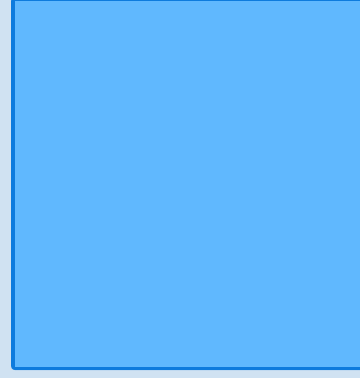


## What do you need to know?

Quadrilateral shapes are shapes which have 4 straight edges and 4 vertices. We know that there are many different quadrilateral shapes, however they can be classified as either **regular** or **irregular**.

**Regular** means the shape will be completely even (all the sides will be equal), whereas **irregular** means that it will not be an even shape.

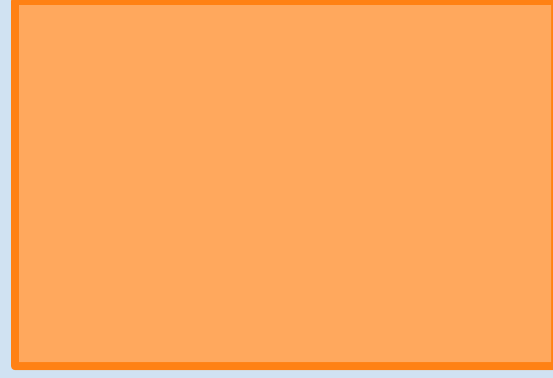
### Regular Quadrilaterals



Square

There is only one regular quadrilateral, which is the **square**. This is because its edges have the same length and because they have 4 right (90°) angles.

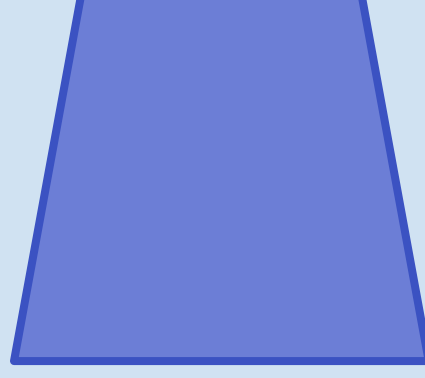
### Irregular Quadrilaterals



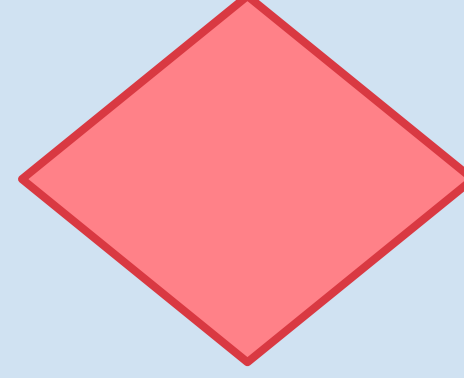
Rectangle



Parallelogram



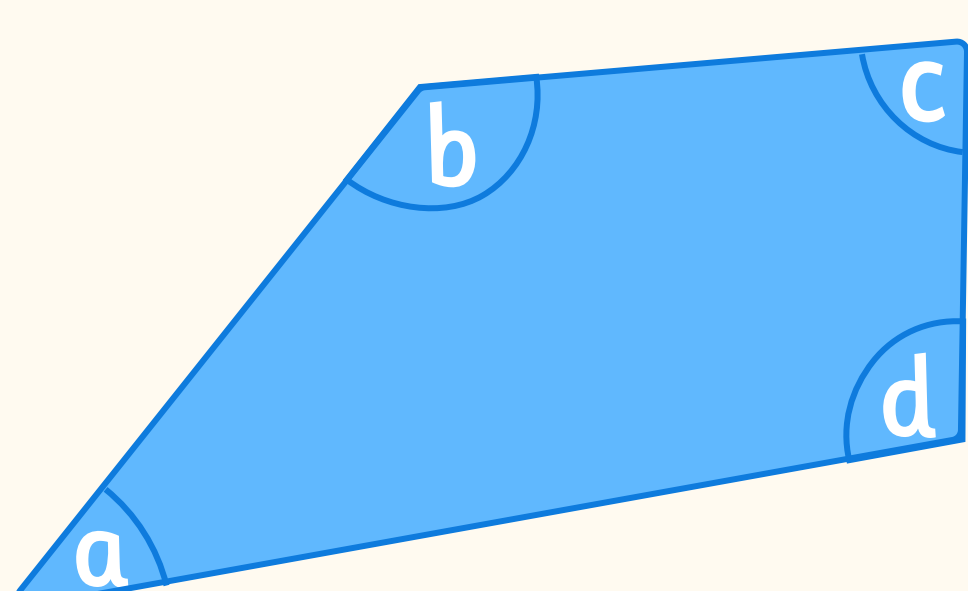
Trapezium



Rhombus

All other quadrilateral shapes are **irregular** because they have edges with **differing** lengths and differing angles.

The interior angles of a quadrilateral shape will **always** add up to 360°, no matter how irregular it may look.



In this example,

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

this is because every quadrilateral shape can be split into two triangles. The interior angle of a triangle measures 180°, so two triangles within a quadrilateral will equal 360°.

When you know the interior angles of a quadrilateral equal 360°, you can easily work out an angle that may be missing.

## Let's see this in an example...

Take a look at the irregular quadrilateral below:



You can see that two of the angles here are right angles (90°) because they are represented by a square. The third angle measures 75° and we need to find the angle labelled 'a.'

Begin with the total sum of all the angles, which you know is 360°. Then subtract the angles that you have already been given, and you will have your answer

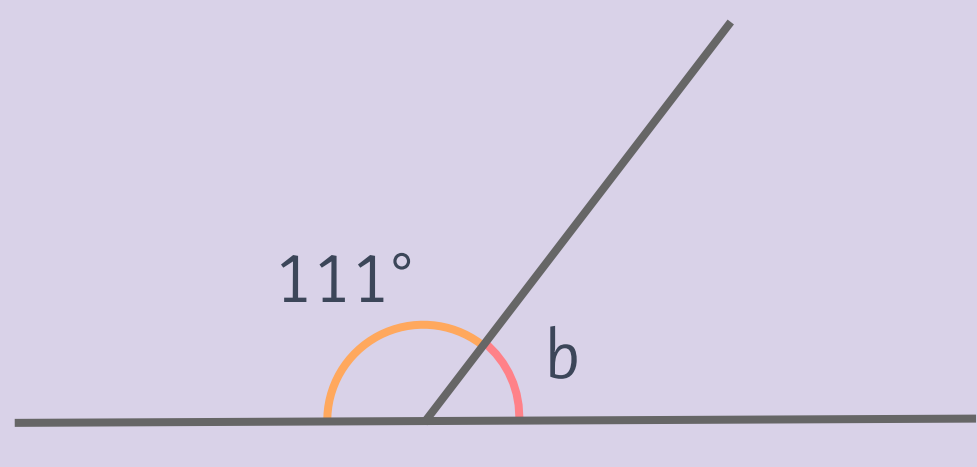
$$360^\circ - 90^\circ - 90^\circ - 75^\circ = 115^\circ$$

$$\text{So, angle } a = 115^\circ \checkmark$$

## But wait...there's more?

Yes! There are some more rules that you need to know which will help you to solve missing angles questions.

1) Angles on a straight line will always equal 180°

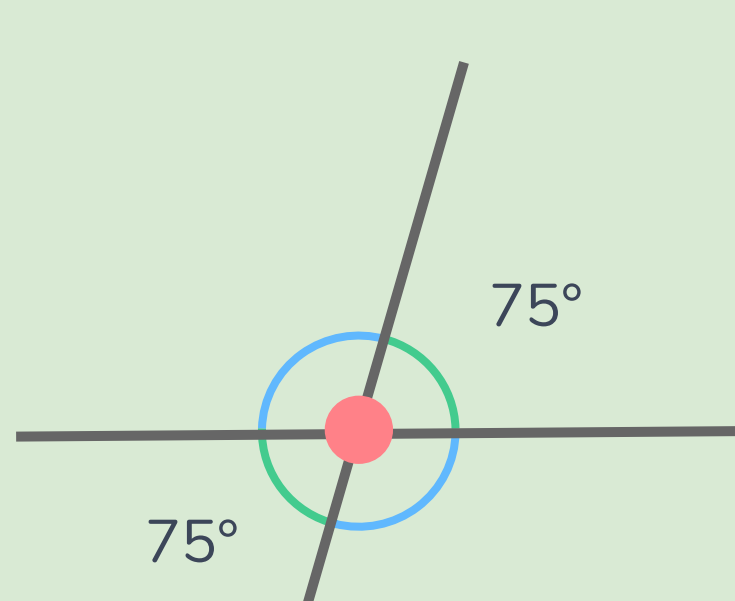


$$180^\circ - 111^\circ = 69^\circ$$

When a line is shown and split into two, like the figure on the left, and you know one of the angles, you can find the other by subtracting the known angle from 180°.

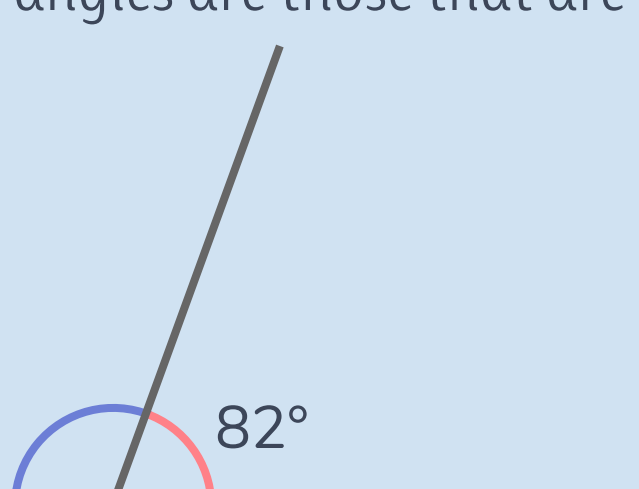
$$b = 69^\circ \checkmark$$

2) Angles that are vertically opposite will always be equal.



When you see two straight lines that are crossing one another, as you can see below, the opposite angles will always be equal. So, if one angle is showing 75°, you know that the angle opposite will also be 75°

3) Reflex angles are those that are greater than 180° but less than 360°



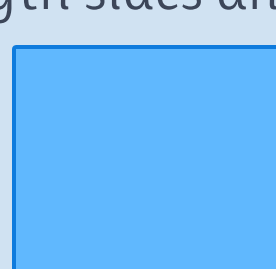
$$360^\circ - 82^\circ = 278^\circ$$

$$C = 278^\circ \checkmark$$

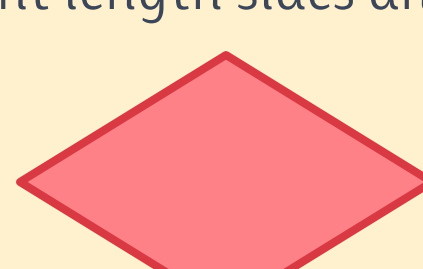
When you see an angle drawn that is almost a full circle, it will be a reflex angle. The interior angles of a quadrilateral equal 360° and so do the angles of a full circle. If you see a reflex angle, like the one below, with an acute angle already given, you calculate it by subtracting the angle shown from 360°.

## ★ Let's recap some Key Vocabulary...

**Regular quadrilateral** - a 4-sided shape with equal length sides and equal angles.



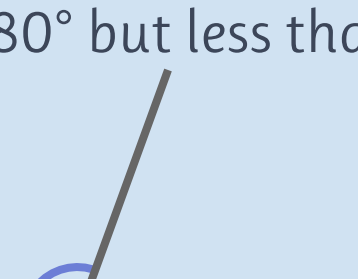
**Irregular quadrilateral** - a 4-sided shape with different length sides and different angles.



**Interior angles** - the angles that are inside of a shape



**Reflex angle** - an angle that measures more than 180° but less than 360°



### 💡 Tips!

Make sure when using a protractor to be very careful, if you measure in a hurry it's very easy to make a mistake and measure incorrectly!

