Three Mathematical Paperfolds
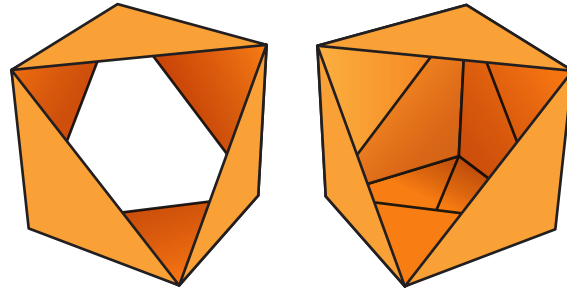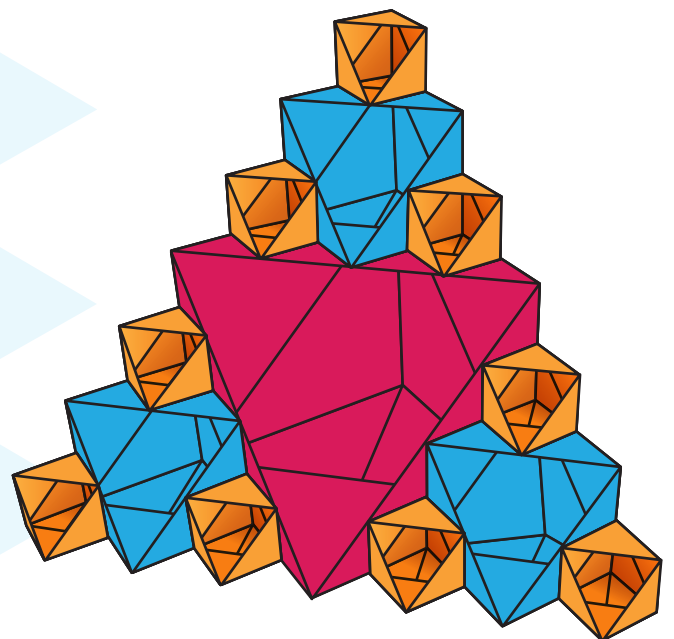
Half Cube & Three Quarter Cube by **David Mitchell**
Sierpinki Pyramid by **Kiumars Sharif**
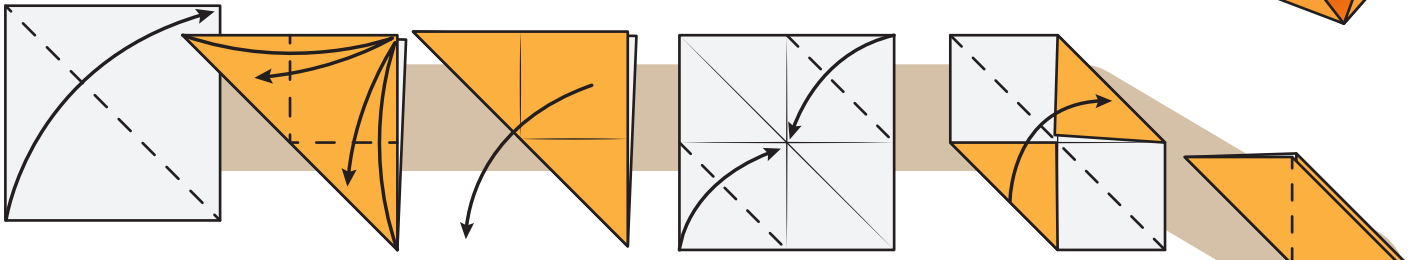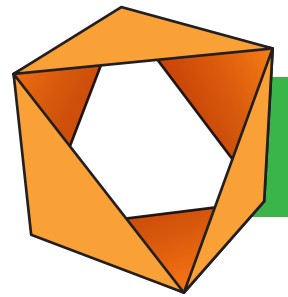**Diagrams** by **Ali Bahmani**

The Sierpinski Pyramid made from modular origami cubes was conceived of by Kiumars Sharif in 2013 and first made using a design of Qubes which were relatively difficult to make. In 2016 David Mitchell realised that it was possible to make a Qube that was much easier to fold but would build into a Sierpinski Pyramid in the same way. This Qube is actually only three quarters of a cube. David Mitchell developed it from his existing Half Cube design by the addition of a fourth, very simple, module. All three designs, the Half Cube, the Three Quarter Cube (or Qube) and the Sierpinski Pyramid are elegant mathematical models that are easy to fold and assemble. In presenting these diagrams we hope that they will prove useful to teachers of mathematics everywhere.
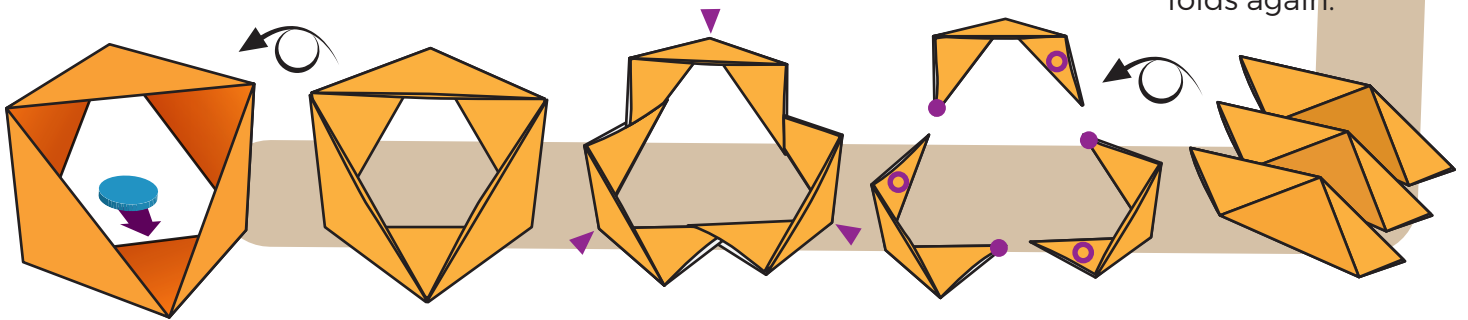
Making the Half Cube:

After the model is folded, If you slip a small coin inside the layers of the bottom module the Half Cube will stand on a flat surface.
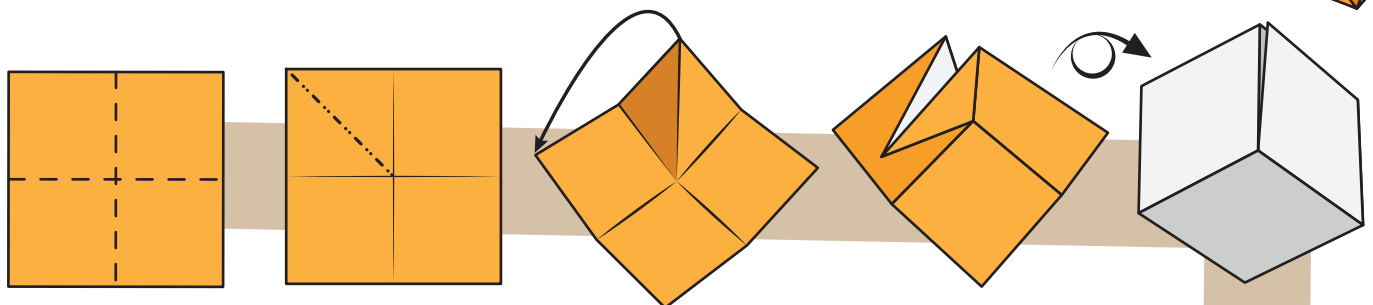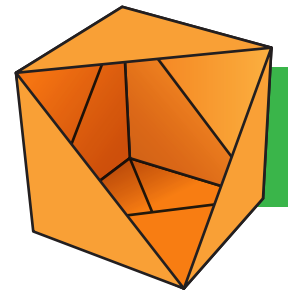

1. fold diagonally.

2. Fold and unfold.

3. Open.

4. Fold to the center.

5. Fold diagonally.

6. Reinforce the folds again.

8. Make 3.

9. Slide corners into pockets.

10. Push together.

11. Turn round.

Finished.

Making the Three Quarter Cube:

You will need a Half Cube and a fourth square of the same size to fold into a fourth module.

1. Fold and Unfold.

2. Mountain fold

3. Make a cube corner.

4. In progress.

5. Reverse of fourth module.

6. The corners of the fourth module…

7. … slide into the pockets of the Half Cube.

8. Turn round.

Finished.

Making the Sierpinski Pyramid

The Sierpinski Pyramid is built by combining iterations of Qubes (Three Quarter Cubes) of different sizes, each succeeding iteration being one eighth the volume of the one before. There is no theoretical limit to the number of iterations that can be achieved but in practice it is difficult to make a Sierpinski Pyramid with more than three or four iterations unless you begin with really large paper.

4

12

a/2

36

a

a/4

1. Prepare your squares. Each iteration uses squares one quarter of the size of those used for the previous iteration.

2. Your finished Qubes will look like this.

3. Begin by placing the largest Qube onto a flat surface then simply add the rest as shown. They do not need to be glued together.

Finished.