

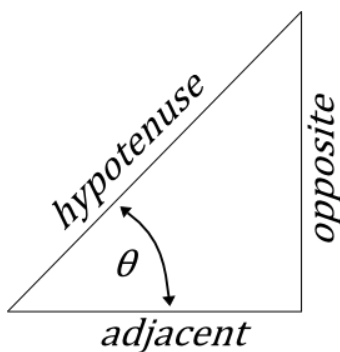
TRIGONOMETRY DEFINITION

RIGHT TRIANGLE DEFINITION

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}} \quad \csc \theta = \frac{\text{hypotenuse}}{\text{opposite}}$$

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}} \quad \sec \theta = \frac{\text{hypotenuse}}{\text{adjacent}}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}} \quad \cot \theta = \frac{\text{adjacent}}{\text{opposite}}$$



TRIG FUNCTIONS RANGE

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

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

$$-\infty \leq \tan \theta \leq \infty$$

$$\csc \theta \geq 1 \text{ and } \csc \theta \leq -1$$

$$\sec \theta \geq 1 \text{ and } \sec \theta \leq -1$$

$$-\infty \leq \cot \theta \leq \infty$$

UNIT CIRCLE DEFINITION

$$\sin \theta = y$$

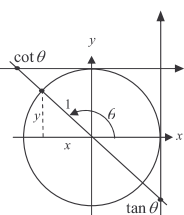
$$\cos \theta = x$$

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

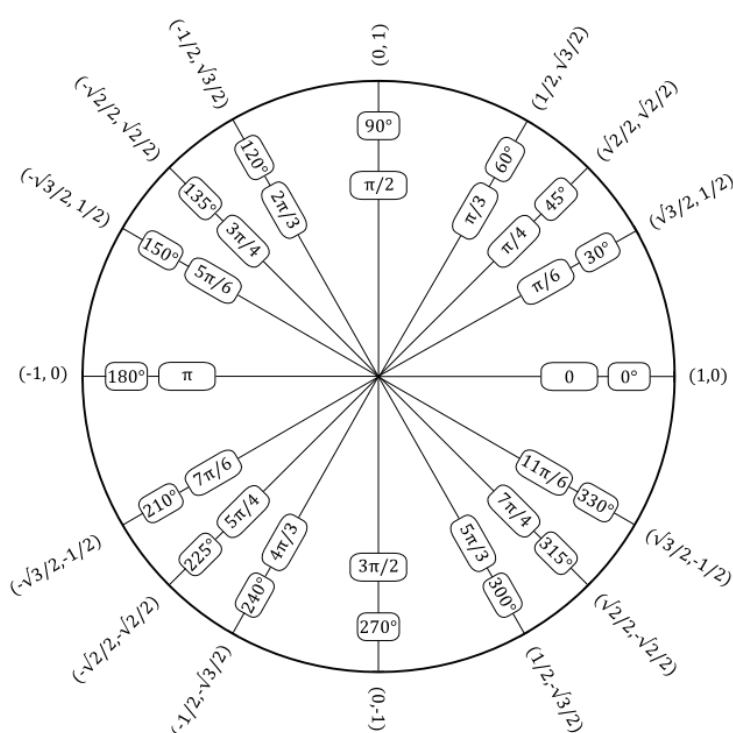
$$\csc \theta = \frac{1}{y}$$

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

$$\cot \theta = \frac{x}{y}$$



$\sin \theta: +$ $\cos \theta: -$ $\tan \theta: -$	$\sin \theta: +$ $\cos \theta: +$ $\tan \theta: +$
$\sin \theta: -$ $\cos \theta: -$ $\tan \theta: +$	$\sin \theta: -$ $\cos \theta: +$ $\tan \theta: -$



TRIG FUNCTIONS DOMAIN

$\sin \theta$, θ can be any angle

$\cos \theta$, θ can be any angle

$$\tan \theta, \theta \neq \left(n + \frac{1}{2}\right) \pi, \quad n = 0, \pm 1, \pm 2, \dots$$

$$\csc \theta, \theta \neq n\pi, \quad n = 0, \pm 1, \pm 2, \dots$$

$$\sec \theta, \theta \neq \left(n + \frac{1}{2}\right) \pi, \quad n = 0, \pm 1, \pm 2, \dots$$

$$\cot \theta, \theta \neq n\pi, \quad n = 0, \pm 1, \pm 2, \dots$$

TRIG FUNCTIONS PERIOD

$$\sin(\omega\theta) \rightarrow T = \frac{2\pi}{\omega}$$

$$\cos(\omega\theta) \rightarrow T = \frac{2\pi}{\omega}$$

$$\tan(\omega\theta) \rightarrow T = \frac{\pi}{\omega}$$

$$\csc(\omega\theta) \rightarrow T = \frac{2\pi}{\omega}$$

$$\sec(\omega\theta) \rightarrow T = \frac{2\pi}{\omega}$$

$$\cot(\omega\theta) \rightarrow T = \frac{\pi}{\omega}$$

INVERSE TRIG FUNCTION NOTATION

$$\sin^{-1} x \equiv \arcsin x \equiv \text{Asin } x$$

$$\cos^{-1} x \equiv \arccos x \equiv \text{Acos } x$$

$$\tan^{-1} x \equiv \arctan x \equiv \text{Atan } x$$

INVERSE TRIG DOMAIN

$$\sin^{-1} x : -1 \leq x \leq 1$$

$$\cos^{-1} x : -1 \leq x \leq 1$$

$$\tan^{-1} x : -\infty \leq x \leq \infty$$

COFUNCTION IDENTITIES

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

$$\tan\left(\frac{\pi}{2} - \theta\right) = \cot \theta$$

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

LAW OF COSINES

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

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

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

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LAW OF SINES

$$\frac{\sin \alpha}{a} = \frac{\sin \beta}{b} = \frac{\sin \gamma}{c}$$



مثلاث در یک نگاه
تهیه و تدوین: مهندس خسرو تاش

INVERSE TRIG FUNCTION RANGE

$$-\frac{\pi}{2} \leq \sin^{-1} x \leq \frac{\pi}{2} \quad 0 \leq \cos^{-1} x \leq \pi$$

$$-\frac{\pi}{2} \leq \tan^{-1} x \leq \frac{\pi}{2} \quad 0 \leq \cot^{-1} x \leq \pi$$