Gases

There are gases all around us.

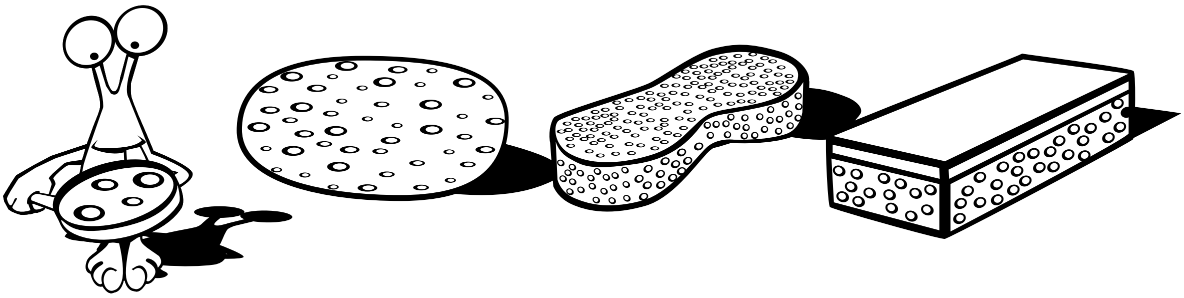
Air is a mixture of gases, can you name any of them?	What gas do we breathe out more than we breathe in?	Which gas do we need to breath in to live?	Can you name any other gases?

Nitrogen makes up most of the air around us. Helium is lighter than air and can be used to fill balloons to make them float. Hydrogen is also lighter than air and it burns easily. Natural Gas (methane) is also flammable.

investigation 1

Look at a sponge with a magnifying glass.

What do you think fills the gaps? Put the sponge under water and squeeze it. What comes out? How could we measure how much gas is inside the sponge? What would you need to do to make the investigation fair?

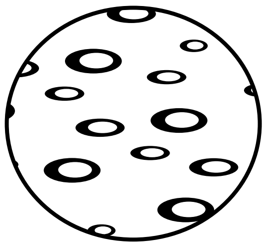


Collect together several different types of sponge (kitchen, bathroom, car/window, natural) with different size holes. Either cut them into equal size pieces to make sure the test is fair, or measure them to find out their volume (length x width x height.)

How could you use knowing the volume to make sure the test is fair?

Put each piece of sponge in water and squeeze out the gas, so that it is replaced with liquid. Next squeeze the liquid into a measuring jug so that you can measure the volume.

type of sponge	volume of water / ml

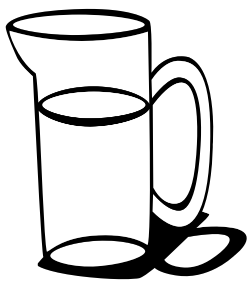


investigation 2

Other dry solids also have air spaces in them.

Weigh out 200g of several different loose materials. Pour in water from a measuring jug. Pour slowly until it just starts to show on the surface. How much water did you use?

	volume of water / ml
dry soil	
marbles or beads	
dried peas	
pasta shapes	



Gases - notes

This module is to encourage children to recognise that there are gases all around them, that there are many different gases and that air is made up of several different gases, not just oxygen. Gases have volume (take up space) and mass, though the volume is only fixed when a gas is contained.

There are gases all around us. **Air is made up mainly of nitrogen, approximately 78%, plus 21% oxygen, 0.9% argon, 0.03% carbon dioxide and 0.07% other gasses.** We need to breathe in oxygen to live, but use up only about 4%, converting it to carbon dioxide. We breathe out 17% oxygen and 4.03% carbon dioxide.

Other gases helium, which is lighter than air and can be used to fill balloons to make them float; hydrogen which is also lighter than air and it burns easily. Natural Gas (methane) is also flammable.

NOW HAND OUT PUPIL WORKSHEETS

investigation 1

This experiment encourages children to notice that gases take up space, shows how to measure volume by displacement and how to plan a fair test.

EQUIPMENT NEEDED:

magnifying glass, bowl of water, measuring cylinder, ruler, selection of sponges (kitchen, bathroom, car/window, natural). The important thing is to have different size holes.

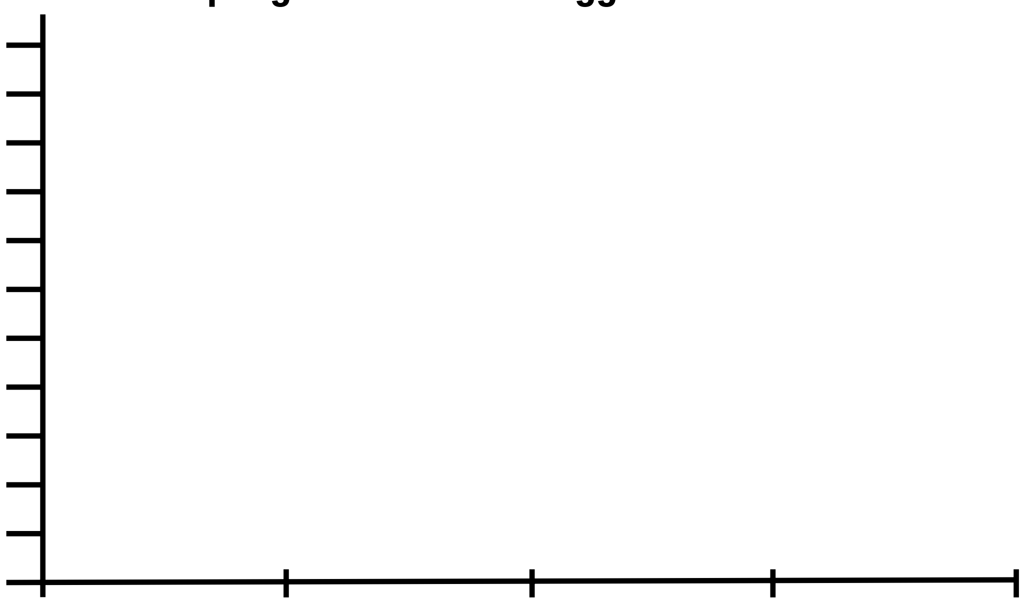
Look at a sponge with a magnifying glass. What do you think fills the gaps? Put the sponge under water and squeeze it. What comes out?

How could we measure how much gas is inside the sponge? - Children will probably suggest collecting the gas in some way. Teachers may have to prompt suggestions by asking **"what will happen if you squeeze the sponge under water?"** and **"how much water will the sponge soak up?"** (the same volume of water as air).

Put each piece of sponge in water and squeeze out all the gas, so it is replaced with liquid. Next squeeze the liquid into a measuring jug so you can measure the volume.

For younger children to make a fair test all the samples of sponge must be the same size. It will be possible to record the differing volume in ml on a bar graph.
For older children the experiment can be made far more advanced by discussing relative volume. Find the volume of each sponge by displacement of water. Immerse the sponge in water in a measuring jug (without squeezing out the air). The increase in water level is the overall volume of the sponge. To find the relative volume divide the volume of the sponge.

Which Sponge Contains The Biggest Volume Of Water?



investigation 2

Other dry solids also have air spaces in them. Children will also practice measuring and see examples of different densities, as all the dry solids have the same weight but have different volumes.

EQUIPMENT NEEDED:

Kitchen scales or similar, 4 bowls or containers, large measuring jug, dry solids (soil,marbles or beads, peas, pasta shapes)

Weigh out 200g of several different loose materials. Pour in water from a measuring jug (remember to note how much water was there to start with. Pour slowly until it just starts to show on the surface. How much water is left, how much was used? It will be possible to record the differing volume in ml on a bar graph.

Which Material Contains The Biggest Volume Of Water?