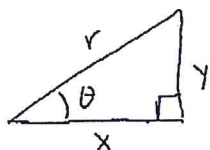


TRIG IDENTITIES



$$\begin{aligned} \sin \theta &= \frac{y}{r} & \csc \theta &= \frac{r}{y} \\ \cos \theta &= \frac{x}{r} & \sec \theta &= \frac{r}{x} \\ \tan \theta &= \frac{y}{x} & \cot \theta &= \frac{x}{y} \end{aligned}$$

$\theta \rightarrow$ function	0	30° $\pi/6$	45° $\pi/4$	60° $\pi/3$	90° $\pi/2$
$\sin \theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan \theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	d.n.e.

FUNDAMENTAL IDENTITIES

$$\begin{aligned} \sec x &= \frac{1}{\cos x} & \csc x &= \frac{1}{\sin x} \\ \tan x &= \frac{\sin x}{\cos x} & \cot x &= \frac{1}{\tan x} \\ \sin^2 x + \cos^2 x &= 1 & 1 + \tan^2 x &= \sec^2 x & 1 + \cot^2 x &= \csc^2 x \\ \sin(-x) &= -\sin x & \cos(-x) &= \cos x & \tan(-x) &= -\tan x \end{aligned}$$

COFUNCTION IDENTITIES

$$\begin{aligned} \sin\left(\frac{\pi}{2} - x\right) &= \cos x & \cos\left(\frac{\pi}{2} - x\right) &= \sin x \\ \tan\left(\frac{\pi}{2} - x\right) &= \cot x & \cot\left(\frac{\pi}{2} - x\right) &= \tan x \\ \sec\left(\frac{\pi}{2} - x\right) &= \csc x & \csc\left(\frac{\pi}{2} - x\right) &= \sec x \end{aligned}$$

REDUCTION IDENTITIES

$$\begin{aligned} \sin(x + \pi) &= -\sin x & \sin\left(x + \frac{\pi}{2}\right) &= \cos x \\ \cos(x + \pi) &= -\cos x & \cos\left(x + \frac{\pi}{2}\right) &= -\sin x \\ \tan(x + \pi) &= \tan x & \tan\left(x + \frac{\pi}{2}\right) &= -\cot x \end{aligned}$$

ADDITION AND SUBTRACTION FORMULAS

$$\begin{aligned} \sin(x + y) &= \sin x \cos y + \cos x \sin y \\ \sin(x - y) &= \sin x \cos y - \cos x \sin y \\ \cos(x + y) &= \cos x \cos y - \sin x \sin y \\ \cos(x - y) &= \cos x \cos y + \sin x \sin y \\ \tan(x + y) &= \frac{\tan x + \tan y}{1 - \tan x \tan y} & \tan(x - y) &= \frac{\tan x - \tan y}{1 + \tan x \tan y} \end{aligned}$$

DOUBLE-ANGLE FORMULAS

$$\begin{aligned} \sin 2x &= 2 \sin x \cos x & \cos 2x &= \cos^2 x - \sin^2 x \\ & & &= 2 \cos^2 x - 1 \\ \tan 2x &= \frac{2 \tan x}{1 - \tan^2 x} & &= 1 - 2 \sin^2 x \end{aligned}$$

FORMULAS FOR REDUCING POWERS

$$\begin{aligned} \sin^2 x &= \frac{1 - \cos 2x}{2} & \cos^2 x &= \frac{1 + \cos 2x}{2} \\ \tan^2 x &= \frac{1 - \cos 2x}{1 + \cos 2x} \end{aligned}$$

HALF-ANGLE FORMULAS

$$\begin{aligned} \sin \frac{u}{2} &= \pm \sqrt{\frac{1 - \cos u}{2}} & \cos \frac{u}{2} &= \pm \sqrt{\frac{1 + \cos u}{2}} \\ \tan \frac{u}{2} &= \frac{1 - \cos u}{\sin u} = \frac{\sin u}{1 + \cos u} \end{aligned}$$

PRODUCT-TO-SUM AND SUM-TO-PRODUCT IDENTITIES

$$\begin{aligned} \sin u \cos v &= \frac{1}{2}[\sin(u + v) + \sin(u - v)] \\ \cos u \sin v &= \frac{1}{2}[\sin(u + v) - \sin(u - v)] \\ \cos u \cos v &= \frac{1}{2}[\cos(u + v) + \cos(u - v)] \\ \sin u \sin v &= \frac{1}{2}[\cos(u - v) - \cos(u + v)] \\ \sin x + \sin y &= 2 \sin \frac{x + y}{2} \cos \frac{x - y}{2} \\ \sin x - \sin y &= 2 \cos \frac{x + y}{2} \sin \frac{x - y}{2} \\ \cos x + \cos y &= 2 \cos \frac{x + y}{2} \cos \frac{x - y}{2} \\ \cos x - \cos y &= -2 \sin \frac{x + y}{2} \sin \frac{x - y}{2} \end{aligned}$$

THE LAWS OF SINES AND COSINES

The Law of Sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

The Law of Cosines

$$\begin{aligned} a^2 &= b^2 + c^2 - 2bc \cos A \\ b^2 &= a^2 + c^2 - 2ac \cos B \\ c^2 &= a^2 + b^2 - 2ab \cos C \end{aligned}$$

