Y10 Maths Knowledge Organiser Foundation Tier: Angles

What must I be able to do?

New content:

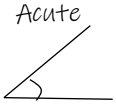
- ☐ Know the interior and exterior angle sums of a polygon
  - ➢ Mathswatch 123 (GCSE)
- ☐ Use bearings to identify directions
  - ➢ Mathswatch 124 (GCSE)

Key vocabulary

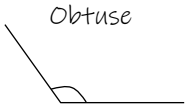
Interior angle	An angle inside a polygon
Exterior Angle	An "outside" angle created by extending one side of a polygon in a straight line
Bearing	An angle which is measured clockwise from North and written as 3 digits.

Types of angles

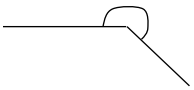
Acute



Obtuse

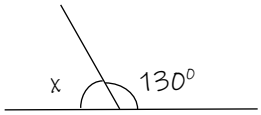


Reflex



Angle facts

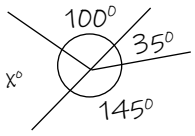
Angles at a point on a straight line sum to 180^0



$x = 180 - 130$

$x = 50^0$

Angles around a point sum to 360^0



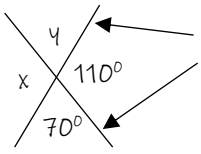
$x = 360 - 100 - 35 - 145$

$x = 80^0$

Vertically opposite angles are equal

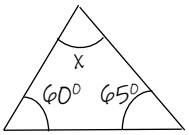
$x = 110^0$

$y = 70^0$



These lines must be straight to make vertically opposite angles

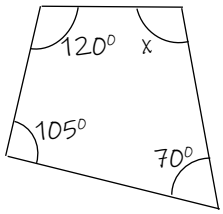
Angles inside a triangle sum to 180^0



$x = 180 - 60 - 65$

$x = 55^0$

Angles inside any quadrilateral sum to 360^0

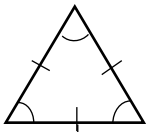


$x = 360 - 120 - 105 - 70$

$x = 65^0$

Triangle properties

The dashes tell you which sides are equal



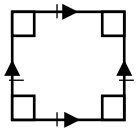
Equilateral

Isosceles

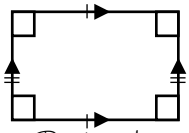
Scalene

Equilateral	Isosceles	Scalene
• 3 equal sides • 3 equal angles • 3 lines of symmetry	• 2 equal sides • 2 equal base angles • 1 line of symmetry	• no equal sides • no equal angles • no lines of symmetry

Quadrilateral properties



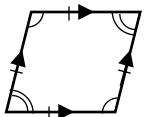
Square



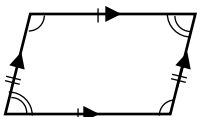
Rectangle

Kite

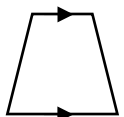
Square	Rectangle	Kite
• 4 equal sides • Opposite sides are parallel • 4 right angles • 4 lines of symmetry	• Opposite sides are equal • Opposite sides are parallel • 4 right angles • 2 lines of symmetry	• 2 pairs of equal sides • 2 equal angles • 1 line of symmetry



Rhombus

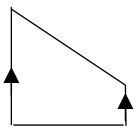


Parallelogram

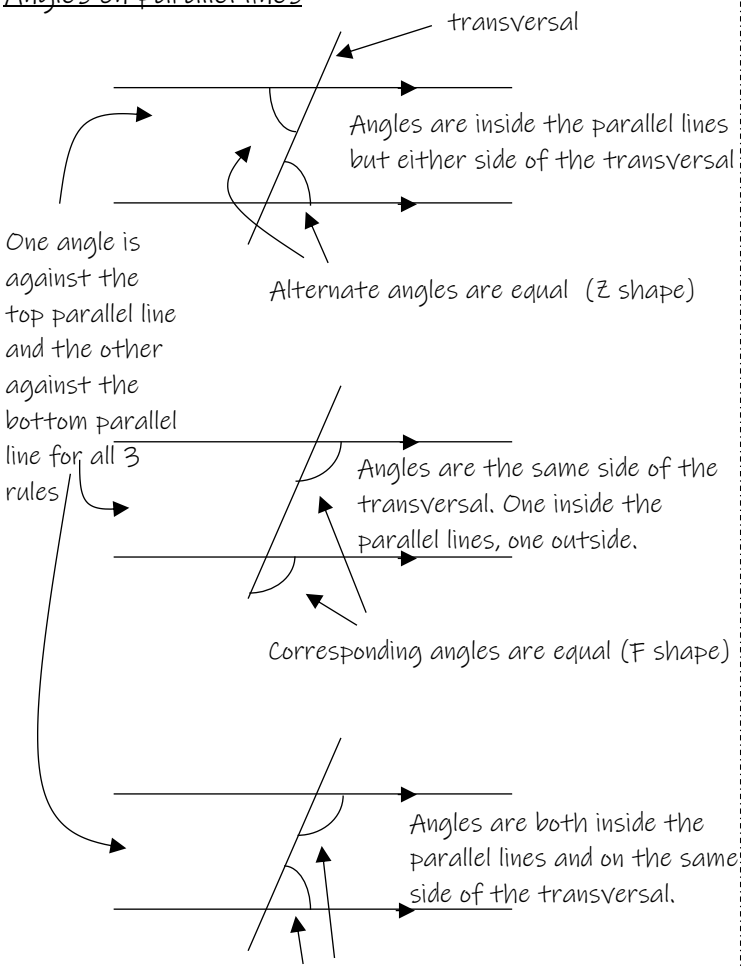


Trapezium

Rhombus	Parallelogram	Trapezium
• 4 equal sides • Opposite sides are parallel • Opposite angles are equal • 2 lines of symmetry	• 2 pairs of equal sides • Opposite sides are parallel • Opposite angles are equal • No lines of symmetry	• One pair of parallel sides



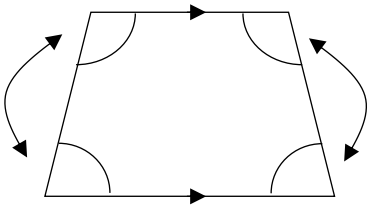
Angles on parallel lines



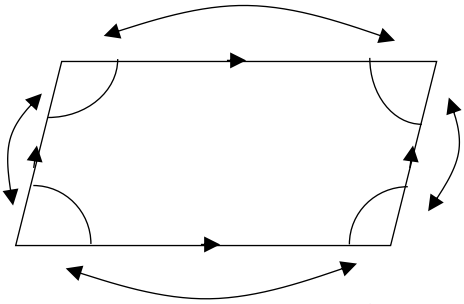
These are also called co-interior angles

Angles in trapezia and parallelograms

As a trapezium and a parallelogram have a pair of parallel sides, the angles at each end form a pair of allied angles which sum to 180°

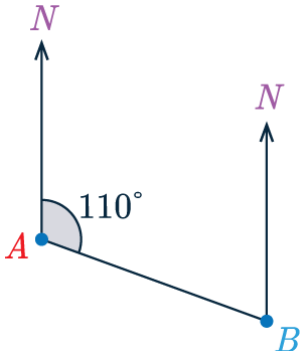


Trapezium – 2 pairs of allied angles

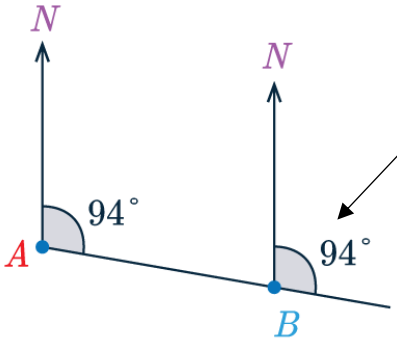


Parallelogram – 4 pairs of allied angles

Bearings



In this example we would say the bearing of B from A is 110° rather than the bearing from A to B is 110°.

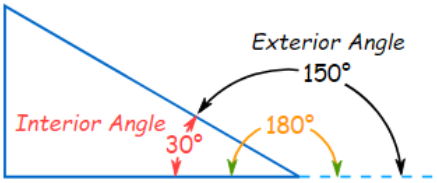


We get the second angle of 94° as they are corresponding angles

If we know the bearing of B from A is 94° then we can calculate the bearing of A from B by extending the line between the points.

The bearing of A from B is 94 + 180 = 274°.

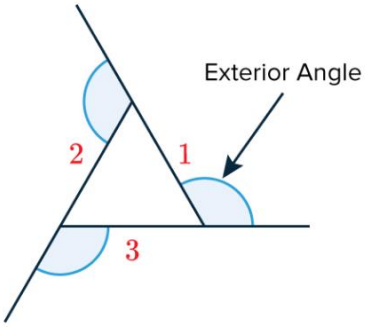
Angles in polygons



Any individual interior angle + its exterior angle will always sum to 180°

The sum of interior angles of a polygon depends on the number of sides:

Shape	Number of Sides	**Sum of interior angles**	Each individual interior angle if the shape is **regular**
Triangle	3	180°	180° ÷ 3 = 60°
Quadrilateral	4	360°	360° ÷ 4 = 90°
Pentagon	5	540°	540° ÷ 5 = 108°
Hexagon	6	720°	720° ÷ 6 = 120°
Heptagon	7	900°	900° ÷ 7 = 128.57..°
Octagon	8	1080°	1080° ÷ 8 = 135°
Nonagon	9	1260°	1260° ÷ 9 = 140°
Decagon	10	1440°	1440° ÷ 10 = 144°
Undecagon	11	1620°	1620° ÷ 11 = 147.27...°
Dodecagon	12	1800°	1800° ÷ 12 = 150°
...	...	...	...
Any polygon	n	**(n – 2) x 180° where n is the number of sides**	(n – 2) x 180° ÷ n



The exterior angles of any polygon will always sum to 360°

If the shape is **regular** then each exterior angle can be calculated by doing 360 ÷ n

GLUE

HERE