SWIMMING STUDY GUIDE

History: The English are thought to be the first to develop competition swimming, which began in London in 1837. The most popular stroke was breaststroke. In 1896 swimming was first seen in the Olympic games as a men’s event. It wasn’t until 1912 that it became an event for women.

FRONT CRAWL
The front crawl is the fastest and one of the most efficient strokes. It is one of the four competitive strokes.

Body Position: The swimmer is in a prone horizontal position with the body flat on the surface of the water. The head and body are aligned with the water line approximately at the middle of the forehead. The arms and legs are extended.

Arm Action: (catch, grab, pull, push, lift and throw) The arms provide most of the propulsive force. The hand goes into the water thumb down, fingertips first, with the palm facing down and out diagonally. The elbow is higher than the hand. The hand enters in front of the shoulder, not crossing the center of the body, thumb aligned with the shoulder. The arm is not quite fully extended as it enters the water. The arm then pulls outward, downward and back forming an inverted S pattern. Throughout the pull the elbow should be higher than the hand. On recovery the arm comes out of the water pinkie first and comes from back to front in a rounded, relaxed movement. The arm should be kept close to the water.

Leg Action: The flutter kick is used, which is an alternating up and down action of the legs. The kick originates from the hip, and the legs are kept relatively straight, but the knees and ankles are relaxed throughout the action. They must be relaxed and floppy to be effective. The power part of the kick is the downbeat. The depth of the kick is between 12-15 inches. The legs should be between 10-15 inches apart.

Breathing: A complete breathing cycle of, inhalation and exhalation, should take place to each arm cycle. The swimmer inhales as the head is rotated (do not lift) just enough to bring the mouth above the surface of the water. As soon as the face goes back into the water start exhaling, blowing air out of your mouth and nose. The breathing should not interrupt the stroke.
The back crawl, also known as backstroke, is the most efficient stroke on the back and is one of the four strokes in competitive swimming.

**Body Position:** The body should be on the back, in a horizontal position with the head in line with the spine and submerged to about the level of the ears. The back is kept straight or flat as possible. The hips should be just below the surface and the legs fully extended.

**Arm Action:** The hand enters the water pinkie first at one or eleven o’clock from the shoulder. The fingers are together and point to the side of the pool. The body rolls toward the entering arm. After the entry the pull is made with the hand describing a flattened S pattern. The first push of the hand is downward, and is made when the hand is even with the shoulder. More power comes from the push than the pull. The arm recovers out of the water in a straight-line thumb first. As the recovering arm passes the head, the palm should be facing out and sideways, ready for entry. Keep both arms moving rhythmically.

**Leg Action:** The flutter kick is used, but the kick is a little deeper than in front crawl. The ankles are loose and floppy, with the feet slightly turned in, toes pointed and legs separated slightly so that your big toes miss each other. The toes come near the surface of the water.

**Breathing:** Since the face is out of the water at all times, free breathing is used. Breathing is rhythmical, inhaling during recovery of one arm and exhaling during recovery of the other arm. Breathe through the mouth.
BREASTSTROKE

The breaststroke is one of the oldest forms of propulsion. It is one of the four strokes used in competition.

**Body Position:** The body should be in a streamlined prone horizontal position, with the back flat. The arms are extended in front of the head with the hands together and the palms slanted slightly downward. The legs are extended with the feet and hips just below the surface of the water. The head is positioned so that the water level is about the eyebrow level.

**Arm Action:** The arm pull is made in a heart-shaped pattern. The pull begins with the palms of the hands facing outward and the elbows fully extended. As the hands are pressed outward and back, the elbows bend. The pull should be wide enough so that the hands are in line with the elbows, but they should not pull beyond the elbows. The pull has been completed and now the hands are in praying position as they start recovery by pushing forward as though you are cutting the heart in half.

**Leg Action:** The whip kick is used. The kick provides greater propulsion than the arms. The legs are together and fully extended in the glide position to begin. The knees are brought under the body as the heels are drawn to a point almost over the knees, the feet are flexed and the toes are pointed to the side. At this point, the knees will be spread slightly and the feet are rotated to a position outside the knees. Without pause, the hips, knees and ankles are extended forcefully, bringing the feet slightly outward and backward through an arc. The kick finishes with the extension of the ankles into a streamline position.

**Breathing:** The swimmer inhales through the mouth during the pull by lifting the head just enough for the mouth to clear the surface. The head is then dropped to the starting position and exhalation occurs during the extension and glide.

**Coordination:** glide, pull, breathe, kick and glide

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BUTTERFLY STROKE

The butterfly is the most difficult and exhausting stroke. It is one of the four competitive strokes.
**Body Position:** The body is in a prone position with the arms and legs fully extended to start. The dolphin kick with a windmill-like movement of both arms in unison is used.

**Arm Action:** Both arms pull together symmetrically, creating the pattern of an hourglass. The hands enter the water with the thumb leading just wide of the shoulder line and press downward and to the side. The elbows are flexed and held high while the hands lead. As the arms become almost vertical the hands move closer together under the trunk. The push phase begins and the hand movement accelerates as the elbows extend vigorously, wrists extended far back to direct pressure backward. The hands perform a sculling motion, pitching outward, inward, and then outward again. The thumbs finish near the thighs. Wrists and elbows are relaxed as the arms round off into recovery. The little finger leads as the arms move out and up. Arms swing forward in a low flat bowl-shaped curve back to the point of entry.

**Leg Action:** The dolphin kick is used. It begins in the hips. Two kicks are used per arm cycle, with the first kick being the larger of the two. The knees lead the legs on the downbeat of the kick. The speed on the downbeat should be twice that of the uplift. The legs are raised first from the hip (straight up) and then from the knee (a bent position). When knee flexion is about 40-degrees the knees spread slightly and the feet are pointed. Toes are just beneath the surface. Strong extension of the knees drives the feet back and down, and the hips lift slightly. The heels are about two feet down on the bottom of the downbeat. The second kick occurs during the finish of the pull.

**Breathing:** Inhalation is a moment before the hands leave the water. Inhalation is through the mouth only; exhalation can be thought either the mouth alone or both mouth and nose simultaneously. As the inhalation is made the chin stays in the water. Inhalation is finished as the arms pass the head in recovery, and the face submerges a moment before the hands do. The forehead is at the waterline during exhalation.

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**SIDESTROKE**

The sidestroke is used primarily for recreational swimming, and is considered a resting stroke. This stroke is also used, with some minor adjustments, in lifeguarding.
**Body Position:** The swimmer is on the side with the bottom arm fully extended over the head and the top arm at the side of the body, fingers pointed toward the feet. The legs start stacked one on top of each other and are fully extended.

**Arm Action:** The bottom arm pulls to the chin, while the top arm recovers from the position at the thigh, up to meet the bottom hand at chin height. The bottom hand then recovers and the top hand pushes the water down to the feet. It is like grabbing an apple off the tree, switching hands and putting it in a basket down by your thigh. On the glide phase the swimmer rests the head on the bottom arm.

**Leg Action:** A scissor kick is used. The top leg moves forward when the upper leg extends at the knee, then at the hip. The lower leg extends from the hip. Heels are pulled up toward the buttocks. The legs are then moved apart, so the swimmer looks as if he or she is taking a giant step, and pulled together simultaneously, feet pointed, to a streamlined position for the glide. One kick is made per stroke cycle.

**Breathing:** Breathing should be through the mouth. Inhalation occurs as the legs recover, and exhalation occurs during the kick.

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**ELEMENTARY BACKSTROKE**

The elementary backstroke is primarily a resting or survival stroke.

**Body Position:** The body is in a horizontal position on the back and is submerged except for the head. The head is submerged to the ears, with the face completely out of the water. The back should be almost flat, with the legs and hips slanted down slightly lower than the head and shoulders. All arm and leg action is performed beneath the surface of the water.

**Arm Action:** From the glide position, the hands are drawn slowly up the sides of the body by flexing the elbows. When the hands have reached a position just below the shoulders, the fingers are turned away from the body and the arms fully extend, still under the water, to a point slightly above shoulder level. The hands and arms then press simultaneously toward the feet in a broad sweeping movement until the hands reach the thighs. The arms are now in the glide position of the stroke.

**Leg Action:** In the glide position the legs are together and fully extended. Flexing the knees and the ankles so that the heels drop down and move back toward the hips starts the recovery. The thighs should be kept fairly straight and in line with the body. When the heels have dropped directly below the knees, the feet are rotated to a hooked position and toes are pointed to the side. At this point the legs are in a position for the whip kick. Without pause the thrust is made by pressing backward and upward against the insides of the lower leg and feet. The legs are fully extended until they are back in the glide position with the toes pointed. The feet should be outside the knees.

**Breathing:** Breathing is rhythmic, through the mouth. Inhalation occurs during arm recovery and exhalation occurs during arm propulsion.

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**TERMS:**

- **Prone Float** – To float face down in the water.
- **Supine Float** – To float on the back.
- **Glide** – Movement in the water with no kick or pull.
**Treading Water** – A skill using arm and leg movements to stay stationary and vertical with the head out of the water.

**Bobbing** – The skill of submerging and pushing off from the bottom to return to the surface.

**Surface Diving** – Used to go under water when swimming on the surface.

**Rotary Kick** – A kicking technique used when treading water, also called the eggbeater kick.

**Front Dive** – Done from the deck, extend the arms above your head, bend forward, push off with your legs and bring your legs together as you enter the water head first.

**Survival Float** – It is a means to remain afloat in deep water for long periods of time with minimum effort. The body is relaxed and the face is down with the arms extended out in front of the head. Breathing is done by pushing down with the hands while lifting the head. There is no kicking action.

**PHYSICAL LAWS AS APPLIED TO SWIMMING**

1. **Center of Buoyancy**: When the lungs are filled with air, the chest is the most buoyant part of the body.
2. **Law of Action/Reaction** (Newton’s Third Law of Motion): For every action, there is an equal and opposite reaction. By pushing water backward with the hands and feet, the swimmer moves forward.
3. **Acceleration** (Newton’s Second Law of Motion): The rate at which a body changes speed is directly related to the force applied. The harder the swimmer presses backward against the water, the faster the swimmer will move forward.
4. **Flotation** (Archimedes’ Principle): A floating body displaces exactly its own weight in water. A body will sink if it is not big enough to displace water that weighs as much as it does, even when submerged. Muscle is less buoyant than fat because muscle is denser and weighs more.
5. **Volume** (Archimedes’ Principle): The bigger something is, the greater its volume.
6. **Symmetrical Movement**: The most efficient way to do certain strokes is to move both arms and legs at the same rate, in the same way. This keeps the stroke more efficient and balanced.
7. **Water Resistance**: Water is denser and has more resistance than air. It slows forward motion but also allows the swimmer to move.
8. **Law of Levers**: A shorter lever arm can apply more force than a long one. A bent arm can apply more force than an extended arm. Try picking up something heavy with a bent, and then a straight arm to test this.
9. **Inertia** (Newton’s First Law of Motion): A body in motion wants to stay in motion; a body at rest wants to stay at rest. It takes more force to get started than it does to stay in motion, which is why swimmers do flip turns so that it permits you to maintain your forwarded movement with a minimum loss of motion.

**TURNS:**

**FRONT CRAWL** (only 1 hand has to touch the wall)

1. open turn
2. flip turn
BACK CRAWL (hands do not have to touch the wall)
   1. open turn
   2. flip turn

BREASTSTROKE AND BUTTERFLY (both hands must touch the wall)
   1. open turn

**WATER SAFETY**
   1. Never swim alone
   2. Always enter the water feet first when unfamiliar with the pool or lake
   3. Only dive when the area is clearly marked for diving and there are no obstructions
   4. Reaching Assists
   5. Throwing Assists

Sources: