



**STEM Enrichment Volunteer Program
Davidson College and The Ada Jenkins Center**

Mission Statement

The goal of STEM Enrichment is to perform engaging, fun science activities and experiments with Ada Jenkins students in hopes of instilling in them an appreciation for STEM. We hope this early exposure to interesting, relevant scientific concepts will foster students' identities as scientists and depict the importance of science in everyday life. Our program's purpose aligns with that of LEARN Works as we uphold principles of explaining and guiding experiments through engaging practices, while also allowing for independent discovery and curiosity. Additionally, we use models and hands-on activities to promote an interactive learning environment that allows students of varying learning styles to thrive.

Lesson Plan: Why do boats float?

Questions to ask students before starting:

Has anyone ever been on a boat? How can something be so heavy, but float in water? Boats can float because of their shape. Whether an object sinks or floats has to do with displacement. **Displacement is when an object displaces, or pushes aside water. A boat floats because it displaces water that weighs more than its own weight!**

Preparation:

- Prepare four stations including:
 - 5x6in sheet of tin foil (pre-cut)
 - 30 pennies
 - A small container filled with water

Procedure:

- Pick up your sheet of tin foil. **How heavy does it feel?**
- Pick up a penny. **How heavy does it feel? Will it sink or float in water? Try it out.**
- Prepare your boat by folding up the sides of the sheet of tin foil. **Why do you think this will prevent the boat from sinking?** (Because as water is becoming displaced, the water may rise around the boat!)
- Place the boat in a bowl of water. **Does it float?**
- **Predict how many pennies your boat will be able to hold without sinking.**
- Begin adding pennies to your boat. **Is there a way you should place the pennies so that you can add more without the boat sinking?** (Spread the pennies out).

- **How many pennies were you able to place on your boat before it sank? Did your boat tip to one side?**
- **How could you increase the number of pennies your boat can carry?**
 - Placing them on the boat differently?
 - Folding the sides higher?
 - Making the boat a different shape?
- Try this experiment again but this time make one of these changes. **Be sure to dry the pennies - why might this be important?** (Because water on the pennies adds weight!)

Troubleshooting

Be sure that there are no holes in the tin foil boat because water will get into the boat and it will sink faster due to added weight from water.

Observations and results

What was the most amount of pennies someone was able to load onto their boat? A penny weighs 2.5 grams. So multiply the number of pennies you were able to load on your boat by 2.5 to determine your boat's carrying capacity. **Why do you think that the boat can carry so many pennies?** This occurs because of displacement, **the boat is displacing water that weighs more than the weight of its cargo!**

Real-World Application

Cargo ships are engineered to carry heavy loads, but they also have to strategically distribute their loads on the ship. These ships can carry up to 25 tons. That is over 3 elephants!

Source:

<https://www.kids-fun-science.com/easy-science-experiment.html>