



# Curiosity Guide #405

## Basketball Science

Accompanies Curious Crew, Season 4, Episode 5 (#405)

### Free-Throw Form

Investigation #8

#### Description

Improve your free throws with these super scientific tips!

#### Materials

- Basketball
- Basketball court

#### Procedure

1. Stand at the free throw line.
2. Hold the ball with both hands.
3. Focus your eyes on the rim.
4. Stand with your feet shoulder-width apart and pointing toward the basket.
5. Bend your knees.
6. Hold the ball just above your waist, then move it up into shooting position.
7. Spread out your fingers so the ball is supported on the tips of your fingers of your dominant hand while the second hand holds the ball stable on the side.
8. Keeping the ball in front of you, lift the ball above your head. Keep your elbow bent.
9. Straighten your body, starting with your legs and torso, and extend your shooting arm in one fluid motion while moving your balance hand away from the ball.

10. Extend your arm and wrist toward the rim, rolling your fingers down the ball to create a backspin. Release the ball just as you reach the top of your jump or stretch.
11. Follow through with your fingers so that your wrist rolls down and your fingertips are pointing at the rim.
12. To establish consistent form, keep practicing!

## My Results

## Explanation

Before the 1950's, basketball players held their ground, shot with two hands, and usually used the backboard. Since then, players have worked on their form to make accurate jump shots. Establishing consistent shooting form involves a lot of practice, but it also builds muscle memory. New players must think a lot about the process, which relies on the cerebral cortex part of the brain. However, when the physical action is regularly repeated, it can become an automatic process. Information for the action is stored in the cerebellum and does not require much concentration. That is why professional players seem to be able to shoot many free throws without much thought.

In fact, if these great players were to think too much about that clutch shot to win the game, that could interfere with their muscle memory and miss the shot.

**Think about this:** When players shoot jump shots far from the rim, they have a better chance of making the shot if the ball travels in a steeper arc. We call the arc the ball travels a parabola. If a player shoots a lower parabola arc at 45 degrees, the ball arrives at the hoop with a smaller angle of opening in the rim. We say that the shot was flat. An arc at a 55-degree angle increases the area of the rim that the ball can fall through by 19% and will lead to more baskets scored. Adding a soft back spin increases the arc and hey, you've got nothing but net!

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