

Knowledge Organiser: Angles, Polygons and Parallel lines

What you need to know:

Straight lines and around a point

To calculate b:

$$62^\circ + 59^\circ = 121^\circ$$

$$180^\circ - 121^\circ = 59^\circ$$

Add the angles we know together first then subtract from 180°.

To calculate h:

$$175^\circ + 106^\circ = 281^\circ$$

$$360^\circ - 281^\circ = 79^\circ$$

Add the angles we know together first then subtract from 360°.

Triangles

Angles in a triangle add up to 180°.

To calculate x:

$$23^\circ + 124^\circ = 147^\circ$$

$$180^\circ - 147^\circ = 33^\circ$$

This means that these 2 sides are equal and the 2 angles at the end of the sides.

To calculate x:

$$180^\circ - 30^\circ = 150^\circ$$

$$150^\circ \div 2 = 75^\circ$$

Subtract from 180°.

Divide by 2 to calculate 1 angle.

Quadrilaterals

Angles in a quadrilateral add up to 360°.

To calculate x:

$$60^\circ + 100^\circ + 95^\circ = 255^\circ$$

$$360^\circ - 255^\circ = 105^\circ$$

Add the angles we know together first then subtract from 360°.

Key Terms:

Quadrilateral: A 2D shape with four sides.

Polygon: A 2D shape.

Regular Polygon: A shape where all of the sides are equal length.

Irregular Polygon: A shape where all of the sides are not equal lengths.

Isosceles: A triangle that has 2 equal sides and 2 equal angles.

Equilateral: A triangle where all of the sides and angles are equal.

Vertically opposite: The 2 angles that are facing each other are equal where 2 lines cross.

Parallel: Always the same distance apart and never touching.

Perpendicular: At right angles (90°).

Interior angle: An angle inside a shape.

Exterior angle: The angle between any side of a shape, and a line extended from the next side.

You need to be able to:

- Classify quadrilaterals and triangles by their geometric properties.
- Calculate missing angles in triangles, quadrilaterals and using the rules of vertically opposite angles.
- Calculate missing angles inside parallel lines and explain using the correct terminology.
- Combine basic angle facts with parallel line facts to solve problems.
- Calculate interior and exterior angles of a regular or irregular polygon and calculate the number of sides.

Hegarty maths clip numbers

Angle facts: 477 - 480, 485 - 491, 812 - 814

Parallel lines: 481 - 483

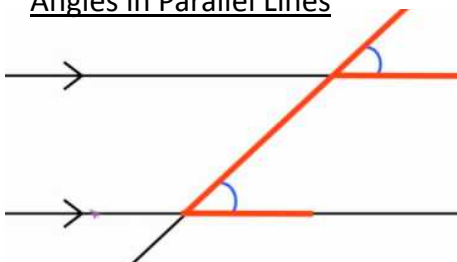
Interior and Exterior: 560 - 564



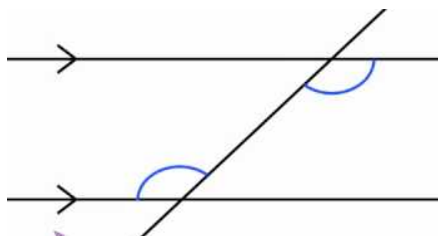
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What you need to know:

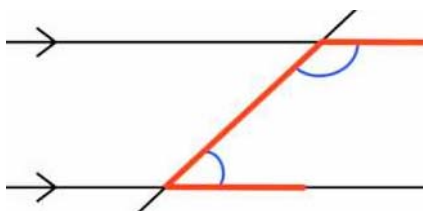
Angles in Parallel Lines



Corresponding angles are equal.



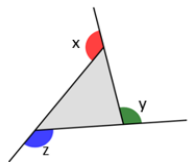
Alternate angles are equal.



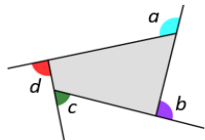
Co-interior angles sum to 180° .

Exterior Angles in Polygons

Exterior angles in a polygon sum to 360° .



$$x + y + z = 360^\circ$$



$$a + b + c + d = 360^\circ$$

The exterior angle of a regular polygon is calculated using: $360 \div n$
 $n = \text{number of sides}$

Interior Angles in Regular Polygons

Calculate the size of one interior angle in a pentagon.

Step 1 – Calculate the sum of the interior angles

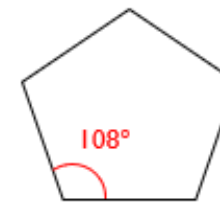
$$\text{Sum of interior angles} = (n - 2) \times 180$$

$n = \text{number of sides}$

Step 2 – Divide by the number of sides

$$(5 - 2) \times 180 = 540$$

$$540 \div 5 = 108^\circ$$



Angles in Polygons

Sometimes you are asked to calculate the number of sides a regular polygon has.

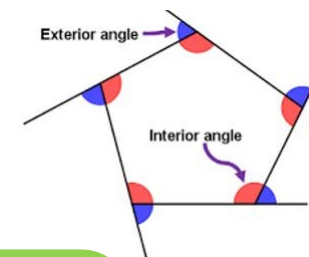
Step 1 – Calculate the size of the exterior angle

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

Step 2 – Divide by the number of sides

$$(5 - 2) \times 180 = 540$$

$$540 \div 5 = 108^\circ$$



Interior and exterior angles key formulae:

Sum of the Interior Angles $180(n - 2)$

Sum of the Exterior Angles Always 360° !

Each Interior Angle $\frac{180(n - 2)}{n}$

Each Exterior Angle $\frac{360^\circ}{n}$