

Trigonometry Handout

Degrees and Radians: The conversion between degrees and radians is given by the following equation.

$$180^\circ = \pi \text{ rad}$$

Reference Angles: If t is measured in radians, the reference angle (called t_r) for t can be found by adding a multiple of 2π to t so that the result (called t_1) is in between 0 and 2π ; that is, $0 \leq t_1 < 2\pi$. After that, the following chart yields the reference angle.

Quadrant of t_1	Value of t_r
I	t_1
II	$\pi - t_1$
III	$t_1 - \pi$
IV	$2\pi - t_1$

Trigonometric Functions: If t is measured in radians and its terminal point is (x, y) , the trigonometric functions of t when defined are as follows.

$$\begin{aligned} \sin t &= y & \cos t &= x & \tan t &= \frac{y}{x} \\ \csc t &= \frac{1}{y} & \sec t &= \frac{1}{x} & \cot t &= \frac{x}{y} \end{aligned}$$

Note that the following relationships hold for the trigonometric functions.

$$\begin{aligned} \tan t &= \frac{\sin t}{\cos t} & \cot t &= \frac{\cos t}{\sin t} \\ \csc t &= \frac{1}{\sin t} & \sec t &= \frac{1}{\cos t} \end{aligned}$$

Pythagorean Identities: The Pythagorean identities are as follows.

$$\begin{aligned} \sin^2 t + \cos^2 t &= 1 \\ \tan^2 t + 1 &= \sec^2 t \\ 1 + \cot^2 t &= \csc^2 t \end{aligned}$$

Common Trigonometric Values: The following is a chart of some common trigonometric values. Other common trigonometric values can be found by using these along with the reference angle and the trigonometric identities.

t	$\sin t$	$\cos t$
0	0	1
$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
$\frac{\pi}{2}$	1	0

Graphs of Trigonometric Functions: The following information is useful for graphing equations of the form $y = a \sin[b(x - c)] + d$ or $y = a \cos[b(x - c)] + d$ for $a \neq 0$ and $b > 0$.

The central axis is $y = d$.

The amplitude is $|a|$.

The period is $\frac{2\pi}{b}$.

Exactly one standard period occurs on the interval $\left[c, c + \frac{2\pi}{b} \right]$.