Basic trigonometric identities

Common angles

Degrees	0°	30°	45°	60°	90°
Radians	0	$\dfrac{\pi}{6}$	$\dfrac{\pi}{4}$	$\dfrac{\pi}{3}$	$\dfrac{\pi}{2}$
sin	0	$\dfrac{1}{2}$	$\dfrac{\sqrt{2}}{2}$	$\dfrac{\sqrt{3}}{2}$	1
cos	1	$\dfrac{\sqrt{3}}{2}$	$\dfrac{\sqrt{2}}{2}$	$\dfrac{1}{2}$	0
tan	0	$\dfrac{\sqrt{3}}{3}$	1	$\sqrt{3}$	

Reciprocal functions

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

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

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

Even/odd

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

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

$$\tan(-x) = -\tan x$$

Pythagorean identities

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

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

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

Cofunction identities

$$\sin(\frac{\pi}{2} - x) = \cos x$$

$$\cos(\frac{\pi}{2} - x) = \sin x$$

$$\tan(\frac{\pi}{2} - x) = \cot x$$

$$\cot(\frac{\pi}{2} - x) = \tan x$$

$$\sec(\frac{\pi}{2} - x) = \csc x$$

$$\csc(\frac{\pi}{2} - x) = \sec x$$

Sum and difference of angles

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

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

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

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

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

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

Double angles

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

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

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

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

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

Half angles

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

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

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

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

Power reducing formulas

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

$$\cos^2 x = \frac{1 + \cos 2x}{2}$$

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

Product to sum

$$\sin x \sin y = \frac{1}{2} \left[\cos(x - y) - \cos(x + y) \right]$$

$$\cos x \cos y = \frac{1}{2} \left[\cos(x - y) + \cos(x + y) \right]$$

$$\sin x \cos y = \frac{1}{2} \left[\sin(x + y) + \sin(x - y) \right]$$

$$\tan x \tan y = \frac{\tan x + \tan y}{\cot x + \cot y}$$

$$\tan x \cot y = \frac{\tan x + \cot y}{\cot x + \tan y}$$

Sum to product

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

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

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

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

$$\tan x + \tan y = \frac{\sin(x+y)}{\cos x \cos y}$$

$$\tan x - \tan y = \frac{\sin(x-y)}{\cos x \cos y}$$

Source

http://evgenii.com/blog/basic-trigonometric-identities