Symmetry

A shape is symmetrical if both sides of it are the same when a mirror line is drawn.

Line of symmetry: a mirror or fold line.

Reflection symmetry: when there are one or more lines of symmetry.

The number of different ways in which the tracing fits is the order of **rotation symmetry.**

Parallelograms do not have reflection symmetry.

Similar areas and volumes

We already know that if two shapes are similar their corresponding sides are in the same ratio, and their corresponding angles are equal. For any pair of similar shapes, the following is true:

Ratio of lengths = a:b

Ratio of areas = a^2:b^2

Ratio of volumes = a^3:b^3

Properties of polygons

The formula for calculating the sum of the interior angles of a regular polygon is: **(n - 2) × 180°** where **n** is the number of sides of the polygon.

The exterior angle of a polygon and its corresponding interior angle always add up to 180° (because they make a straight line).

For any polygon, the sum of its exterior angles is 360°.

Euler's Formula: For any polyhedron that doesn't intersect itself, the:
-Number of Faces
-plus the Number of Vertices (corner points)
-minus the Number of Edges
always equals 2
This can be written: F + V − E = 2

Similar shapes

Similar figures are identical in shape, but not in size.

For any pair of similar figures corresponding **sides** are in the **same ratio** and corresponding **angles** are **equal.**

To prove that two triangles are similar, we have to show that **one** (not all) of the following statements is true:

1. The three sides are in the same proportion.

2. Two sides are in the same proportion, and their included angle is equal.

3. The three angles of the first triangle are equal to the three angles of the second triangle.

Circles and squares are always similar. Rectangles can be similar, but will probably not be.

Parallel lines

Parallel lines will never meet, no matter how far they are extended.

Vertically opposite angles are equal.

Corresponding (F-shaped) angles are equal.

Alternate (Z-shaped) angles are equal.

Co-interior (C-shaped) angles add up to 180°.

Trigonometry reminders

Use SOHCAHTOA to memorise the trigonometric ratios.

Use "SHIFT" on the calculator when solving angles ($\sin^{-1}$, $\cos^{-1}$ and $\tan^{-1}$)

Congruent shapes

If two shapes are **congruent**, they are **identical** in both **shape** and **size.**

The symbol ≅ means 'is congruent to'. Two triangles are congruent if one of the following conditions applies:

The three sides of the first triangle are equal to the three sides of the second triangle (the SSS rule: **S**ide **S**ide **S**ide).

Two sides of the first triangle are equal to two sides of the second triangle, and the **included** angle is equal (the SAS rule: **S**ide **A**ngle **S**ide).

Two angles in the first triangle are equal to two angles in the second triangle, and one (similarly located) side is equal (the AAS rule: **A**ngle **A**ngle **S**ide).

In a right-angled triangle, the hypotenuse and one other side in the first triangle are equal to the hypotenuse and corresponding side in the second triangle (the RHS rule: **R**ight-angled, **H**ypotenuse, **S**ide).

Shapes can be congruent even if one of them has been rotated or reflected.

Transformations reminders

We always write the horizontal displacement at the top of the vector and the vertical displacement at the bottom.

Remember that a point and its image are always the same distance from the centre of rotation.

The scale factor tells us by how much the object has been enlarged.

The centre of enlargement tells us where the enlargement is being measured from.