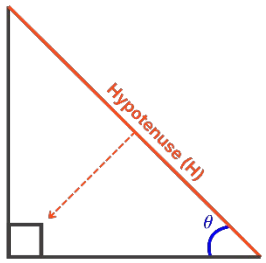
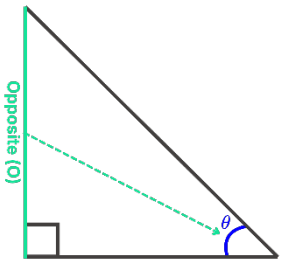
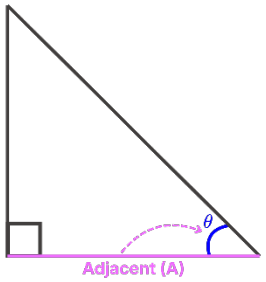
Trigonometry

Understanding trigonometry

Trigonometry helps us find missing sides and missing angles in right-angled triangles, using ratios called Sine (sin), Cosine (cos) and Tangent (tan).

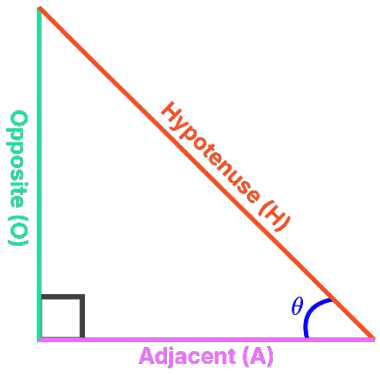
Before using trigonometric ratios, it is important to identify and label the sides first.

For any right-angled triangle identify the:

Hypotenuse (H)	Opposite (O)	Adjacent (A)
		
Longest side, opposite the right angle.	Side opposite the angle you are working with.	Side next to the angle you are working with (not the hypotenuse).

Choosing the correct ratio

Once you have identified and labelled the sides, determine which sides are known and which side or angle you need to find.



Ratio	Formula	Memory
Sine	$sin\theta = \frac{Opposite}{Hypotenuse}$	S O H
Cosine	$cos\theta = \frac{Adjacent}{Hypotenuse}$	C A H
Tangent	$tan\theta = \frac{Opposite}{Adjacent}$	T O A

SOHCAHTOA helps us remember the three trigonometric ratios.

S O H C A H T O A

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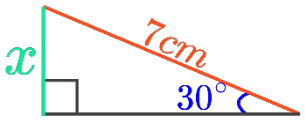
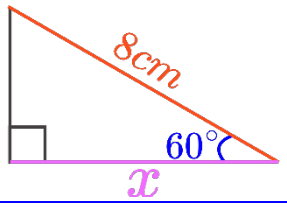
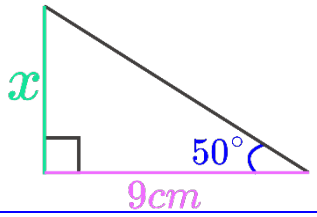
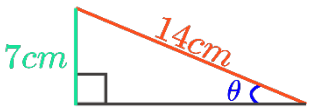
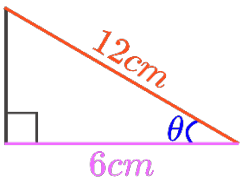
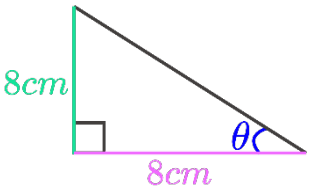
Finding a missing side

Once you have identified and labelled the sides, choose the correct ratio, substitute the known values, and solve for the missing side.

S O H		$sin\theta = \frac{Opp}{Hyp}$	$sin30 = \frac{x}{7}$ $sin30 \times 7 = x$ $x = 3.5cm$
C A H		$cos\theta = \frac{Adj}{Hyp}$	$cos60 = \frac{x}{8}$ $cos60 \times 8 = x$ $x = 4cm$
T O A		$tan\theta = \frac{Opp}{Adj}$	$tan50 = \frac{x}{9}$ $tan50 \times 9 = x$ $x = 10.7cm$

Finding a missing angle

Once you have identified and labelled the sides, choose the correct ratio, substitute the known values, and use the inverse trigonometric function to find the missing angle.

S O H		$sin\theta = \frac{Opp}{Hyp}$	$sin\theta = \frac{7}{14}$ $\theta = sin^{-1} \times \frac{7}{14}$ $\theta = 30°$
C A H		$cos\theta = \frac{Adj}{Hyp}$	$cos\theta = \frac{6}{12}$ $\theta = cos^{-1} \times \frac{6}{12}$ $\theta = 60°$
T O A		$tan\theta = \frac{Opp}{Adj}$	$tan\theta = \frac{8}{8}$ $\theta = tan^{-1} \times \frac{8}{8}$ $\theta = 45°$

Related helpsheet

- Understanding Pythagoras

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