

5E Lesson Plan: Density Dips!

by Beth Ann Bryant-Richards

Grade Levels: 6-8

Materials Needed:

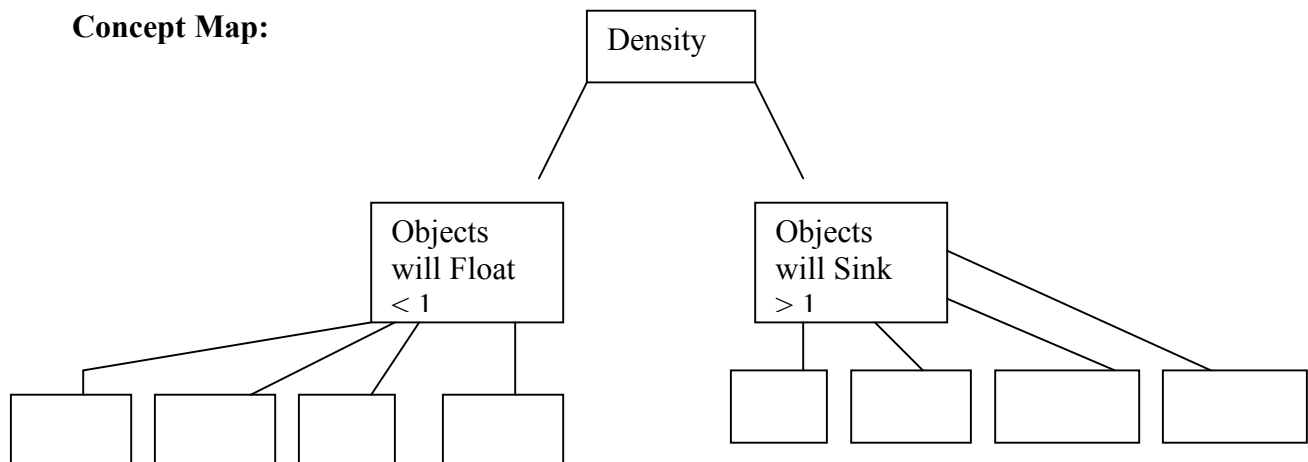
- a transparent container
- water
- various items to test in the transparent container of water (cork, paper clip, pencil, Ivory soap, Dove soap, small rubber ball, can of Pepsi, can of diet Pepsi)
- salt for the extension activity
- student science notebooks

IL State Standard: 12.D.3b Explain the factors that affect the gravitational forces on objects (e.g., changes in mass, distance).

Safety Notes:

- 1. Students and teachers should refrain from consuming food or drink in the science classroom or labs.**
- 2. Students and teachers should wash hands thoroughly before and after conducting science inquiry activities.**
- 3. Students and teachers should exercise caution when lifting large heavy containers of water.**

Concept Map:



ENGAGEMENT:

Teacher will begin lesson by asking students to think about the following
Steel sinks in water but a ship made of steel floats.....why is that?

What causes an item to float in water?

What causes an item to sink in water?

Students should write their answers in the science notebooks.

Prompt students to share a few of their answers aloud.

Tell students they will be conducting an experiment on determining if mass/size is a factor in determining whether an object will float or sink.

EXPLORATION:

Next, ask students to predict if a given item will float or sink. Have them write their predictions down in their science notebooks.

Item 1: paper clip

Item 2: pencil

Item 3: cork

Item 4: rubber ball

Item 5: Ivory soap

Item 6: Dove soap

Item 7: Can of Pepsi

Item 8: Can of Diet Pepsi

After you drop each item into the container of water, ask students to write down whether or not their predictions were correct.

EXPLANATION:

As a class, discuss answers to the following questions:

Why do you think some things float and some things sink?

Why does the Ivory Soap float while the Dove soap sinks?

Why does the can of Pepsi sink while the can of diet Pepsi floats?

Explain the following

Density = Mass of the object (M) / Volume of the object (V)

Density of water = 1.0 g/cm³

Density of regular Pepsi = 1.06g/cm³

Density of Diet Pepsi = 0.98g/cm³

If Density > 1, the item will sink

If Density < 1, the item will float

The Ivory soap has air whipped in when it is manufactured, so it has a density of less than 1, and it floats. The Dove soap does not have as much air whipped into it, so it has a density of more than one, and it sinks.

Extra Practice

Calculate the mass and volume of a wooden block and an aluminum block. Predict which one will sink or float based on your calculation. Check if your predictions are correct by conducting an experiment.

ELABORATION:

What happens to the Pepsi cans if you add 100g of salt to the water?

Do the cans sink or float?

What changed?

Explain the differences in density of salt water and fresh water. Look at these photos of people floating in the Dead Sea and the Great Salt Lake:





EVALUATION:

Rubric for Class Discussion

Do students demonstrate understanding that whether an object floats or sinks in a fluid depends on the density—or mass per unit of volume—of the object as well as the density of the fluid. Is there evidence in their answers to reflect and support their knowledge?

Points: 4

Students can fully answer questions about density and mass. Students can reflect and support their knowledge and understand the extension activities thoroughly.

Points: 3

Students can answer questions about density and mass.

Points: 2

Students have somewhat of an understanding of density and mass.

Points: 1

Students do not display an understanding of density and mass.

Teachers can give a short quiz about density at the end of the class period.

Rubric:

4 points=4 correct answers

3 points=3 correct answers

2 points=2 correct answers

1 point= correct answer

Science Quiz

1. What is density?
2. What happens when an object has a density of <1 ? What happens when an object has a density of >1 ?
3. How does density affect the buoyancy of an object?
4. How would different kinds of liquid (fresh water, salt water, carbonated water) affect the buoyancy of an object?

Cross-curricular Components:

1. Math: Students can calculate the density of objects around the classroom using the formula given.
2. Social Studies: Students can create a travel brochure about the Dead Sea, explaining why it is so easy for people to float in the famous body of water.