



“Float a Boat” Instructions

Ages: K-12 (adult supervision required for younger children)

Background:

- Some objects float in water and other objects sink.
 - Buoyancy is the force that determines whether an object will sink or float in a liquid.
 - Things that are positively buoyant float
 - Things that are negatively buoyant sink
- For an object to FLOAT, the weight of the water the object displaces (moves) must be greater than the weight of the object.



Goals:

- Students will experiment with different boat designs/shapes to determine which design will hold the most “cargo” (weighted household items) before sinking.
- Use the process of science to test different engineering solutions.

Materials:

- Aluminum foil
- Scissors
- Ruler
- 10 – 20 pieces of “Cargo” (such as washers, pennies, or other “weighted” objects you can add to your boat)
- Medium-sized container of water
- Towel

Question:

Does a boat’s shape affect how much cargo it can hold? Your challenge will be to build a boat that will hold the most cargo (such as washers, pennies, other weighted objects). You will do an experiment to test different boat shape designs.

Quick Note: When a scientist wants to learn more about an animal or plant, or habitat, they do an experiment. In an experiment, it is very important that everything is kept the same (controlled) except for one thing. That one thing that changes is called a “variable.” In this experiment, the boat shape will change, BUT size and type of foil used will remain the same (controlled) for all boat shapes.

Steps:

1. Using a ruler, measure and cut five 6” x 6” foil squares.
2. Using the 6” x 6” foil squares, build 3 different boat shapes - one circle, one square, and one triangle-shaped boat.
3. Decide if you think boat shape will impact how much cargo the boat can hold. If you think the amount of cargo (ex. number of washers or pennies) a boat can hold will differ for each shape, then decide which boat you think will hold the most cargo. Be sure to record your hypotheses on the “Float a Boat Datasheet.”

4. Write down the boat shape (boat # 1 = square; boat #2 = circle; boat #3 = triangle on your “Float a Boat Datasheet.” Make a guess of how much cargo (ex. number of pennies or washers) you expect each boat shape to hold before it sinks. Record your guesses for each boat shape in the table on your “Float a Boat Datasheet.”
5. Place boat #1 (the square boat) in the container of water. Slowly add cargo, one at a time to your boat. Write down how much cargo (ex. number of pennies or washers) the boat held before it sank.
6. Repeat for boat #2 (circle) and #3 (triangle). Make sure you use the same weighted cargo (washers, pennies, etc.) for each boat shape, as consistency is key.
7. Analyze results and draw conclusions. Which boat shape held the most cargo? Did your results match your hypothesis? Why do you think your experiment turned out the way it did? Write down your conclusions and additional questions on the “Float a Boat Datasheet”

Continue your learning and engineering:

- Are there other boat shapes or designs you could consider? Take the two remaining foil pieces and consider grabbing other household items, such as straws, coffee stirrers, toothpicks, popsicle sticks, etc. to see if you can build a boat that holds the most cargo.
- Want to go even bigger? Consider starting with a larger piece of foil (larger than 6” x 6”) and other household items to see if you can build a larger model. With your parent’s permission, you could use a larger container of water to see how much cargo your larger boat can hold.
- Be creative, have fun, and be safe!

Questions? Want to share your results?

Contact Oregon Sea Grant Marine Educators! Feel free to send us your photos and tell us about your experience!

- Phone: 541-867-0233
- Email: SeaGrantMarineEd@oregonstate.edu



Float a Boat Datasheet

Question: *(What question are you trying to investigate?)*

Does boat shape affect the amount of "cargo" (weighted objects) it can hold?

Hypothesis: *(What do you think will happen?)*

- 1) Hypothesis 1 - Circle one: I believe that the boat shape (will or will not) affect the amount of cargo (ex. pennies, washers, etc.) that can be added to a boat without it sinking.

Will Will Not

- 2) Hypothesis 2 - Circle one: I believe that the _____ boat shape will hold the most cargo (ex. pennies, washers, etc.) before it sinks.

Circle Square Triangle

Materials & Methods: *(How will you test your question and what will you use?)*

Observations & Results: *(What is happening in your experiment?)*

Use the foil square to build the three different boat shapes (circle, square, and triangle). Place one boat inside the container of water. Gently add one piece of "cargo" at a time inside the boat. Be sure to count each piece of "cargo" as you go. Stop adding "cargo" to the boat, once it sinks. You will repeat this experiment with the other two boats, one at a time. Fill out the table below. Then, feel free to experiment with other boat shapes that will serve as Boat #4 and #5.

Boat #	Boat Shape (Circle, Square, or Triangle, Other)	Guess how much "cargo" the boat will hold before it sinks.	How much "cargo" did the boat hold before it sank?	How did the boat sink? Fast or Slow? Also include other observations.
Boat 1				
Boat 2				
Boat 3				
Boat 4				
Boat 5				

Conclusion: *(Was your hypothesis supported? Why do you think things happened the way they did?)*

Further Questions: *(What could you do differently in the future? What other questions would be interesting to ask?)*