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Science – "Why does it float?" – Exploring the Concept of Density

Reading/Discussion:

Try tossing a small stone and a branch into a stream. Which one floats and which one sinks? Although the stone is smaller and weighs less than the branch, it quickly sinks to the bottom. Why?

It is the **density** of the object and not the weight that makes it float or sink. The density of an object depends on how much **mass** (stuff the object is made of) is in the **volume** (size) of the object.

For example, a slice of bread has quite of lot of air in it, so it is not very dense. If you try, you will find that a slice of bread will float quite nicely in a bowl of water. But if you squeeze it as hard as you can (this is easier if there is no crust). Once you have squeezed out all the air and **compressed** the bread you will end up with the same amount of bread **(mass**) but it will be much smaller **(volume**). See if the bread will float now!

It doesn't, does it? That's because even though there is still the same amount of bread, you squashed it and made it smaller so it displaces (takes the place of) less water. If the bread weighs more than the water it displaces then it will sink. If it weighs less than the water it displaces it will float.

In the same way, although the stone weighs less than the branch, it is also much smaller and so it weighs less than the water it displaces, and sinks. The amount of water the branch displaces weighs more than the branch itself so the water is able to hold it up and it floats.

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You can check this by pushing a rubber ball right under the water in a measuring jug. See where the water came before you put the ball in and where it came to afterwards and then weigh that amount of water. Your teacher will probably have to help you with this. Because the ball is able to float, you should find that the water displaced weighs more than the ball.

Have you noticed that it is easier to float in the ocean than in a lake? That is because the salt in the ocean makes the water denser. The Dead Sea is so salty that it is almost impossible **not** to float. Here is another experiment for you to do. Take an egg and try to float it in a bowl of water. The egg is a little denser than the water it displaces and so it will sink, just like the stone and the squashed slice of bread! Now add salt to the water (you will need about a third of a cup of salt to a cup of water), and try again. Because the salt makes the water denser than the egg, the amount of salty water the egg displaces now weighs more than the egg and the egg will now float.

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Science – "Why does it float?" – Exploring the Concept of Density Questions

A: What have I learned about density?

In a small group of friends, talk about the following questions and see whether you can answer them in your own words before looking at the text:

1. What does mass mean?
2. What does volume mean?
3. What does density mean?
4. What do we mean by displaces?
5. How dense must an object be in order to sink in water?
6. Why is it easier to float in the ocean?
7. Ice blocks float in water – why? (This one you have to work out for yourself! Can you?)

B: Think like a scientist.

Can you think of a way to make a stone float on the water? What would you use? How would you use it? Write down your experiment then draw a diagram and label it. Explain why you think it would work.

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Activity A

1. Mass is the stuff or material of which the object is made.
2. Volume is the size of the object.
3. Density is the amount of stuff that is contained in the size of the object.
4. Displaces means take the place of.
5. The object must be denser than the water it displaces.
6. The water in the ocean is denser that fresh water.
7. When water freezes it expands, so ice blocks have the same mass of water in a bigger volume and are therefore less dense.

Activity B

The answer to this question will depend upon the children's ingenuity. The stone would have to be placed onto an object, which together with the weight of the stone will displace less water than its own density.