4H1750

TEACHING SCIENCE

...when you don't know diddly-squat

Can you make a boat out of aluminum foil?

Purpose:

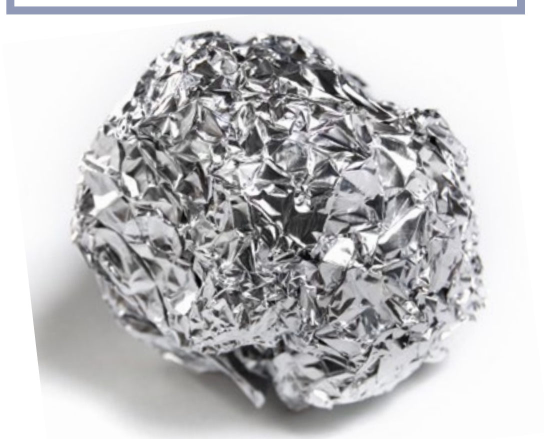
The purpose is **not** to teach specific content, but to teach the process of science – asking questions and discovering answers. This activity encourages young people to try to figure things out for themselves rather than just read an answer on the internet or in a book. As a leader, try not to express your opinion, but let the youth engage in arguments based on evidence.

Time required:

20 minutes or multiple days depending on the interest and questions the youth have

Materials:

- ❑ Aluminum foil sheets 9 inches by 10.75 inches (one per participant) (You can buy these in bulk precut.)
- ❑ A basin or tub, a little bit bigger than the tin foil sheet, that will hold water
- ❑ Pennies (at least 300)



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SCIENCE PRACTICE: Asking questions and defining problems

1. Ask the youth: *Why do some things float and others sink? Why does a boat that weighs many tons float, but a small pebble sinks? Why are boats shaped the way they are?*

SCIENCE PRACTICE: Planning and carrying out investigations

2. Give each youth one sheet of aluminum foil. Ask them to create a boat that can hold as many pennies as possible. Let them place the pennies on the boat however they want. As they design their boats, try to get the youth to think about why some things float and some things sink.

SCIENCE PRACTICE: Developing and using models

3. *Are the foil boats that hold the most pennies shaped like typical boats? Why might the boat model you are making be different from a normal boat? What things do you have to consider when floating a boat out in open water compared to in a closed container?*

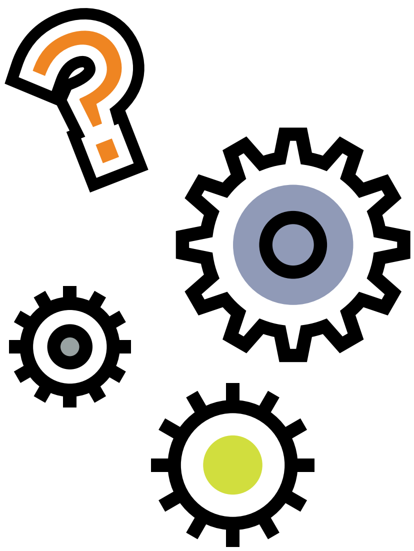
SCIENCE PRACTICE: Analyzing and interpreting data

4. *Based on what you observed, is there anything you could do to make a better boat? Why do you think some boats held more pennies than others? Does how you load your boat affect how much it will hold? Why or why not?*

SCIENCE PRACTICE: Constructing explanations and designing solutions

5. *Why did your boat sink? How did you alter your design so the boat didn't sink as quickly? Did the way you loaded your boat make a difference in the number of pennies it would hold?*

You do not need all the answers to teach science. You simply need an inquisitive mind and to be willing to carry out an investigation.



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SCIENCE PRACTICE:
Engaging in argument from evidence

6. *Do you think there is a maximum amount of pennies a boat made from one sheet of foil will hold? Or if the design is correct, is it limitless? Why or why not?*

Other thoughts:

- *Could you repeat this test with other materials, such as parchment paper or wax paper? Do you think the results would be different?*
- *Do you think a different cargo (other than pennies) would affect how much weight the boat can hold?*
- *Could you test traditional boat shapes and see how well they hold pennies? (canoe, pontoon, rowboat) What types of boats are built for speed compared to those that hold cargo?*

Science & Engineering Practices:

These eight Science and Engineering Practices come from *A Framework for K–12 Science Education* (National Research Council, 2012, p. 42). These research-based best practices for engaging youth in science are connected to in-school science standards that all children must meet.

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Reference

National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* Washington, DC: National Academies Press.