Aluminum Foil Boat Experiment

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Introduction

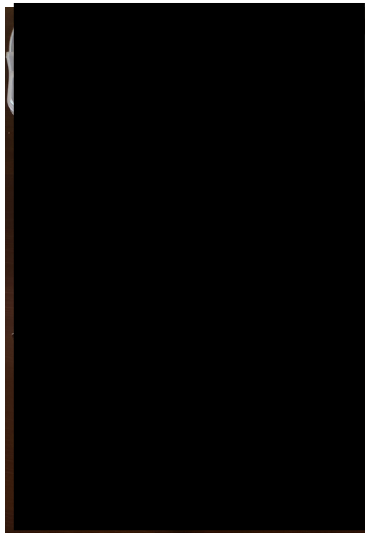
How is it possible for a boat to float on the water? Design and construct boats out of aluminum foil and see how many pennies they can hold before they sink.

Think About This

How does the shape of a boat change how much weight it can carry?

Materials

- ☐ 3 sheets of aluminum foil, of equal size
- ☐ Small objects to use as weights
  - Try to find an object that you have a lot of that can get wet, such as:
    - Pennies, dimes, or other coins
    - Marbles
    - Buttons
- ☐ A place to float a small boat
  - Clear, plastic container filled halfway with water
  - Large kitchen bowl filled halfway with water
  - A sink or bathtub filled partway with water
- ☐ Paper towel or dish towel
- ☐ Piece of paper
- ☐ A pencil or pen



Do Ahead of Time

- Gather all supplies
- Fill testing container with enough water so that the boat can float freely and cannot touch the bottom without sinking

Directions

Boats of all shapes and sizes are able to float and carry cargo. Make different boats out of foil to discover how a boat's shape and design can impact its ability to carry weight.

1. Set up a record sheet like the one below on a piece of paper, or print out a copy.
2. Think of three different boat shapes. Draw the first boat in the column on the left. Draw the second boat in the middle column. Draw the third boat in the column on the right.
3. Using one sheet of aluminum foil, fold up the foil to build the boat design. Be sure to pinch the foil together tightly so that the boat doesn't leak.
4. Place the boat onto the water in the testing container. Does it float? Record your observations on the record sheet.
5. Predict, or guess, how many pennies (or other weights you're using) the boat will hold. Record the prediction on the record sheet.
6. Place pennies or weights into the boat one by one, slowly. Wait 5 seconds in between placing each penny. Keep adding pennies until the boat sinks. The last penny that causes the boat to sink does not count.
7. Remove the boat from the water and count/recount the number of pennies the boat held. Record the number on the record sheet.
8. Place pennies on towel to dry off. Make sure the pennies are completely dry before testing the next boat.
9. Repeat steps 3-7 to test the remaining boat designs.

Aluminum Foil Boat Experiment Continued

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BOAT #1	BOAT #2	BOAT #3
Draw the Boat Design	Draw the Boat Design	Draw the Boat Design
Does it Float? (Y/N)	Does it Float? (Y/N)	Does it Float? (Y/N)
Predicted # of Pennies	Predicted # of Pennies	Predicted # of Pennies
Actual # of Pennies	Actual # of Pennies	Actual # of Pennies

What was the most successful shape? Does the shape of the boat affect how much weight it can hold?

_____

_____

_____

How did the placement of the weight affect the boat's ability to float?

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What's Happening?

When an object, like a boat, is placed into water, it pushes some of the water aside. This is called **displacement**. The amount of water that is displaced equals the weight of the object.

Objects in the water have two forces acting upon them - **gravity** and **buoyancy**. Gravity is the force pulling the object down, while buoyancy is the force pushing the object up. The amount of buoyancy is equal to the amount of water that is displaced. If the buoyancy is less than the force of gravity, the object will sink. If the buoyancy is greater than the force of gravity, the object will float.

How much space a boat takes up can help spread out the gravity over a larger area. A larger boat usually holds more weight than a smaller one. The shapes of the boats all helped to spread out the weight of the boat.

Was it your largest boat that could hold the most weights? Email us at
AtHome@discoveryworld.org
and show us pictures of your boats or tell us what you observed.