At-Home Experiment

DEFYING GRAVITY

Is it easier to float in an ocean or a lake? Why is there a difference? The force of gravity pulls your body to Earth. But water exerts an upward force, called buoyancy (BOY-uhn-see) on your body. This buoyancy works against the force of gravity. Ocean water has something special in it — salt! Does salt water have a greater buoyant force than fresh water? Let’s find out!

STUFF YOU’LL NEED

- 2 identical, clear drinking glasses (or jars)
- water
- ½ cup of salt
- 2 raw eggs in their shells
- ½ cup of sugar

QUESTION

Does a raw egg float? Does salt water affect whether the egg sinks or floats?

THINGS TO DO

1. Fill in the Question, Research, and Hypothesis sections of your lab report.
2. Fill the glasses ¾ full with water.
3. Stir the salt into one of the glasses until it dissolves. The water will be cloudy and some salt may settle on the bottom of the glass.
4. Carefully place an egg in each glass. See Figure 1.
5. What happens to the egg in plain (fresh) water? Record your answer in Data section #1 of your lab report.
6. What happens to the egg in salt water? Record your answer in Data section #2.
7. Remove the egg from the fresh water. Stir ½ cup of sugar into the fresh water cup and carefully place the egg back in the glass. Record your answer in Data section #3.

FIGURE 1
QUESTION

Find the question on the previous page and write it here.

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RESEARCH

Look up density, buoyancy, and Dead Sea online or in the library. Write some facts you learned here.

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Book or Internet site(s) you used:

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HYPOTHESIS

Based on your research, do you think the egg will
A. sink or float in plain (fresh) water? __________
B. sink or float in salt water? _________________

MATERIALS

List what you used to perform this experiment.

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PROCEDURE

Step-by-step, list what you did in this experiment. (Hint: Check out the Things To Do section.)

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DATA

Circle the correct answer below.

1. In fresh water, the egg  floats  sinks

2. In salt water, the egg  floats  sinks

3. In sugar water, the egg  floats  sinks

Record any other observations you made.

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CONCLUSION

What is the answer to the question at the top of page 2?

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REAL WORLD EXAMPLES

1. If you went swimming in the Dead Sea, do you think you would sink lower or float higher than in a swimming pool?

2. Scuba divers often attach weights to their belts to help them sink. Sometimes they dive in freshwater (non-salty water) such as lakes, streams, and rivers. Other times they dive in the salty ocean. Do you think they need more weights when they’re diving in fresh water or ocean water? Why?

EXTRA CREDIT

Fill a clear bowl with water and drop in items to see if they sink or float (some suggested items to test: stone, toothpick, button, ice cube, lemon, grape, piece of wood, can of soda, can of diet soda, coin, cork, plastic bottle top, metal bottle top, nail, pencil, eraser, piece of clay, sponge). Make a list of objects that float. Make a separate list of objects that sink. What are some similarities between objects in the same list?
Question
The egg sinks in fresh water (water without salt) but floats in salt water as well as sugar water.

Real World Examples
1. People float higher in the Dead Sea because it is extremely salty — the saltiest body of water on the planet.
2. Scuba divers require more weight when diving in the ocean than in fresh water because, as with the egg, the human body is more buoyant in salt water.

Explanation
Water pushes up on objects, acting in the opposite direction to gravity. People are described as “weightless” in a swimming pool because the water pushes up and counteracts the downward pull of gravity. Salt water exerts a greater buoyant force on an object than fresh water (it pushes up on the egg with a stronger force) because it is more dense.

The density of the water makes the difference. When an object floats, it is because it is displacing its own weight in the same volume of water. Think of each drop of salt water or sugar water as being heavier than an equivalently sized drop of fresh water. An egg can float in salt water because it displaces an egg’s volume of water and the weight of that displaced salt water is heavier than the egg itself. The egg then rests in that area of displaced water. On the other hand, the weight of fresh water that would be equivalent to the weight of the egg is greater than the volume of the egg. Thus, the egg itself does not have a great enough volume to displace its own weight in water. The buoyant force is less than its weight and it sinks.