Cambridge IGCSE · Mathematics 0580 · Notes

Geometrical terms and symmetry

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What you need to know

By the end of this topic you should be able to:

1. **Use the basic words of geometry**: point, vertex (plural vertices), line, parallel, perpendicular, right angle, bearing, and the names of angles by size (acute, obtuse, reflex). **Extended only:** also plane and perpendicular bisector.
2. **Tell interior and exterior angles apart**, and know what **congruent**, **similar** and **scale factor** mean. You will not be asked to prove that two shapes are congruent.
3. **Name and describe triangles** (equilateral, isosceles, scalene, right-angled), **special quadrilaterals** (square, rectangle, kite, rhombus, parallelogram, trapezium) and **polygons** (regular and irregular; pentagon, hexagon, octagon, decagon).
4. **Name solids and their parts**: cube, cuboid, prism, cylinder, pyramid, cone and sphere, with faces, surfaces, edges and vertices, and know what a net is. **Extended only:** also hemisphere and frustum.
5. **Name the parts of a circle**: centre, radius (plural radii), diameter, circumference, semicircle, chord, tangent, arc, sector and segment. **Extended only:** major and minor arcs.
6. **Recognise line symmetry and the order of rotational symmetry** of flat shapes and patterns, including the symmetry of triangles, quadrilaterals and polygons: draw every line of symmetry, state the order, and shade squares or complete a shape to give it a stated symmetry.
7. **Extended only: recognise the symmetry of prisms, cylinders, pyramids and cones**: count their planes of symmetry and describe their axes of rotational symmetry.

Understand it

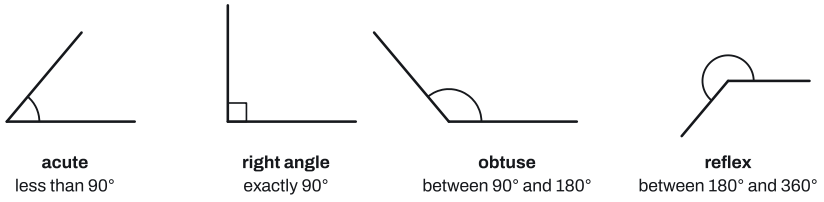
Points, lines and angles

A **point** is a position, usually marked with a dot or cross and named with a capital letter. A **vertex** is a corner of a shape, where edges or sides meet. A **line** is straight; strictly it goes on for ever, and the piece between two points A and B is the **line segment** AB.

- **Parallel** lines go in the same direction and never meet, however far they are extended. They are marked with matching arrows.
- **Perpendicular** lines meet at a **right angle** (90°), marked with a small square.

- A **bearing** is an angle measured clockwise from north, written with three figures, such as 045°.
- **Extended only:** a **plane** is a flat surface, like a sheet of paper that goes on for ever. The **perpendicular bisector** of a line segment cuts it into two equal halves at right angles.

Angles are named by their size:



Name	Size
acute	less than 90°
right angle	exactly 90°
obtuse	more than 90° but less than 180°
reflex	more than 180° but less than 360°

An angle of exactly 180° is a straight line. Two arms from the same point make two angles that add up to 360°. The other way round from the 130° angle is $360^\circ - 130^\circ = 230^\circ$, a reflex angle. So every pair of arms makes one angle below 180° and one reflex angle: read which one the question marks.

Interior and exterior angles

In a polygon, an **interior angle** is the angle inside the shape at a vertex. Extend one side past the vertex: the angle between that extension and the next side is an **exterior angle**. Because they sit together on a straight line,

$$\text{interior angle} + \text{exterior angle} = 180^\circ.$$

Walk round any polygon (with no reflex interior angle) and you turn through each exterior angle once, one full turn in total, so the **exterior angles add up to** 360°. In a regular polygon with n sides the exterior angles are all equal, so each is $\frac{360^\circ}{n}$. For a regular hexagon: exterior $360 \div 6 = 60^\circ$, interior $180 - 60 = 120^\circ$. (Working out other unknown angles belongs to the Angles topic.)

Congruent and similar

- **Congruent** shapes are exactly the same shape **and** the same size. One may be turned over or rotated, but every length and every angle matches.
- **Similar** shapes are the same shape but can be different sizes: the angles match, and every length of one is the same multiple of the matching length of the other. That multiple is the **scale factor**. A triangle with sides 3, 4 and 5 cm and one with sides 6, 8 and 10 cm are similar, with scale factor 2.

Congruent shapes are similar with scale factor 1. "Same area" or "same angles" is not enough for congruent.

Triangles

- **Equilateral:** all three sides equal, all angles 60°.
- **Isosceles:** two sides equal, and the two angles opposite them are equal.
- **Scalene:** all three sides different, all angles different.
- **Right-angled:** one angle is 90°. It can also be isosceles (angles $90^\circ, 45^\circ, 45^\circ$) or scalene.

So a triangle with angles 40°, 70° and 70° is isosceles (two equal angles), and one with angles 100°, 45° and 35° is scalene.

Special quadrilaterals

A **quadrilateral** is any polygon with 4 sides. Six special ones have names. Learn each by its sides, angles, diagonals and symmetry.

Name	Sides	Angles	Diagonals
square	4 equal; opposite sides parallel	all 90°	equal; cross at 90° and bisect each other
rectangle	opposite sides equal and parallel	all 90°	equal; bisect each other (not at 90°)
rhombus	4 equal; opposite sides parallel	opposite angles equal	cross at 90° and bisect each other; not equal
parallelogram	opposite sides equal and parallel	opposite angles equal	bisect each other
kite	two pairs of equal **adjacent** sides	one pair of opposite angles equal	cross at 90°; one cuts the other in half
trapezium	exactly one pair of parallel sides		

A square is a special rectangle **and** a special rhombus, and all of them except the kite and trapezium are parallelograms. When a question lists properties, pick the name that fits **all** of them and **only** them: "4 equal sides and 2 lines of symmetry" is a rhombus, because a square has 4 lines.

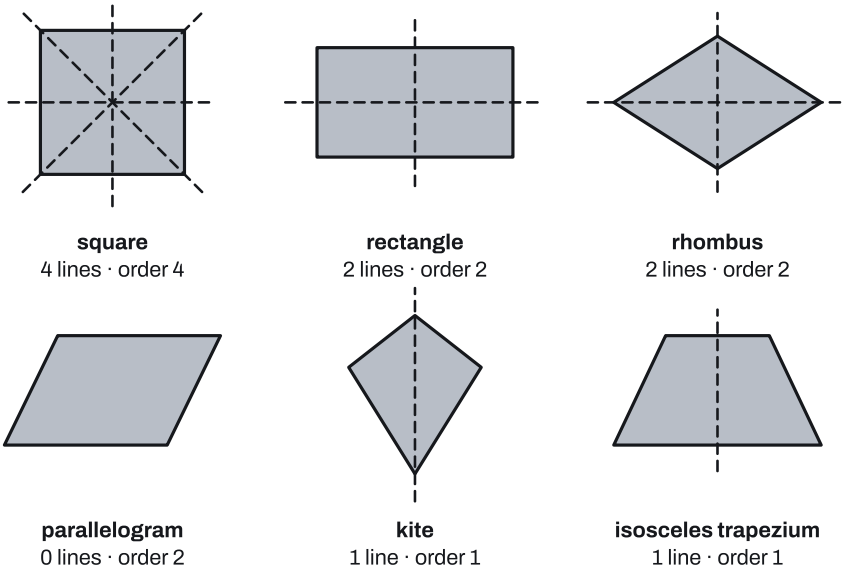
Polygons

A **polygon** is a flat shape with straight sides. A **regular** polygon has all sides equal **and** all angles equal; if either fails it is **irregular**. A rhombus has equal sides but (unless it is a square) unequal angles, so it is not regular.

Sides	3	4	5	6	8	10
Name	triangle	quadrilateral	pentagon	hexagon	octagon	decagon

Line symmetry

A shape has a **line of symmetry** (a mirror line) if folding it along that line makes the two halves fit exactly on top of each other. Each point on one side has a partner the same distance away on the other side, directly across the line.

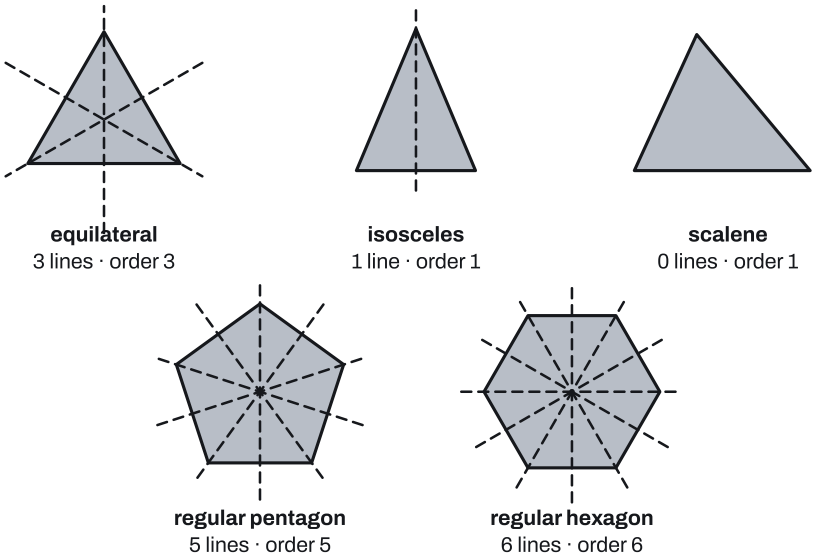


Two traps are worth remembering. A **rectangle's diagonals are not lines of symmetry**: fold a rectangle along a diagonal and the corners do not meet. And a **parallelogram has no lines of symmetry at all**, even though it looks balanced. A trapezium usually has none; the **isosceles trapezium** (its two sloping sides equal) has one.

Rotational symmetry

A shape has **rotational symmetry** if it fits onto itself more than once during one full turn about its centre. The **order** is the number of times it fits in one full turn, counting the starting position. A square fits after 90°, 180°, 270° and 360°, so its order is 4.

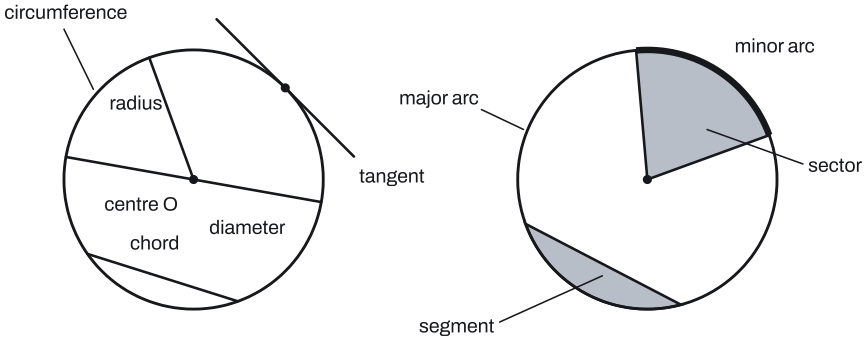
Every shape fits once (after a full turn), so a shape with no rotational symmetry has **order 1**, never 0. The order is a whole number, not an angle.



A **regular polygon with n sides has n lines of symmetry and rotational symmetry of order n**. When n is odd, each line goes from a vertex to the midpoint of the opposite side. When n is even, half the lines join opposite vertices and half join the midpoints of opposite sides.

For a pattern, check each possible mirror in turn: vertical, horizontal and both diagonals. For rotational symmetry, turn the page (or tracing paper) about the centre and look for the positions where the pattern matches.

Circles



- **Centre**: the middle point, the same distance from every point on the circle.
- **Radius**: a line from the centre to the circle, or its length. **Diameter**: a line through the centre from one side to the other, twice the radius: $d = 2r$.
- **Circumference**: the whole curved edge, or its length.
- **Chord**: a line joining two points on the circle. The diameter is the longest chord.
- **Tangent**: a straight line that touches the circle at one point only.
- **Arc**: part of the circumference. **Extended only:** the shorter arc between two points is the **minor arc**, the longer one the **major arc**.
- **Sector**: the region between two radii and an arc (a "slice of pie"). **Segment**: the region between a chord and an arc. A **semicircle** is half a circle, cut off by a diameter.

Sector and segment are regions; radius, diameter, chord and tangent are lines.

Solids

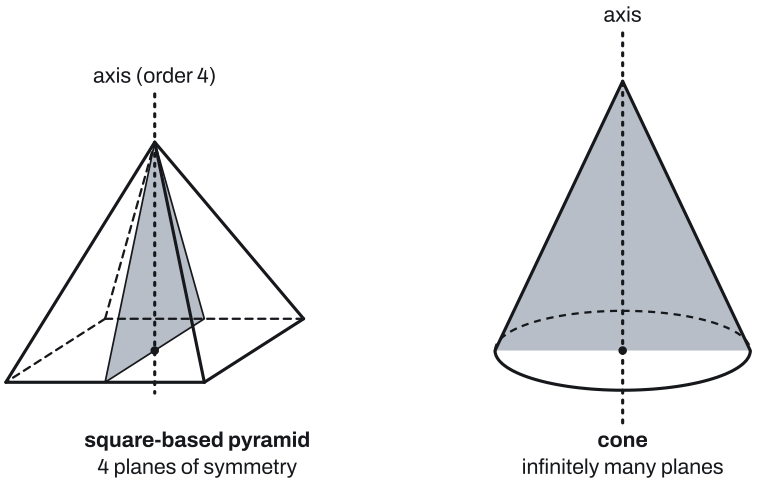
A **face** is a flat surface of a solid; a solid can also have curved **surfaces**. An **edge** is where two faces meet, and a **vertex** is a corner.

- **Cube**: 6 square faces. **Cuboid**: 6 rectangular faces.
- **Prism**: the same cross-section all the way along, such as a triangular prism. A prism whose cross-section has n sides has $n + 2$ faces, $3n$ edges and $2n$ vertices.
- **Pyramid**: a polygon base with triangular faces meeting at one vertex (the apex). A pyramid with an n-sided base has $n + 1$ faces, $2n$ edges and $n + 1$ vertices.
- **Cylinder**: a prism with a circular cross-section. **Cone**: a circular base and a curved surface up to a point. **Sphere**: a ball.
- **Extended only:** a **hemisphere** is half a sphere; a **frustum** is what is left of a cone or pyramid when the top is cut off parallel to the base.

A **net** is a flat shape that folds up to make a solid. The net of a cube is six squares joined edge to edge.

Symmetry of solids

Extended only. A **plane of symmetry** cuts a solid into two halves that are mirror images of each other. An **axis of rotational symmetry** is a line through the solid; turning the solid about it, it fits onto itself, and the order counts how many times in one full turn.



square-based pyramid
4 planes of symmetry

cone
infinitely many planes

- A **square-based pyramid** has 4 planes (two through the midpoints of opposite base edges, two through opposite base corners) and an axis of order 4 from the apex to the centre of the base.
- A **cone** or a **cylinder** has infinitely many planes through its axis; a cylinder also has one more plane cutting it in half across the middle.
- A **cuboid** with three different edge lengths has 3 planes; a **cube** has 9.
- A **prism** (other than a cube) has one plane halfway along its length, plus one for each line of symmetry of its cross-section.

Key facts and formulas

"Given" means it is on the List of formulas printed on page 2 of the exam paper. Everything else, learn.

Formula	Status
Acute $< 90^\circ$; right $= 90^\circ$; obtuse between 90° and 180°; reflex between 180° and 360°	Learn it
Interior angle + exterior angle $= 180^\circ$	Learn it
Exterior angles of a polygon add up to 360°; regular polygon: exterior angle $= \dfrac{360^\circ}{n}$	Learn it
Regular polygon with n sides: n lines of symmetry, rotational symmetry of order n	Learn it
Order of rotational symmetry is at least 1 (order 1 means no rotational symmetry)	Learn it
Diameter $= 2\times$ radius	Learn it
Circumference $C = 2\pi r$	Given
Prism with n-sided cross-section: $n + 2$ faces, $3n$ edges, $2n$ vertices	Learn it
Pyramid with n-sided base: $n + 1$ faces, $2n$ edges, $n + 1$ vertices	Learn it
Similar shapes: every length $\times$ the same scale factor, angles unchanged	Learn it

Shape	Lines of symmetry	Order of rotational symmetry
square	4	4
rectangle, rhombus	2	2
parallelogram	0	2
kite, isosceles trapezium, isosceles triangle	1	1
equilateral triangle	3	3
scalene triangle, general trapezium	0	1

How to do it

In the questions we have tagged for this topic (82 questions, 2021–2025; six of them were printed on two papers), the types came up this often. 26 of the 82 questions have parts of more than one type, so the counts add up to more than 82.

Question type	Questions
Naming shapes and solids, or giving their properties	31
Lines of symmetry: draw, complete or shade	22
Order of rotational symmetry: state or shade	20
Naming a type of angle	16

Question type	Questions
Parts of a circle: name or draw	11
Congruent and similar shapes	7
Interior and exterior angles of polygons	6
Solids: edges, vertices, planes and axes of symmetry	2

1. Naming shapes and solids, or giving their properties (31 questions)

1. **Count the sides** (or faces, for a solid) first: that gives the family (triangle, quadrilateral, pentagon, and so on).
2. **Check each property given**: equal sides, parallel sides, right angles, diagonals, lines of symmetry, order of rotational symmetry.
3. **Choose the name that fits every property and no more.** Use the table of lines and orders in Key facts.
4. Write **one** exact mathematical name, spelled clearly ("rhombus", not "diamond"; "trapezium", not "trapezoid").

For example, "a quadrilateral with rotational symmetry of order 2 and no lines of symmetry" is a parallelogram: the rectangle and rhombus have order 2 but also 2 lines each.

Variations you will meet:

- **"Write down two geometrical properties of a rhombus (or rectangle)".** Pick properties from **different aspects**, such as one about sides and one about diagonals: "all four sides are equal" and "the diagonals cross at right angles". Properties true of every quadrilateral ("angles add up to 360°", "4 sides") score nothing, and "opposite sides equal" does not single out a rhombus from a parallelogram.
- **Draw or sketch a named shape**, such as a kite on a grid: use a ruler and count squares so the equal sides really are equal.
- **Two different quadrilaterals with the same symmetry**: for 2 lines and order 2, the rectangle and the rhombus.
- **Explain why a triangle is scalene** when two of its angles are given: work out the third angle (180° minus the other two), then say that all three angles are different, so all three sides are different.
- **Name a solid** from a drawing: cylinder, cone, cuboid, prism, pyramid, sphere.
- **"What does parallel mean?"** Lines that stay the same distance apart and never meet.
- **Name a triangle** from equal-side marks or equal angles, then use that in an angle calculation.

2. Lines of symmetry: draw, complete or shade (22 questions)

1. **Find the centre** of the shape or pattern; every line of symmetry of a shape with rotational symmetry passes through it.

2. **Test each candidate mirror**: vertical, horizontal, then both diagonals (and, for shapes made of equilateral triangles or regular polygons, lines at other angles through vertices). Imagine folding: every part must land on a matching part.
3. **Draw every line that works, and only those**, with a ruler, right across the shape. A dashed line is fine.

Variations you will meet:

- **Complete a shape** so that a given line is a line of symmetry: reflect each vertex across the line (same distance on the other side, measured at right angles to the line), then join up.
- **Shade squares** so a pattern has one (or two) lines of symmetry: pick the mirror first, then shade the partner of each square that has no partner. Shade exactly as many as asked, and then check that you have not made extra lines or lost the one you wanted.
- **"Draw the line of symmetry"** in the singular means there is exactly one.
- **A regular polygon**: n lines, all through the centre.

3. Order of rotational symmetry: state or shade (20 questions)

1. **Imagine turning** the shape about its centre through one full turn.
2. **Count the positions** where it looks exactly the same, including the start. That count is the order.
3. **Write a whole number**: $1, 2, 3, \ldots$ Never an angle, and never 0.

A quick check: the smallest angle that works is $360^\circ \div \text{order}$. A shape that matches after 120° has order 3.

Variations you will meet:

- **Shade squares for order 2**: each shaded square needs a partner in the position turned through 180° about the centre (the same distance from the centre, on the opposite side). **For order 4**, each square needs partners at 90°, 180° and 270°.
- **Shaded parts change the answer.** A square outline has order 4, but with some squares shaded the order may drop to 2 or 1. Count with the shading.
- **Named shapes**: learn the table in Key facts (a rectangle has order 2; a regular decagon has order 10).

4. Naming a type of angle (16 questions)

1. Estimate or read the size (measure with a protractor if asked).
2. Use the ranges: acute below 90°, right angle 90°, obtuse between 90° and 180°, reflex between 180° and 360°.
3. Write the word; for an angle between 90° and 180° the answer is simply "obtuse".

If the angle is marked on the outside of two lines (the long way round), it is reflex even if the gap between the lines looks small.

5. Parts of a circle: name or draw (11 questions)

1. Look at where the line starts and ends: centre to circle is a **radius**; circle to circle through the centre is a **diameter**; circle to circle not through the centre is a **chord**; a line touching at one point is a **tangent**.
2. For a region: between two radii is a **sector**; between a chord and the circle is a **segment**.
3. For "draw a ...", use a ruler, start and finish exactly on the circle (or at the centre), and for a tangent make sure it only touches.

Variations you will meet:

- **Diameter given, radius wanted** (or the other way): halve or double. A diameter of 36 cm gives a radius of 18 cm.
- **Mark a point on the circumference**: put it exactly on the curve, not inside.
- **Draw a triangle with a right angle at a point on the circle** (a circle theorem): join the point to both ends of a diameter.

6. Congruent and similar shapes (7 questions)

1. **Compare sizes**: if every length matches, the shapes are **congruent**; if every length is multiplied by the same number, they are **similar**.
2. Turn or flip one shape in your head: congruent shapes can be reflections or rotations of each other.
3. Answer with the exact word: "congruent" or "similar".

Variations you will meet:

- **Pick the congruent shape** from several on a grid, or **draw one**: copy every length and angle, in any position or orientation.
- **"Explain why triangle B is congruent to triangle C"**: they are the same shape and the same size (for example, one is a reflection of the other). "Same angles", "same area" or "similar" is not enough.
- **The term for two polygons that are the same shape and size** is "congruent"; for the same shape but a different size it is "similar".
- **Choose a congruence condition** (seen once on an Extended paper): three sides equal (SSS), two sides and the angle between them (SAS), two angles and the side between them (ASA), or right angle, hypotenuse and one other side (RHS). Match the letters to what is marked equal, in order.

7. Interior and exterior angles of polygons (6 questions)

1. **Regular polygon, n sides**: exterior angle $= 360 \div n$; interior angle $= 180 -$ exterior angle.
2. **Number of sides from an angle**: $n = 360 \div \text{exterior angle}$. From an interior angle, find the exterior angle first: interior 144° gives exterior 36° and $n = 360 \div 36 = 10$.
3. **"Show that"**: write both steps with numbers, for example $360 \div 20 = 18$, then $180 - 18 = 162$.

Variations you will meet:

- **"Write down two properties that show a polygon is regular"**: all sides are equal **and** all angles are equal.
- **A line of symmetry through a regular polygon** cuts an interior angle in half, which can give an unknown angle.

8. Solids: edges, vertices, planes and axes of symmetry (2 questions)

1. **Count methodically**: for a pyramid or prism, use the base or cross-section with n sides and the rules in Key facts, then check by counting on the drawing. A square-based pyramid ($n = 4$) has 5 faces, 8 edges and 5 vertices.
2. **Extended only: planes of symmetry**: imagine slicing the solid into two mirror-image halves. Count each different slice.
3. **Extended only: axis of rotational symmetry**: name two points it passes through, such as the apex and the centre of the base.

Worked examples

The bold codes show where marks are earned, as in Cambridge mark schemes. The number is how many marks.

- **B1** mark for a correct result on its own, with no method needed.

Example 1

(a) Write down the mathematical name for an angle of 214°. **[1]**

(b) A triangle has angles 40°, 70° and 70°. Write down the mathematical name for this type of triangle. **[1]**

(c) A quadrilateral has four right angles and exactly two lines of symmetry. Write down its mathematical name. **[1]**

(d) A quadrilateral has exactly one pair of parallel sides and exactly one line of symmetry. Write down its mathematical name. **[1]**

(e) Write down two geometrical properties of a kite. **[2]**

(f) AB is a line joining two points on a circle and passing through the centre. The radius of the circle is 4.5 cm. Write down the mathematical name of AB and its length. **[2]**

(a) 214° is between 180° and 360°: **reflex**. **B1**

(b) Two angles are equal: **isosceles**. **B1**

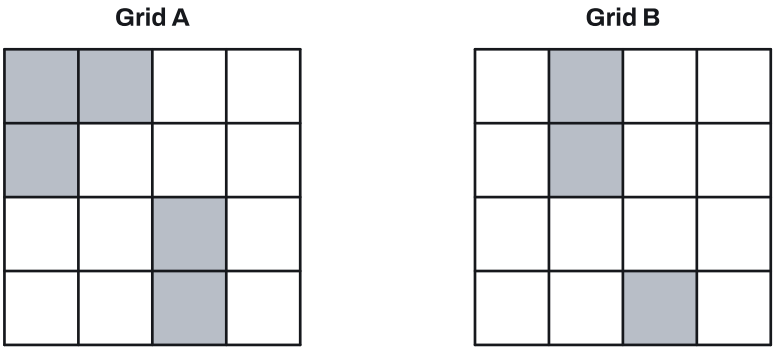
(c) Four right angles means a square or a rectangle. A square has 4 lines of symmetry, so it is a **rectangle**. **B1**

(d) One pair of parallel sides is a trapezium; the line of symmetry makes it an isosceles one: **trapezium** (isosceles trapezium). **B1**

(e) Any two from different aspects, for example: two pairs of equal adjacent sides; the diagonals cross at right angles; exactly one line of symmetry. **B1 B1**

(f) Through the centre, from circle to circle: a **diameter**. **B1** Length $= 2 \times 4.5 = 9$ cm. **B1**

Example 2



(a) Shade **one** more square in Grid A so that the pattern has a line of symmetry. Draw the line of symmetry. **[2]**

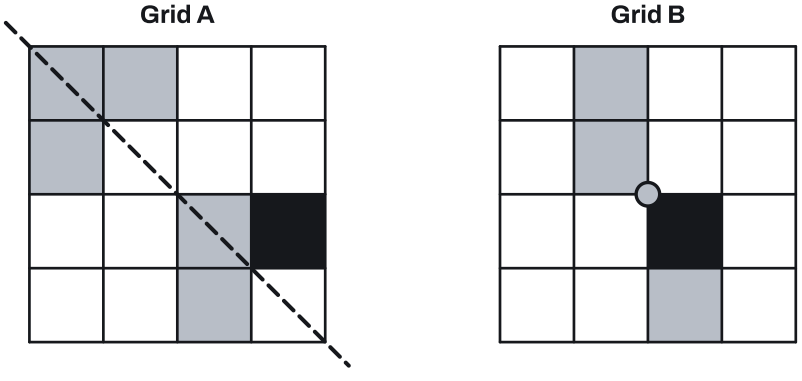
(b) Shade **one** more square in Grid B so that the pattern has rotational symmetry of order 2. **[1]**

(c) Write down the number of lines of symmetry of your completed pattern in Grid B. **[1]**

(a) Test the mirrors. Vertical, horizontal and the bottom-left to top-right diagonal all fail, however you add one square. Try the diagonal from the top-left corner to the bottom-right corner: row 1 column 2 and row 2 column 1 are partners; row 1 column 1 and row 3 column 3 lie on the mirror. Only row 4 column 3 is missing its partner, which is **row 3, column 4**. Shade it. **B1** Draw the diagonal from the top-left to the bottom-right corner. **B1**

(b) Turning through 180° about the centre sends row 1 column 2 to row 4 column 3 (both shaded) and row 2 column 2 to **row 3, column 3**, which is empty. Shade it. **B1**

(c) Test the four mirrors on the completed pattern: none works (the pattern is a zig-zag that leans one way). **0** lines. **B1**



1 line of symmetry (dashed)

order 2 about the centre

Example 3

A regular polygon has 8 sides.

(a) Write down the mathematical name of this polygon. **[1]**

(b) Write down the number of lines of symmetry and the order of rotational symmetry. **[2]**

(c) Work out the size of one exterior angle and one interior angle. **[2]**

(d) Explain why every line of symmetry of a regular 7-sided polygon passes through exactly one vertex. **[1]**

(a) Octagon (regular octagon). **B1**

(b) A regular polygon with n sides has n of each: **8** lines of symmetry **B1**, order **8 B1**.

(c) Exterior angle $= 360 \div 8 = 45^\circ$. **B1** Interior angle $= 180 - 45 = 135^\circ$. **B1**

(d) With an odd number of sides, the side opposite each vertex has no vertex opposite it, so each line of symmetry joins a vertex to the midpoint of the opposite side, and never to a second vertex. **B1**

Example 4

Extended. A prism has a cross-section that is an equilateral triangle of side 4 cm, and it is 10 cm long.

(a) Write down the number of faces, edges and vertices of the prism. **[2]**

(b) Write down the number of planes of symmetry of the prism. **[2]**

(c) Describe the axis about which the prism has rotational symmetry of order 3. **[1]**

(d) Write down the number of planes of symmetry of a cone. **[1]**

(a) The cross-section has $n = 3$ sides: faces $3 + 2 = 5$, edges $3 \times 3 = 9$, vertices $2 \times 3 = 6$. **B2** (**B1** for two of the three correct)

(b) Each of the triangle's 3 lines of symmetry, run along the length, gives a plane (through one long edge and the middle of the opposite rectangular face): 3 planes. There is one more halfway along the length. Total **4**. **B2** (**B1** for the 3 planes along the length)

(c) The line through the centres of the two triangular ends. **B1**

(d) Every plane containing the cone's axis cuts it into mirror halves: **infinitely many**. **B1**

Common mistakes

- **Giving the order of rotational symmetry as an angle or a word.** Examiners regularly see 90° or 180°, or "symmetry", instead of a number such as 4. The order is how many times it fits in one turn.
- **Saying order 0.** A shape with no rotational symmetry has order 1.

- **Adding diagonals that are not lines of symmetry.** A rectangle's diagonals are not mirrors, and patterns with shaded squares often lose their diagonal lines. Test every line by folding before you draw it.
- **Missing lines.** Many answers show only the horizontal or only the vertical line when both work, or leave out the diagonals of a square-based pattern. Check all four directions.
- **Ignoring the shading.** The shaded parts are part of the pattern: a square grid may have order 4, but the shaded pattern on it might have only order 2.
- **Shading the wrong number of squares.** If the question says "one more square", shade exactly one. Extra squares lose the mark even if the symmetry is right.
- **Freehand or short lines of symmetry.** Use a ruler and draw right across the shape, through its centre.
- **Vague properties.** "It has 4 sides" or "angles add up to 360°" are true of every quadrilateral. Give properties of sides, angles, diagonals or symmetry that belong to that shape.
- **Mixing up quadrilaterals.** Rhombus, parallelogram and trapezium are often swapped. A rhombus has 4 equal sides; a parallelogram has two pairs of parallel sides; a trapezium has only one pair.
- **Radius or diameter? Chord or tangent?** The most common wrong answers: diameter for a radius, and tangent for a chord. A diameter goes through the centre; a tangent only touches.
- **Wrong polygon names.** Hexagon has 6 sides, pentagon 5, octagon 8. Learn the list rather than guessing (heptagon and hectogon have been seen for a pentagon).
- **"Enlargement" or "the same" for congruent.** Use the exact term: congruent (same shape and size) or similar (same shape).

How to get the marks

- **"Write down the mathematical name"** needs one precise word. Two different names (such as "rhombus or kite") score nothing, even if one is right.
- **Drawing lines of symmetry**: typically 2 marks, 1 for most of the correct lines with no wrong ones. A wrong extra line costs a mark, so draw only lines you have tested. Rule them, and extend them across the whole shape.
- **Shading questions** usually have one mark for exactly the right squares. Read how many squares to shade.
- **"Write down"** means no working is needed; **"Work out"** (such as an interior angle) needs the steps shown.
- **Properties** questions give a mark per correct, specific property. Two properties about sides count as one aspect; spread across sides, angles, diagonals and symmetry.
- **"Explain" or "give a reason"**: state the fact in words, such as "all three angles are different, so it is scalene".
- **Solids**: answer the exact thing asked (edges or vertices or faces); counts in the wrong spaces lose the marks.
- **Circle drawing**: a radius must start at the centre, a chord and a diameter must end on the circle, and a tangent must touch at one point.

Quick check

1. Write down the mathematical name for (a) an angle of 89°, (b) a triangle with sides 5 cm, 7 cm and 9 cm.
2. Write down the number of lines of symmetry and the order of rotational symmetry of an isosceles trapezium.
3. A circle has a diameter of 17 cm. Write down its radius, and the name of the region between two radii and an arc.
4. (a) Write down the number of faces, edges and vertices of a cube. (b) *Extended.* Write down the number of planes of symmetry of a cuboid measuring 3 cm by 4 cm by 5 cm.
5. Triangle P has sides 3 cm, 4 cm and 5 cm. Triangle Q has sides 6 cm, 8 cm and 10 cm. Are they congruent or similar? Give the scale factor if there is one.

Answers

1. (a) Acute (less than 90°). (b) Scalene (all three sides different).
2. 1 line of symmetry (through the midpoints of the parallel sides); order 1.
3. Radius $= 17 \div 2 = 8.5$ cm. The region is a sector.
4. (a) 6 faces, 12 edges, 8 vertices. (b) 3 planes, each cutting one of the three sets of edges in half.
5. Similar, not congruent: every side of Q is $2\times$ the matching side of P ($6 \div 3 = 8 \div 4 = 10 \div 5 = 2$), so the scale factor is 2.

Past questions to try

- **0580/31/M/J/25 Q5**: the order of rotational symmetry and all the lines of symmetry of a shape.
- **0580/12/M/J/25 Q13**: naming a quadrilateral from its properties, and properties of a rectangle.
- **0580/23/M/J/25 Q3**: planes of symmetry and the axis of a square-based pyramid.
- **0580/22/O/N/22 Q9**: spotting congruent triangles and the condition that shows it.