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Giant bubbles

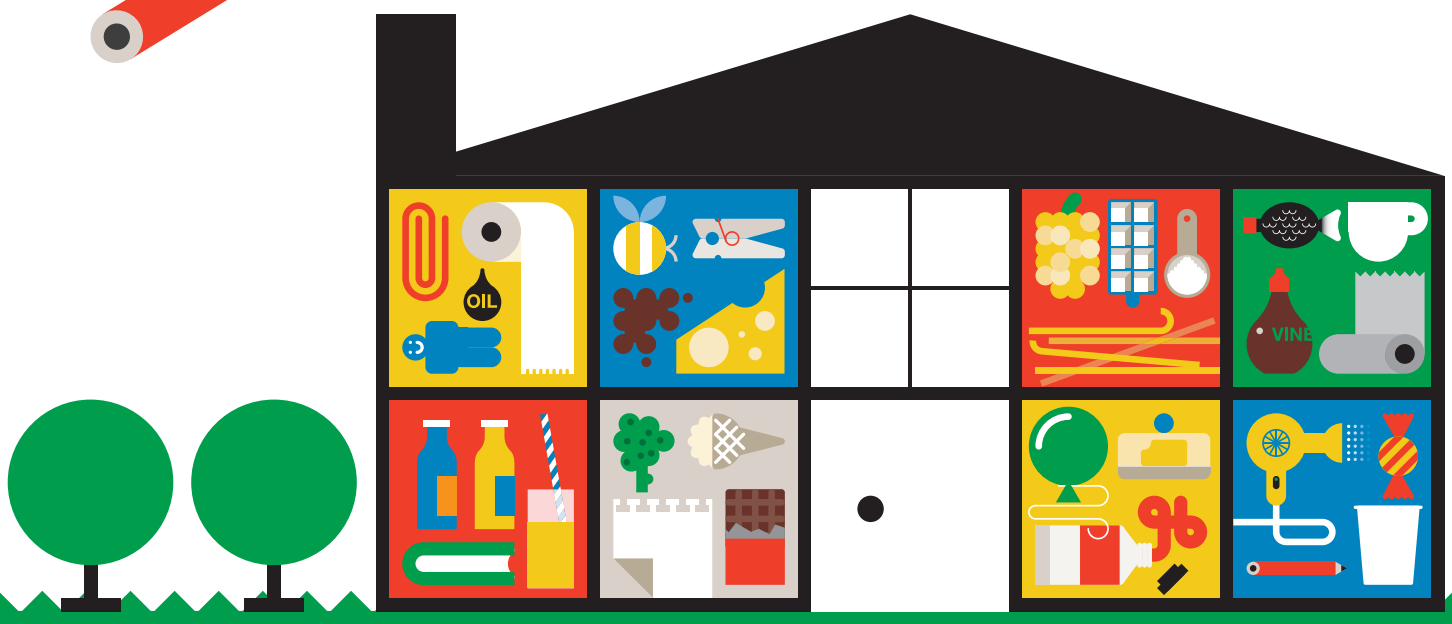
Giant bubbles

The activity

Make a home-made bubble mixture and wands. Use them to look more closely at the characteristics and behaviour of soap bubbles.

ExpeRiment with different shapes and sizes of bubbles and see what you can and cannot control about bubbles.

Learn how to make giant bubbles and find out why bubbles are usually round.



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What you'll need

- Good quality washing up liquid
- Water
- Glycerin (optional)
- Plastic tub or other container for bubble mixture
- Measuring jug (optional)
- Various things with holes in them for blowing bubbles with. Watch the video for ideas. Straws, pipe cleaners, paperclips, coat hangers, cookie cutters and cake tins with removable bottoms are all particularly good.
- For giant bubbles: wooden spoons (or other sticks), a couple of metres of string and a small weight you can thread through it, like a metal key ring or nut.

Special materials

If you don't have glycerin (sometimes spelled glycerine), you can buy it from the chemist in the coughs & colds section or a supermarket in the baking section.

What to do

Make some bubble mixture. You can do this as part of the activity with your child or children. The quality of your bubble mixture will depend on lots of things, like:

- the type of washing up liquid you use
- the quality of your tap water (whether it is hard water or soft water)
- whether you use glycerin

Depending on the type of washing up liquid you use, you should be able to make a working bubble mix by just adding some washing up liquid to water. Start with the amount of water you want and add about a tenth of that amount of washing up liquid. Give this a stir and then try making a bubble. If it doesn't work, slowly add more washing up liquid until you have a mixture that gives good bubbles.

If you have some glycerin, try stirring some into your mixture; using about a tablespoon of it for each litre of bubble mixture you're making. Apparently bubble mixture improves if you leave it to sit overnight, but you don't have to do that.

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What to do (continued):

A mixture we found that works is 1 litre of water, 100ml of washing up liquid and 30 ml (2 tablespoons) of glycerin.

Blow some bubbles! Put a straw into your bubble solution and try blowing gently into the liquid. You should be able to make a lot of bubbles very quickly. Then dip one end of a straw into the solution, take it out and blow gently through the other end. See if you can control the size of bubble you can blow out of the straw.

Try making bubbles using things with bigger holes, like a paperclip or pipe cleaner bent into a circle.

Try poking a dry finger into a bubble, then try the same thing after dipping your finger in bubble solution.

Try making bubbles inside bubbles by poking a straw dipped in bubble solution into an existing bubble and blowing again.

Try out objects with different shaped holes, like cookie cutters or pipe cleaners bent into other shapes.

Try objects with really big holes, like a coat hanger or a cake baking tin with its bottom removed.

Try making giant bubbles with the special wand we show you how to make in the video.

Questions to ask children

Before each activity: can you predict what will happen? Why do you predict that? (For example, can you predict what will happen if you blow harder? Can you predict what will happen if we use a square shaped bubble blower?)

What happens if you blow too hard? What happens if you blow not hard enough? Why do you think that is?

Does the size of the hole in your bubble blower affect the size of the bubble you get? Why do you think that is?

Does the shape of the hole you blow your bubble through affect the shape of the bubble you get?

If we change what goes into our bubble mixture, what happens to the bubbles? Which makes the best bubbles?

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The science

To understand bubbles scientifically, it's helpful to know about the forces that are acting on them.

Why are soap bubbles round?

Blowing a soap bubble is a bit like blowing up a balloon. Instead of a skin of rubber, soap bubbles have a skin made out of soapy water. When you blow up a balloon, you stretch the rubber and trap air inside it which pushes out against the rubber. When you blow up a soap bubble, you stretch the skin of soapy water as you blow into it. This puts air inside the soapy skin which becomes trapped when the skin closes and forms a bubble.

If you blow a balloon up too big, the rubber is stretched too thin. The force of the air pushing out from inside is too much, so it bursts. The same thing happens with a soap bubble if you blow it up too big or if you blow into it too hard.

If you have a bigger hole for your bubble, you have more soapy water on it. This means you can usually make a bigger bubble because you have more skin for your bubble. This is like starting with a bigger empty balloon.

The shape of your bubble blower (or 'wand') does not make a difference to the shape of the bubble you get. As Mei explains in the video, this can also be understood by making a comparison to a balloon. When you blow up a balloon, you have to blow hard. The air inside the balloon has to press outwards and stretches the rubber of the balloon. When you tie up the balloon, the air inside it carries on pressing outwards and the rubber presses inwards. These forces balance each other and give the balloon its shape.

A similar thing happens when you blow a soap bubble, but instead of rubber, it is a thin skin of soap solution that contains the air. Your bubble may start off in a funny shape. But the soap film is always pulling inwards and the air is pushing outwards. The force pushing inwards and the force pushing outwards will always exactly balance making the final shape round.

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The science (continued)

Why do we need soap?

You can make bubbles with just plain water – try blowing into a cup of water with a straw. However, the bubbles you can make are very small and don't last very long. That's because the skin quickly becomes too thin somewhere on the bubble, and breaks at that point letting the air escape. The soap helps stop the skin getting too thin anywhere, and allows the bubble to last much longer.

Why does glycerin help?

The skin of a soap bubble is constantly losing molecules of water which are evaporating from the surface. This is one reason why they eventually burst. Adding glycerin slows this process down and helps bubbles last longer.

Being safe

It's a good idea to avoid getting the bubble mixture or soap in your eyes or mouth. If you do get it in either, a good rinse with tap water should quickly stop any irritation. Make sure you wash your hands afterwards. If you're doing the activity indoors, you may want to cover your table and floor with some old newspaper to avoid getting soap on those surfaces.

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Going Further:

You can experiment with your bubble mixture and giant bubble wand to see just how big you can get your bubbles to be.

There are lots of different bubble mixture recipes on the internet, just search for "soap bubble recipe". You could try making two or three of them and comparing how good the bubbles they make are.

The sad thing about bubbles is that they only last for a short time before bursting. See if you can work out why they burst and whether you can do anything to make them last longer. You could try trapping a bubble in a jam jar or other container and experimenting to try to keep it for a long time.

You could look up more about the forces involved in bubbles, in particular air pressure and surface tension and why adding washing up liquid to water allows us to make bubbles.

You could watch this short video on the effect of pressure on bubbles: http://bit.ly/BubblesPressure

There's lots of interesting science about bubbles and many scientists dedicate their lives to learning more about them. You can read about some interesting discoveries and applications here: http://bit.ly/BubbleSci