Trigonometric Formulas Super Summary Sheet

Date:

Trig. Ratios of Special Angles

	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	0 2π	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$
sin	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	**0**	**1**	**0**	**-1**
cos	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	**1**	**0**	**-1**	**0**
tan	$\frac{\sqrt{3}}{3}$	**1**	$\sqrt{3}$	**0**	**NA**	**0**	**NA**
	30°	**45°**	**60°**	**0°/360°**	**90°**	**180°**	**270°**

Limits of Trig

$$\lim_{x\to 0}\frac{\sin x}{x}=1$$

$$\lim_{x\to 0}\frac{\sin mx}{nx}=\lim_{x\to 0}\frac{\sin mx}{\sin nx}=\frac{m}{n}$$

$$\lim_{x\to 0}\frac{\cos x-1}{x}=0$$

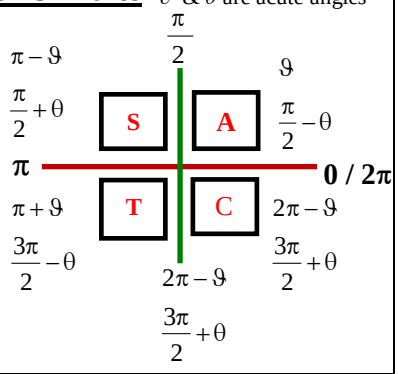
$$\lim_{x\to 0}\sin x=0$$

$$\lim_{x\to 0}\cos x=1$$

$$\lim_{x\to 0}\tan x=0$$

CAST rules

∂ & θ are acute angles



Derivative Rules of Trig

$$\frac{d(\sin x)}{dx}=\cos x \qquad \frac{d(\csc x)}{dx}=-\csc x\cot x$$

$$\frac{d(\cos x)}{dx}=-\sin x \qquad \frac{d(\sec x)}{dx}=\sec x\tan x$$

$$\frac{d(\tan x)}{dx}=\sec^2 x \qquad \frac{d(\cot x)}{dx}=-\csc^2 x$$

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

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

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

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

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

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

Related Acute formulas

	sin		cos		tan	
$\pi-x$	+	sin x	-	cos x	-	tan x
$\pi+x$	-		-		+	
$2\pi-x$	-		+		-	
$0-x$	-		+		-	

Corelated Acute formulas

	sin		cos		tan	
$\frac{\pi}{2}-x$	+	cos x	+	sin x	+	cot x
$\frac{\pi}{2}+x$	+		-		-	
$\frac{3\pi}{2}-x$	-		-		+	
$\frac{3\pi}{2}+x$	-		+		-	

Addition & Subtraction Formulas

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

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

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

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

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

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

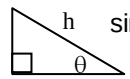
Double Angle formulas

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

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

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

Trigonometric Ratios (Soh Cah Toa)



$$\sin\theta=\frac{opp}{hyp} \qquad \cos\theta=\frac{adj}{hyp} \qquad \tan\theta=\frac{opp}{adj}$$

Half Angle Formulas (Optional)

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

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

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

Product Angle Formulas (Optional)

$$\sin a\sin b=\frac{\cos(a-b)-\cos(a+b)}{2}$$

$$\cos a\cos b=\frac{\cos(a+b)+\cos(a-b)}{2}$$

$$\tan a\tan b=\frac{\cos(a-b)-\cos(a+b)}{\cos(a+b)+\cos(a-b)}$$

Sine Law

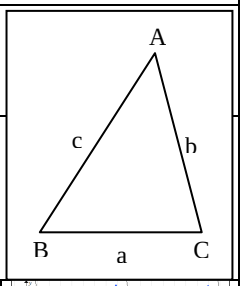
$$\frac{\sin A}{a}=\frac{\sin B}{b}=\frac{\sin C}{c}$$

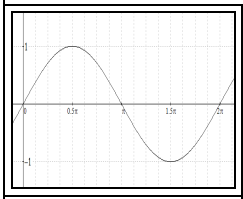
Cosine Law

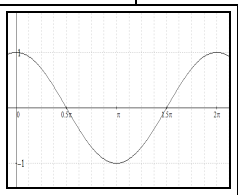
$$a^2=b^2+c^2-2bc\cos A$$

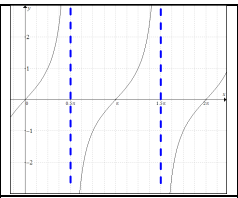
$$b^2=a^2+c^2-2ac\cos B$$

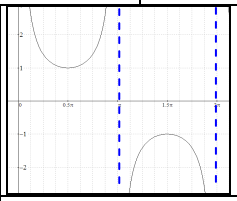
$$c^2=a^2+b^2-2ab\cos C$$

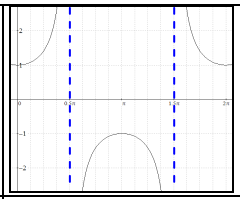


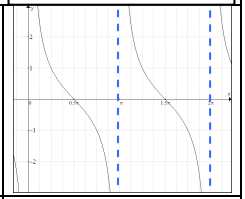












y = sin x
D: $x\in R$
R : $-1\le y\le 1$
Period = 2π

y = cos x
D: $x\in R$
R : $-1\le y\le 1$
Period = 2π

y = tan x
D: $x\neq\frac{(2n+1)\pi}{2}$
R: $y\in R$
Period = π
VA: $x=\frac{(2n+1)\pi}{2}$
$n\in I$

y = csc x
D : $x\neq n\pi$
R : $y\le -1$ or $y\ge 1$
Period = 2π
VA : $x=n\pi$
$n\in I$

y = sec x
D : $x\neq\frac{(2n+1)\pi}{2}$
R : $y\le -1$ or $y\ge 1$
Period = 2π
VA: $x=\frac{(2n+1)\pi}{2}$
$n\in I$

y = cot x
D : $x\neq n\pi$
R : $y\in R$
Period = π
VA : $x=n\pi$
$n\in I$