## The cosine rule



## What's the difference between $b$ and $B$ ?

The diagram above can represent any triangle. There are three angles, $A, B$ and $C$. Each angle faces a side, the side being named after the angle that faces it. So the side opposite angle $A$ is called side $a$.

## Does the cosine rule work for any triangle?

The cosine rule can be used for any triangle, right-angled or not. However, there are less complicated methods for finding sides and angles in rightangled triangles, so you will find you only need to use the cosine rule for nonright triangles.

## What is the rule?

$a^{2}=b^{2}+c^{2}-2 b c \cos A$

## Why do I need the cosine rule?

You know: all three sides
You want to find: an angle


If you feel confident with rearranging equations, you can rearrange the cosine rule to find the angle A directly:

$$
C=\cos ^{-1}\left(\frac{a^{2}+b^{2}-c^{2}}{2 a b}\right)
$$

You know: two sides and the angle between them You want to find: the other side


In this situation, you can also rearrange the cosine rule to find the side c directly - although it's only a case of square-rooting both sides:

$$
c=\sqrt{a^{2}+b^{2}-2 a b \cos C}
$$

