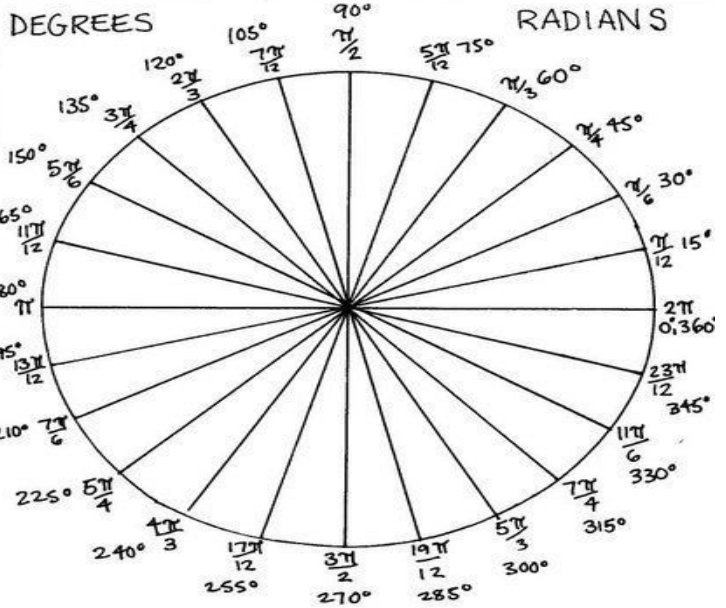


# Trigonometry

Deg.	Rad.	Sine	Cosine	Tangent
30	$\pi/6$	0.5	$\sqrt{3}/2$	$1/\sqrt{3}$
45	$\pi/4$	$1/\sqrt{2}$	$1/\sqrt{2}$	1
60	$\pi/3$	$\sqrt{3}/2$	0.5	$\sqrt{3}$
90	$\pi/2$	1	0	UND.
120	$2\pi/3$	$\sqrt{3}/2$	-0.5	$-\sqrt{3}$
135	$3\pi/4$	$1/\sqrt{2}$	$-1/\sqrt{2}$	-1
150	$5\pi/6$	0.5	$-\sqrt{3}/2$	$-1/\sqrt{3}$
180	$\pi$	0	-1	0
210	$7\pi/6$	-0.5	$-\sqrt{3}/2$	$1/\sqrt{3}$
225	$5\pi/4$	$-1/\sqrt{2}$	$-1/\sqrt{2}$	1
240	$4\pi/3$	$-\sqrt{3}/2$	-0.5	$\sqrt{3}$
270	$3\pi/2$	-1	0	UND.
300	$5\pi/3$	$-\sqrt{3}/2$	0.5	$-\sqrt{3}$
315	$7\pi/4$	$-1/\sqrt{2}$	$1/\sqrt{2}$	-1
330	$11\pi/6$	-0.5	$\sqrt{3}/2$	$-1/\sqrt{3}$
0, 360	$2\pi$	0	1	0



SOH CAH TOA  
Y/R X/R Y/X

Degrees - Radians  $n^\circ = n^\circ \left( \frac{\pi}{180} \text{ rad} \right)$ ;

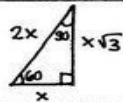
Radians - Degrees  $n \text{ rad} = n \text{ rad} \left( \frac{180}{\pi} \right)$

Def. of Radian

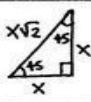
$s = r\theta$   
s - Arc Length

All Smart Trig Classes  
Sin ⊕ All ⊕  
Tan ⊕ Cos ⊕

30-60-90  
 $\pi/6 - \pi/3 - \pi/2$



45-45-90  
 $\pi/4 - \pi/4 - \pi/2$



DERIVATIVES OF BASIC TRIG FUNCTIONS IF x is in radians

$\frac{d}{dx} \sin x = \cos x$   $\frac{d}{dx} \cos x = -\sin x$   $\frac{d}{dx} \sec x = \sec x \tan x$   
 $\frac{d}{dx} \tan x = \sec^2 x$   $\frac{d}{dx} \cot x = -\csc^2 x$   $\frac{d}{dx} \csc x = -\csc x \cot x$   
 $\frac{d}{dx} \sin u = \cos u \cdot u'$   $\frac{d}{dx} \tan u = \sec^2 u \cdot u'$   $\frac{d}{dx} \sec u = \sec u \tan u \cdot u'$   
 $\frac{d}{dx} \cos u = -\sin u \cdot u'$   $\frac{d}{dx} \cot u = -\csc^2 u \cdot u'$   $\frac{d}{dx} \csc u = -\csc u \cot u \cdot u'$

## TRIG IDENTITIES

$\sin^2 x + \cos^2 x = 1$   
 $\tan^2 x + 1 = \sec^2 x$   
 $1 + \cot^2 x = \csc^2 x$

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

$\sin\left(\frac{x}{2}\right) = \pm \sqrt{\frac{1 - \cos x}{2}}$

$\cos\left(\frac{x}{2}\right) = \pm \sqrt{\frac{1 + \cos x}{2}}$

$\tan\left(\frac{x}{2}\right) = \pm \sqrt{\frac{1 - \cos x}{1 + \cos x}}$

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

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

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

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

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

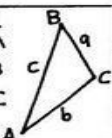
$\cos(x-y) = \cos x \cos y + \sin x \sin y$

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

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

## THE LAW OF COSINES

$a^2 = b^2 + c^2 - 2bc \cos A$   
 $b^2 = a^2 + c^2 - 2ac \cos B$   
 $c^2 = a^2 + b^2 - 2ab \cos C$



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

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

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

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

## THE LAW OF SINES

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