

TRIGONOMETRY

Labelling Sides and Choosing the Correct Ratio

So, we have looked at labelling the sides, let's move on to finding the ratios...

You'll need an acronym to help you: **SOH CAH TOA**.

S stands for **sine**, which is abbreviated to **sin**

C stands for **cosine**, which is abbreviated to **cos**

T stands for **tangent**, which is abbreviated to **tan**

O stands for **opposite**

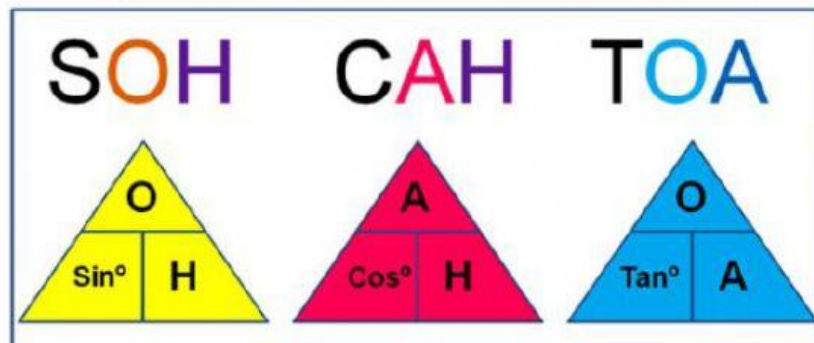
H stands for **hypotenuse**

A stands for **adjacent**.

We write it like this:

O	A	O			
S	H	C	H	T	A

OR

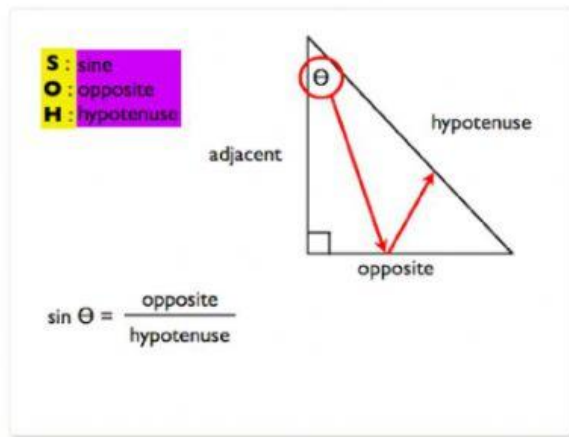


SOHCAHTOA is a nifty way to remember how to find the sine/ cosine/ tangent of an angle in a right triangle.

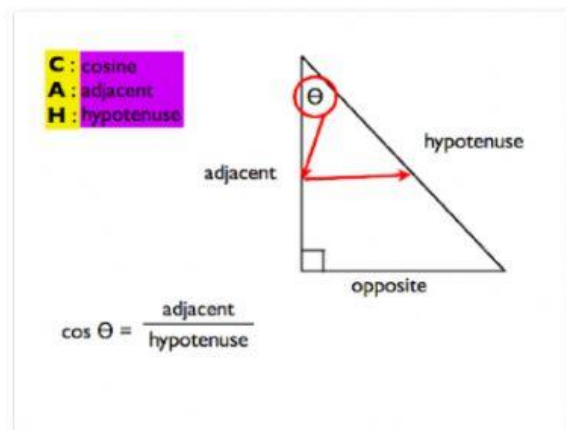
Note: ONLY WORKS FOR RIGHT TRIANGLES.

By using SOHCAHTOA you can find angle measures and side lengths of various right triangles. SOHCAHTOA is important to remember when solving right triangles.

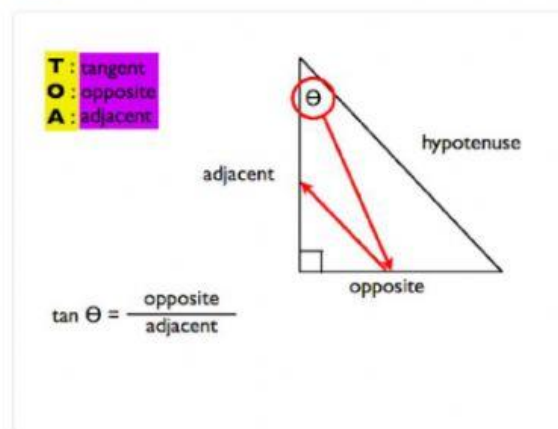
Sine



Cosine

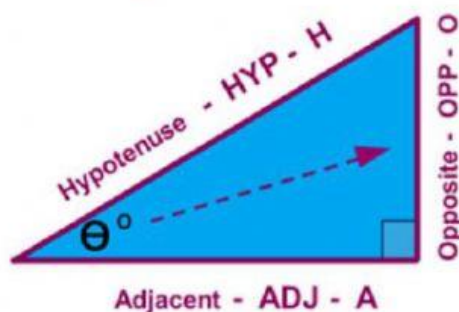


Tangent



To sum up the above:

Trig Ratios – SOH CAH TOA



Name	Ratio	Expression
Sine	O / H	$\sin \theta$
Cosine	A / H	$\cos \theta$
Tangent	O / A	$\tan \theta$

We use "SOH-CAH-TOA" to help us remember the Ratios

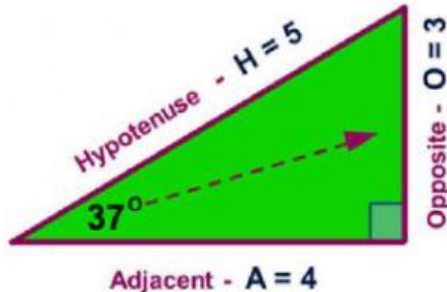
SOH is short for **Sine** = Opposite / Hypotenuse = O / H

CAH is short for **Cosine** = Adjacent / Hypotenuse = A / H

TOA is short for **Tangent** = Opposite / Adjacent = O / A

Let's look at a few examples below:

Trigonometric Ratios – Example 1



Find the values of the three regular Trig Ratios for the Given Triangle using SOH – CAH – TOA

Use "SOH-CAH-TOA" to get the Trig Ratios for the Triangle

SOH is short for $\sin \theta = O / H \Rightarrow \sin 37^\circ = 3/5$ or 0.6 ✓

CAH is short for $\cos \theta = A / H \Rightarrow \cos 37^\circ = 4/5$ or 0.8 ✓

TOA is short for $\tan \theta = O / A \Rightarrow \tan 37^\circ = 3/4$ or 0.75 ✓

(Online Trig Ratio Calculator) <http://www.mathopenref.com/calculator.html>

Sine Ratio Values on Calculator

We use the special "Sin" and "Sin⁻¹" calculator buttons when solving Sine Triangle Questions.

Warning: Your calculator must be in "Degrees" DEG Mode.

$\sin 60^\circ \Rightarrow \sin 60 \Rightarrow 0.8660$ ✓

$\sin 45^\circ \Rightarrow \sin 45 \Rightarrow 0.7071$ ✓

$\sin 30^\circ \Rightarrow \sin 30 \Rightarrow 0.5$ ✓

Note that we round off long decimal trig values from the calculator to four decimal places.

Cosine Ratio Values on Calculator

We use the special "Cos" and "Cos⁻¹" calculator buttons when solving Cosine Triangle Questions.

Warning: Your calculator must be in "Degrees" DEG Mode.

$\cos 60^\circ \Rightarrow \cos 60 \Rightarrow 0.5$ ✓

$\cos 45^\circ \Rightarrow \cos 45 \Rightarrow 0.7071$ ✓

$\cos 30^\circ \Rightarrow \cos 30 \Rightarrow 0.8660$ ✓

Note that we round off long decimal trig values from the calculator to four decimal places.

Tangent Ratio Values on Calculator

We use the special "Tan" and "Tan⁻¹" calculator buttons when solving Tangent Triangle Questions.

Warning: Your calculator must be in "Degrees" DEG Mode.

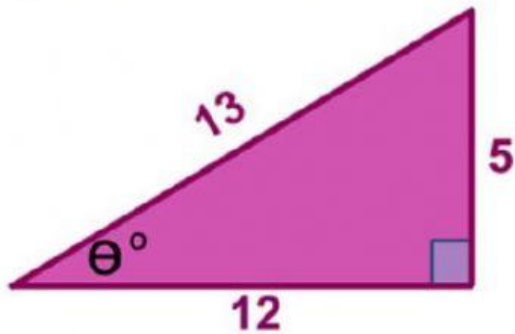
$\tan 60^\circ \Rightarrow \tan 60 \Rightarrow 1.7321$ ✓

$\tan 45^\circ \Rightarrow \tan 45 \Rightarrow 1$ ✓

$\tan 30^\circ \Rightarrow \tan 30 \Rightarrow 0.5774$ ✓

Note that we round off long decimal trig values from the calculator to four decimal places.

Trigonometric Ratios – Example 2



Find the value of $\tan \theta$
for the Given Triangle
using SOH – CAH – TOA

Use “SOH-CAH-TOA” to get the Trig Ratios for the Triangle

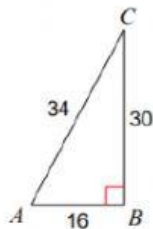
First Label the Triangle Sides with HYP, OPP, and ADJ

TOA is short for $\tan \theta = O / A \Rightarrow \tan \theta^\circ = 5/12$ or 0.4167 ✓

Your turn 😊

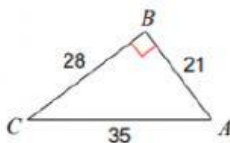
Find the value of each trigonometric ratio.

1) $\tan C$



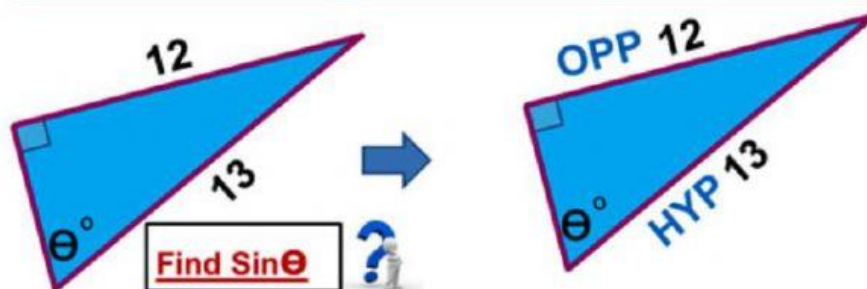
Show your working out here:

2) $\tan C$



Show your working out here:

Sine Triangle – EXAMPLE 4



To find Sin θ , use $\text{Sin}\theta = \text{OPP} / \text{HYP}$

$$\text{Sin}\theta = 12 / 13$$

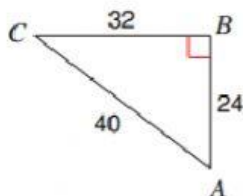
$$\text{Sin}\theta = 0.9230769$$

$$\text{Sin}\theta = 0.9230 \quad \checkmark$$

Your turn 😊

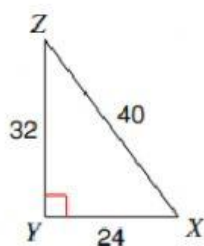
Find the value of each trigonometric ratio.

$\sin A$



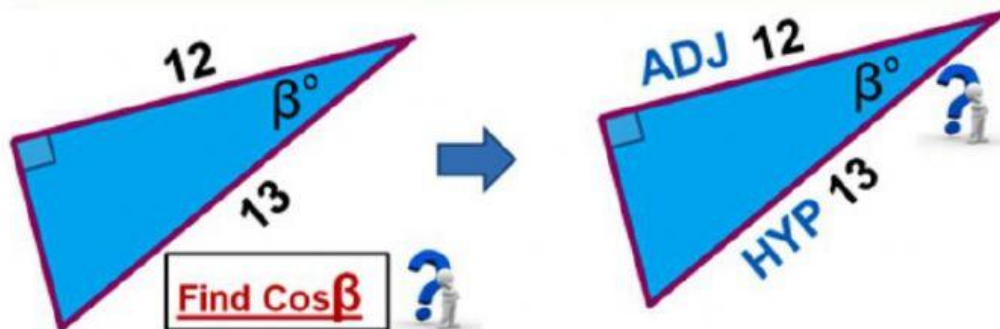
Show your working out here:

$\sin Z$



Show your working out here:

Cosine Triangle – EXAMPLE 4



To find Cos θ , use $\text{Cos}\theta = \text{ADJ} / \text{HYP}$

$$\text{Cos}\beta = 12 / 13$$

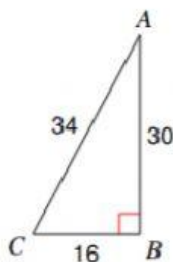
$$\text{Cos}\beta = 0.9230769$$

$$\text{Cos}\beta = 0.9230 \quad \checkmark$$

Your turn 😊

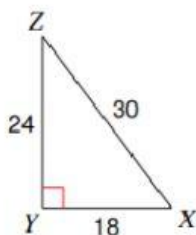
Find the value of each trigonometric ratio.

$\cos C$



Show your working out here:

$\cos Z$



Show your working out here:

REFLECTION:

How well have you learnt today?

Give me a rating from 0 to 5: _____

State 2 things that you have learnt REALLY well today:

1- _____

2- _____