SCIENCE MUSEUM GROUP

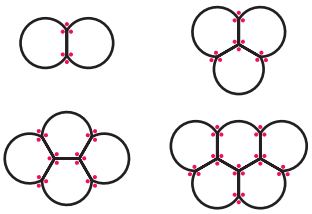
BUBBLE GEOMETRY

MAKING	Age 7–11	Topic MATHS, GEOMETRY	30 MIN
	Skills used MAKING OBSERVATIONS • CURIOSITY		

Overview for adults

Geometry is the study of shapes and their properties. This activity makes use of geometry in observing the shapes and angles soap bubbles create when they join together.

What's the maths?



THE RED DOTS REPRESENT 120-DEGREE ANGLES.

A soap bubble is simply a very thin sheet of soapy water called a soap film surrounding a volume of air. A force called surface tension pulls the soap film tight, so that it always has the minimum surface area possible. That is why a free-floating bubble always forms a sphere.

If two bubbles of the same size join, the surface between them will be perfectly flat. But if they are different sizes, that surface will bulge into the larger bubble, because the air pressure is greater inside the smaller bubble. Whenever two or more bubbles meet, the angle between the soap films will always be exactly 120 degrees.

Maths in your world

The way bubbles connect is the same as how bees build honeycomb. In each case, the angle at which the lines meet is always 120 degrees. The resulting hexagon pattern is the most efficient way for the honeycomb to connect using the smallest surface area for the volume of the individual cells. This means the bees don't make more wax than is necessary.

Did you know...?

Even in the foam of tiny bubbles in washing-up water or on shampooed hair, soap films always meet at 120 degrees.

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Use the Science Museum Group's famous bubble mixture, and a little maths, to explore how soap bubbles interact with each other.

You will need...

Top tip: This activity can get wet and messy. You should do it somewhere that can be wiped down easily or use bin bags to protect your surfaces. You can do it outside, although even a slight wind can affect the quality of the bubbles you make.

Think and talk about...

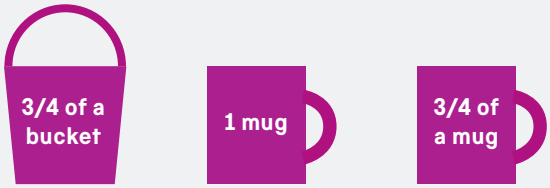
- Why do you think a free-floating bubble is always spherical?
- How do the bubbles change when they are in the air, on a surface and connected to other bubbles?
- Where have you seen patterns in your daily life?

Investigate...

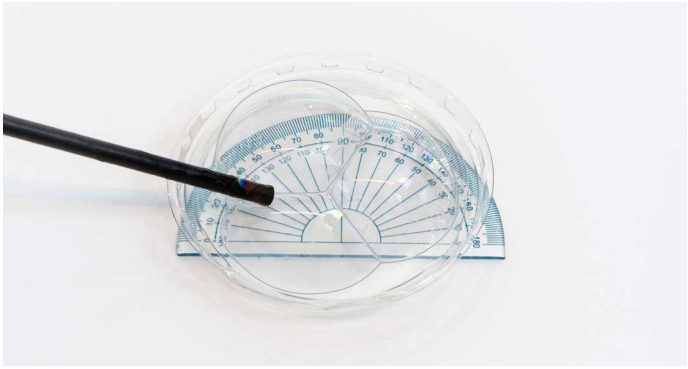
- At what angle do the soap films meet? (Hint: it's always the same.)
- Can you make a frame of a different three-dimensional shape, such as a tetrahedron (triangular-based pyramid)? What happens when you blow a bubble in the middle?
- Can you blow a bubble inside another bubble?

Follow these steps...

To make a bucket of bubble mixture use:

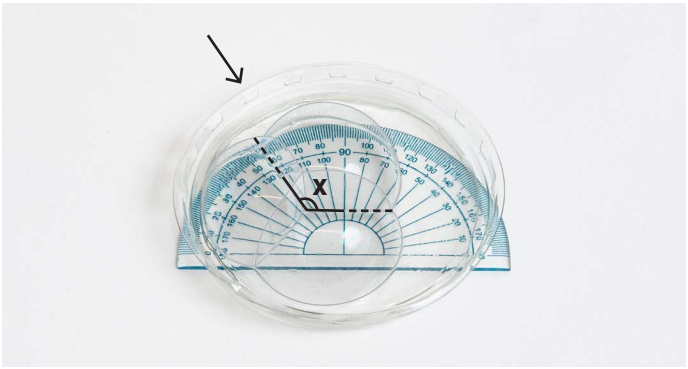


of warm water | **of washing-up liquid** | **of glycerine or sugar**

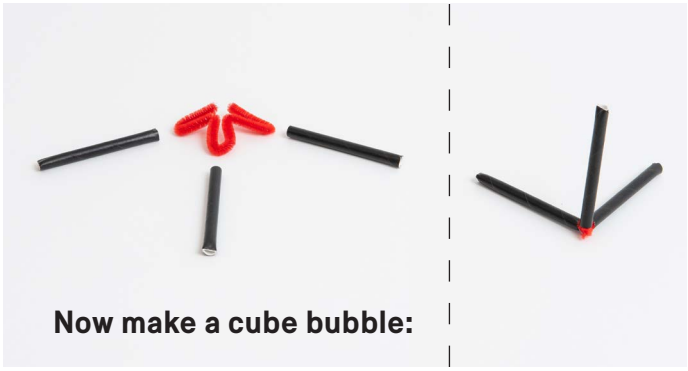


1 Add the glycerine and the washing-up liquid to the warm water and stir the mixture slowly for a minute or two – this is to help the glycerine dissolve.

2 Slide the protractor underneath the lid, and lightly coat the surface of the lid with bubble mix. Dip the straw into the bubble mixture, and slowly blow bubbles, one by one.

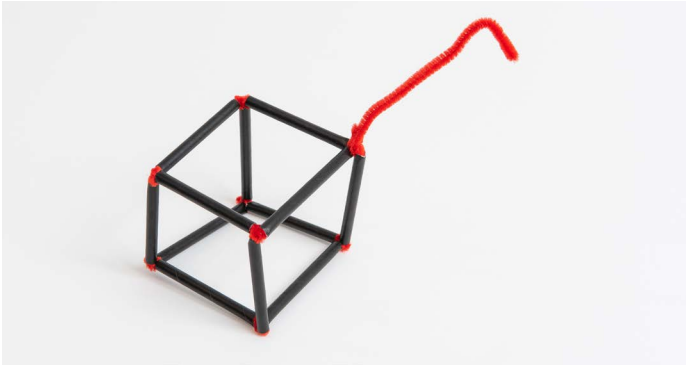


3 Carefully move the lid over the protractor so you can measure the angles where the bubbles connect.

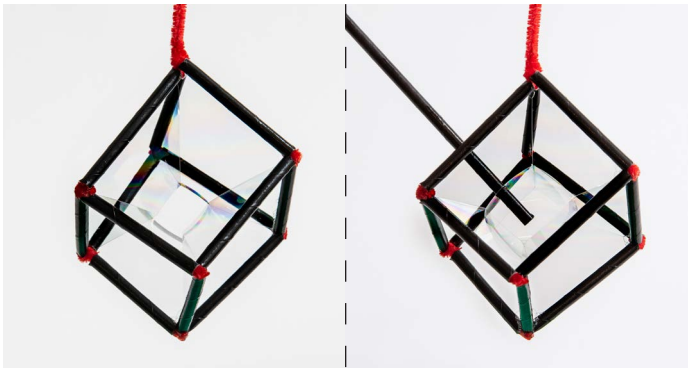


Now make a cube bubble:

4 To make a cubic frame, fold a pipe cleaner to give it three loops. Put one piece of straw on each loop. This is one corner of the cube.



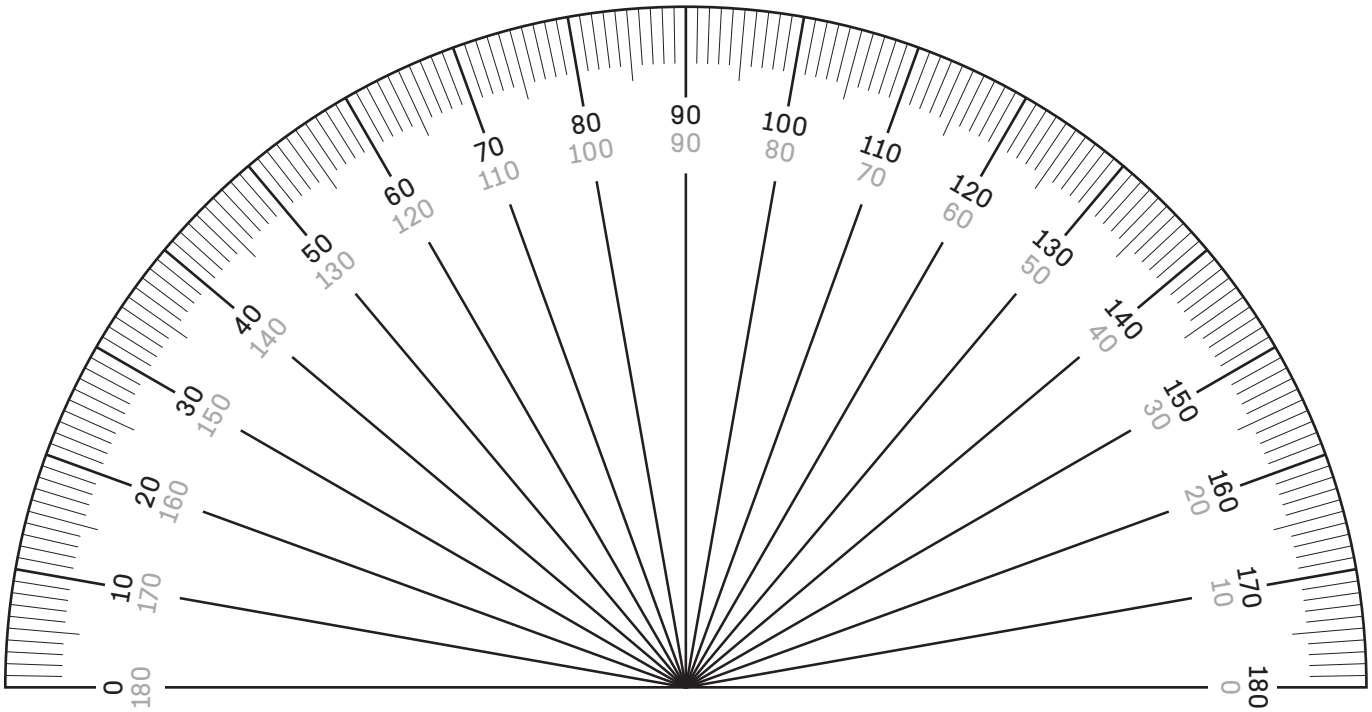
5 Make seven more pipe cleaner corner pieces, and attach more straw pieces to complete the cube. Attach the handle.



6 Dip the frame fully into the solution. Gently pull it out and blow a bubble in the middle with a straw.

Maths in your world

The hexagon pattern seen in honeycomb works in the same way as how bubbles connect – always at 120 degrees. The honeycomb connects using the least amount of wax.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