



**Advanced Mathematics  
Support Programme®**

# Modular origami

## 2 - making the shapes

# Origami paper

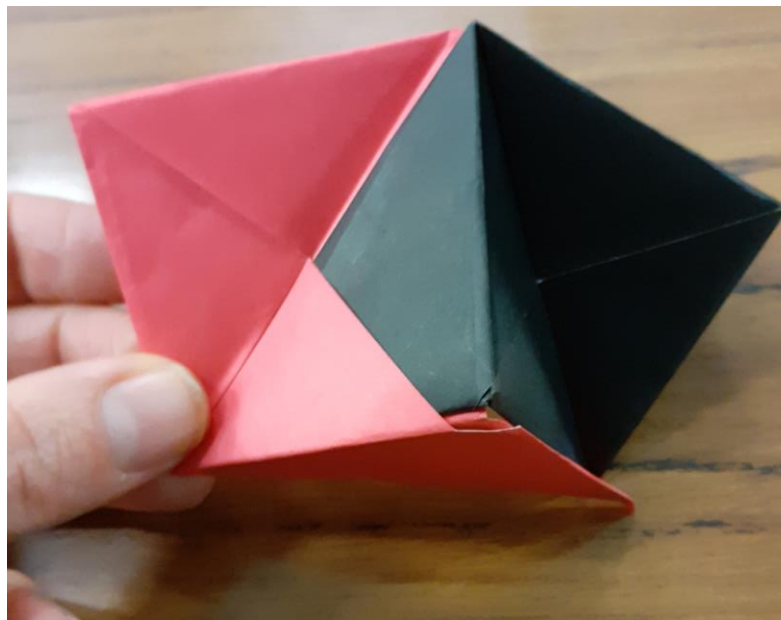
- You need square paper for all origami
- If you have no square paper, there are two methods to make squares in this video
- <https://bit.ly/squarefroma4>

# Before you start...

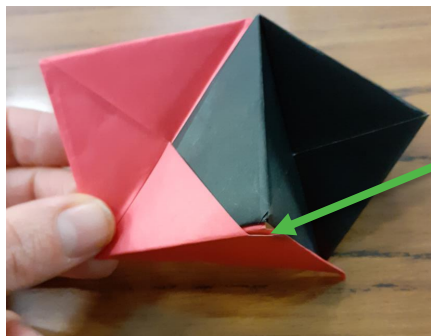
- You will need to make several units for each of the shapes
  - 6 units to make a cube
    - Ideally 2 each of three colours
  - 12 shapes to make a stellated octahedron
    - Ideally 4 each of three colours

# To make a cube

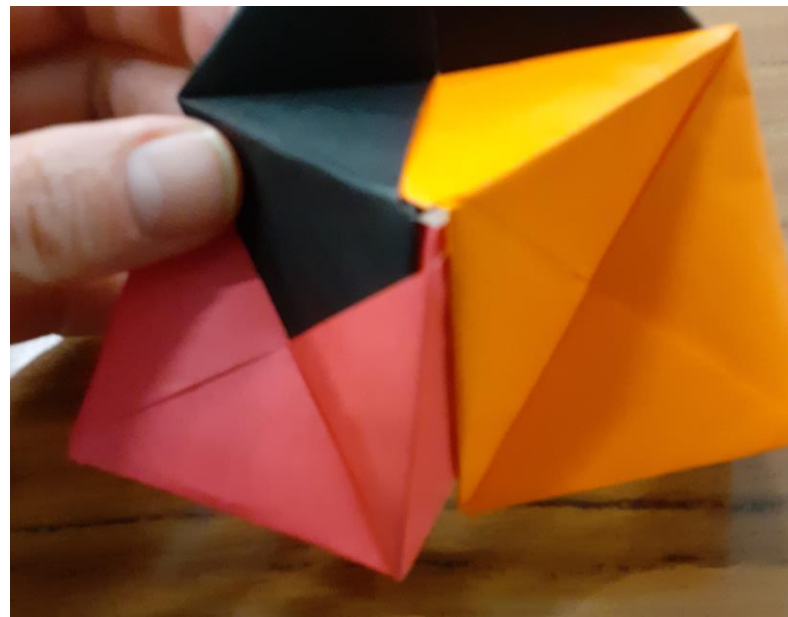
- Take two pieces of different colours.
- Hold them at right angles to each other.
- Slide one end of one piece in to the middle flap of another piece



- Take a piece of the remaining colour.



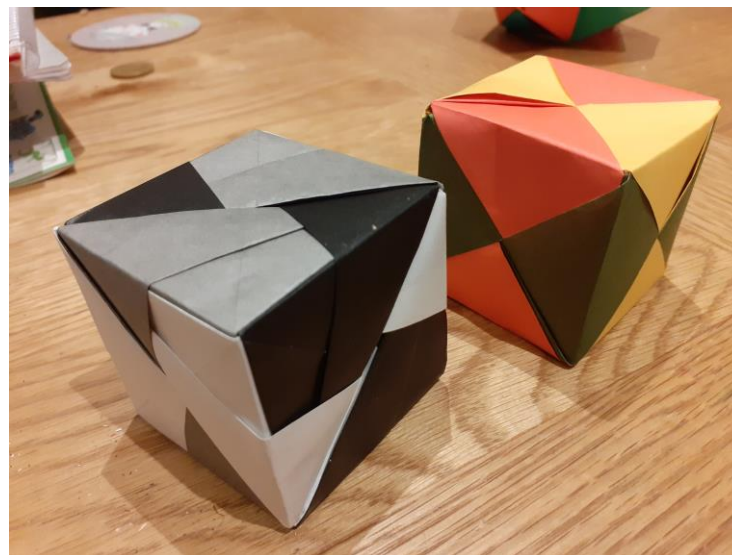
You will be inserting the third piece to make a pyramid of three colours



- Flip the inside flap on to the outside and tuck in



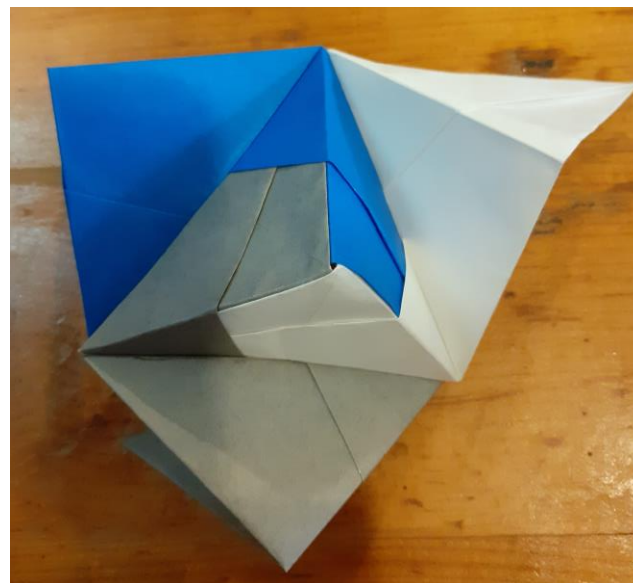
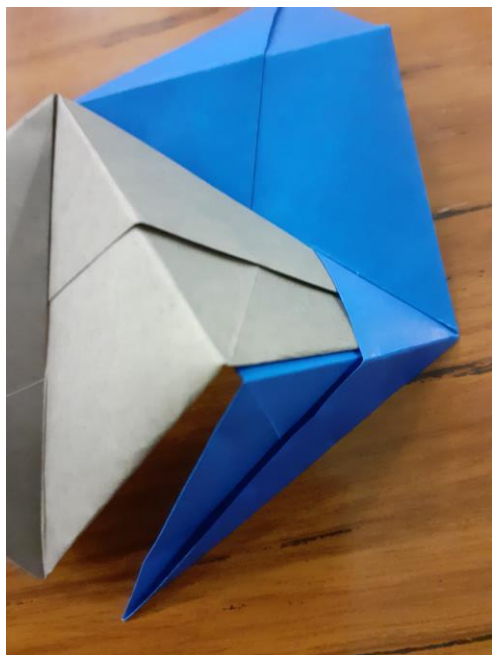
- Add the other pieces one at a time to make the cube.
- You can work out what goes where by putting the same colour pieces opposite each other in the cube. A bit of playing will ensure that each face has the same colour tucked in twice.
- You can make the cube with either unit 1 or unit 2, ending with these:



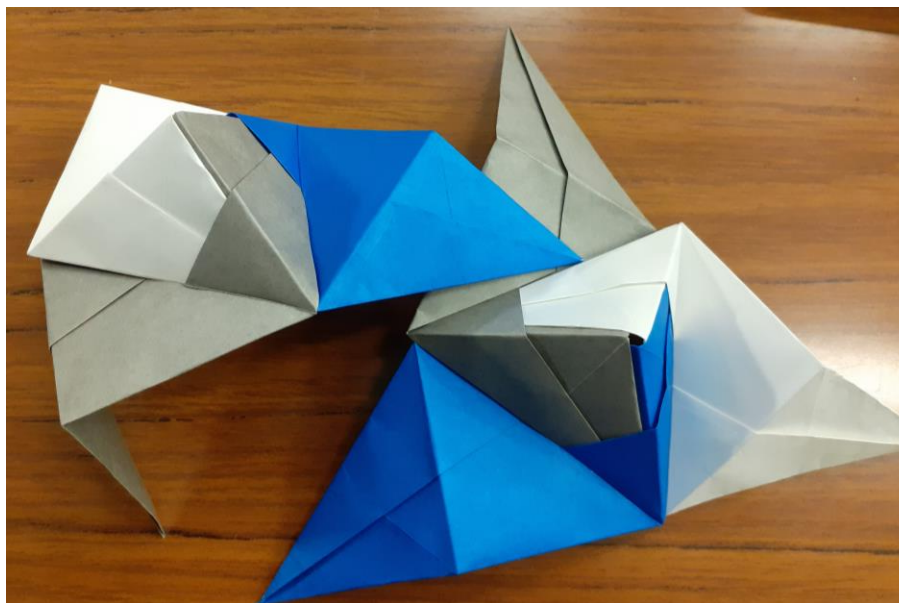


# Making a stellated octahedron

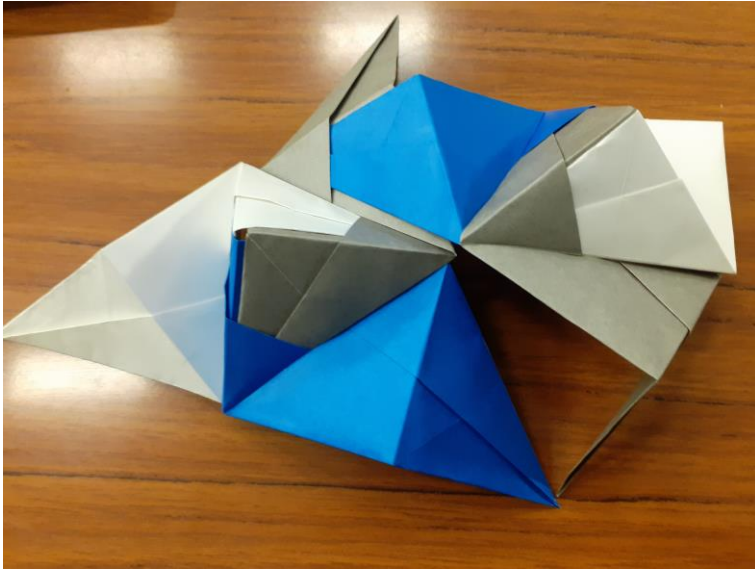
- Put one of each of the 3 colours together to make the corner of the cube, it looks like a pyramid
- Make 4 identical pyramids,



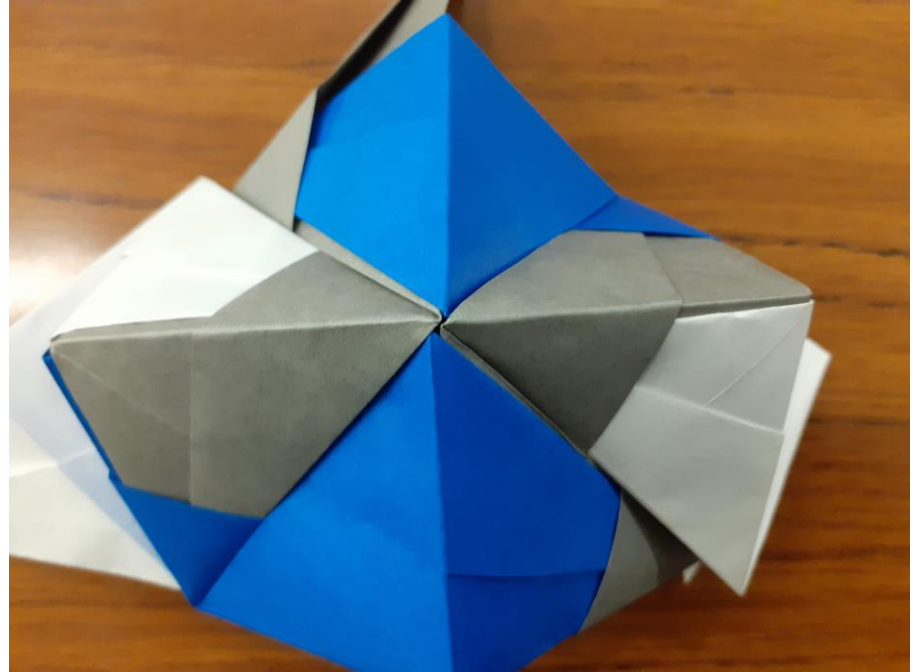
- Attach one pyramid to the other.
- Unlike the cube, you will now be attaching a different colour to the square (in the diagram a blue flap is inserted in to a grey square where there is already a white flap).



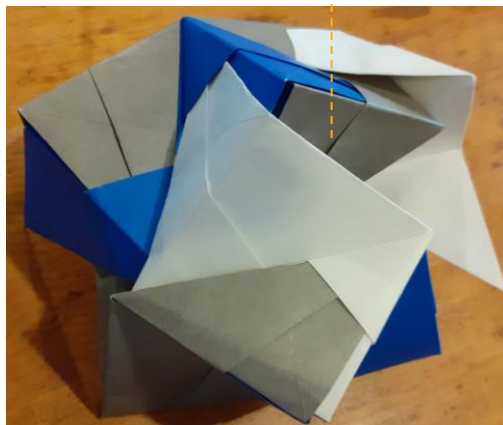
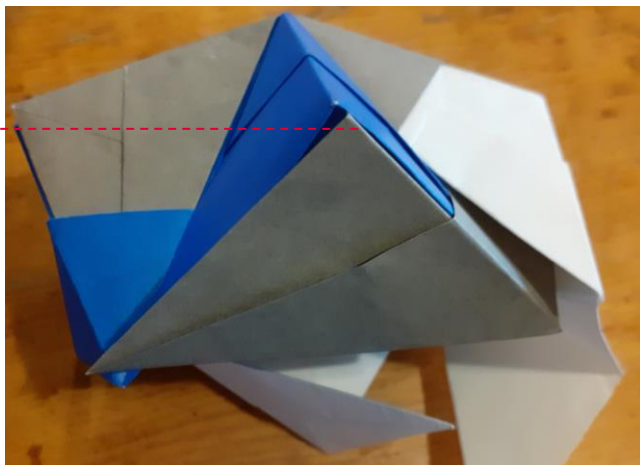
- Tuck the units in



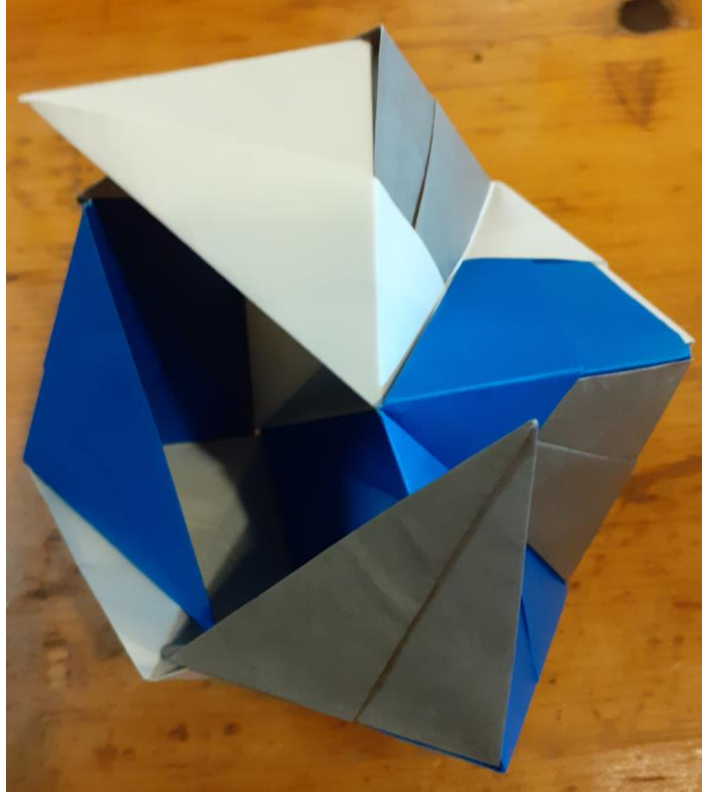
so you end up with this



- Add the next 3 unit module.
- You should always get 3 different colours meeting at the top vertex of each pyramid.
- Find a vertex where two colours meet, and insert the missing colour.
- Then tuck in relevant flaps



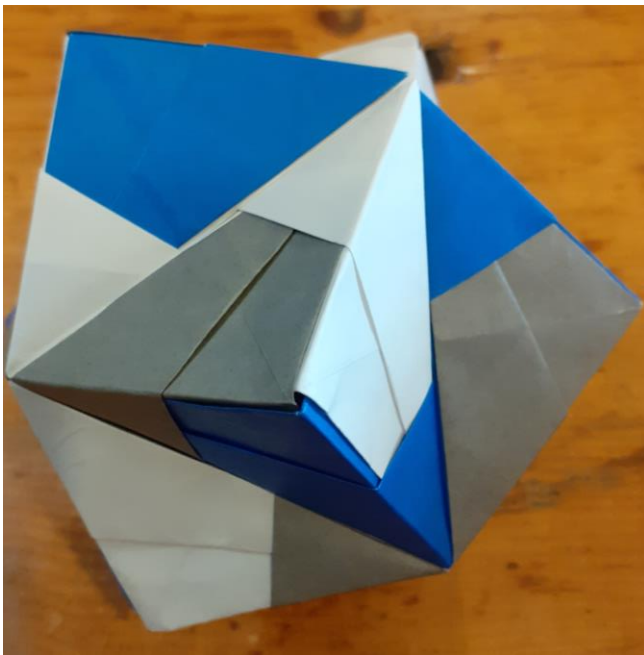
- You will end with this:



- Attach the final 3-piece the same way

# End result!

- Depending on whether you used unit 1 or unit 2, you should end with a shape like this



# Other shapes

- You can use 30 pieces to make a stellated icosahedron. You will need to do this in a team! (Or a good couple of hours).
- Make 30 units (10 x 3 colours work well)
- Start by connecting 5 x 3 pyramids in to a pentagon
- Rotate the shape, adding extra shapes to make sets of 5 pyramids.
- You should be able to arrange it so every vertex has 3 different colours.

# Happy making!!





# Others?

- There is a whole host of exciting shapes you can make with the sonobe unit (and others)
- If you google ‘sonobe origami’ lots of websites, youtube videos etc will come up.
- People have even made their lampshades out of them!

# Stellated?

- Below are some examples of stellated polyhedra. What makes them stellated?
- Do your shapes fit this description? Discuss with your neighbours.

