

Constructing the Archimedean solids

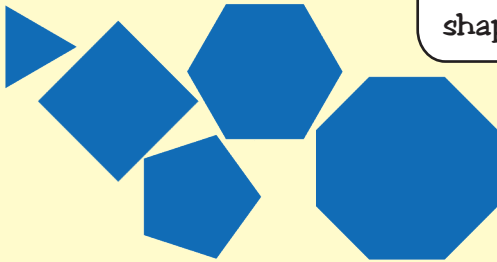
Two more template face making methods



To scale up polygons with an odd number of sides you can use the following technique (we have used a triangle as an example).

Which shapes?

Which of these shapes would you enlarge with method 2 (from the previous page) and which with method 3?



What do you notice about the number of sides and the method used to enlarge the shapes?



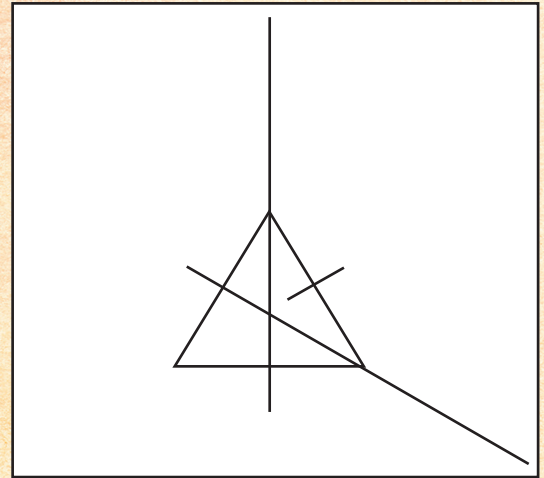
Complete the enlargement of this equilateral triangle using the regular polygon expansion scale for 50mm side lengths..

Face making method 3

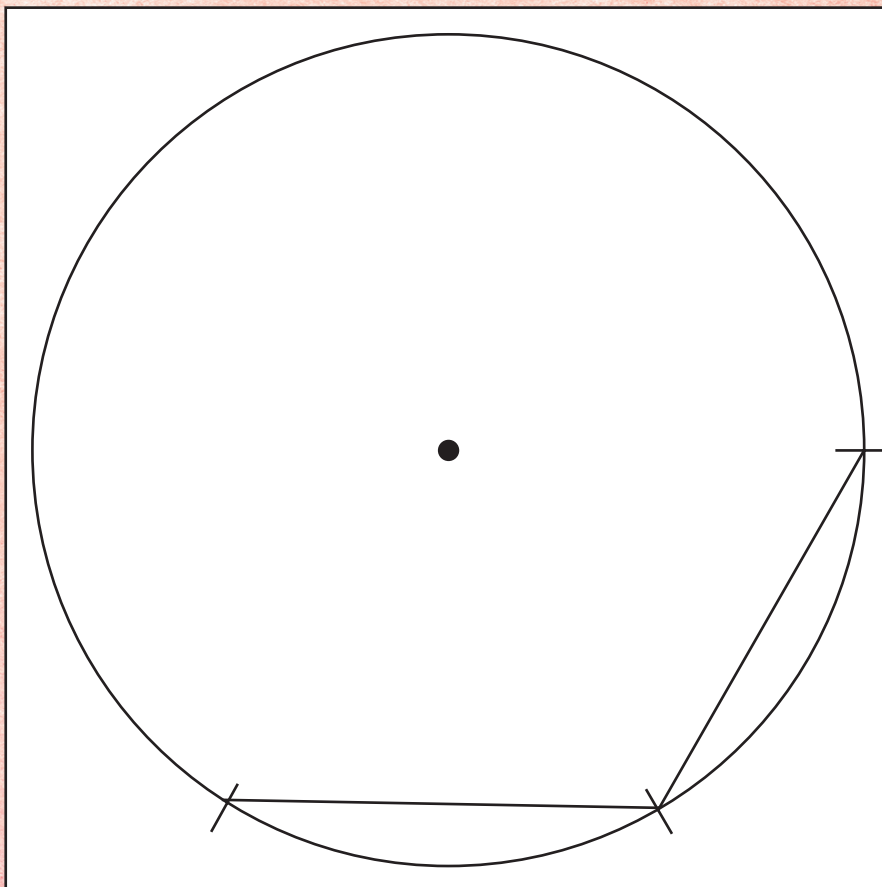
Step 1: Use your Mathomat to draw a triangle. Mark the mid points of each side.

Step 2: Draw a line from each midpoint through its opposite vertex and beyond.

Step 3: Mark equal lengths on each extension. Join up the marks.



Inscribing polyhedra faces in a circle



Complete this hexagon with 55mm sides using your Mathomat. (For the other faces to have sides of 55mm use methods 2 and 3 to scale up.)

Face making method 4

Step 1: Draw a circle with Mathomat. In this case we have used the 110mm diameter protractor.

Step 2: Mark the centre of the circle using the Mathomat circle centre finder in the protractor.

Step 3: Mark the 6 vertices of the regular hexagon face. That's $360^\circ \div 6 = 60^\circ$ for each vertex position using the Mathomat protractor.

Step 4: Join the marked vertices points with lines using Mathomat.

Step 5: Cut the circle out, then fold over the excess to create your 'curved' tabs and the hexagon polyhedra face.

with Mathomat II

More construction techniques for making faces for the models and putting models together.

Continuing to build Jack and Livvy's **Great Rhombicuboctahedron** (see pages 6.3 (1 and 2) on MAC):

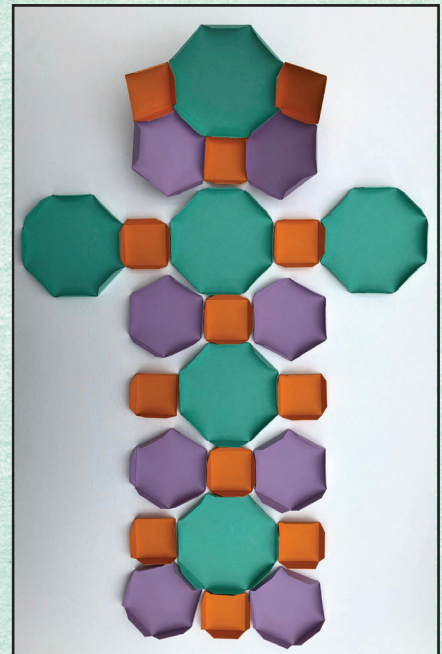
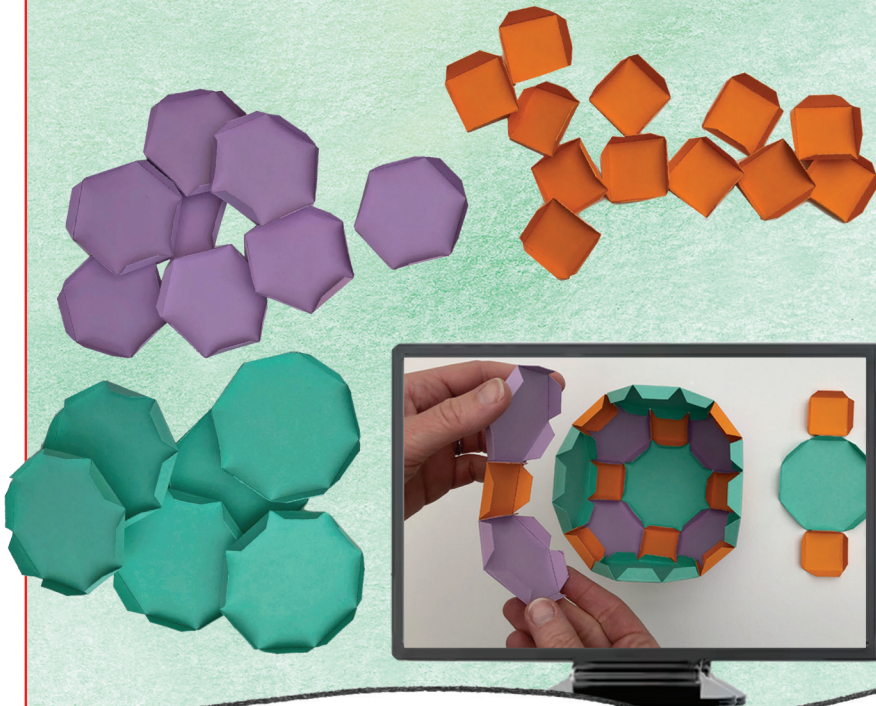
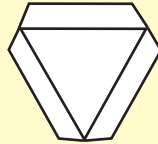
Jack worked out they would need 6 octagons, 8 hexagons and 12 squares. They made three templates to trace round, using Face making methods 2 and 4 to make 50 mm sided faces, with straight tabs on all sides.

When all the shapes are ready for assembly, they are then laid out following the net. The photograph, right, shows the first pieces glued together.

Tabs: in or out?

Don't forget the tabs...they need to go on every side if you are making the shapes separately.

Use the parallel guides on Mathomat to draw the tabs and angle the sides. It is easy to cut straight tabs with a craft knife, for a 'tabs inside' model.



TIPS

For models with sides 45 mm or less a 180 gms card is fine. For larger models a 270 gms weight is better.

You will need universal glue and a craft knife (or scissors).

Your stencil will include the tabs.

Decide if you are doing outside or inside tabs.

Lightly score and fold the tabs against the Mathomat ruler edge.

For the most complicated models, tabs outside are easier when you get to the last pieces to glue, even if you have small hands!

Lay out the cut out shapes in the order of the net and use your colour guide.

Some models are easier built in sections.

The next pages show a step-by-step for making a complex model. It's helpful to open the WIP pictures for models in the explorer manual support section of the website and view them at the same time.