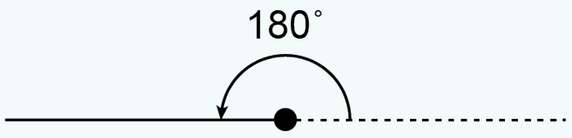
Angles

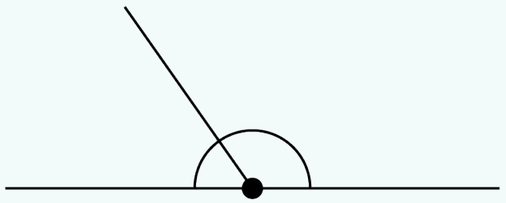
Angles are formed when two lines meet. The lines form the arms of the angle, and the angle measures the amount of rotation needed to move from one arm to the other.

Angles on a straight line

If a line is turned through half a complete turn, then it has turned through 180°.



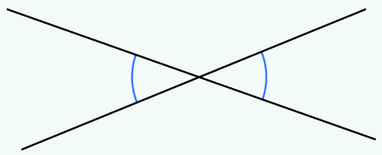
We can use this fact to help us calculate the angles that are formed when one or more lines come to meet at a point on another line. In this diagram, the two angles formed above the horizontal line. They combine to form the half turn angle of 180°.



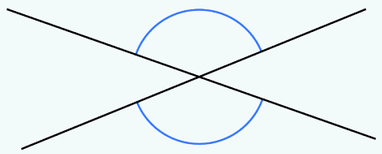
We refer to these angles as being 'angles on a straight line'. The rule for these angles is that **angles on a straight line always add to 180°**.

Vertically opposite angles

When two or more straight lines cross each other, vertically opposite angles are formed.



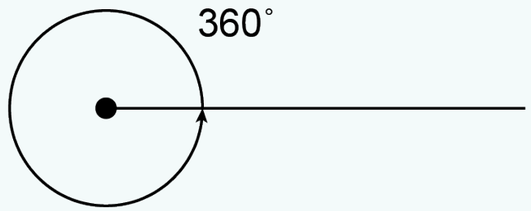
In the same diagram, we can identify another pair of vertically opposite angles.



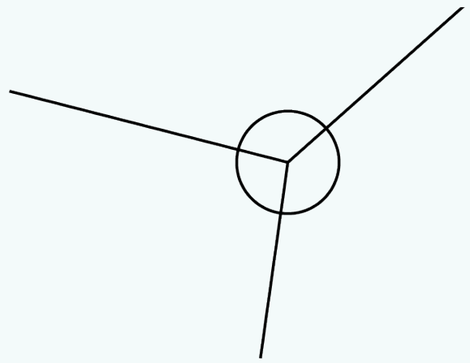
The rule for vertically opposite angles is that **vertically opposite angles are equal to each other**.

Angles around a point

If a line is turned through a full turn, then it has turned through 360°.



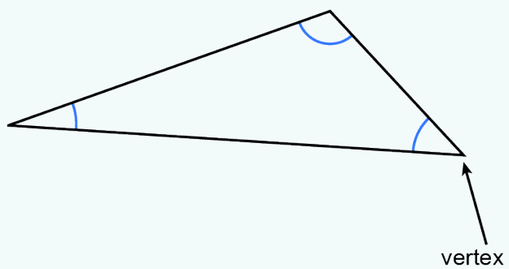
We can use this fact to help us calculate the angles that are formed when two or more lines meet at a point. In this diagram, the three angles that are formed combine to form the full turn angle of 360°.



We refer to these angles as 'angles around a point'. The rule for these angles is that **angles around a point always add to 360°.**

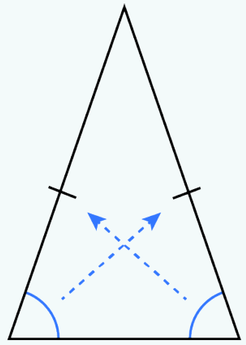
Angles in a triangle

Every triangle has three vertices and three interior angles. The rule for the angles in a triangle is that the **angles in a triangle always add to 180°**.



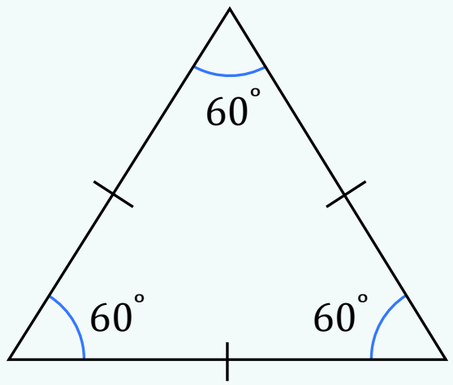
Isosceles triangles

In an isosceles triangle, two of the sides are of equal length, and two of the angles are equal. In this isosceles triangle, the two angles at the base (or bottom) of the triangle are equal. The two sides that are opposite these angles (follow the arrows) will then be equal. They are marked with a short line striking through each equal side.



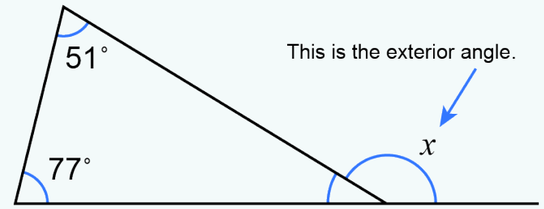
Equilateral triangles

All equilateral triangles have three equal sides and three equal angles. In equilateral triangles, every angle is 60°. For any equilateral triangle, the angles will always be the same size, 60°. However, although the lengths of the three sides will all be equal within a given equilateral triangle, they can be of any length, meaning we can have different sized equilateral triangles.



Exterior angles

Sometimes, one of the sides of the triangle is extended which then creates an exterior angle. As the name suggests, this angle will be outside the triangle.



We can start by calculating the third angle inside the triangle.

$77 + 51 + (3^{rd}\text{ angle}) = 180$

(Angles in a triangle add to 180°.)

$128 + (3^{rd}\text{ angle}) = 180$

$= 180 - 128$

$= 52°$

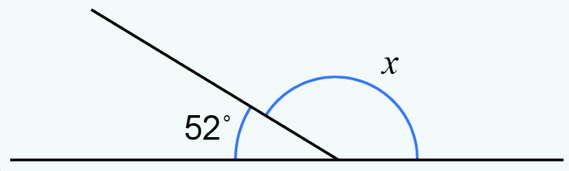
Now we can calculate the size of angle x, by focusing on the angles on the right of the triangle.

These two angles are angles on a straight line.

$52 + x = 180$

$x = 180 - 52$

$x = 128°$



Check that you can:

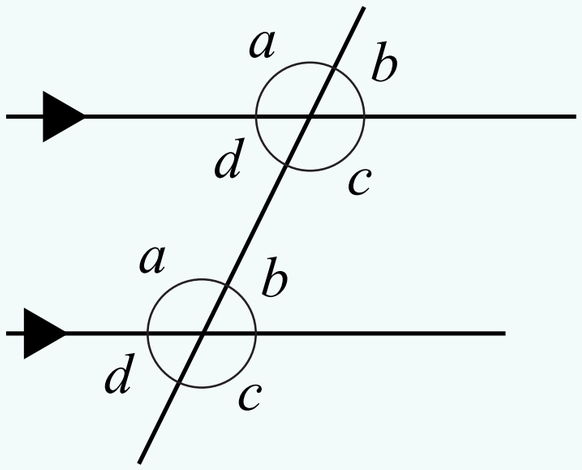
- recognise the different types of angles, i.e. acute, right-angle, obtuse, straight and reflex
- remember the properties of the different types of triangle
- recognise parallel lines.

Angles

Angles are formed when two lines meet. The lines form the arms of the angle, and the angle measures the amount of rotation needed to move from one arm to the other.

Angles with parallel lines

When a line crosses a pair of parallel lines, two sets of four angles are formed. In each of the two sets of angles, there are angles on a line, angles around a point and vertically opposite angles. Because the two lines are parallel, the bottom set of four angles will be the same as those in the top set of four angles. This means that if we know the size of any one of the eight angles in this diagram, we can easily calculate the size of the other seven.



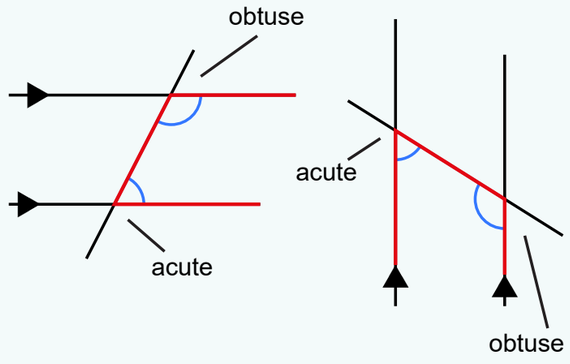
Allied or co-interior angles

Another relationship between a pair of angles called 'allied angles', can also be identified. They can also go by the name of '**co-interior angles**'.

With these pairs of allied angles, one angle is always an acute angle, and the other angle is always obtuse. This means they cannot be equal to each other.

Allied angles form a C or U shape, depending on the direction of the parallel lines.

The rule for allied angles is that **allied angles add to 180°**.

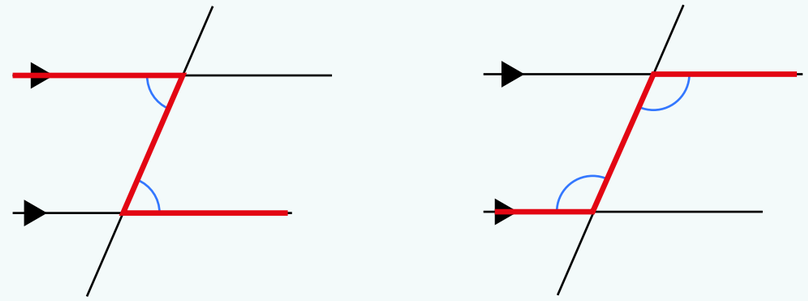


REMEMBER!

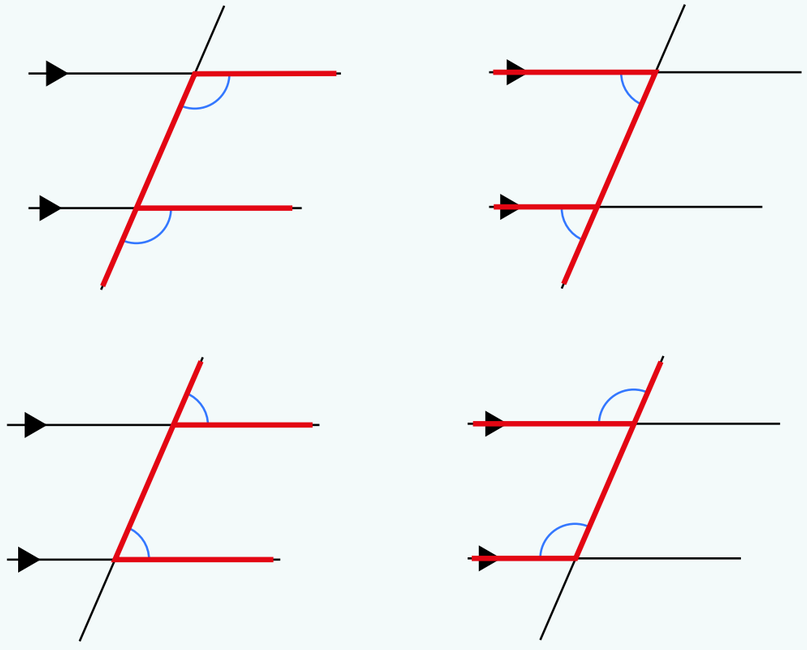
It is important to refer to the angles with parallel lines by their correct names, not the letter of the alphabet that they look like.

Alternate and corresponding angles

Within the two sets of four angles that are formed, some of the angles that are equal to each other form a Z-shape. These are called '**alternate angles**'.



Also, within the two sets of four angles that are formed, some of the angles that are equal to each other form an F-shape. These are called '**corresponding angles**'.



Identifying alternate and corresponding angles in a diagram can help us find the size of some of the angles in parallel lines.