



## Curiosity Guide #507

### Soccer Science

Accompanies Curious Crew, Season 5, Episode 7 (#507)

#### Throw-In Challenge

Investigation #4

#### Description

How far can you throw a soccer ball?

#### Materials

- 2 Soccer balls
- Measuring tape
- A friend

#### Procedure

- 1) Stand on one of the painted side field lines or mark your own line in your yard.
- 2) Stretch out the measuring tape onto the field.
- 3) Try standing in place and throwing one of the balls with one hand.
- 4) How far did the ball go?
- 5) Try again, but this time throw the ball with both hands over your head while you remain in place.
- 6) What did you notice? How far did the ball go?
- 7) Try the following technique for soccer throw-ins.
- 8) Hold the ball on its sides with both hands.
- 9) Move the ball over and behind your head while arching your back.
- 10) Rotate your shoulders forward while taking a step forward with your stronger foot.
- 11) Drag your weaker foot behind for traction and stability but be careful not to lift that foot off the ground.

- 12) Once the ball passes over your head, release the ball but follow through with your hands in the direction of the throw.
- 13) What did you notice? How far did the ball go?
- 14) Spend time practicing your technique for soccer throw-ins. You will be glad you used science to perfect your technique!

## My Results

## Explanation

When you are standing in place, throwing a ball with one hand moves the ball farther more easily than throwing with two hands. This is because a one-handed throw allows you to twist your body at the waist to increase the amount of energy traveling through the hips, back, shoulder, arm, and wrist. A two-handed throw is more restrictive, with less body twist. However, with strength training and practice, you can learn to throw the ball quite far with two hands. Push-ups and pull-ups can help strengthen the upper body. Also, regularly practicing with a partner, or throwing at increasingly distant targets, can help condition the muscles for improved distance and accuracy.

Some players with backgrounds in gymnastics learn to do a flip throw-in, where the athlete does a front flip, lands on her or his feet, and releases the ball with a lot of momentum.

**Think about this.** In the game of soccer, forces from kicks, throws, or headers are constantly applied to the ball. In each case, that force changes the ball's acceleration, which is how fast the ball is moving. Players have to make quick decisions about how hard they will kick the ball. Is the athlete going to do a short kick to a teammate, or a hard strike on the goal? Either way, the moment the force is applied to the ball is when the ball is accelerating the most. As soon as your foot loses contact, the ball begins to slow down, so be sure you apply enough force. Wow! Great shot!

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