

Density

2nd Grade

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Benchmarks:

SLC 11: Students will compare properties of liquid states and solids.

Purpose:

This lesson helps students discover the idea of density and how it relates to whether objects float or not. In addition, students will design and evaluate experiments to establish scientific properties.

Materials:

- Plastic Eggs (2)
- Stones or pebbles
- Plastic beakers (~5)
- Water
- Penny
- Paper Clip
- Wood Block
- Candle
- Clay

Initial Demonstration:

Before class, demonstrator should fill one of the plastic eggs with pebbles and seal it, as well as sealing a plastic egg with only air inside of it. Demonstrator asks a student volunteer to hold the two filled plastic eggs to determine which one is heavier. Demonstrator has another student come up and drop one of the plastic eggs into a beaker of water. Student then drops the other plastic egg into the water.

Target Observations:

- One of the eggs sunk, the other did not.
- The egg that sunk was the heavy egg.

Target Model:

-Heavy solid objects sink in water, light solid objects float.

Procedure:

Break the class up into groups of students of ~4-5 per group. Give the students the attached experiment sheet which they will use to “prove you wrong” that heavy solid objects sink in water, light solid objects float by placing the objects in water and seeing if they sink or float. In order to establish the relative weights of the objects, the students should make qualitative judgments such as, “heavy,” “sort of heavy,” “light,” etc... After this is done the students should be given all of the materials and asked to do the experiment to “prove you wrong,” recording their observations as they go.

Discussion:

Did the groups prove you wrong? How? I.e., were there two objects where the heavier object floated and the lighter object sunk? If so, why? How should we revise our model?

Target Revised Model:

-Heavy solid objects sink in water, light solid objects float, *unless the heavy object is wood or a candle.*

Procedure:

Tell the students that you think that they can't prove you wrong this time, but you're going to have them do another experiment just to be sure. Ask the students which object was the heaviest that they used in the last experiment. The heaviest object should be the clay. Ask the students to prove you wrong that the clay will always sink, regardless of how you shape it. To do this experiment, the students will be given the clay from the last experiment, an experiment sheet (with examples of different ways to shape the clay) and the beaker of water from the last experiment (all other objects should be recollected). Target Shape: if the clay is shaped as a bowl with really high sides, it should float.

Discussion:

Ask the groups if they proved you wrong. If so, how? What shape seemed to work? Is there a shape where the clay sinks? Does the shape make a difference as to whether the clay will float or not? What is so special about the shape that makes it float? Sink?

Target Revised Model:

-The weight of an object does not tell us if it floats. The amount of "empty space" in the object, instead, matters: objects with more "empty space" float, objects with less "empty space" sink.

Discussion/Demonstration:

How do you think big metal boats float on water? What does the idea of "empty space" tell us about wood? It floats without any holes in the middle.

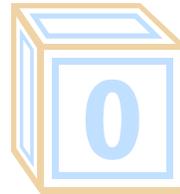
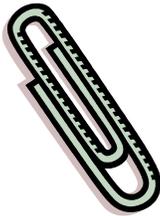
When students come to this last question, they are likely to get stumped. Demonstrator should pull out a briefcase or suitcase packed overfull. Something without a lot of empty space is like a fully packed suitcase – everything is jammed close together. An object with a lot of empty space inside is like a suitcase that is full, but not over-packed – the suitcase closes easily. Metal, like the paperclip, is like the over-packed suitcase – it doesn't have a lot of space inside. Wood, however, is like the not-so-packed suitcase, with some "empty space" inside of it.

Prove me wrong: Heavy objects float and light objects sink.

Data Sheet



Names:

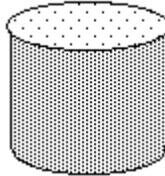
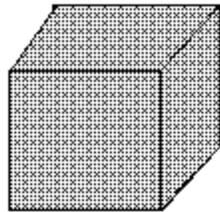
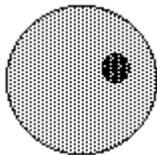
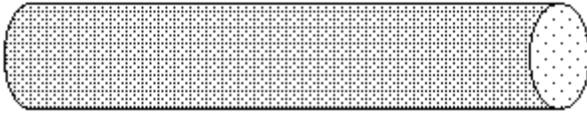


Penny	Paper clip	Clay Ball	Wood Block	Candle
Heavy or Light?				
<u>Sink or Float?</u>				
_____	_____	_____	_____	_____

Prove me Wrong: Clay will always sink, even if you change it's shape.

Data Sheet

Here are some possible shapes to try:



Names:

Did you find a shape that made the clay float? Draw and/or describe this shape in the box below:

Try and draw your shape here:

Try and describe your shape here (what does it look like, are there real-life examples of this shape?):
