

NORWICH SCIENCE FESTIVAL

At home

PENCIL BUOYANCY



You will need:

- pencil
- plasticine or blu-tac (about the size of one table-tennis ball)
- clear container or bowl
- 35g of table salt
- 1 litre of tap water at room temperature
- spoon

You can change the amount of salt and water used in this experiment to fit in your container, for example 70g of salt in 2 litres of water or 17g salt in 500ml water.

Experiment:

Pour the water into your container. This container now represents fresh water.

Drop the pencil into the container with the water and see what happens. Does it sink or float?

The pencil should float on top of the water.

Now drop your plasticine in the water. What happens this time?

The plasticine should sink.

This is because plasticine is more dense than water but the pencil is less dense than water.

Try sticking a small blob of plasticine onto your pencil, and then put it back in the water. If the blob of plasticine is small enough, the pencil will still float.

Now try adding a bigger blob of plasticine onto your pencil, and then put it back in the water. If the blob of plasticine is big enough, it will force the pencil to sink.

CHALLENGE TIME

Try changing the size of the blob of plasticine attached to the pencil until the pencil doesn't sink or float, but hovers wherever you leave it in the water. This is very difficult to get exact, so if you can get the pencil to hover while you count to five, you've done well!

(Tip: try to keep the water as still as you can while doing this.)

Once you've managed this, the hovering pencil has become 'neutrally buoyant' in the fresh water, meaning the density of the pencil with the plasticine is equal to the density of the water.

After you've tried the challenge (in the 'Challenge Time' box), take the pencil and plasticine out of the container, but don't take the plasticine off the pencil! Add the table salt to your container. Stir this in with a spoon until you can't see any more salt. This means all the salt has dissolved in the water, and the container now represents salty water, like the sea.

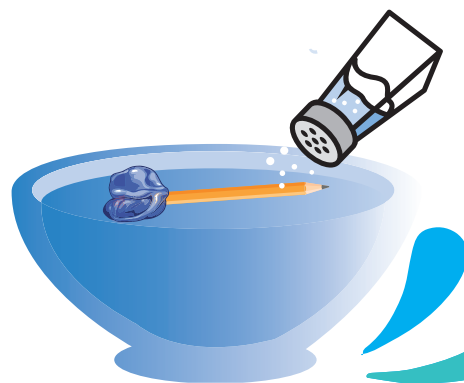
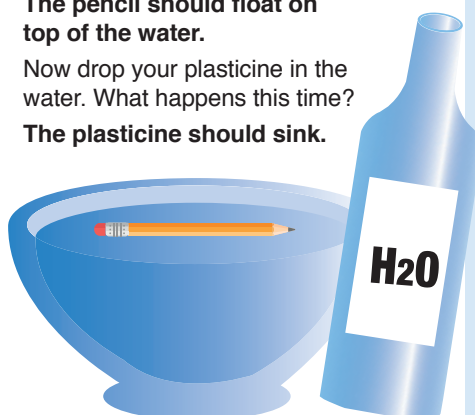
Put your pencil with the plasticine on into the salty water. What happens this time?

It floats!

Why does the pencil with plasticine float in the salty water?

The pencil and plasticine had the same density as the fresh water. Salty water is more dense than fresh water so the pencil and plasticine will float on top.

Try experimenting with how much plasticine is on the pencil and see what happens in the salty water.



This activity sheet was written by Elizabeth Siddle and Jack Mustafa, postgraduate researchers in the School of Environmental Sciences at the University of East Anglia.

The Norwich Science Festival at Home activity sheets were brought to you by the University of East Anglia and the Norwich Research Park. For more information, visit norwichsciencefestival.co.uk.