

Trigonometric Ratios

Essential information

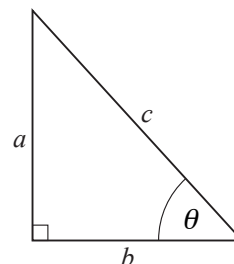
- In a **right angled triangle**, given an angle θ and the length of one side, you can use

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{a}{c}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{b}{c}$$

or

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{a}{b}$$



to find the lengths of the other two sides and to find angles, using the SHIFT button on a calculator

(opp : opposite; hyp : hypotenuse; adj : adjacent)

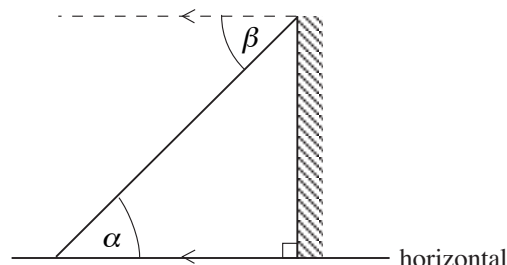
[Note that calculators should be in *degree mode* for trigonometric calculations.]

For example, (i) given c and angle θ , $a = c \sin \theta$, $b = c \cos \theta$

(ii) given a and angle θ , $c = \frac{a}{\sin \theta}$, $b = \frac{a}{\tan \theta}$, etc.

- The **angle of elevation** (α) is the angle made with the horizontal, as shown in the diagram (angle β is called the **angle of depression**).

Angle $\alpha = \text{angle } \beta$ (alternate angles).



- Important values of $\sin$, $\cos$ and $\tan$** are shown in the table below.

θ	$\sin \theta$	$\cos \theta$	$\tan \theta$
0°	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45°	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	1	0	infinite