



## Curiosity Guide #507

### Soccer Science

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

#### Design a Mini-Foosball Table

STEM Challenge

#### Description

Foosball, football, soccer: Whatever the name, these words spell FUN!

#### Materials

- Shoe box
- Extra cardboard
- Wooden dowels, three-sixteenths-inch in diameter
- Wooden clothespins
- Markers
- Hole punch
- Utility knife
- Scissors
- Ruler
- Hot glue and glue gun
- Tape
- Level
- Paint
- Rubber bands
- Ping pong ball

## Procedure

- 1) Space four dowels out equidistantly beside the open shoebox.
- 2) Keeping the positions of the dowels, Clip 3 to 4 clothespins on each dowel so that the dowels stand on the base of the clothespins and one end of each dowel touches the side of the box.
- 3) On the shoebox, measure and mark one-fourth to three-eighths of an inch up from the location of the end of each dowel with a marker to ensure the clothespins won't hit the bottom of the box during play.
- 4) Use a hole punch to make holes at the four dowel marks made on one side of the box.
- 5) One at a time, slide a dowel through a hole in the side of the box to mark the opposite side. Be sure the dowels run level.
- 6) Mark the locations for the dowels on the opposite side and punch holes out with the hole punch.
- 7) Slide in each of the four dowels and attach the clothespins, 2 for each goalie end and three in the center.
- 8) Mark the location of each clothespin on the dowel with a marker.
- 9) Disassemble the dowels and set aside.
- 10) Use the utility knife to carefully cut out a goal on each end large enough for the ping pong ball to go through.
- 11) Goals can be open, or you might add a goal room out of cardboard scraps and tape to catch the ball.
- 12) Paint, color or decorate the clothespins and dowels to identify the opposing teams.
- 13) Slide the dowels back in place. Place rubber bands on the ends of every dowel to keep the dowels from falling out.
- 14) Position the painted clothespins in place according to the marks you made. Hot-glue the clothespins in place.
- 15) Drop in the ping pong ball and play!

## My Results

### Explanation

Foosball is the German word for soccer that translates into the word "football." The game of foosball is believed to have started in Europe. Foosball came to the United States in the 1960s. Like soccer, Newton's Laws of Motion are involved in the game of foosball. The ball will stay at rest until a force acts on it. Then the ball will move in the direction it was struck. The ball's speed will slow from friction on the box. However, if the ball is struck again, it will accelerate during impact and then decelerate or slow down after impact. The distance the ball travels depends on the force applied to the ball. If the ball meets an obstacle, like an opponent's clothespin, that collision will cause an equal and opposite reaction on the ball and change the ball's direction. Most players have fun spinning the dowels as quickly as they can in hopes that they are lucky enough to get the ping pong ball in the goal. However, with practice you can learn to control the ball with the clothespins and strike the ball with enough force and at the proper angle to score. Have fun!

The Crew did a great job engineering foosball tables, and engineers continue to redesign soccer balls too. The traditional soccer balls were made of 32 stitched panels in a pattern called the Buckminster design. In 2006, a new design was introduced with only 14 bonded panels. Then, in 2010, the Jabulani ball was developed with 8 solid panels held together with shallow stitches. Players noticed that smoother ball designs made the balls behave differently, even changing direction in the air when kicked in certain ways. The Brazuca ball is the latest design with even fewer panels-- only 6-- and deeper seams. Redesigning soccer balls continues to be a fun challenge!

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