

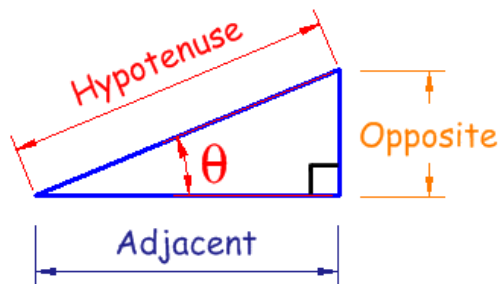
## Trigonometry

Trigonometry deals with angles. Trigonometry helps us to find out how far things are from one another when we can't measure them. Early astronomers needed to tell something meaningful about the Sun and Moon and stars and their relationship between man standing on the Earth or how they were positioned in relation to one another.

We can not do much navigating, build bridges or skyscrapers without trigonometry.

The main functions in trigonometry are **Sine, Cosine, Tangent** and **Cotangent**.

Sine, Cosine, Tangent and Cotangent are all based on a Right-Angled Triangle. The abbreviation of sine is sin, cosine is cos, tangent is tan and cotangent is cot.



Opposite side is opposite to the angle  $\theta$

Adjacent side is adjacent (next to) to the angle  $\theta$

Hypotenuse is the longest one and it is opposite to the right angle.



$$\sin q = \frac{\textit{opposite}}{\textit{hypotenuse}}$$

$$\cos q = \frac{\textit{adjacent}}{\textit{hypotenuse}}$$

$$\tan q = \frac{\sin q}{\cos q} = \frac{\textit{opposite}}{\textit{adjacent}}$$

$$\cot q = \frac{\cos q}{\sin q} = \frac{\textit{adjacent}}{\textit{opposite}}$$



Good calculators have sin, cos and tan on them, to make it easy for you. Just put in the angle and press the button.

### Sohcahtoa

Sohca...*what?* Just an easy way to remember which side to divide by which!

Like this:

**Soh...** Sine = Opposite / Hypotenuse

**...cah...** Cosine = Adjacent / Hypotenuse

**...toa** Tangent = Opposite / Adjacent

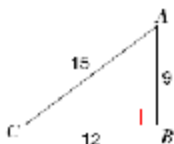
### Examples

1)  $\tan A$



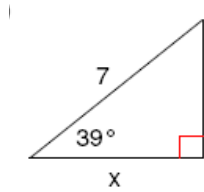
$$\tan A = \frac{\textit{opposite}}{\textit{adjacent}} = \frac{30}{16} = 1,88$$

2)  $\cos C$



$$\cos C = \frac{\textit{adjacent}}{\textit{hypotenuse}} = \frac{12}{15} = 0,8$$

## 3) Find the missing side. Round to the nearest tenth.



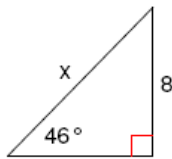
hypotenuse is 7 and x is adjacent

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}} \quad \cos 39^\circ = \frac{x}{7} \quad \text{/use calculator for calculating}$$

$$0,7771 = \frac{x}{7} \quad \text{/}.7 \quad \cos 39^\circ$$

$$x = 5,5$$

## 4) Find the missing side. Round to the nearest tenth.



hypotenuse is x and opposite is 8

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}} \quad \sin 46^\circ = \frac{8}{x} \quad \text{/ use calculator}$$

$$0,72 = \frac{8}{x} \quad \text{/}.x$$

$$0,72x = 8 \quad \text{/}:0,72$$

$$x = 11,1$$

## 5) Find each angle measure to the nearest degree.

$$\tan A = 2.0503$$

$$a = \tan^{-1} 2,0503 \quad \text{/ use calculator push SHIFT TAN 2,0503 or 2,0503 SHIFT TAN}$$

$$a = 64^\circ$$

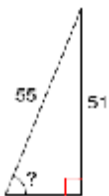
## 6) Find each angle measure to the nearest degree.

$$\cos Z = 0,1219$$

$$Z = \cos^{-1} 0,1219 \quad \text{/ use calculator push SHIFT COS 0,1219 or 0,1219 SHIFT COS}$$

$$Z = 83^\circ$$

## 7) Find the measure of the indicated angle to the nearest degree.



hypotenuse is 55 and opposite is 51

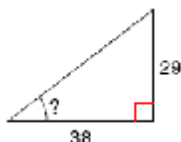
$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}} \quad \sin A = \frac{51}{55}$$

$$\sin A = 0,927 \quad \text{/ use calculator}$$

$$\sin A = 68^\circ$$

## 8) Find the measure of the indicated angle to the nearest degree.

adjacent is 38 and opposite is 29



$$\tan A = \frac{\text{opposite}}{\text{adjacent}} \quad \tan A = \frac{29}{38}$$

$$\tan A = 0,763 \quad \text{/ use calculator}$$

$$a = 37^\circ$$