Year 9 Spring 2 Knowledge Organiser

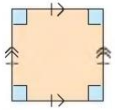
HARROW HIGH MATHEMATICS

2D Shapes

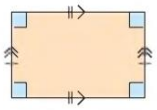
By Side	By Angle
Equilateral Triangle has three equal sides	Acute triangle has three angles < 90°
Isosceles Triangle has two equal sides	Right triangle has one angle = 90°
Scalene Triangle has no equal sides	Obtuse triangle has one angle > 90°

- A **quadrilateral** is a 2D shape with four sides and four angles.

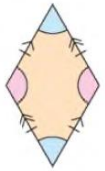
Square



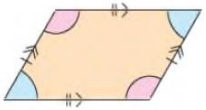
Rectangle



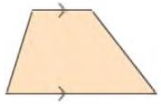
Rhombus



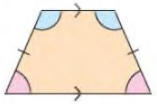
Parallelogram



Trapezium



Isosceles trapezium

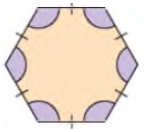


Kite

The equal angles are coloured the same.

Sides	Name	Sides	Name
3	triangle	7	heptagon
4	quadrilateral	8	octagon
5	pentagon	9	nonagon
6	hexagon	10	decagon

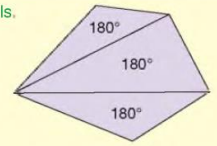
A shape is **regular** if all sides and angles are equal.

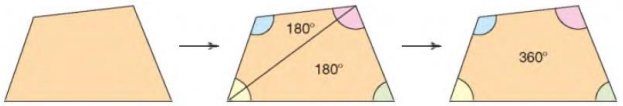


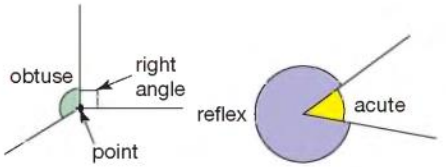
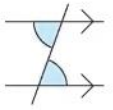
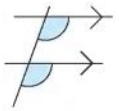
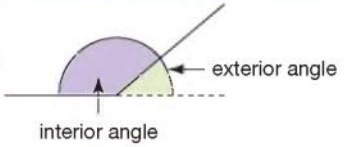
Angles review

- Angles inside a triangle add up to 180.
- Angles inside a quadrilateral add up to 360.
- In general, you can find out the angles inside a polygon by finding the smallest number of triangles you can draw inside.

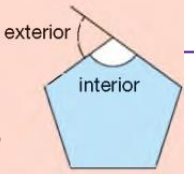
Draw in the two diagonals.
Three triangles formed:
3 × 180° = 540°
Sum of interior angles = 540°





Language	Meaning	Example
Acute angle	0 < acute angle < 90°	
Right angle	right angle = 90°	
Obtuse angle	90° < obtuse angle ⩽ 180°	
Reflex angle	180° < reflex angle ⩽ 360°	
Alternate and Corresponding angles	When a line crosses a pair of parallel lines, **alternate angles** lie on opposite sides of the crossing line and opposite sides of the parallel lines. **Corresponding angles** lie on the same side of the crossing line and the same side of the parallel lines.	Alternate angles  Corresponding angles 
Interior angle	The angle between two adjacent sides inside a polygon.	
Exterior angle	The angle between one side of a polygon and the next side extended.	

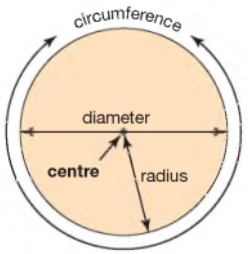
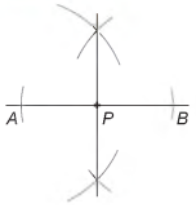
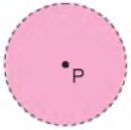
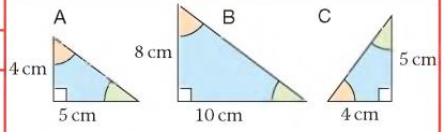
- The exterior angles of any polygon add to 360°.
- Interior angle + exterior angle = 180°
- The sum of the interior angles of any polygon = (number of sides − 2) × 180°



Mathematics Mastery

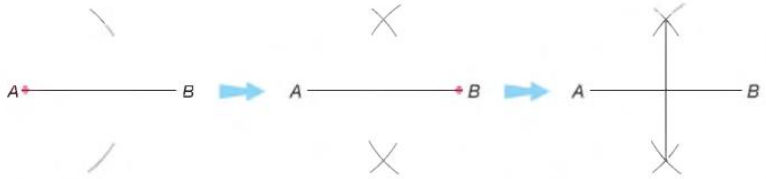
Year 9 Spring 2 Knowledge Organiser

HARROW HIGH MATHEMATICS

Language	Meaning	Example
Circle	A closed curve in a flat surface which is everywhere the same distance from a single fixed point.	
Diameter	A chord that passes through the centre of the circle.	
Radius **Radii (plural)**	A straight line segment drawn from the centre of the circle to the perimeter.	
Circumference	The distance around the edge of a circle.	
Bisect	Cut into two parts of the same shape and size.	
Perpendicular bisector	A line which bisects another line at right angles.	
Construct	Draw something accurately using compasses and a ruler.	
Construction lines	Lines drawn during a construction that are not part of the final object.	
Locus **Loci (plural)**	A set of points which satisfy a given set of conditions. The path followed by a moving point.	The set of points less than 1 cm from P is the interior of a circle. 
Congruent	Exactly the same shape and size.	 A and B are similar; the scale factor is 2. A and C are congruent.
Similar	The same shape but different in size.	
Scale factor	The ratio of corresponding lengths in two similar shapes.	

- The **perpendicular** bisector of a line bisects the line at right angles.

- To construct the perpendicular bisector of line AB

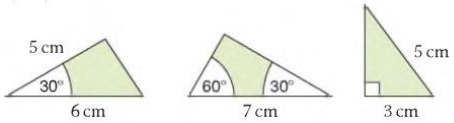


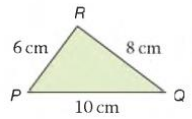
Congruence and construction

You can **construct** a unique **triangle** when you know

two sides and the angle between them (SAS) or two angles and a side (ASA) or right angle, the hypotenuse and a side (RHS) or three sides (SSS).

Any two triangles constructed using any one of these four sets of information will be congruent.



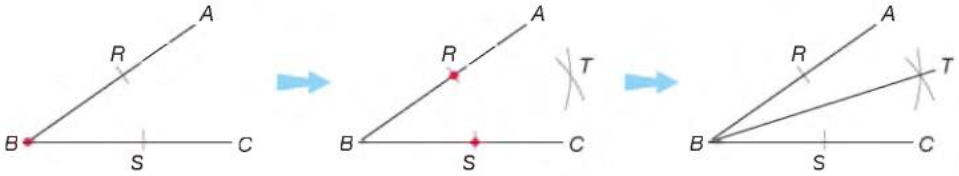


You will need a ruler and a protractor for SAS, ASA and RHS triangles.

You will need a ruler and compasses for SSS triangles.

You can use a straight edge and compasses to construct an angle bisector.

- To bisect angle ABC

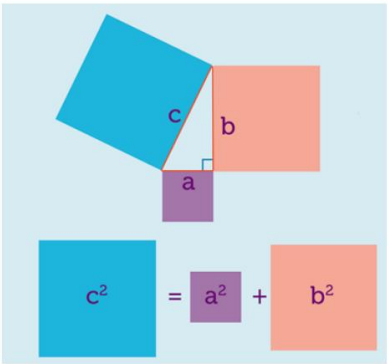


Pythagoras' Theorem

In a **right-angled triangle** the **hypotenuse** is the longest side. The other two sides are called the **legs.**

Pythagoras' theorem states for any right angled triangle, $c^2 = a^2 + b^2$, where c is the length of the hypotenuse, and a and b are the lengths of the legs.

You can use Pythagoras' theorem to find a missing length when you already know the other two lengths.



Mathematics Mastery