

Special Angle Table

Degrees	Radians	Sine	Cosine	Tangent	Cotangent	Secant	Cosecant
0°	0	0	1	0	undefined	1	undefined
30°	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$	$\sqrt{3}$	$\frac{2\sqrt{3}}{3}$	2
45°	$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	1	$\sqrt{2}$	$\sqrt{2}$
60°	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{\sqrt{3}}{3}$	2	$\frac{2\sqrt{3}}{3}$
90°	$\frac{\pi}{2}$	1	0	undefined	0	undefined	1

A unit circle diagram centered at the origin of a Cartesian coordinate system. The circle has a radius of 1. The x and y axes are shown, with arrows at their ends. The circle is divided into four quadrants by the axes. Key points on the circle are labeled with their coordinates and corresponding angles in radians. The angles are given in increasing order starting from the positive x-axis (0 radians) and moving counter-clockwise. The points are: (1,0) at 0 and 2π, (0,1) at π/2, (-1,0) at π, (0,-1) at 3π/2, and various other points in between labeled with angles like π/3, π/4, 5π/6, 2π/3, 7π/6, 5π/4, 4π/3, 7π/4, and 11π/6.

$$\nu = \cot^{-1} \chi$$

Reciprocal & Ratio Relationships

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

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

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

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

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

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

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

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

Pythagorean Relationships

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

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

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

Half-Angle Formulas

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

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

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

$$\tan \frac{x}{2} = \frac{\sin x}{1 + \cos x}$$

$$\tan \frac{x}{2} = \frac{1 - \cos x}{\sin x}$$

Double-Angle Formulas

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

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

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

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

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

Sum and Difference Formulas

$$\sin(a \pm b) = \sin a \cos b \pm \sin b \cos a$$

$$\cos(a \pm b) = \cos a \cos b \mp \sin a \sin b$$

$$\tan(a \pm b) = \frac{\tan a \pm \tan b}{1 \mp \tan a \tan b}$$

Co-Function Relationships

$$\sin x = \cos(90 - x) \quad \cos x = \sin(90 - x)$$

$$\tan x = \cot(90 - x) \quad \cot x = \tan(90 - x)$$

$$\sec x = \csc(90 - x) \quad \csc x = \sec(90 - x)$$

Negative Relationships

$$\sin(-\theta) = -\sin \theta \quad \csc(-\theta) = -\csc \theta$$

$$\cos(-\theta) = \cos \theta \quad \sec(-\theta) = \sec \theta$$

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

