

# ANCHORS AWAY

## EXPERIMENT: DESIGN AND RACE BOATS



Experience how pressure makes things move. Design a boat and sail, then see if it can make it to the finish line before your opponent's in a breath-powered boat race!

### MATERIALS

Boat materials, such as aluminum foil, Styrofoam cartons, pieces of pool noodle

Sail materials, such as paper or foam craft sheets

Two 10-foot vinyl rain gutters

Four gutter end caps

Blue food coloring

Straws

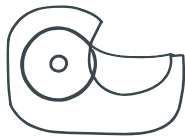
Craft sticks

Tape

Scissors

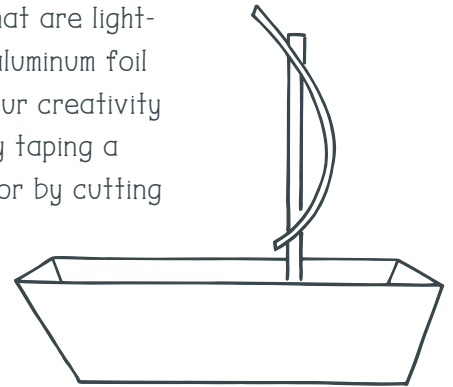
Long table or several chairs

Water

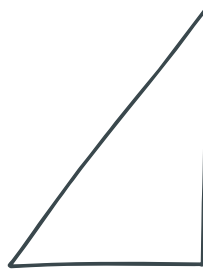


### INSTRUCTIONS

Build your boat using materials that are light-weight and waterproof, such as aluminum foil or pieces of pool noodles. Use your creativity and imagination! Make the mast by taping a straw or craft stick to the boat or by cutting a slit into a pool noodle and inserting the craft stick. Cut a piece of lightweight paper or foam craft sheet to act as the mainsail. Think about what shape will help your boat move fastest. Poke a hole in either end of the sheet and slide the sail onto the mast through the holes, or tape it to the mast. Decorate your boat in any way you'd like.



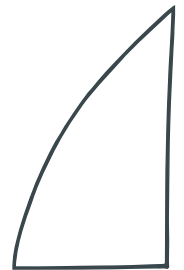
### POSSIBLE SAIL SHAPES:



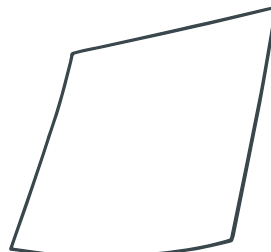
lateen



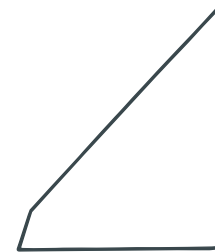
square head



roached

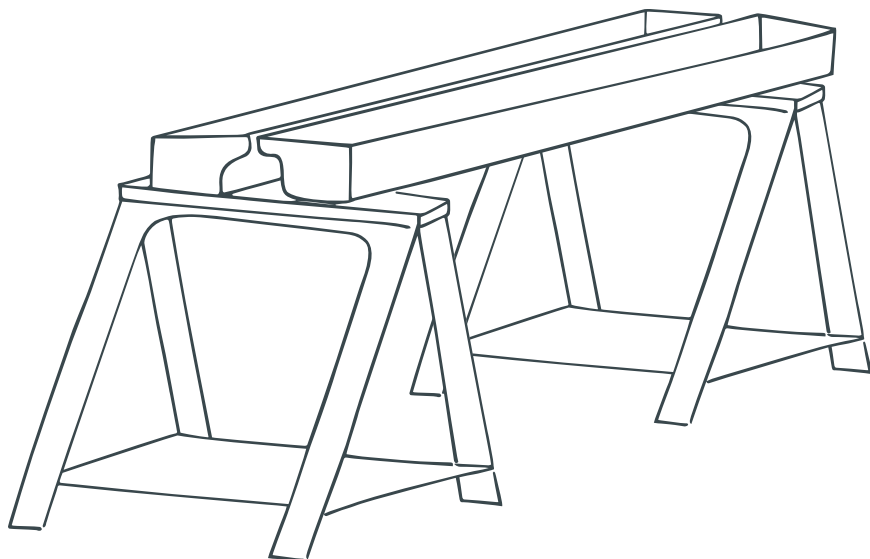


lug sail

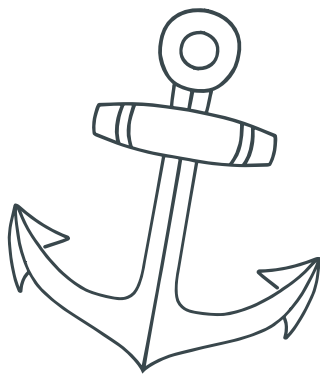


settee

Prepare the racing track. Snap the end caps in place on each gutter and lay the gutters side by side on a long table or on chairs. You may need to tape the gutter to the table to make sure it remains upright. Fill each gutter with water and add a few drops of blue food coloring.



Get ready to race! Place the boats at the starting line. When the official says, "Go!" each player blows through a straw aimed at their boat to get it to move. Don't use the straw to push the boat forward! Follow the boat down the track and blow at the sail as you go. The first player to get their boat to the finish line is the winner!



## GAME ON

Use a stopwatch to time your boat races. Then redesign your boat and sail to see if you can make an even faster one. What boat shape will move more quickly? What sail material is most effective?

## TIPS

Find inexpensive vinyl rain gutters at home improvement stores. Or race your boats in a bathtub or pool by making "lanes" with pool noodles or other long objects to help them sail straight.

## MORE WAYS TO PLAY WITH BOATS

See a large boat up close in MSI's *U-505 Submarine* exhibit ([msichicago.org/u505](http://msichicago.org/u505)). This year is the 70th anniversary of the capture of this German submarine during WWII.

## LIKE THIS ACTIVITY?

You could be a ...

- Mechanical engineer
- Naval architect
- Sailor
- Boat mechanic

## WHAT'S HAPPENING?

Air is made up of tiny particles called air molecules. When you blow on your hand, you can feel the air because you are pushing the air molecules with your breath. The force of air molecules pushing against the surface of an object in scientific terms is known as "pressure." In this case, air pressure can move the boat because more force is being exerted on one side of the boat than the other. The harder you blow, the faster the air molecules move and the more pressure you put on the boat. Your breath is acting just like wind on real boats!