

# WHATEVER FLOATS YOUR BOAT

Can you make a boat that floats out of aluminum foil? Can that same boat carry more than its own weight? In this experiment, you can explore the relationship between density, displacement, and buoyancy. What other materials could you use to make a boat? What shapes or designs work best?



## Which Boat Shape Holds More Weight?

### YOU WILL NEED:

- Scissors
- Aluminum foil
- Large bowl or sink filled with water
- Pennies



1 Cut out two square pieces of aluminum foil. Make sure they are about the same size.



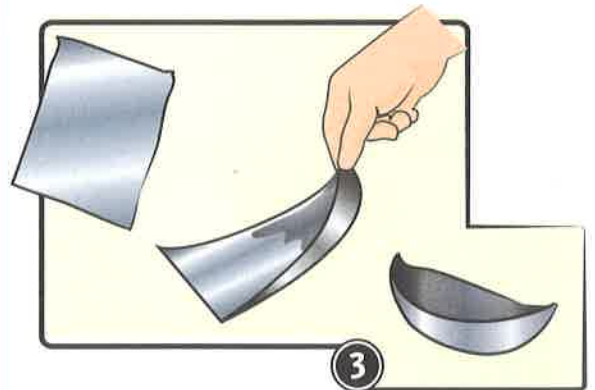
2 Shape one piece of aluminum foil into a round boat shape.

### A WATERY DISCOVERY

Archimedes was a scientist in ancient Greece. He knew that when an object was placed in water, some of the water was pushed out of the way, or displaced. It is said that he exclaimed, "Eureka!" when he discovered that the force of the water pushing up on the object is equal to the weight of the water displaced.



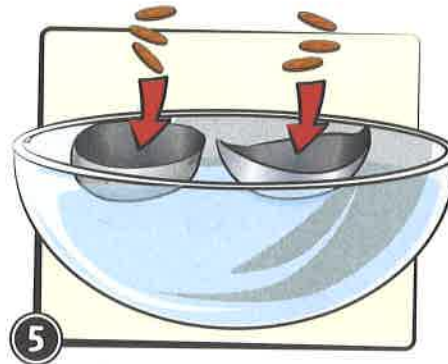
Eureka!



3 Shape the other piece into a canoe shape, with pointed ends. These two shapes will be your model boat shapes.



4 Float your boats in a large bowl or sink filled with water.



5 Add pennies to each boat, one at a time, until one boat sinks. Continue adding pennies until the other boat sinks. Which boat can hold the most pennies without sinking? Why do you think one boat shape worked better than the other?



- ☞ Try your test again, but use teaspoons of water instead of pennies.
- ☞ Try making test boats with different materials, such as clay, wood, or empty recyclables.
- ☞ Research real boats, and create models to test their shapes.

## SUBMARINES

Boats, ships, and submarines are engineered to have buoyancy. A submarine is specially designed so that the crew can change its buoyancy to dive or return to the surface. They do this by taking water in or pushing water out of compartments called ballast tanks.



## The SCIENCE Behind It

A material is buoyant and floats in water if it is less dense than the water around it. But aluminum is more dense than water! How does this work? A solid aluminum boat would definitely sink in water. But the boats in this experiment are both shaped to hold some air. That air is what gives the shape its buoyancy. An object can float in water if its overall density (including the air inside) is less than the density of the water. But a boat loses buoyancy when it becomes too heavy with coins, or when it tips and takes on water.

