Swimming Starts Checklist

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The swim start is an important aspect of the time attained in a swim race. The start has three components, each of which can be broken down for discrete analysis—the starting block, the dive, and the pullout (breakout). All swim events, except the backstroke, begin on the elevated starting block situated at the edge of the pool.

The key to a fast start is the ability to react to the signal as fast as possible. The start is important in the swim race to advance the swimmer as far down the pool as possible before stroking starts. The further down the pool the swimmer can project their body, the faster the time for the race. Entry into the water is an important aspect of the race, as the less the splash the less the resistance to entry and the faster the subsequent race.

![Image of swimmers diving into the water](image)

Figure 1. The key to an effective start is the ability to react to a signal quickly.

1 Starting Block

To achieve maximum speed from the start block, the swimmers seek to keep their center of gravity as close to the front edge of the block as possible. At the
sound of the start, the swimmers employ a combination of explosive leg drive and a push with the toes from the surface of the block.

Many swimmers lean back slightly on the blocks prior to the signal. When the signal is given, the legs are extended slightly and the weight is shifted over the front edge of the blocks. This unbalanced position will give the swimmer greater momentum from the blocks as they push off with both legs.

Figure 2. Ready position on blocks for the running start, in which feet are staggered and hands grip the front of the blocks.

Running Start

The running start is the block start in which the feet are placed on the block in a staggered position, and takes it’s name from a track sprinter’s start. One foot is placed at the front of the blocks, and the other foot is placed to the rear of the blocks. The hands are placed on the front edge of the starting blocks. The front knee is flexed at close to $70^\circ$, while the back knee is flexed at $130^\circ$ degrees. The person who reacts fastest and gets their body moving toward the water wins the start. Whether using the grab or the track start, always have the head down and the hips as high and as close to the edge of the blocks as possible. This positions the center of gravity closer to the edge of the block.

The swimmer wants to get off the blocks as powerfully as possible. The "newer" track start is more powerful because the swimmer uses the arms to help pull the body off the blocks. The swimmer should use both arms to pull back forcefully on the blocks, to help generate speed for the takeoff. The legs
contract forcefully at the same time that the arms are pulling backwards on the block, causing the body to be projected forward.

When the gun sounds, the arms are flexed upwards while the legs are forcefully extended to drive the swimmer off the blocks. The arms should be driven upwards forcefully to increase the ground reaction forces from the blocks. As the swimmer drives the arms upward and forwards, the reaction to this movement is downward and backward on the shoulders. This down and back movement of the shoulders is transmitted to the hips, which move down and back. This movement is transmitted to the knees, ankles, feet and the blocks, and produces an increased downward force against the blocks. This increased downward force will produce an increased upward force that will help to propel the swimmer faster off the blocks. The ability of the arms to generate downward and backward forces on the feet should not be underestimated, and arm swing upward and forward should be emphasized by swim coaches. Many swimmers drive the arms backward toward the back foot at the gun, which will produce a forward force on the shoulders and feet, which will not increase the ground reaction forces or the velocity off the blocks. Recall the impulse momentum equation that states that a larger force in the direction of the movement will produce a greater change in

Figure 3. Maximum range arm swing that will increase ground reaction forces to a greater extent than a shorter arm swing.
Velocity from the blocks.

Figure 4. Arms driven up to shoulder level off the blocks, increasing the forces from the blocks to the feet. Note this swimmer is using the conventional start.
Figure 5. These are effective arm swings by these swimmers, as the arms are driven forcefully forward and upward from the blocks, which will increase the downward backward forces on the feet and the resulting propulsive force.
Figure 6. Arm swing is complete as feet are leaving the blocks. Arms have completed their contribution to propulsion and are now preparing for entry. The rear leg leaves the blocks first, while the toes of the front leg are the last to leave the blocks. The majority of the push off force is provided by the front leg, which is the last to leave the blocks and is fully extended at takeoff. During the airborne phase, the arms are fully extended in front of the shoulders, while the legs are fully extended with the toes pointed. The shoulders maintain an angle of 130° of flexion during the airborne phase.

The push off of the front leg can also be improved by a forceful upward movement of the back leg after it leaves the blocks. As the back leg completes its push and is lifted upwards, the back leg should be driven up forcefully to increase the ground reaction forces on the front foot. As the back leg is driven upwards, it pushes downward on the back hip, which pushes downward on the pelvis, then the front hip, and then the blocks. The faster and more forceful the movements of the back hip, the greater the ground reaction forces and the more forceful the pushoff.

The swimmer wants to travel as far as possible while airborne, to cover the optimal distance before entering the water. Leg strength is related to
power off the blocks, so strength training may help to enhance performance in the start.

Figure 7. As back leg leaves the blocks the leg should be extended forcefully upwards from the blocks. This forceful hip extension will increase the upward forces on the front foot and increase the velocity of takeoff. Leg action has to occur before the front leg leaves the block.

Conventional Start

In the conventional start both feet are placed slightly apart on the front edge of the blocks with the feet parallel and the toes overlapping the front edge of the blocks. The hands also grip the front edge of the blocks until the gun sounds. Whether using the grab or the track start, always have the head down and the hips as high and as close to the edge of the blocks as possible. This positions the center of gravity closer to the edge of the block.
When the beeper goes off, quickly push (don't grab) on the starting block with your hands. This gets the body moving towards the water quickest and positions the body for best use of the leg thrust. With the legs, try to explode; then concentrate on using the toes (which were curled over the front of the block) for additional push.

![Image](shutterstock.com-53827747)

Figure 8. Ready position for the conventional start, in which the feet are close together and toes flex over the front edge of the blocks. Hands grip the blocks in front of the toes.

II The Dive

The dive is intended to be one that creates as little water resistance on entry as possible. The swimmer, depending upon the stroke to be employed during the race, will attempt an angle of entry that balances speed through the water and an ability to seamlessly begin the stroke cadence.

The swimmer should travel the optimal distance through the air before entering the water. This skill requires a forceful pushoff by the legs on the blocks, and an optimal entry position.

Once the start begins and you are hurtling through space, the dive begins. You can gain .1 to .3 seconds on the start, but you can gain or lose .5 to 1.0 seconds on the dive. Therefore the dive is much more important than the actual start technique. Head up, push with feet and toes upward and outward. Once the swimmer enters the water they should try to get the body to enter into the smallest "hole" possible. This reduces loss of speed when the hands break the surface tension of the water.
Figure 8. Swimmers are airborne during the dive phase of the start. Greater distance of dive = more effective start.

Figure 9. Dive phase of start, head down, arms flexed to 90°.
Figure 6. Arm swing at takeoff. Arms first move up and back to optimize reaction forces from the blocks.

make a hole in the water. The hands are clasped with one hand on top of the other and the arms pointing directly upwards from the shoulders. The hands should make the smallest possible hole in the water to minimize splashing at entry. The arms, head and body are aligned during entry to attain a streamlined shape. The shoulders are pointing directly upwards in a position of 180° of shoulder flexion. The head is perfectly aligned with the arms and is in a neutral position. The swimmer must keep the head down and arms down, while following the whole body through water where the head and arms went. As the upper body enters the water, the hips continue to extend to align the legs with the trunk. During entry, the body assumes a streamlined position to minimize splash.
Figure 8. Good alignment of swimmers at entry into the water, minimal splashing at entry.
A common error seen during entry is the head moving too far into flexion so that it is no longer aligned with the arms. This can increase the resistance at entry and decrease the effectiveness of the start. The head must be kept down but it must remain aligned with the arms and shoulders.

III The Pullout

The transition between the dive and the stroke itself is the pullout, where the swimmer moves dynamically to the racing position in the water. The swimmer tries to maintain a streamlined shape in the water, with all the body parts aligned in a straight line.

The swimmer wants to start swimming the race at optimal speed. When the swimmer comes to the surface of the water to start swimming, they want to have as much of the starting block speed as possible. To do this, they maintain a tight streamline while also performing a well-timed breakout to the surface of the water. It has been suggested that stretching daily helps to improve the streamline.

In the breaststroke the pullout consists of one full arm stroke underwater, and one full kick. The arm stroke usually consists of a butterfly arm stroke underwater, accompanied by a dolphin kicks.

- In breaststroke races, you are allowed to complete one "pullout" underwater, regardless of how far you travel - but your head must break the surface of the water before you complete your next arm stroke.
Hold the streamline until just before you begin slowing to the speed of the next step - you have to figure this out in practice.

- It is better to begin the next step too soon - when you are still moving fast - than to wait too long - when you have lost too much speed.
- Breaststroke usually has the longest period of time before the streamline is disturbed and begins with a pull.

Breaststroke - here you will start with your arms, followed by a return to an upper body streamline and then a kick. Breaststroke even has a special name for the breakout - the pullout.

- Push off on your side, rotated slightly towards your chest, then complete the rotation to a fully chest down shortly after you leave the wall. Push off at a downward angle.
- Before you slow down, begin your pull - but this one is a long one, all the way to your side. You maintain your head in line with your spine, even though your arms have moved; you are trying to stay as streamlined as possible. As you pull, level your body.
- The pull follows a pattern similar to butterfly - hands sweeps out, turn and press back and in under your body slightly while you keep your elbows high (point them towards the side walls of the pool), then press back, finishing by pushing the water back past your thighs, arms extended and tight against your sides.
- After a brief pause, slip, slide, and sneak your hands back to the streamline position. keep your elbows and hands close your body as you move them forward.
- As soon as you are streamlined, pull your heels up and take one strong kick up to the surface.
- Begin your pull as you surface, being sure to break the surface of the water with your head before you begin the in-sweep of your regular stroke.
- Start your pull and take your breath in its normal sequence; don't breath first, pull later; it's like dropping an anchor.