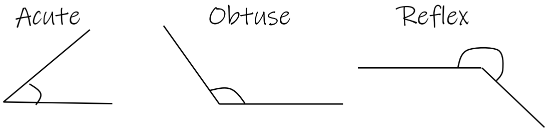
Y10 Maths Knowledge Organiser Higher Tier: Angles and Scales

What must I be able to do?	Key vocabulary	
New content:	**Interior angle**	An angle inside a polygon
☐ Know the interior and exterior angle sums of a polygon ➢ Sparx U427 ☐ Read scale drawings and maps ➢ Sparx U257	**Exterior Angle**	An "outside" angle created by extending one side of a polygon in a straight line
☐ Use bearings to identify directions ➢ Sparx U525, U107	**Bearing**	An angle which is measured clockwise from North and written as 3 digits.

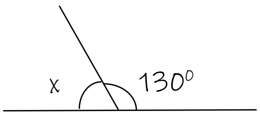
Types of angles

Acute | Obtuse | Reflex



Angle facts

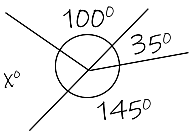
Angles at a point on a straight line sum to 180°



$x = 180 - 130$

$x = 50°$

Angles around a point sum to 360°



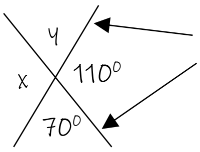
$x = 360 - 100 - 35 - 145$

$x = 80°$

Vertically opposite angles are equal

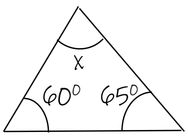
$x = 110°$

$y = 70°$



These lines must be straight to make vertically opposite angles

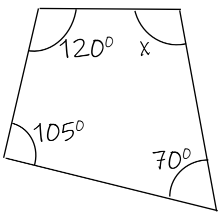
Angles inside a triangle sum to 180°



$x = 180 - 60 - 65$

$x = 55°$

Angles inside any quadrilateral sum to 360°

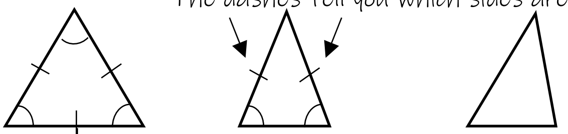


$x = 360 - 120 - 105 - 70$

$x = 65°$

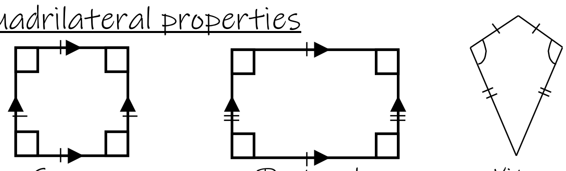
Triangle properties

The dashes tell you which sides are equal

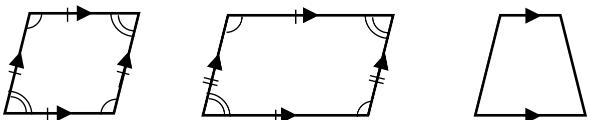


Equilateral	Isosceles	Scalene
• 3 equal sides • 3 equal angles • 3 lines of symmetry	• 2 equal sides • 2 equal base angles • 1 line of symmetry	• no equal sides • no equal angles • no lines of symmetry

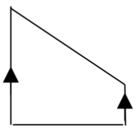
Quadrilateral properties



Square	Rectangle	Kite
• 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

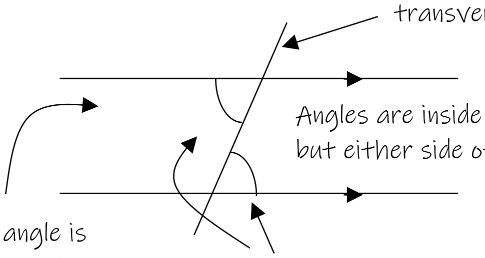


Rhombus	Parallelogram	Trapezium
• 4 equal sides • Opposite sides are parallel • Opposite angles are equal • 2 lines of symmetry	• 2 pairs of equal sides • Opposite sides are parallel • Opposite angles are equal • No lines of symmetry	• One pair of parallel sides



Angles on parallel lines

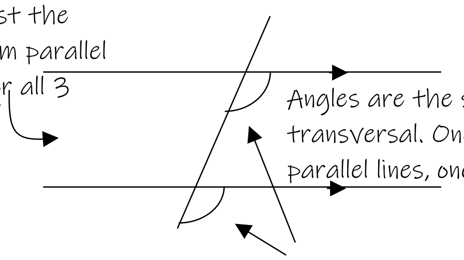
transversal



Angles are inside the parallel lines but either side of the transversal

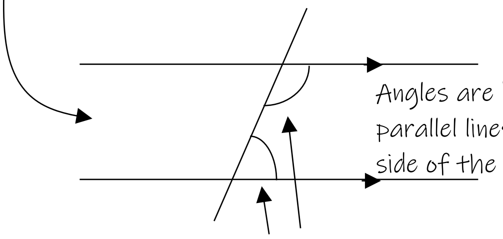
Alternate angles are equal (Z shape)

One angle is against the top parallel line and the other against the bottom parallel line for all 3 rules



Angles are the same side of the transversal. One inside the parallel lines, one outside.

Corresponding angles are equal (F shape)



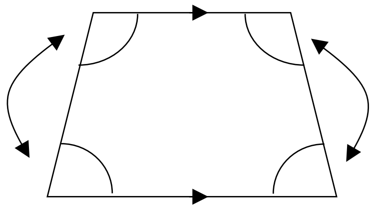
Angles are both inside the parallel lines and on the same side of the transversal.

Allied angles sum to 180° (C shape)

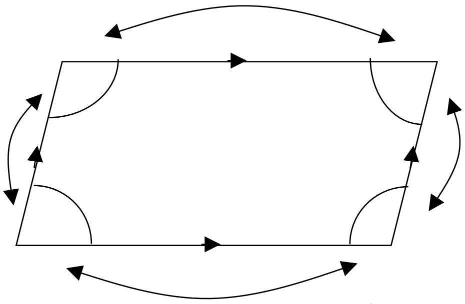
These are also called co-interior angles

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°

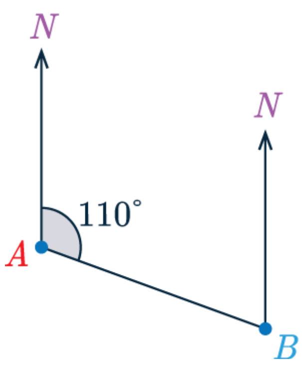


Trapezium – 2 pairs of allied angles

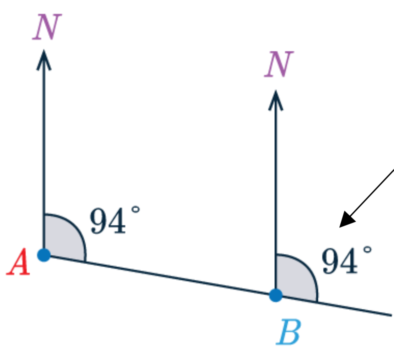


Parallelogram – 4 pairs of allied angles

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°.

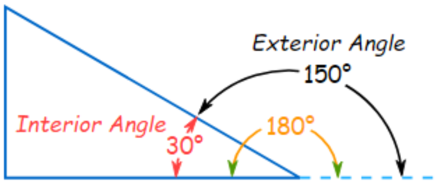


We get the second angle of 94° as they are corresponding angles

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°.

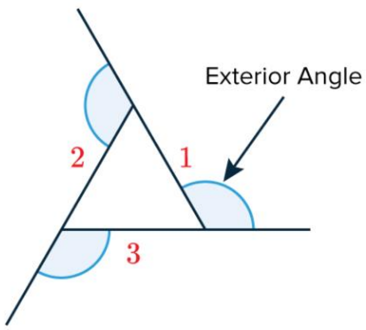
Angles in polygons



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

Map Scales

A map scale is usually given as a ratio e.g. 1 : 100000

This would mean that for each cm on the map, it represents 100,000 cm (or 1km) in real life.

If you knew the distance in real life you would divide by 100,000 to find the distance on the map.

If you measured a distance on the map, you would multiply it by 100,000 to find the distance in real life.

Other examples: 1 : 50000 1 cm on the map is 50,000 cm in real life (or 0.5 km)

1 : 100 1 cm on the map is 100cm in real life (or 1 m)

GLUE

HERE