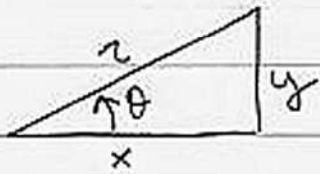


TRIGONOMETRY



$$\cos \theta = \frac{x}{r}$$

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

$$\sin \theta = \frac{y}{r}$$

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

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

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

$$x^2 + y^2 = r^2 \text{ (Pythagore)}$$

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

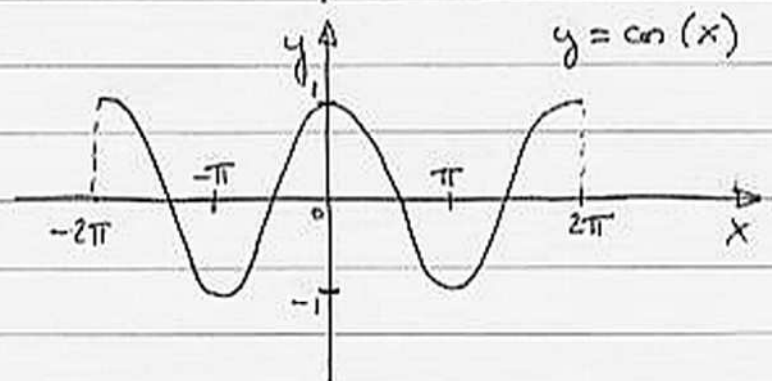
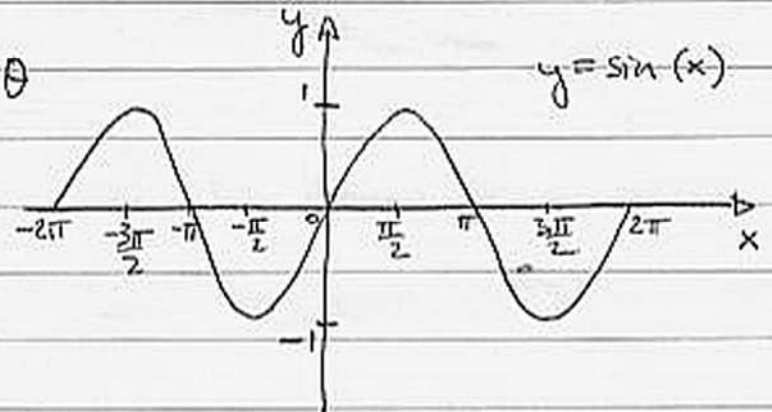
$$-1 \leq \sin \theta \leq 1$$

$$-1 \leq \cos \theta \leq 1$$

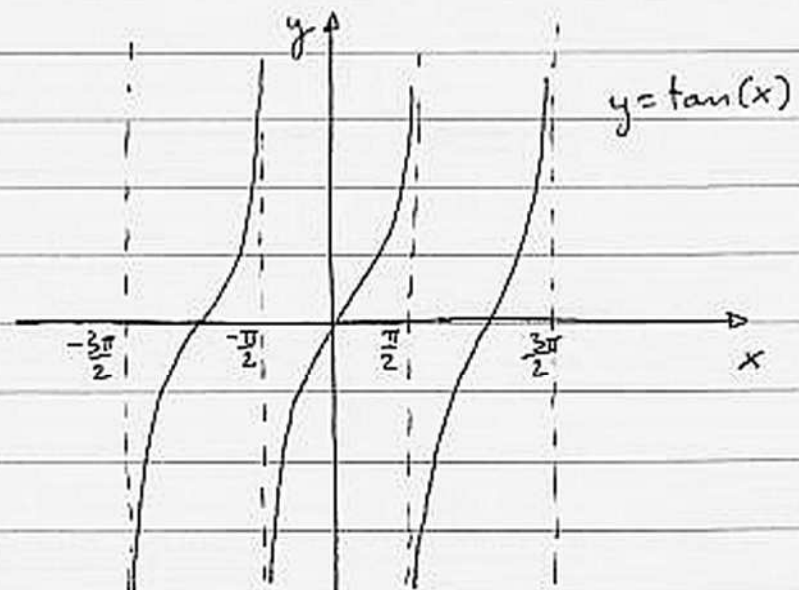
$$1 + \tan^2 \theta = \frac{1}{\cos^2 \theta} = \sec^2 \theta$$

$$\cot^2 \theta + 1 = \frac{1}{\sin^2 \theta} = \csc^2 \theta$$

rad	deg
0	0
$\frac{\pi}{6}$	30
$\frac{\pi}{4}$	45
$\frac{\pi}{3}$	60
$\frac{\pi}{2}$	90
π	180
2π	360



θ	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\sin \theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan \theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞



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

$$\cos(x \pm y) = \cos x \cos y \mp \sin x \sin y$$

$$\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}$$

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

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

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

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

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

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

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

$$\cos x \cos y = \frac{1}{2} (\cos(x+y) + \cos(x-y))$$

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

$$\sin(\theta + 2\pi) = \sin \theta$$

$$\cos(\theta + 2\pi) = \cos \theta$$

$$\sin(\theta + \pi) = -\sin \theta$$

$$\cos(\theta + \pi) = -\cos \theta$$

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

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

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

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

$$\sin(\pi - \theta) = \sin \theta$$

$$\cos(\pi - \theta) = -\cos \theta$$

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

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

