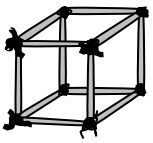
FLEXIBLE SHAPES



If you have not already done so, try the
Collapsible Cube activity and watch the video.

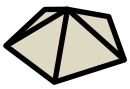
1. Make a tetrahedron out of rolled paper sticks. Press it gently. See that it does not change its shape – it is rigid.

2. Make the five 3D shapes below with paper sticks, all the same length.
   Before you make each 3D shape, imagine it in your mind. Try to visualise how it will behave. Do you think that it will be:
   a) Rigid, like the tetrahedron, so it will not change its shape at all?
   b) Collapsible, like the cube, so it will collapse into one or more flat shapes?
   c) Not rigid, but will not collapse into a flat shape?

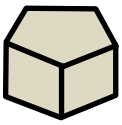
3. Write down your predictions.

Square pyramid

Triangular prism



Pentagon pyramid



Pentagonal prism

Boat octahedron

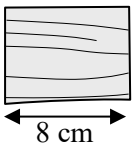
4. Sketch, and name or describe, the shapes that each of the 3D shapes can make.

HELP

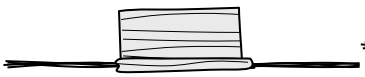
Follow the instructions below, or watch this video: https://youtu.be/iaJ6EitIGKU, to learn how to make rolled paper sticks.

You need: An old magazine or scrap paper to cut up (or you can use dried banana fibre); string; sticky tape; scissors or a blade to cut with.

Cut a rectangle of paper,
8 cm long and about 6 cm wide.
Cut a length of string about 24 cm long.



Carefully roll the rectangle of paper around the string to make a stick.
Roll it as tightly as you can.



About 8 cm of string will hang out from each end of the stick.
Fasten the paper with sticky tape. You have made your first paper stick!

Make more paper sticks. How many will you need to make your 3D shape?
(Each edge of your shape will need one paper stick.)

NEXT

When you have made several 3D shapes, begin to compile your results into a table. This could show: the mathematical name of the 3D shape (if it has one); the shape(s) of its faces; the number of its edges, faces and vertices; whether it is rigid or can change its shape; what shapes it can change into. Remember to include the cube and the tetrahedron on your table.

Then think of another 3D shape that you can try.

Try to predict, *before* you make each 3D shape, whether it will be rigid or whether you will be able to change its shape.
Try to visualise and describe how your 3D shape will behave.
Record what you predict, and what you find out.

If you are working with a group of learners then you can share your results. Build up a complete record of everything you have discovered about the shapes you have made.

Resources: An old magazine or scrap paper to cut up (or you can use dried banana fibre); string; sticky tape; scissors or a blade to cut with.