.

In rivers and oceans, all swimmers should respect the power of nature. Powerful waves, tides, and currents can easily overpower even the most experienced swimmers, sweeping them out beyond safety or throwing them into coral or rocks. Caves pose additional dangers because swimmers can be trapped inside them. Swimmers must follow the instructions of lifeguards and obey posted information about water conditions, tides, and other dangers such as jellyfish or pollution. A good precaution for children is the buddy system, in which each child is paired with another while in the water. This system ensures that no person is swimming alone and that if an emergency does happen, the lifeguard can be notified immediately.

III. THE MAJOR STROKES

Four of the five main swimming strokes—the crawl, backstroke, breaststroke, and butterfly—are used both in competition and recreation. The fifth major stroke, the sidestroke, is slower than the competitive strokes and is used primarily as a recreational and life-saving technique.

A. Crawl

The crawl is the fastest and most efficient swimming technique. It is also called the freestyle, because swimmers use it in freestyle events, which allow the use of any stroke.

To swim the crawl, a swimmer travels through the water with the chest and head pointing downward toward the bottom. The legs move in a flutterkick, moving up and down quickly and continually. Each arm stroke begins as the right arm is brought in front and slightly to the right of the swimmer's head and into the water. When the right hand enters the water, the right elbow should be above the surface of the water and the body should be tilted slightly to the left side. At the same time, the left arm accelerates underneath the water in a pulling motion down the length of the body.

After the right arm enters the water, the body naturally rolls to the right so that the body is horizontal to the water surface. The left arm continues through the stroke at the swimmer's side. The swimmer continues to extend the right arm forward, and the body begins to roll onto its right side.

As the right arm begins to pull the swimmer forward, it increases the body's tilt to the right side, and the left arm exits the water near the swimmer's hip.

The swimmer then brings the left arm forward to enter the water while the right arm travels down the swimmer's side. As the left arm enters the water and the right arm exits, the swimmer's body begins to turn to the left side again, and the swimmer begins the stroke sequence once more.

In the crawl, turning the head to breathe is a simple, easy motion that should be coordinated with the body roll. As the body tilts completely to the right or left side, the swimmer should roll the head to the same side and take a breath. After inhaling, the swimmer puts his or her face back in the water, looking toward the bottom of the pool. The swimmer exhales slowly through the nose or mouth as the body rolls toward the other side.

B. Backstroke

The backstroke is the only stroke that is swum on the back, with the swimmer looking up. Backstroke swimmers therefore cannot see where they are going. Because the face is out of the water, swimmers need no special breathing technique. Backstrokers use the same flutterkick that crawl swimmers do.

At the beginning of each arm stroke, the swimmer extends the right arm so it enters the water slightly to the right of the head. The palm should be facing away from the swimmer and the pinky finger should enter the water first. At the same time, the swimmer moves the left arm through the water below the left side of the body. Once in the water, the right arm begins pulling the swimmer forward by bending at the elbow. At the same time the swimmer holds the left arm straight as it reaches the hip and lifts it out of the water. As the right arm continues to pull, the swimmer rotates slightly onto the right side and swings the left arm up above the head.

As the swimmer finishes the right arm's stroke along the body, he or she begins to rotate toward the left side as the left arm reaches to enter the water above the head.

As the left hand enters the water, the body completes its roll to the left side and the right arm lifts out of the water. Continuing these motions, the swimmer moves forward.

C. Breaststroke

The breaststroke is one of the easiest and most relaxing strokes for novices. Competitive swimmers, however, find it difficult because it uses more energy than the crawl and backstroke when swum at a fast pace. The breaststroke has undergone major changes since it was introduced in the 17th century. Most swimmers now use a technique called the wave breaststroke, which Hungarian coach Jozsef Nagy developed in the late 1980s.

To swim the wave breaststroke, the swimmer enters the water with the body streamlined, facing the pool bottom with arms and legs fully extended. To begin the stroke, the swimmer sweeps the arms out with the hands facing outward and bent slightly upward at the wrist. When the swimmer's body and arms form a T-shape, the swimmer bends each arm at the elbow. The elbows remain near the surface of the water, while the forearms and hands, pointing toward the bottom of the pool, sweep inward and underneath the chin. The swimmer shrugs the shoulders, looks down, and arches the back as the arm sweep pulls the body forward. The swimmer then raises the feet to the surface of the water, bends the knees, and spreads the legs. The thighs should remain in line with the body.

As the head and upper torso clear the surface of the water, the swimmer inhales and lunges forward with the arms. During this movement the swimmer turns the feet outward and kicks backward. The swimmer then returns to the basic streamlined position and repeats the stroke.

D. Butterfly

The butterfly stroke is powerful, graceful, and fast. More than any other stroke, the butterfly relies on good technique. Developed between 1930 and 1952, the butterfly is swum with an undulating motion. The arms are brought forward over the water's surface, then brought back together in front of the body simultaneously. Each arm stroke is complemented by two dolphin kicks, meaning the feet are kept together and brought down then up again, much like the motion of a dolphin's tail.

The swimmer begins the butterfly with the body in the basic streamlined position and the head facing downward. The arms enter the water with the hands facing outward, as the swimmer lunges forward, submerging the head and chest slightly. At this point the swimmer makes a light downward kick with both feet. The body glides forward, and the hands catch water and begin to pull.

The pulling stroke begins with the hands facing outward and the elbows near the water surface. The swimmer pulls the hands down so that they come together under the body. The legs start the second downward kick.

When the swimmer then pulls the arms down to the hips, the motion forces the head and shoulders above the surface of the water. This positioning enables the swimmer to inhale.

The swimmer finishes the arm pull with a sweeping motion that brings each arm along the sides with the palms facing in. When the second downward kick is completed, the swimmer swings the arms slightly out of the water and glides forward. Another stroke cycle begins as the swimmer plunges the arms back into the water above the head.

E. Sidestroke

The sidestroke evolved out of the breaststroke technique in the 19th century, primarily because swimmers wanted to swim faster. Swimmers originally thought that because the body remained on one side throughout the sidestroke cycle, there would be less resistance. However, because the sidestroke generates less force than the other strokes, it turned out to be slower. The sidestroke has remained a popular recreational stroke for novices. It is also used as a life-saving technique because the lifesaver's head remains above the water at all times and one arm stays free to help the distressed swimmer.

The sidestroke's propulsion comes mainly from the legs in a movement called a scissors kick, because the legs are brought together powerfully like the shears of a pair of scissors. The arms provide some propulsion but mainly serve to stabilize the body on its side.

The swimmer starts the sidestroke by balancing the body on either the right or the left side. The head, back, and legs are straight, with the feet and toes pointed. The bottom arm extends ahead of the swimmer under the water, while the top arm is placed along the side, so that the hand is at the upper thigh. The face stays just above the surface to allow easy breathing.

The swimmer moves the lower arm downward and then draws it back to the body and toward the feet in a sweeping motion. This pulls the body slightly forward. At the same time, the swimmer flexes the hips and knees, and brings the heels slowly up toward the buttocks. As the arms and hands come together near the chest, the swimmer extends the legs straight then brings them together in a powerful thrust. The swimmer returns to the starting position as the body glides through the water. When the glide begins to slow, the swimmer repeats the stroke cycle.

IV. COMPETITIVE SWIMMING

Competitive swimming is one of the most popular participant sports in the world. In the United States alone, more than 250,000 individuals belong to the sport's governing organization, USA Swimming. Many leagues exist for competitive swimmers, including ones sponsored by summer programs, cities, Young Men's Christian Association (YMCA) chapters, Jewish Community Center (JCC) chapters, high schools, colleges, and Masters Swim programs.

A. Pools

Pools for competition come in two basic sizes. Short-course pools measure 25 yd (22.8 m) or 25 m (27.3 yd) in length. (The United States is the only country that conducts competition in 25-yd pools.) Long-course pools measure 50 m (54.6 yd) in length. Most major swimming events take place in 50-m pools.

Most pools for high-level competition have eight lanes—one for each swimmer. (Many public pools or pools at recreational facilities have only six lanes.) The lanes extend the full length of the pool and range up to 2.5 m (8 ft 2 in) wide. Floating plastic lane markers separate the lanes, reduce turbulence, and help each competitor swim in a straight line. Each lane also has a line painted on the bottom. This line serves as a visual reference for the competitor when swimming with the head down. At 5 m (5.5 yd) before each wall, the line becomes a T, signaling the swimmers how far they are from the wall, so that they can prepare their turns or their finish. Also at 5 m, a line of flags is strung across the width of the pool, providing the same information to backstrokers.

Pools used for competition also have lines at the sides of the pool at the 15-m (16.4-yd) mark. Used by judges during competition, these lines indicate the farthest distance a swimmer is allowed to swim under water after the start and when making a turn.

Crawl, breaststroke, and butterfly competitors begin racing by diving from starting blocks that are 75 cm (30 in) above the surface of the water. Backstroke swimmers start in the water by holding on to the side of the pool in a crouched position, and then lunging backward away from the wall.

At most high-level competitions, electronic timing devices record how long each competitor takes to complete the course. The device starts timing when the starter's horn goes off. Each lane has an electronic touch pad on the wall that the swimmer pushes when completing the race. The pad stops the timing device and records the swimmer's time in a computer. The score is then transferred to a scoreboard that the swimmers, fans, and judges can see. Each lane also has a timekeeper with a handheld stopwatch, in case the electronic timing device fails. All timing is done to the hundredth of a second, and many races are decided by small margins.

B. Equipment

In competition, swimmers wear a swimsuit, a swim cap, and goggles. Swimsuits are made of a material such as Lycra or Spandex that clings tightly to the swimmer but also permits a free range of motion. A swim cap worn over the hair and ears also helps to reduce the resistance a swimmer encounters when moving through the water. Swim goggles allow swimmers to see better under water. They also protect swimmers' eyes from irritation caused by chlorine and other chemicals in the pool water, and from salt or pollution in natural bodies of water.

In a sport where races are decided by hundredths of a second, every advantage is important. For major meets, most swimmers shave the body hair off of their arms, legs, and any other surface area that is in contact with the water. This reduces resistance and can lower a swimmer's time by as much as 1 or 2 percent—a significant difference.

C. Training

Most swimmers at the highest levels of competition train for four to five hours a day and five to seven days a week. They typically swim about 10,000 to 20,000 m (6 to 12 mi) per day and supplement their workouts with flexibility exercises, weight training, and other routines.

As major competitions near, swimmers spend hours honing their starts and turns, trying to execute them as quickly as possible. They also spend time working on technique so they maintain as streamlined a position as possible.

Most swimmers train by doing groups of distances, called sets, following strict instructions. For example, a coach may instruct a team to swim "6 x 400 meters on 5:00, descending 1-3 and 4-6." This means that a swimmer will do six 400-meter swims, one starting every five minutes. If the swimmer completes the first 400-meter segment before five minutes, he or she can rest until the five minutes have elapsed. But the second 400-meter segment must be swum at a faster pace than the first, and the third segment faster than the second.

The swimmer then starts over, easing up on the fourth swim, but picking up the pace again for the fifth and sixth segments. Many training regimens exist; all are designed to build strength and endurance.

D. Swim Meets

Swim meets are organized competitions that pit individual swimmers or swimming teams against each other. Most meets feature preliminary races, called heats, that occur before the finals. The top eight swimmers from the preliminaries compete in the finals of each event. In the finals, the fastest swimmers are assigned to the middle lanes. These lanes are considered most desirable because the swimmers in them are most aware of the positions of their competitors. Swimmers in the middle lanes also encounter the least wave action from the water as it travels from the swimmers and bounces off the sides of the pool.

During competition, swimmers must obey the starter's commands. When the starter announces "Take your marks," all the swimmers must assume the starting position by crouching on the blocks. The starter's horn (or pistol) then sounds, indicating the start of the race, and the swimmers dive into the water. In most meets, any swimmer who makes a false start by leaving the starting block before the horn sounds is disqualified. In Olympic competition, two false starts are allowed for the competitors as a whole. After these two, any competitor who makes a false start is disqualified.

Swimmers are also disqualified for swimming the wrong stroke or for swimming the stroke incorrectly, as judged by officials. Turning incorrectly or failing to surface 15 m after the turn can also lead to disqualification.

E. Events

Events take place in the freestyle, backstroke, breaststroke, butterfly, and individual medley. In the individual medley event, the swimmer completes an equal distance of each of the four strokes in this order: butterfly, backstroke, breaststroke, and freestyle.

At major national and international competitions, the freestyle events are swum at six different lengths. They are 50-meter, 100-meter, 200-meter, 400-meter, 800-meter, and 1,500-meter races. Swimmers race the backstroke, breaststroke, and butterfly at two lengths, 100 meters and 200 meters. Individual medley events are 200 meters and 400 meters in length.

Meets also involve relay events, in which four swimmers compete as a team, taking turns swimming equal distances. The team with the fastest combined time wins. The relay events are the 4 × 100-meter freestyle relay, the 4 × 100-meter medley relay, and the 4 × 200-meter medley relay. In the medley relays, the first member of the team swims the backstroke, the second swims the breaststroke, the third swims the butterfly, and the fourth swims the freestyle. At some meets, swimmers not only compete on an individual level but also win points for their teams. The team that scores the most points wins the meet.

V. OTHER SWIMMING ACTIVITIES

Swimming is integral to several sports, including body boarding, snorkeling, surfing, synchronized swimming, triathlon, underwater diving, and water polo. People also should have strong swimming skills in a variety of other water-based activities, including competitive diving, fishing, jet-skiing, rowing, sailing, and waterskiing.

Swimming is a valuable activity for physical therapy and exercise. Because it works the majority of the muscles in the body and provides both aerobic benefits and resistance benefits (as the swimmer pulls and pushes through the water), the sport is generally considered one of the most complete forms of exercise. Swimming does not strain joints and connective tissue as much as many other forms of exercise, and swimmers injure themselves at a lower rate than most other athletes. Athletes in other sports who are recovering from injuries often swim to stay in shape.

Several exercise programs are water based. In water aerobics, the water provides extra resistance for cardiovascular workouts. Many older adults exercise by becoming involved in programs with organized coaching, workouts, and competition. Swimming laps in pools is an extremely popular exercise among people of all ages.

Not all competitions take place in pools. In long-distance swimming, racers compete over lengthy courses, usually in lakes, rivers, or the ocean. Most competitions are held at distances of 5 and 25 km (3.1 and 15.5 mi), but some races are longer than 38 km (24 mi). The longest races can take seven or eight hours to complete.

Several occupations require that individuals be proficient swimmers. For lifeguards, swimming skills are perhaps most important because lifeguards are responsible for the safety of other people in swimming areas. Scuba diving and snorkeling instructors also must be prepared to assist others if an emergency occurs. Physical education teachers must swim well enough to teach others. Underwater archaeologists do research while scuba diving, so strong swimming skills help them with their work. Pearl divers must be able to swim deep and hold their breath for a long time as they descend to the bottom to search for their treasures. Sailors and offshore oil workers do not swim as part of their jobs, but because they work on the water, they should be able to swim fairly well in case they accidentally fall overboard.

VI. HISTORY

Human beings have been swimming for thousands of years. One of the earliest representations of swimming is an ancient Egyptian wall relief that shows soldiers of Pharaoh Ramses II (reigned 1290-1224 BC) pursuing their enemies by swimming across the Orontes River between ancient Egypt and Asia Minor.

Swimming was highly esteemed in ancient Greece and Rome, especially as a form of training for warriors. In Japan, competitions were held as early as the 1st century BC. In Europe, swimming was less popular during the Middle Ages (5th century to 15th century), when immersion in water was sometimes associated with the recurrent epidemic diseases of the time.

The crawl stroke was probably invented independently in various areas of the world several hundred years ago. Swimmers in South America and the South Pacific used crawl-like strokes long before they were used in Europe. Native Americans also used an overarm crawl stroke. In 1844 two members of the Native American Ojibwa tribe named The Flying Gull and Tobacco traveled to England, where they defeated local champions and became national celebrities.

By the 19th century European misconceptions about the dangers of swimming had been dispelled. In the late 19th century amateur swimming clubs began conducting competitions in the United States and Britain. In the United States, colleges and universities such as Yale University, Indiana University, and the University of Southern California played an important role in spreading interest in swimming as a competitive sport. In 1875 Matthew Webb of Great Britain became the first person to swim across the English Channel (*see Channel Swimming*). Webb swam between Dover, England, and the coast of France near Calais, where the channel is more than 32 km (20 mi) in width. By 1896 swimming had become well established. It was one of the sports at the first modern Olympic Games, held that year in Athens, Greece.