1 Reflection and rotation symmetry

This work will help you

- recognise reflection symmetry and rotation symmetry in a shape
- complete a shape with given reflection or rotation symmetry
- name types of triangle and quadrilateral, and recognise symmetrical and regular polygons
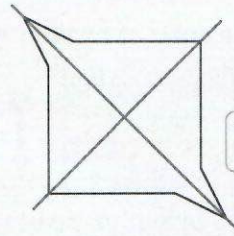
You need sheets F1–1, F1–2, F1–3 and F1–4.
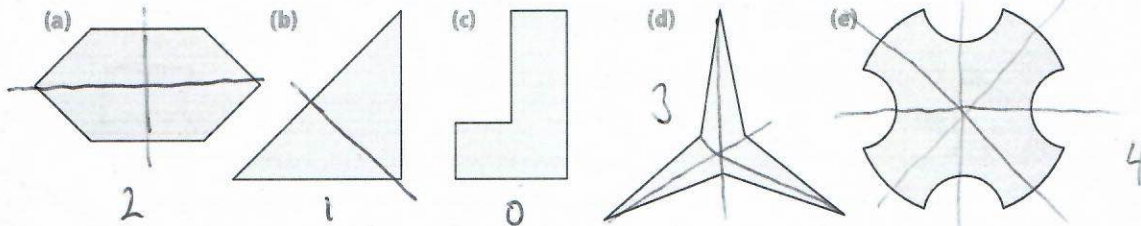
A Reflection symmetry

level 4

A shape with **reflection symmetry** has one or more mirror lines that reflect one half of the shape exactly on to the other half.

These mirror lines are called **lines of symmetry**.

This shape has two lines of symmetry.

A1 How many lines of symmetry has each of these shapes?

(a)   (b)   (c)   (d)   (e)

2   i   0   3   4

A2 This question is on sheet F1–1.

A3 This question is on sheet F1–2.

more than 1 way

A4 Copy each diagram and follow the instruction below it.

(a)   (b)   (c)   (d)

Shade two more squares to make a pattern with 2 lines of symmetry.

Shade two more squares to make a pattern with 1 line of symmetry.

Shade three more squares to make a pattern with 4 lines of symmetry.

Shade two more squares to make a pattern with 1 line of symmetry.
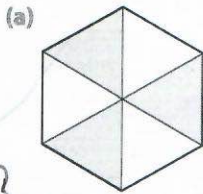
B Rotation symmetry

A shape with **rotation** (or rotational) **symmetry** can be rotated round its centre so that it fits on top of itself more than one way.
The **order** of rotation symmetry is the number of different positions a shape fits on top of itself.
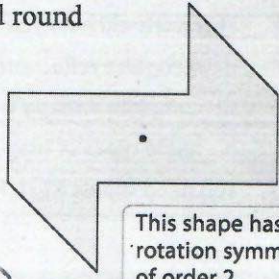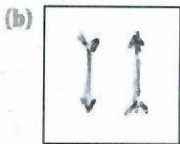
This shape has rotation symmetry of order 2.

We say that a shape with **no rotation symmetry** has **order 1** as it fits on top of itself in only one way.
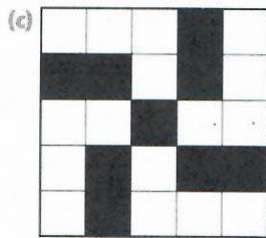
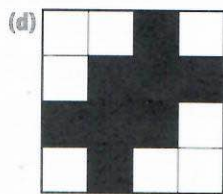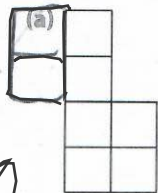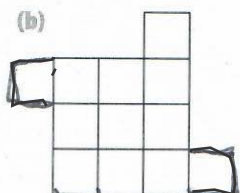**B1** What is the order of rotation symmetry of each of these?

(a)   (b)   (c)   (d)

3   2   4   2
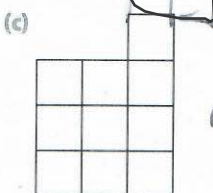
B2 This question is on sheet F1–3.

B3 Copy each diagram and complete it as stated.

(a)   (b)   (c)

Add two more squares so that the final shape has rotation symmetry of order 2.

Add three more squares so that the final shape has rotation symmetry of order 4.
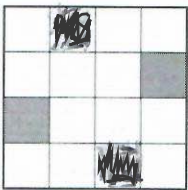
Add three more squares so that the final shape has no rotation symmetry.

more than 1 way

almost arbitrary

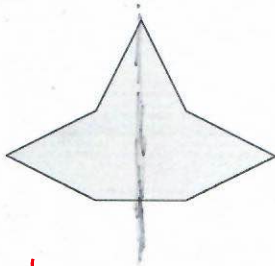*It's got to have order 1*

B4 Copy this diagram and shade two more squares so that it has rotation symmetry of order 4.
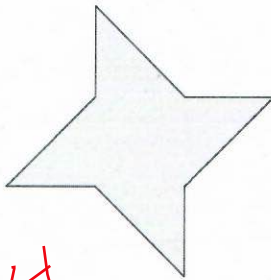
c Both types of symmetry

A shape can have reflection symmetry and rotation symmetry

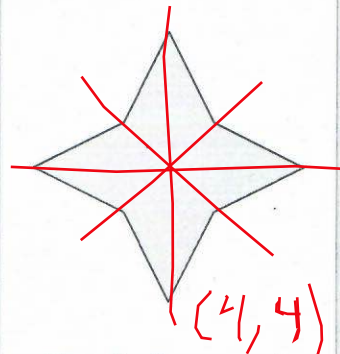This shape has reflection symmetry but no rotation symmetry.

1

- How many lines of symmetry does it have?

This shape has rotation symmetry but no reflection symmetry.

4

- What is its order of rotation symmetry?

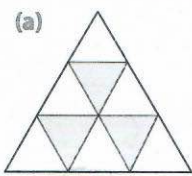This shape has **both** reflection and rotation symmetry.
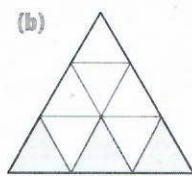
(4,4)

- Describe the symmetry of this shape.

C1 For each design below

  (i) write down how many lines of symmetry it has
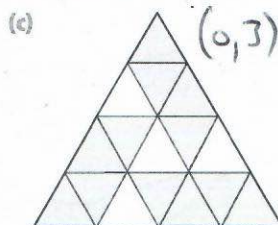
  (ii) write down the order of rotation symmetry

(lines, order)
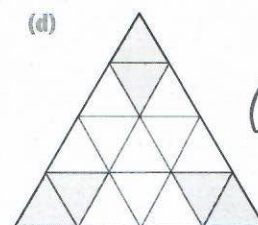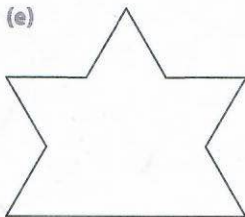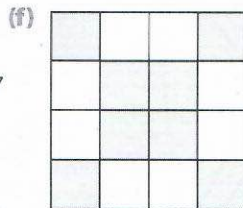
(a)

(3,3)

(b)

(1,1)

(c)

(0,3)

(d)

(3,3)

(e)

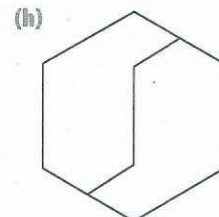(1,1)

(f)

(4,4)

(g)

(0,4)

(h)

(2,2)

C2 This question is on sheet F1–4.

12 1 Reflection and rotation symmetry