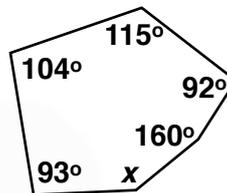


## Symmetry (Reflection and Rotational)

### Starter

1. **(Review of last lesson)** A regular polygon has 17 sides. Calculate the size of one **interior** angle. Give your answers to 1 d.p.

2. **(Review of last lesson)**  
Calculate the value of  $x$ .



3. State the number of lines of symmetry of:  
(a) a square                      (b) a rectangle                      (c) an isosceles triangle

### Notes

#### **Reflective symmetry**

A shape has reflective symmetry if one half of the shape can be reflected in a line onto the other half. The line is called the **line of symmetry**.

**E.g. 1** Geogebra 1:                      [Finding the line of symmetry](#)                      (10 questions)

**Working:**                      The red line will go green when you are correct.

**E.g. 2** Geogebra 2:                      [Rotating a line to find the lines symmetry](#)                      (14 questions)

**Explanation:**                      [Lines of symmetry](#)

#### **Rotational symmetry**

A shape has rotational symmetry when it still looks the same after a rotation **of less than one full turn** around its centre.

**Geogebra 3:**                      [Rotational symmetry of a regular pentagon](#)

The **order** of rotational symmetry is the **number of times** a shape matches as it spins round.

Obviously, every shape can turn  $360^\circ$  round and fit onto itself but shapes with order of rotational symmetry are said to have **no rotational symmetry**.

Click on the geogebra links below to see more examples

**E.g. 3** Geogebra 4:                      [Rotational symmetry of regular polygons](#)

Write down the smallest angle which each regular polygon must rotate through to be on itself. In addition, write down the order of rotational symmetry.

- |                          |                     |
|--------------------------|---------------------|
| (a) Equilateral triangle | (b) Square          |
| (c) Regular pentagon     | (d) Regular hexagon |

What is the connection between the smallest angle the regular polygon must rotate through and its order of rotational symmetry?

**Working:**                      (a)  $120^\circ$ , order of rotational symmetry = 3

**E.g. 4** Geogebra 5: Rotational symmetry of quadrilaterals

Write down the order of rotational symmetry for these quadrilaterals:

- |                   |               |             |
|-------------------|---------------|-------------|
| (a) Square        | (b) Rectangle | (c) Rhombus |
| (d) Parallelogram | (e) Trapezium | (f) Kite    |

**E.g. 5** Geogebra 6: Rotational symmetry of strange shapes

Write down the order of rotational symmetry for the 12 shapes.

**Working:** Figure 1 Order of rotational symmetry = 5  
Figure 2 No rotational symmetry

**Geogebra 7:** Rotational and reflective symmetry

**Explanation:** Rotational symmetry

**Video:** Reflective symmetry

**Video:** Rotational symmetry

[Solutions to Starter and E.g.s](#)

**Exercise**

p62 15.3 Qu 1–10

**CIMT Activity 15.2 Lines of Symmetry** (you will need to scroll down to find the activity)

**Summary**

Reflective symmetry — a shape has reflection symmetry if one half of the shape can be reflected in a line to the other half. The line is the line of symmetry.

Rotational symmetry — shape has rotational symmetry when it still looks the same after a rotation of less than one full turn around its centre.

The **order** of rotational symmetry is the **number of times** a shape matches as it spins round. Obviously, every shape can turn  $360^\circ$  round and fit onto itself but shapes with order of rotational symmetry are said to have **no rotational symmetry**.

[Textbook answers \(only available during a lockdown\)](#)