

PROJECT INSPIRE LESSON PLAN

UNDERSTANDING DENSITY

Curriculum Objectives

In this workshop, students will learn about various aspects of hydrology. Students will have the opportunity to conduct experiments and gather data to explore relationships between mass and volume.

Materials

- One quarter pint, one half-pint, four pint, and one quart glass jars
- A empty liter of Coca-Cola and a beaker showing milliliters
- At least 4 eggs
- At least 12 Tablespoons salt
- Tap water

Activity

In this activity, students use an experiment to discover the relationship between mass and volume. Students also have the opportunity to create hypotheses, make observations, and analyze the results of the experiment. Students will make comparisons between lungs, balloons, and fish swim bladders to learn how some things float, others sink, and some stay suspended in the water (neither floating or sinking). In this experiment, students will prove whether it is easier to float in the saltwater ocean or in a freshwater lake by using eggs in mason jars.

Students begin by making a hypothesis about which type of water the eggs will float in and why. Next, students review the size of the mason jars, ensuring that everyone understands the ratios between quarter pints, half pints, pints, and quarts. (Demonstrate by pouring water between the jars, if necessary.) Next, have four students come and each pick an egg for weighing. Weigh each egg, record the data, and set the eggs down next to the four mason jars lined up on the table, labelled 1-4.

Details

Location: Stono Preserve or other garden space

Lesson: Outdoors

Activity: Outdoors

Time of year: Anytime

Age: Elementary school



QUARTER PINT

HALF PINT

PINT

QUART

Jar #	Tablespoons of Salt	Egg Weight (grams)	Hypothesis of Egg Float (top, middle, or bottom)	Result of Egg Float (top, middle, or bottom)	Salinity (salt/water)
1	0				
2	2				
3	4				
4	6				

Next, select four volunteers who then add salt to their jar as specified in the table above. Once the salt is in the jars, the students will need to add water to the half-pint water line, close the lid, and shake the solution until the salt has dissolved. Then measure the weight of the jar with no salt and compare that to the weight of the jar with the most salt. Record this data then have each volunteer carefully lower an egg into their mixture, setting the egg at the bottom of the jar. Record observation about the ability of the eggs to float on top, in the middle, or rest on the bottom.

Once students have come to terms that it's the salt in the water floating the egg, have them represent the salinity of the saltwater using a fraction where a represents how many tablespoons of salt are in solution and b represents the volume of solution. Combine jars 1 and 3 and mathematically determine the salinity. Combine jars 2 and four and determine the salinity. Now combine all jars in quart and find out the total salinity of all the dissolved solutions together.

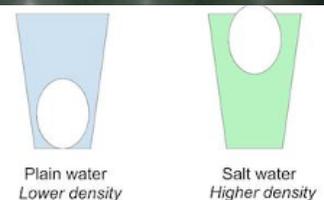
Compare our standard measurements to the liter jug. Ask if it's better to have a liter or a quart of coke, and then demonstrate which one is larger. Show the benefit of milliliter measurements for measuring small volumes of liquid. If there's time, discuss the terms ppm, ppb and show how the ocean's saltiness of ~40ppm would be equivalent to 40ml of salt dissolved in one liter (a.k.a. 1000ml).

Follow-up questions:

- Why do eggs float differently even though they are the same size and weight?
- Thinking about a fish swim bladder, what will happen to a fish if it swims from the ocean to a freshwater environment?
- How does rain affect the salinity of water? Tides?



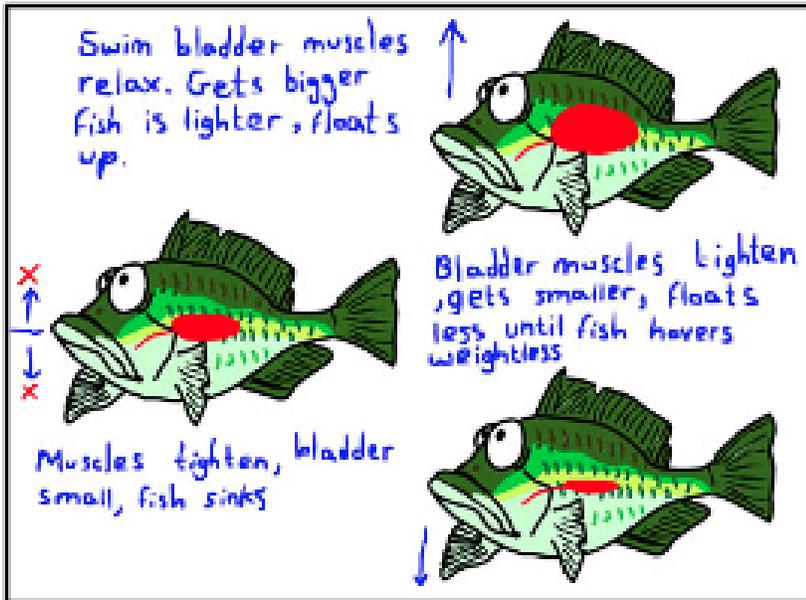
Source: [Pinterest](#)



Source: [Study.com](#)

Additional Resources

- [How to Explain Density to Elementary Students \(website\)](#)
- [Sink or float? A hands-on density activity for kids \(blog\)](#)
- [Animation: Learning about Density \(video\)](#)
- [Egg Floating in Saltwater Experiment \(video\)](#)
- [Science Spotlight: Fish, Swim Bladders and Boyle's Law \(video\)](#)



Source: [SharkyJones](#)