

Trigonometry Formulas

Reciprocal Identities

$$\csc\theta = \frac{1}{\sin\theta}$$

$$\sec\theta = \frac{1}{\cos\theta}$$

$$\cot\theta = \frac{1}{\tan\theta}$$

Quotient Identities

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

$$\cot\theta = \frac{\cos\theta}{\sin\theta}$$

Pythagorean Identities

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

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

$$\csc^2\theta = 1 + \cot^2\theta$$

Addition and Subtraction Formulas

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

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

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

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

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

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

Double Angle Formulas

$$\sin 2x = 2 \sin x \cos x$$

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

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

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

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

Related Angle Identities

$$\begin{aligned} \sin(\pi - x) &= \sin x \\ \cos(\pi - x) &= -\cos x \\ \tan(\pi - x) &= -\tan x \end{aligned}$$

$$\begin{aligned} \sin(2\pi - x) &= -\sin x \\ \cos(2\pi - x) &= \cos x \\ \tan(2\pi - x) &= -\tan x \end{aligned}$$

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

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

Co-Related Angle Identities

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

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

$$\begin{aligned} \sin\left(\frac{3\pi}{2} - x\right) &= -\cos x \\ \cos\left(\frac{3\pi}{2} - x\right) &= -\sin x \\ \tan\left(\frac{3\pi}{2} - x\right) &= \cot x \end{aligned}$$

$$\begin{aligned} \sin\left(\frac{3\pi}{2} + x\right) &= -\cos x \\ \cos\left(\frac{3\pi}{2} + x\right) &= \sin x \\ \tan\left(\frac{3\pi}{2} + x\right) &= -\cot x \end{aligned}$$