

ALUMINUM FOIL BOATS

Overview:

This lesson serves as a prototyping experiment. It also teaches students about density and surface area as it pertains to water. Students will build boats that need to hold as much payload(coins) as possible before sinking. They can rapidly build as many boats as possible to hold more and more weight

Learning Objectives:

Students will:

- Learn about the concept of buoyancy and why things float.
- Learn about surface area and how to distribute weight
- Learn that problem solving and design are iterative processes where solutions can constantly be refined,

Materials/Resources:

Per Group

- One large plastic tub filled w/water (at least 1ftx1ftx6in)

- Coins, or other items that can be used as weights (at least 2lbs)
- Aluminum Foil (approx. 12inch x 12inch)
- Paper Cups
- Saran Wrap
- Paper Clips
- Scissors
- Scratch paper

Lesson Outline

Time	Activity	Description
5 min	Introduction to Boat-building activity	<ul style="list-style-type: none"> • Assign students to groups of 2-3. • Give each group a sheet of aluminum foil. Explain to them that they need to construct a boat that will float and then hold as much weight as possible before sinking. <ul style="list-style-type: none"> ○ Each group can place the weight on the boat as they please.
15 min	Design and build	<ul style="list-style-type: none"> • Allow the students to build one boat and place it in the plastic tub. • Instruct students to test the boat by adding coins / weights • Instruct students to record the number of weights that prototype 1 could carry before sinking.

10 min	Discussion and instruction	<ul style="list-style-type: none"> • Ask students to share out what made their boat sink or float • Explain the concept of buoyancy to the students. • You may wish to use the diagram appended at the end of this lesson.
15 min	Design and Build (Round 2)	<ul style="list-style-type: none"> • Have the students continually build and test their boats and generate feedback. • If the students seem to maximize the weight on aluminum foil boats, require them to use the additional items (e.g. cups and saran wrap) to make building more challenging. • With these new materials build, test, and generate feedback.
5 min	Closing	<ul style="list-style-type: none"> • Ask students to write down at least one observation or insight they had during the boat-building process.

BUOYANCY

Buoyancy is the force that water exerts on a object. Gravity times the mass of the object is a downward force and buoyancy pushes upward. As long as the object is not more dense than the water then it will float. The diagram on the side should illustrate this effect clearly.

