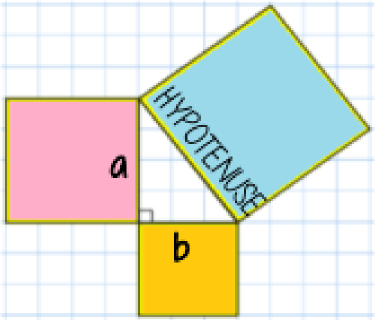
Pythagoras theorem R



Hypotenuse^2 = $a^2 + b^2$

This is commutative – the square of the hypotenuse is equal to the sum of the squares of the two shorter sides

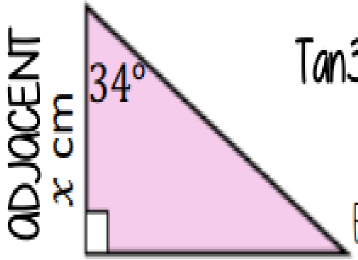
Places to look out for Pythagoras

- Perpendicular heights in isosceles triangles
- Diagonals on right angled shapes
- Distance between coordinates
- Any length made from a right angles

Tangent ratio: side lengths

$\tan\theta = \dfrac{\text{opposite side}}{\text{adjacent side}}$

Substitute the values into the tangent formula



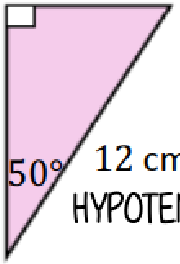
$\tan 34 = \dfrac{10}{x}$

Equations might need rearranging to solve

$x \times \tan 34 = 10$

$x = \dfrac{10}{\tan 34} = 14.8\text{cm}$

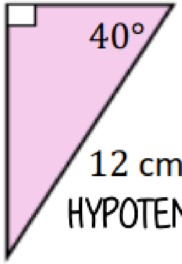
Sin and Cos ratio: side lengths



$\sin\theta = \dfrac{\text{opposite side}}{\text{hypotenuse side}}$

NOTE

The Sin(x) ratio is the same as the Cos(90-x) ratio



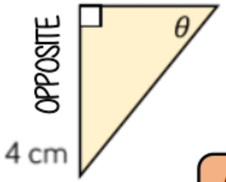
$\cos\theta = \dfrac{\text{adjacent side}}{\text{hypotenuse side}}$

Substitute the values into the ratio formula

Equations might need rearranging to solve

Sin, Cos, Tan: Angles

Inverse trigonometric functions



Label your triangle and choose your trigonometric ratio

Substitute values into the ratio formula

$\tan\theta = \dfrac{3}{4}$

$\theta = \tan^{-1}\dfrac{3}{4}$

$\theta = 36.9°$

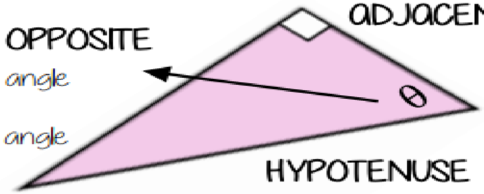
$\theta = \tan^{-1}\dfrac{\text{opposite side}}{\text{adjacent side}}$

$\theta = \sin^{-1}\dfrac{\text{opposite side}}{\text{hypotenuse side}}$

$\theta = \cos^{-1}\dfrac{\text{adjacent side}}{\text{hypotenuse side}}$

Hypotenuse, adjacent and opposite

ONLY right-angled triangles are labelled in this way



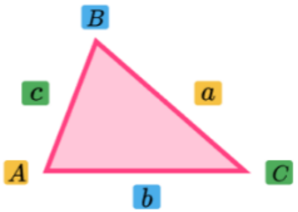
OPPOSITE: Always opposite an acute angle. Useful to label second. Position depend upon the angle in use for the question

ADJACENT: Next to the angle in question. Often labelled last

HYPOTENUSE: Always the longest side. Always opposite the right angle. Useful to label this first

The **sine rule** is a relationship between the size of an angle in a triangle and the opposing side.

We can use the sine rule to work out a missing angle or side in a triangle when we have **information about an angle and the side opposite it, and another angle and the side opposite it.**



This is the sine rule:

$$\frac{a}{sin(A)} = \frac{b}{sin(B)} = \frac{c}{sin(C)}$$

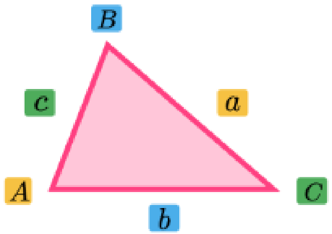
or

$$\frac{sin(A)}{a} = \frac{sin(B)}{b} = \frac{sin(C)}{c}$$

THIRD SPACE LEARNING

Cosine Rule

The **cosine rule** is a formula which can be used to calculate a missing side or missing angle in a triangle.



This is the cosine rule to find a missing side:

$$a^2 = b^2 + c^2 - 2bc\,cos(A)$$

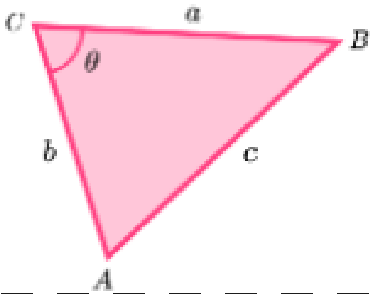
This is the rearranged cosine rule to find a missing angle:

$$Cos(A) = \frac{b^2 + c^2 - a^2}{2bc}$$

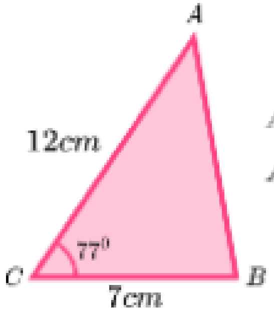
Area of a Triangle Trig $(\frac{1}{2}abSinC)$

Area of a triangle trig is a formula to calculate the area of any triangle.

Area of a triangle = $\frac{1}{2}abSinC$



E.g.



$$Area = \frac{1}{2} \times 7 \times 12sin(77)$$

$$Area = 40.92(2.d.p.)$$

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