3. Counting symmetries

We can now start to move away from the underlying objects and start thinking about the symmetries themselves. It will be useful to think of the symmetries as transformations from now on.

1. The shapes you were given are called "regular polygons". What types of symmetry do they have? What would happen if their edges were not all the same length?

2. Compare the different shapes. Do any of them seem to be more symmetric than others? Can you make this idea of "more" or "less" symmetric precise?

3. Can you find a shape whose symmetries are also all symmetries of a different shape (ie do all of the symmetry transformations of the first shape give rise to symmetry transformations of the second object)?

4. How would you distinguish between two symmetries of a given polygon? (Careful - we want to count the symmetries themselves, not just the types!) What would it mean for two transformations to give rise to the same symmetry?

5. Think of different ways you can use to keep track of the different symmetries. Use these methods to count the number of different symmetries of the shapes.

Extension Is it possible to count the symmetries of a circle? How would you keep track of its different symmetries?

Extension Count the symmetries of the five platonic solids (the three-dimensional versions of the regular polygons).