Advanced Mathematics Support Programme®

Origami paper

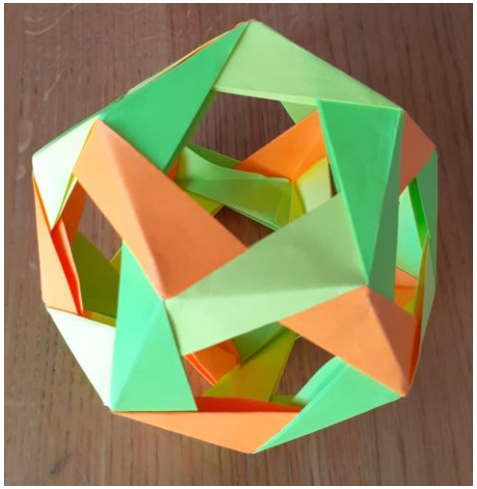
- You need square paper for all origami

- Square post-its were used for this construction. They work well for this, however you can use standard square origami paper.
- If you need to make square paper, instructions are available at this link

- https://bit.ly/squarefroma4

Dodecahedron origami

- We will construct a dodecahedron
- The dodecahedron has been made from 3 colours, with the 3 different colours meeting at each vertex.
- You don’t have to use this colouring.



Polyhedrons

- The platonic solids are 3D shapes that have congruent faces. How many can you name?
- A dodecahedron is a platonic solid. How many edges and faces does it have?
- Use Euler's polyhedron formula to calculate how many vertices a dodecahedron has.

Making each module

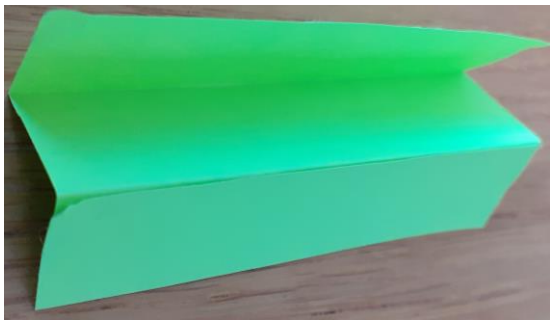
- The dodecahedron is made from 30 separate edge pieces.
- To use the 3 colour strategy, you need to make 3 sets of 10 pieces.

Step 1

- Take your post – it or origami paper
- Fold it in half, then unfold it
- If using postits, you need to fold the sticky edge up to meet the other edge (then unstick it)

Step 2

- Fold both halves in to the central line.
- If you are using post it notes, one of these will be stuck together. This is fine (it actually makes the next steps a bit easier)
- Fold back in the middle crease so you have an zig zag (you will have an N shape with a post-it or an M/W shape with standard origami paper)

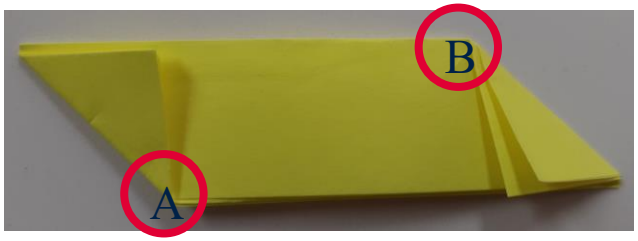


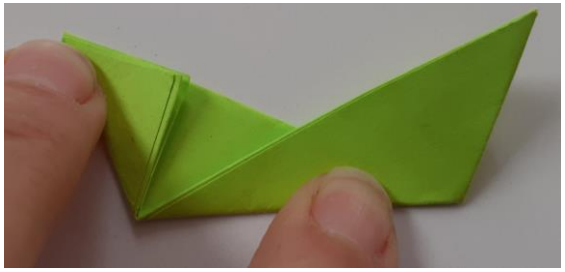
Step 3

- Fold along the zig zag edges to make a rectangle with ¼ width of the original paper
- Fold the bottom left corner up to meet the top line.
- Rotate 180 degrees and do the same

Step 4

- Crease along the middle diagonal, between the position A and B.
- Make sure your creases are sharp as this makes the next stage easier and more stable.





Step 5

- Get folding!
- You need 30 of these pieces in total, preferably in 3 different colours, 10 of each.

Answers

Polyhedrons

- The platonic solids are 3D shapes that have congruent faces. How many can you name?

There are 5 platonic solids – cube, tetrahedron, octahedron, dodecahedron and icosahedron.

- A dodecahedron is a platonic solid. How many edges and faces does it have?

30 edges, 12 faces

- Use Euler's polyhedron formula to calculate how many vertices a dodecahedron has.

V + f – e = 2, so v = 2+e-f

v = 2 + 30 – 12 = 20 vertices