

# Trigonometry

## Trigonometry

$$\sin 2\theta = 2 \sin \theta \cos \theta$$

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta$$

$$\tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

$$\sin (x + y) = \sin x \cos y + \cos x \sin y$$

$$\sin (x - y) = \sin x \cos y - \cos x \sin y$$

$$\tan(x + y) = \frac{\tan x + \tan y}{1 - \tan x \cdot \tan y}$$

$$\tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \cdot \tan y}$$

$$\cos (x + y) = \cos x \cos y - \sin x \sin y$$

$$\cos (x - y) = \cos x \cos y + \sin x \sin y$$

$$\sin A + \sin B = 2 \sin \left( \frac{A+B}{2} \right) \cos \left( \frac{A-B}{2} \right)$$

$$\sin A - \sin B = 2 \cos \left( \frac{A+B}{2} \right) \sin \left( \frac{A-B}{2} \right)$$

$$\cos(A) - \cos B = 2 \cos \left( \frac{A+B}{2} \right) \cos \left( \frac{A-B}{2} \right)$$

$$\cos A - \cos B = -2 \sin \left( \frac{A+B}{2} \right) \sin \left( \frac{A-B}{2} \right)$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$1 + \tan^2 \theta = \sec^2 \theta$$

$$1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$$

$$\sin \theta \cdot \sin (60 - \theta) \cdot \sin (60 + \theta) = \frac{1}{4} \sin 3\theta$$

$$\cos \theta \cdot \cos (60 - \theta) \cdot \cos (60 + \theta) = \frac{1}{4} \cos 3\theta$$

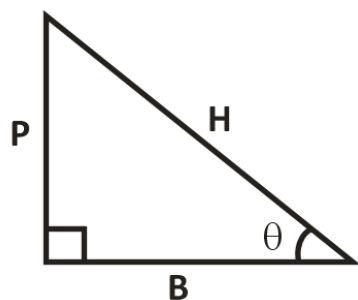
$$\tan \theta \cdot \tan (60 - \theta) \cdot \tan (60 + \theta) = \tan 3\theta$$

Complementary Pairs:

$$\text{If } \sin x = \cos y \Rightarrow x + y = 90^\circ$$

$$\tan x = \cot y \Rightarrow x + y = 90^\circ$$

$$\operatorname{cosec} x = \sec y \Rightarrow x + y = 90^\circ$$



$$\sin \theta = \frac{P}{H}$$

$$\cos \theta = \frac{B}{H}$$

$$\tan \theta = \frac{P}{B}$$

$$\operatorname{cosec} \theta = \frac{H}{P}$$

$$\sec \theta = \frac{H}{B}$$

$$\cot \theta = \frac{B}{P}$$

#### Maxima and Minima

1.	$a \sin \theta + b \cos \theta$	$-\sqrt{a^2 + b^2}$	$\sqrt{a^2 + b^2}$
2.	$a \sin \theta - b \cos \theta$	$-\sqrt{a^2 + b^2}$	$\sqrt{a^2 + b^2}$
3.	$a \sin^2 \theta + b \cos^2 \theta$	smaller between a & b	Bigger between a & b
4.	$a \sin^2 \theta + b \operatorname{cosec}^2 \theta$	$2\sqrt{ab}$	$\times$
5.	$a \cos^2 \theta + b \sec^2 \theta$	$2\sqrt{ab}$	$\times$
6.	$a \tan^2 \theta + b \cot^2 \theta$	$2\sqrt{ab}$	$\times$
7.	$a \sec^2 \theta + b \operatorname{cosec}^2 \theta$	$(\sqrt{a} + \sqrt{b})^2$	$\times$