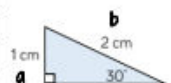


Ratio in right-angled triangles

When the angle is the same the ratio of sides a and b will also remain the same



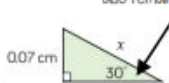
$$a:b = 1:2$$

$$\frac{a}{b} = \frac{1}{2}$$



$$a:b = x:100$$

$$50:100$$



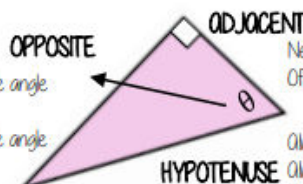
$$a:b = 0.07:x$$

$$0.07:0.14$$

Hypotenuse, adjacent and opposite

ONLY right-angled triangles are labelled in this way

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



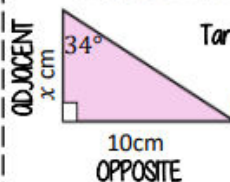
Next to the angle in question
Often labelled last

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

Tangent ratio: side lengths

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

Substitute the values into the tangent formula



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

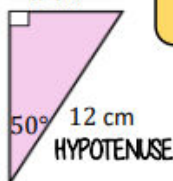
Equations might need rearranging to solve

$$x \times \tan 34 = 10$$

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

Sin and Cos ratio: side lengths

OPPOSITE
x cm

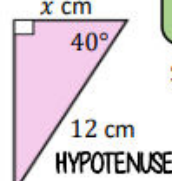


$$\sin \theta = \frac{\text{opposite side}}{\text{hypotenuse side}}$$

NOTE

The $\sin(x)$ ratio is the same as the $\cos(90-x)$ ratio

ADJACENT
x cm



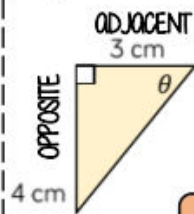
$$\cos \theta = \frac{\text{adjacent side}}{\text{hypotenuse side}}$$

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

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

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

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

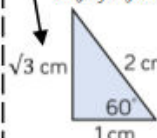
$$\tan \theta = \frac{3}{4}$$

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

$$\theta = 36.9^\circ$$

Key angles

This side could be calculated using Pythagoras



$$\tan 30 = \frac{1}{\sqrt{3}}$$

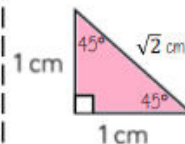
$$\tan 60 = \sqrt{3}$$

$$\cos 30 = \frac{\sqrt{3}}{2}$$

$$\cos 60 = \frac{1}{2}$$

$$\sin 30 = \frac{1}{2}$$

$$\sin 60 = \frac{\sqrt{3}}{2}$$



$$\tan 45 = 1$$

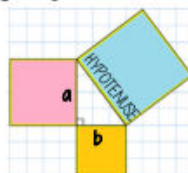
$$\cos 45 = \frac{1}{\sqrt{2}}$$

$$\sin 45 = \frac{1}{\sqrt{2}}$$

Pythagoras theorem

R

$$\text{Hypotenuse}^2 = a^2 + b^2$$



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

Key angles 0° and 90°

$$\tan 0 = 0$$

$$\tan 90$$

This value cannot be defined – it is impossible as you cannot have two 90° angles in a triangle



$$\sin 0 = 0$$

$$\sin 90 = 1$$

$$\cos 0 = 1$$

$$\cos 90 = 0$$

@whisto_maths

Additional Notes: