



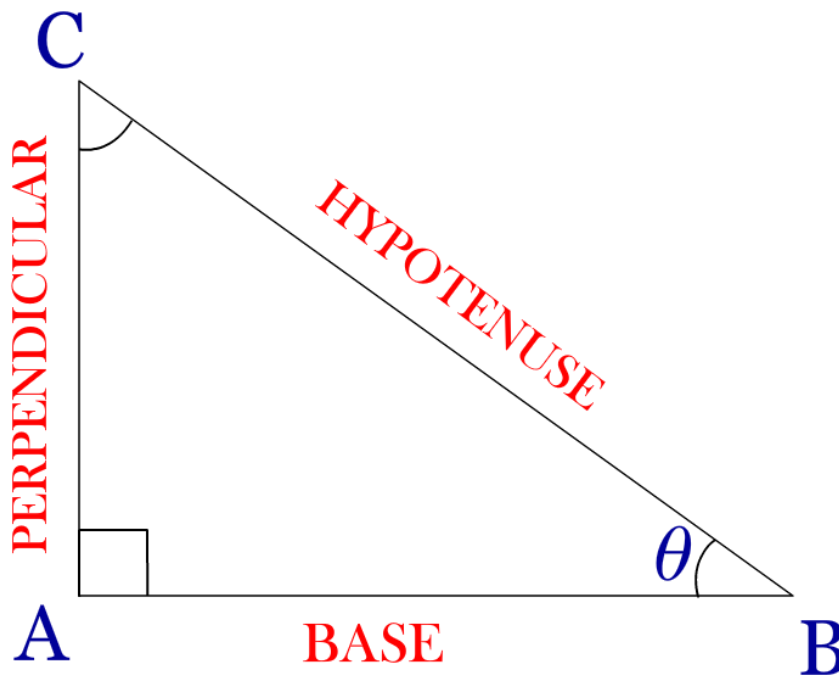
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# TRIGONOMETRY

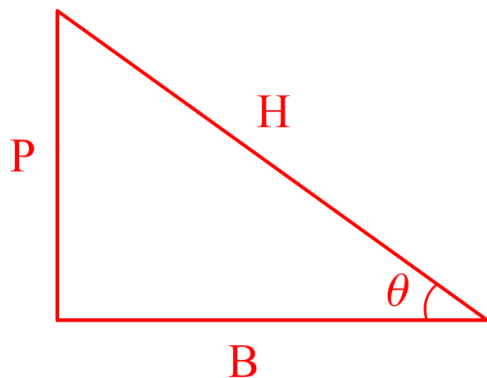
## FORMULA LIST

# TRIGONOMETRIC SIDES

- PERPENDICULAR : Side opposite to angle  $\theta$   
HYPOTENUSE : Side opposite to  $90^\circ$  angle  
BASE : Side adjacent to angle  $\theta$



# TRIGONOMETRIC RATIO'S



P- Perpendicular

B- Base

H- Hypotenuse

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

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

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

$$\operatorname{Sec} \theta = \frac{H}{B}$$

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

$$\operatorname{Cot} \theta = \frac{B}{P}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta} \quad \operatorname{Cot} \theta = \frac{\operatorname{Cosec} \theta}{\operatorname{Sec} \theta}$$

$$\operatorname{Cosec} (x) = \frac{1}{\sin (x)}$$

$$\operatorname{Sec} (x) = \frac{1}{\cos (x)}$$

$$\operatorname{Cot} (x) = \frac{1}{\tan (x)}$$

## TRIGONOMETRIC RATIO TABLE

	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
$\sin \theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan \theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	n.d
$\operatorname{Cosec} \theta$	n.d	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
$\sec \theta$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	n.d
$\cot \theta$	n.d	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

$$\sin \theta = \cos \phi$$

$$\text{If, } \theta + \phi = 90^\circ$$

# MEASUREMENT OF ANGLES

## Radian to Degree Conversion

$$\text{radian} = \frac{180^\circ}{\pi}$$

## Sexagesimal System

$$\text{Right angle} = 90 \text{ degree} = 90^\circ$$

$$1^\circ = 60 \text{ minutes} = 60'$$

$$1' = 60 \text{ seconds} = 60''$$

## Centesimal System

$$\text{Right angle} = 100 \text{ Grades} = 100^g$$

$$1^g = 100 \text{ minutes} = 100'$$

$$1' = 100 \text{ seconds} = 100''$$

## TRIGONOMETRIC RATIOS IN ALL THE 4 QUADRANTS

$$\sin(90-\theta) = \cos\theta$$

$$\cos(90-\theta) = \sin\theta$$

$$\tan(90-\theta) = \cot\theta$$

$$\sin(90+\theta) = \cos\theta$$

$$\cos(90+\theta) = -\sin\theta$$

$$\tan(90+\theta) = -\cot\theta$$

$$\sin(180-\theta) = \sin\theta$$

$$\cos(180-\theta) = -\cos\theta$$

$$\tan(180-\theta) = -\tan\theta$$

$$\sin(180+\theta) = -\sin\theta$$

$$\cos(180+\theta) = -\cos\theta$$

$$\tan(180+\theta) = \tan\theta$$

$$\sin(270-\theta) = -\cos\theta$$

$$\cos(270-\theta) = -\sin\theta$$

$$\tan(270-\theta) = \cot\theta$$

$$\sin(270+\theta) = -\cos\theta$$

$$\cos(270+\theta) = \sin\theta$$

$$\tan(270+\theta) = -\cot\theta$$

$$\sin(360-\theta) = -\sin\theta$$

$$\cos(360-\theta) = \cos\theta$$

$$\tan(360-\theta) = -\tan\theta$$

# RANGE & DOMAIN OF TRIGONOMETRIC FUNCTIONS

	Domain	Range
$y = \sin(x)$	$(-\infty, \infty)$	$[-1, 1]$
$y = \cos(x)$	$(-\infty, \infty)$	$[-1, 1]$
$y = \tan(x)$	$\mathbb{R} - \left( (2n+1) \frac{\pi}{2} \right)$ $\cup_{k \in \mathbb{Z}} \left( (2k+1) \frac{\pi}{2}, (2k+3) \frac{\pi}{2} \right)$	$(-\infty, \infty)$
$y = \operatorname{cosec}(x)$	$\mathbb{R} - (n\pi)$ $\cup_{k \in \mathbb{Z}} (k\pi, (k+1)\pi)$	$(-\infty, -1] \cup [1, \infty)$
$y = \sec(x)$	$\mathbb{R} - \left( (2n+1) \frac{\pi}{2} \right)$ $\cup_{k \in \mathbb{Z}} \left( (2k+1) \frac{\pi}{2}, (2k+3) \frac{\pi}{2} \right)$	$(-\infty, -1] \cup [1, \infty)$
$y = \cot(x)$	$\mathbb{R} - (n\pi)$ $\cup_{k \in \mathbb{Z}} (k\pi, (k+1)\pi)$	$(-\infty, \infty)$

## SUM & DIFFERENCE FORMULA

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

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

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

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

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

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

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

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

### Double Angle Formula

$$\sin (2x) = 2 \sin x \cos x$$

$$\sin (2x) = \frac{2 \tan x}{1 + \tan^2 x}$$

$$\cos (2x) = 2 \cos^2 x - 1$$

$$\cos (2x) = 1 - 2 \sin^2 x$$

$$\cos (2x) = \frac{1 - \tan^2 x}{1 + \tan^2 x}$$

$$\tan (2x) = \frac{2 \tan x}{1 - \tan^2 x}$$



## Triple Angle Formula

$$\sin (3x) = 3 \sin x - 4 \sin^3 x$$

$$\cos (3x) = 4 \cos^3 x - 3 \cos x$$

$$\tan (3x) = \frac{3 \tan x - \tan^3 x}{1 - 3 \tan^2 x}$$

## Half Angle Formula

$$\sin (x/2) = \pm \sqrt{\frac{1 - \cos x}{2}}$$

$$\cos (x/2) = \pm \sqrt{\frac{1 + \cos x}{2}}$$

$$\tan (x/2) = \pm \sqrt{\frac{1 - \cos x}{1 + \cos x}}$$

## Sum & Difference of Trigonometric Ratio's

$$\cos x + \cos y = 2 \cos \left( \frac{x + y}{2} \right) \cos \left( \frac{x - y}{2} \right)$$

$$\cos x - \cos y = (-)2 \sin \left( \frac{x + y}{2} \right) \sin \left( \frac{x - y}{2} \right)$$

$$\sin x + \sin y = 2 \sin \left( \frac{x + y}{2} \right) \cos \left( \frac{x - y}{2} \right)$$

$$\sin x - \sin y = 2 \cos \left( \frac{x + y}{2} \right) \sin \left( \frac{x - y}{2} \right)$$

## TRIGONOMETRIC EQUATIONS

$\sin x = 0$	$x = n\pi$
$\sin x = 1$	$x = (4n+1)\pi/2$
$\cos x = 0$	$x = (2n+1)\pi/2$
$\cos x = 1$	$x = 2n\pi$
$\sin x = \sin y$	$x = n\pi + (-1)^n y$
$\cos x = \cos y$	$x = 2n\pi \pm y$
$\tan x = \tan y$	$x = n\pi + y$

# JOIN TRIGONOMETRIC COURSES

(Click on the images to Learn more.)

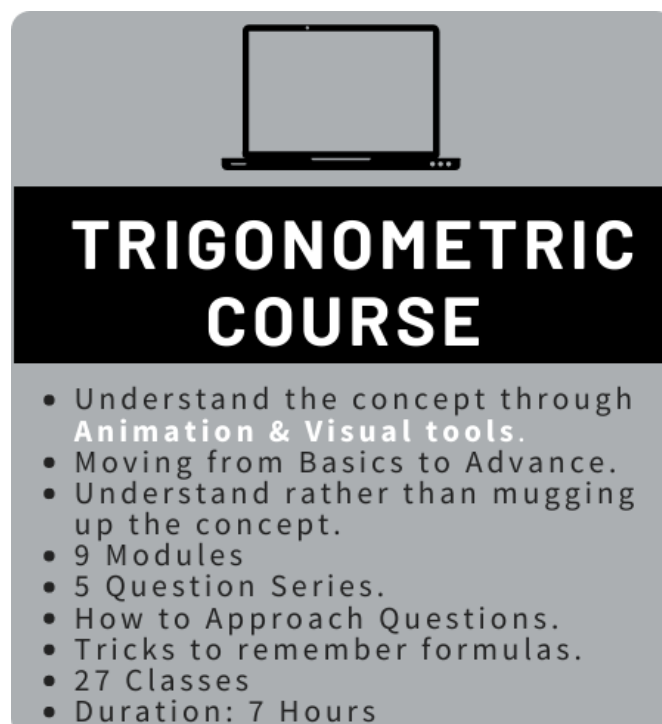
We Use ANIMATION & VISUAL tools for Better Understanding of the concept.



**FREE**

**FREE TRIGONOMETRIC COURSE**

- Understand the concept through Animation & Visual tools.
- 2 Modules
- 7 Classes
- Duration: 46 Min



**TRIGONOMETRIC COURSE**

- Understand the concept through Animation & Visual tools.
- Moving from Basics to Advance.
- Understand rather than mugging up the concept.
- 9 Modules
- 5 Question Series.
- How to Approach Questions.
- Tricks to remember formulas.
- 27 Classes
- Duration: 7 Hours

## Refer the Links to Learn more about TRIGONOMETRY



**TRIGONOMETRIC  
BLOG**

- Trigonometric Tips & Tricks.
- Techniques to Learn Formulas.
- How to approach Trigonometric questions.
- Comparisons.
- And many MORE.

**NOTES:**

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