NC SCIFEST
PRESENTED BY BIOGEN FOUNDATION

DUKE ENERGY SCIENCE NIGHT

Boat Builders

Big idea

Explore a force called **buoyancy** by designing and building a boat with a simple household material.

You will need

WHAT WE GAVE YOU:

- large plastic tubs
- sheets of aluminum foil
- glass stones
- Boat Builders instruction sheet

STUFF YOU PROVIDE:

- water
- paper towels
- a container to hold the glass stones
- a large towel (recommended)

Set it up

Fill the plastic tubs no more than 2/3 full of water. Place the towel on a stable surface that won't be easily jostled and put the containers of water on the towel. Place the Boat Builders instruction sheet on the table along with the foil sheets and glass stones.

It's showtime!

Explain to students they'll be using the design process (question, plan, build, test, improve) to experiment with buoyancy. The essential question to ask students is if different shapes of boats can hold different amounts of weight before sinking. Give each student one sheet of aluminum foil to shape and fold however they would like. Once they're ready, have them place their boat in the tub of water and count how many glass stone they can add before it sinks.

If they love it...

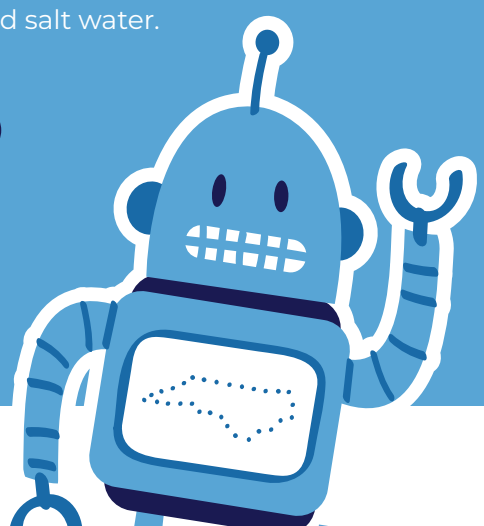
After their boat sinks, they can pull it out of the water and reshape it to see if they can build a better boat. Students can redesign and retest their boat as many times as they'd like as long as it doesn't rip the foil.

Fun options

AHEAD OF TIME

In one of the plastic tubs, create a saltwater solution inside. Stir in regular table salt ¼ cup at a time until no more salt will dissolve in the water. Ask students to compare how the same vessel behaves in both fresh and salt water.

Continued ›



SCIENCE FOR ALL • CIENCIA PARA TODOS •

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Why is this science?

Gravity is a force that pulls everything on Earth downward. **Buoyancy** is a force that pushes upward on objects that are in fluids (liquids and gases). Ships use the force of buoyancy to float even when the ship itself is made of a very dense material that would normally sink, like metal.

The shape of a ship determines how much weight it can carry. Large ships such as cargo ships and aircraft carriers push a lot of water to the side: this is called displacement. The more water that a ship displaces, the more buoyancy will push up on it, and the more weight it can carry.

If you look closely, you may even see the water level going up in the plastic tub as students add marbles to their boats causing their boats to displace more water.

North Carolina connection

Ships have a long and important history in North Carolina. The first colonists in the state arrived in the Outer Banks in 1585 after sailing across the Atlantic from England. The colonists disappeared a few years later, giving rise to the name The Lost Colony, but you can still visit the site and watch a show about the event in Manteo every summer. In the late 17th and early 18th centuries, pirates sailed the coast of North Carolina. One of the most famous pirates of all time, Blackbeard, terrorized the seas from the Caribbean all along the Atlantic coast until his ship ran aground near Beaufort, NC. His ship, the Queen Anne's Revenge, was discovered in 1996 and you can visit the lab in Greenville where conservation work is being done to prepare artifacts for museums. The QAR Lab holds a special open house as part of the NC Science Festival every year!

N&C SCIFEST

PROUDLY PRODUCED BY

MOREHEAD PLANETARIUM+ SCIENCE CENTER

DUKE ENERGY SCIENCE NIGHT

Boat Builders

Supplies

- 1 sheet of aluminum foil
- glass stones
- tub of water

What to do

- Question – What do you think makes a boat float?
- Plan – What do you want your boat's shape to be?
- Build – Go ahead and put your plan in motion!

Test your boat

- Test – Place your boat in a tub of water. Slowly and carefully count and add glass beads to the boat until it sinks from the weight.
- Improve – Think about how you might rebuild your boat with a different plan to hold even more glass beads before sinking.

You can redesign and retest your boat as long as you don't rip the foil!