



## Curiosity Guide #502

### Simple Machines: Wedge

Accompanies Curious Crew, Season 5, Episode 2 (#502)

#### Designing a Mini-Canoe

STEM Challenge

#### Description

Put your design skills to the test to create a canoe that will travel straight.

#### Materials

- Aluminum foil
- Plastic wrap
- Softened birch bark
- Milk cartons
- Paper clips
- Wire
- Play doh
- Popsicle sticks
- Balsa wood pieces
- Scissors
- Hot glue
- Tape
- Stapler
- String
- Rubber bands
- Toothpicks
- Wallpaper tubs
- Water
- Pennies or washers

Procedure 1: Design and make a canoe, using materials from the list  
Consider the following guidelines.

The canoe should:

- 1) Travel straight when launched in a water track.
- 2) Be narrow enough to fit in the water track.
- 3) Be as symmetrical as possible to run true.

Procedure 2: Test your design

- 1) Fill the wallpaper containers with water.
- 2) Place 10 pennies or washers in the bottom of your boat for ballast.
- 3) Secure a rubber band spanning across the top of the track, 5 inches from one end.
- 4) Attach a piece of tape to the center of the rubber band to serve as a pull when retracting the rubber band.
- 5) Pull the rubber band back by the tab to the end of the track.
- 6) Place the canoe inside the launcher and release.
- 7) Test and redesign as necessary.
- 8) Could you get the boat to run straight?

My Results

Keep track of your original design, the changes you make, and what happened in the test run after each change.

## Explanation

The bow of a boat, particularly in a canoe, is a kind of wedge meant to slice through the water when the boat is propelled forward. If the nose of a boat were flat, the boat would not go as straight or as easily because of the water resistance. The more symmetrical the two sides of the canoe are, the straighter the canoe will travel. The more tapered the front of the boat is, the less force is required to move the boat along. Boats that are wide are usually more stable, but you must use more force to get wide boats to go faster.

**Explore further:** Many vehicles make great use of wedges in their designs. You saw how the crew was trying to make their canoes symmetrical. Boats that can cut through the water will run smooth, straight, and fast. Look at the shape of airplanes. Airplanes use wedges, too, on their noses and wings to separate and cut through the air molecules. That helps airplanes run more efficiently. Racecars are another great example of wedge technology that can separate air particles and reduce the air resistance. The shapes of the vehicles allow them to increase their speed with less energy. Now that's fast!

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