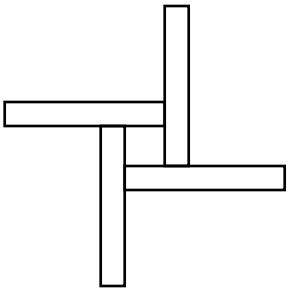
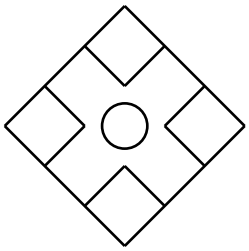
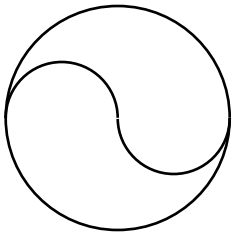
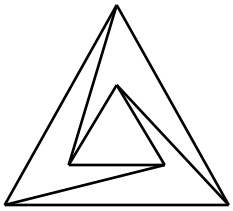
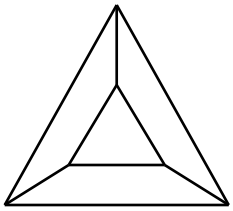
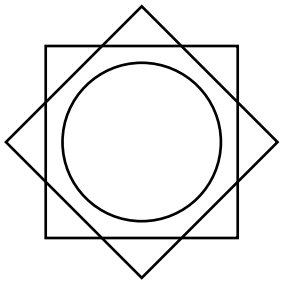
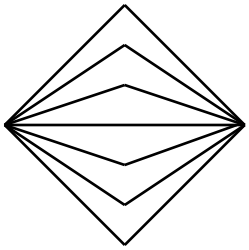
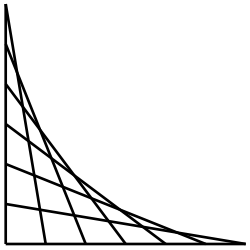
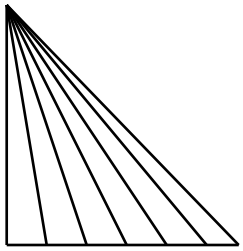
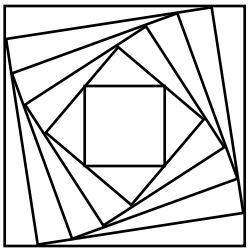
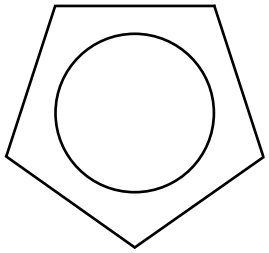
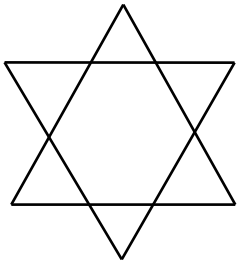
1. Create a group table for the symmetries of the swastika. What is its symmetry group called?
2. Create a group table for the symmetries of the equilateral triangle. It will be helpful to cut out such a triangle and colour each of its vertices a different colour (colour both sides). Draw each of the symmetry transformations in your workbook and then working with a partner construct the group table by physically manipulating the triangle. What is the symmetry group of the equilateral triangle?
3. What are the symmetry groups of each of the following figures? What is the total number of symmetries in each case? Describe which symmetries which generate each symmetry group?

4. In your workbook modify each of the figures on the previous page so as to reduce the symmetry to a smaller symmetry group (this may not always be possible). Try to avoid breaking all the symmetry. Name the new symmetry group you have created and write down how many symmetries it has. The new symmetry group is called a **subgroup** of the original symmetry group. Only certain subgroups are possible. By examining the examples you have created find a rule that will tell you what how many symmetries a subgroup of a group with n symmetries can have.

5. For each one of the following symmetry groups, draw a figure with those symmetries.

   (a) D_6

   (b) C_4

   (c) C_7

   (d) D_4

   (a) D_2

   (b) C_1

   (c) C_8

   (d) D_3

   Of the above groups write down which are subgroups of another group that is listed?