

# Symmetry

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

## At a glance

Lines of symmetry, rotational symmetry, symmetric quadrilaterals and planes of symmetry in solids.

1. Line symmetry
2. Rotational symmetry
3. Symmetry of triangles and quadrilaterals
4. Symmetry in solids

## 1. Line symmetry

☐ I revised this

- A line of symmetry splits a shape into two mirror images.
- Test by folding (or with a mirror or tracing paper).
- A regular polygon with  $n$  sides has  $n$  lines of symmetry.

### Worked example

How many lines of symmetry does a regular hexagon have?

1. Regular  $n$ -gon:  $n$  lines.

**6**

## 2. Rotational symmetry

☐ I revised this

- The **order** is how many times a shape looks the same in one full turn.
- Order 1 means no rotational symmetry (it only matches itself after  $360^\circ$ ).
- A regular  $n$ -gon has rotational symmetry of order  $n$ .

### Worked example

What is the order of rotational symmetry of a parallelogram?

1. It looks the same after a half turn ( $180^\circ$ ) and a full turn.

**Order 2**

## 3. Symmetry of triangles and quadrilaterals

☐ I revised this

- Know these well — they are used to find missing angles and lengths.

| Shape                | Lines             | Order |
|----------------------|-------------------|-------|
| Equilateral triangle | 3                 | 3     |
| Isosceles triangle   | 1                 | 1     |
| Square               | 4                 | 4     |
| Rectangle            | 2                 | 2     |
| Rhombus              | 2 (the diagonals) | 2     |
| Parallelogram        | 0                 | 2     |
| Kite                 | 1                 | 1     |
| Isosceles trapezium  | 1                 | 1     |

### Worked example

Which quadrilateral has rotational symmetry of order 2 but no lines of symmetry?

1. Rectangle and rhombus have lines; parallelogram has none.

**Parallelogram**

## 4. Symmetry in solids

☐ I revised this

- A **plane of symmetry** cuts a solid into two mirror halves.
- Cuboid (all edges different): 3 planes. Cube: 9 planes.
- Prisms, cylinders, pyramids and cones: picture slicing through the middle.

### Worked example

How many planes of symmetry does a cuboid with three different edge lengths have?

1. One plane through the middle of each pair of opposite faces.

**3**

### Common mistakes

| Don't write                                               | Write instead                             |
|-----------------------------------------------------------|-------------------------------------------|
| ✗ A parallelogram has 2 lines of symmetry                 | ✓ It has none; its order of rotation is 2 |
| ✗ Order 0 rotational symmetry                             | ✓ The smallest order is 1                 |
| ✗ A rhombus's lines go through the midpoints of its sides | ✓ Its lines are the diagonals             |

### In the exam

- Use tracing paper in the exam to check lines and order.
- Complete-the-pattern questions: reflect each square across the given line(s).
- Answer with a number for 'order' — 'order 2', not 'twice'.

### My notes

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