

Sink or Float? Experiments in Buoyancy

Grade Level: Kindergarten

Standards Connection(s) You can describe objects' materials (paper, cloth, clay) and physical properties (shape, size, weight, buoyancy, flexibility, color, magnetism, texture).

Objective: In this lesson, students will learn about weight, volume, buoyancy and density. They will also learn how to make hypothesis, conduct a simple experiment, and present their results to their classmates.

Vocabulary/Definitions: 3 – 6 important (new) words

- **hypothesis** – an educated guess or prediction
- **experiment** – a way to test your hypothesis

- **weight** – how heavy or light something is.
- **volume** – how much space something takes up
- **density** – how much something weighs relative to how much volume it has
- **buoyancy** – does it float, sink, or something in between?

Materials:

What will you bring with you?

- scale (balance scale or coat hanger/baskets/weight units)
- fruits/veggies for testing
- clear bin with water
- worksheets

What should students have ready (pencils, paper, scissors)?

- writing utensil

Classroom Set-up:

Student grouping, Power/Water, A/V, Light/Dark, set-up/clean-up time needed
Access to water and some time to set up the bin.

Classroom Visit

1. Introduction:

10 Minutes

Who are you? What do you want to share with students and why? How will you connect this with students' interests and experiences?

Introduce yourselves and interest in science.

Today we're all going to be scientists. Something that scientists do is to observe the world around them. Then, because scientists are usually very curious people, they ask a lot of questions about the things that they see. I know that you're all very curious so I'm sure that you'll make good scientists.

Scientists are also very creative people, they'll use their imaginations and come up with explanations for all the questions that they ask. When they come up with these ideas, scientists call them **hypotheses**. Once scientists have come up with a hypothesis they'll test it with an **experiment**.

Today's experiment is about **buoyancy** which means whether or not something will float. If you've ever been in a swimming pool or bathtub, you've probably already made some observations about whether or certain things are **buoyant**. Normally, we think about an object's **weight** and things that are really light usually float. But, have you



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ever thought about how something that's really big and heavy like a big ship can float? Why do you think that is? It's actually because those big boats, even though they're very heavy, also have a very large **volume** and take up a lot of space so they can float. I'm sure that you can also think of very small things that will sink.

2. Learning Experience(s): **25 Minutes**

What will you do, what will kids do? Demonstrations, hands-on activities, images, games, discussion, writing, measuring... Describe in order, including instructions to kids.

Give everybody a worksheet with a chart. Break into 4 groups.

We have this balance scale here to help you measure the weight. First, before you test your objects you can use this scale to find the object's weight. Then you test whether or not this object sinks or floats based on its weight.

3. Wrap-up: Sharing Experiences **5 Minutes**

Putting the pieces together – how will students share learning, interpret experience, build vocabulary?

Let everyone have a chance to go through the experiment and test with small groups.

Come back together at the end and compare results. Did any of your results surprise you?

Go through some surprising ones together:

- pomegranate: whole, half, seeds, pith
- unopened cans of regular/diet soda

4. Connections & Close: **5 Minutes**

What else might kids relate this to from their real-life experience? How can they learn more? Thanks and good-bye! Clean-up.

Condiment Diver - *The world's simplest Cartesian diver*

Materials: Squeeze condiment packet (soy sauce, ketchup, etc.), Clear plastic bottle with tight fitting lid, glass or cup of water

First, you have to figure out if your condiment packet is a good Cartesian diver candidate. Fill a glass with water and drop in your packet. The best packets are ones that just barely float.

After you have found the proper packet, fill an empty, clear plastic bottle to the top with water. Shove your unopened condiment packet into the bottle. Replace the cap... and you're done! Squeeze the bottle to make the diver sink, and release to make it rise. Amazing!

Many sauces are denser than water, but it is the air bubble at the top of the sauce that determines whether the packet will sink or swim. Squeezing the bottle causes the bubble to shrink. This smaller bubble is less buoyant and the packet sinks.

By Eric Muller Originally published in The Physics Teacher, May 1996

Total 45-50 Minutes

Follow-up – After Presentation

Condiment Diver: http://www.exploratorium.edu/snacks/condiment_diver/index.html

The Shape of Flotation: http://pbskids.org/dragonflytv/web_assets/pdf/dftv_gpsedguide_sailboatdesign.pdf

Above Water: Buoyancy & Displacement: <http://www.state.nj.us/education/21cclc/casp/lsc/unit1/Lesson11.pdf>



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--Collect 6 fruits and veggies from your grocery bag—will they sink or float in water? Does measuring the mass of the fruit or veggie help you figure out if it will sink or float?

--Before you fill in your predictions for each fruit or vegetable consider what factors or properties would cause a fruit or vegetable to sink or float...Measure the mass of the fruits and veggies on the scale and record them on the chart

--Now make a hypothesis: If I place a(n) _____ in water, it will _____

--Fill out the chart below with what happens to each fruit or veggie when you put it in the water:

What type of fruit/veggie?	Mass (grams)	Hypothesis (S or F)	Outcome (S or F)
1.			
2.			
3.			
4.			
5.			
6.			



More to do!

Measure the estimated density of each fruit and vegetable.

Density = Mass/Volume : You already know the mass (above).

Measure the volume with water displacement in a large bowl or beaker.

The density of water is 1g/mL. Do you see a pattern in why something sinks or floats in water based on its density?

Use an orange or banana as your fruit. What happens when you peel the orange or banana? What do you think that means about the fruit?



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