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

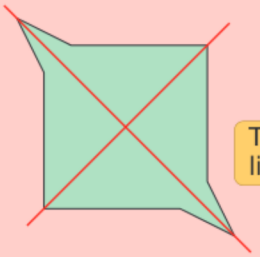
You need sheets F1–1, F1–2, F1–3 and F1–4.

A Reflection symmetry

level 4

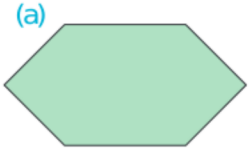
A shape with reflection symmetry has one or more mirror lines that reflect one half of the shape exactly on to the other half.

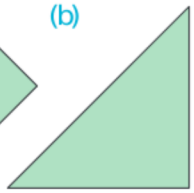
These mirror lines are called lines of symmetry.

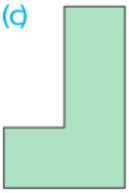


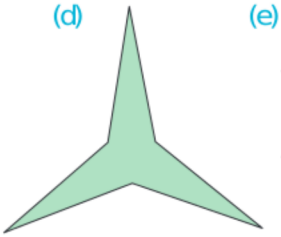
This shape has two lines of symmetry.

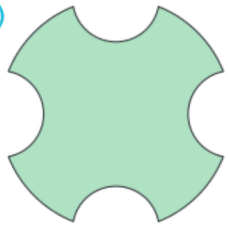
A1 How many lines of symmetry has each of these shapes?

(a) 

(b) 

(c) 

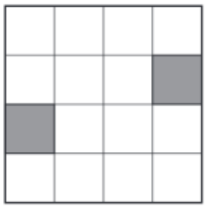
(d) 

(e) 

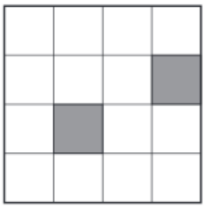
A2 This question is on sheet F1–1.

A3 This question is on sheet F1–2.

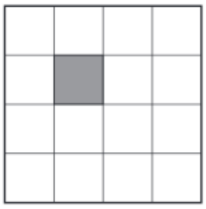
A4 Copy each diagram and follow the instruction below it.

(a) 

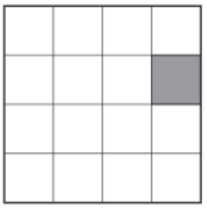
Shade two more squares to make a pattern with 2 lines of symmetry.

(b) 

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

(c) 

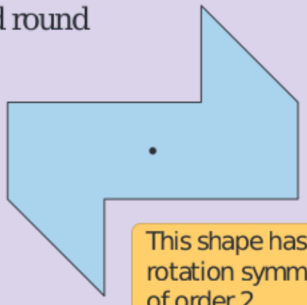
Shade three more squares to make a pattern with 4 lines of symmetry.

(d) 

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.



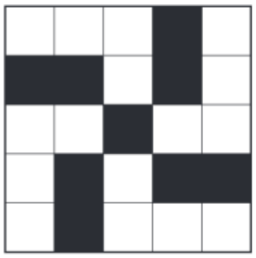
This shape has rotation symmetry of order 2.

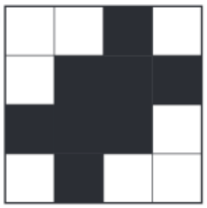
We say that a shape with no rotation symmetry has order 1 as it fits on top of itself in only one way.

B1 What is the order of rotation symmetry of each of these?

(a) 

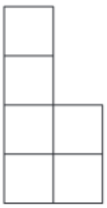
(b) 

(c) 

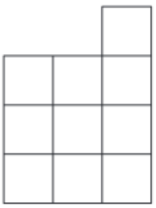
(d) 

B2 This question is on sheet F1–3.

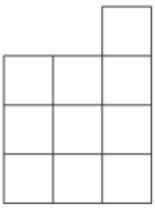
B3 Copy each diagram and complete it as stated.

(a) 

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

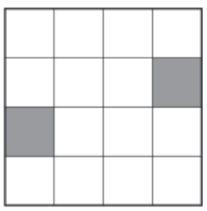
(b) 

Add three more squares so that the final shape has rotation symmetry of order 4.

(c) 

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

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

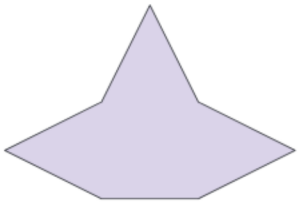


C Both types of symmetry

T

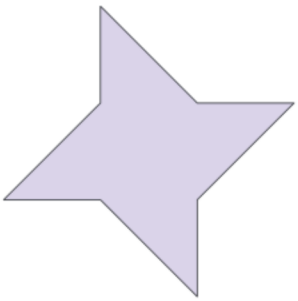
A shape can have reflection symmetry and rotation symmetry

This shape has reflection symmetry but no rotation symmetry.



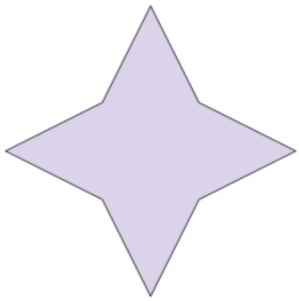
- How many lines of symmetry does it have?

This shape has rotation symmetry but no reflection symmetry.



- What is its order of rotation symmetry?

This shape has both reflection and rotation symmetry.



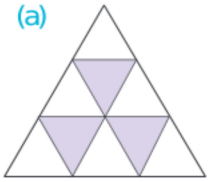
- Describe the symmetry of this shape.

C1 For each design below

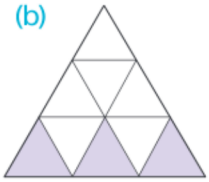
(i) write down how many lines of symmetry it has

(ii) write down the order of rotation symmetry

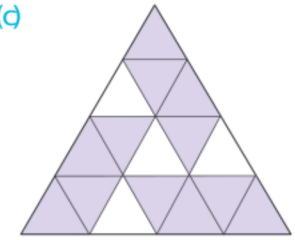
(a)



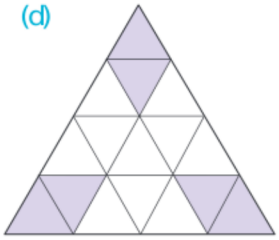
(b)



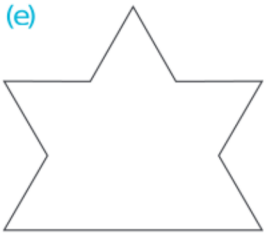
(c)



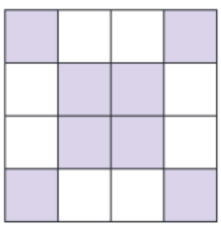
(d)



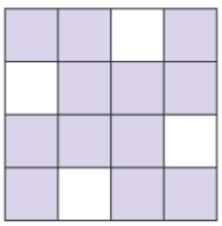
(e)



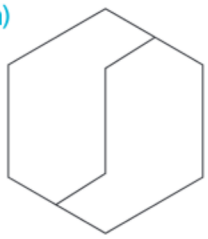
(f)



(g)

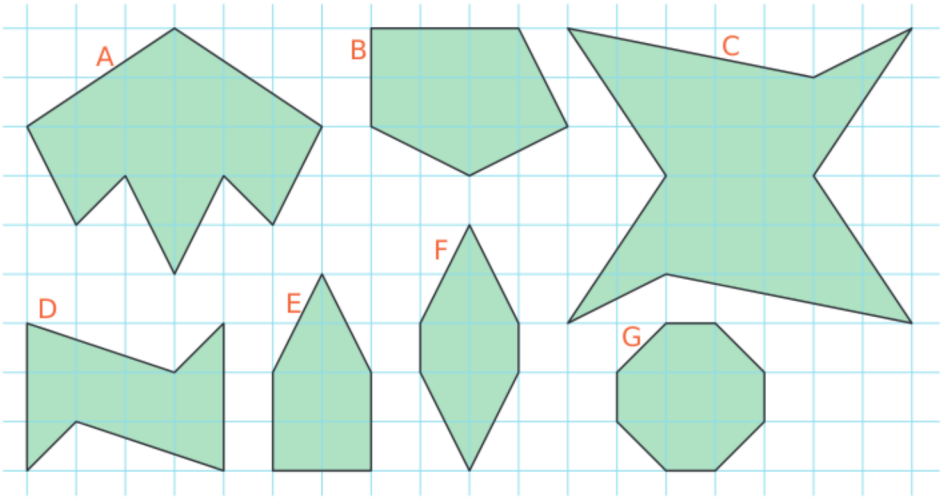


(h)



C2 This question is on sheet F1–4.

E2 Here are some polygons.



Which of these polygons is

(a) a pentagon with reflection symmetry

(b) an octagon with reflection symmetry but no rotation symmetry

(c) a hexagon with rotation symmetry but no reflection symmetry

(d) an octagon with rotation symmetry but no reflection symmetry

E3 Draw a decagon with only one line of symmetry.

A polygon that has all its edges equal and all its angles equal is called a regular polygon.

E4 Here are some regular polygons.

(a) Copy and complete this table.

Polygon	Number of sides	Lines of symmetry	Order of rotation symmetry
Equilateral triangle	3	3	3
Square	4		
Regular pentagon	5		
Regular hexagon			
Regular nonagon			

(b) An icosagon is a polygon with 20 sides.
What symmetry does a regular icosagon have?