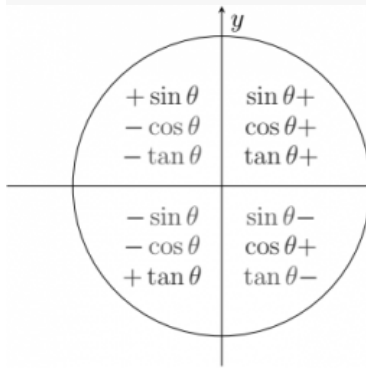


Sign in quadrants



Unit circle trig functions

$$\begin{aligned} \sin \theta &= y/r & \csc \theta &= r/y \\ \cos \theta &= x/r & \sec \theta &= r/x \\ \tan \theta &= y/x & \cot \theta &= x/y \end{aligned}$$

Degrees

- Acute: Less than 90
- Right: 90
- Obtuse: More than 90, less than 180
- Straight: 180

Fundamental identities

Reciprocal Identities

$$\sin \theta = 1/\csc \theta \quad \csc \theta = 1/\sin \theta$$

$$\cos \theta = 1/\sec \theta \quad \sec \theta = 1/\cos \theta$$

$$\tan \theta = 1/\cot \theta \quad \cot \theta = 1/\tan \theta$$

Pythagorean Identities

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

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

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

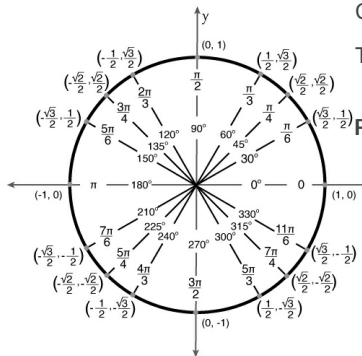
Quotient Identities

$$\tan \theta = \sin \theta / \cos \theta$$

$$\cot \theta = \cos \theta / \sin \theta$$

Unit circle

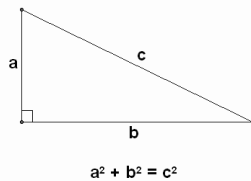
Unit Circle



SohCahToa Trig Functions

$$\begin{aligned} \sin \theta &= \text{opp}/\text{hyp} & \csc \theta &= \text{hyp}/\text{opp} \\ \cos \theta &= \text{adj}/\text{hyp} & \sec \theta &= \text{hyp}/\text{adj} \\ \tan \theta &= \text{adj}/\text{opp} & \cot \theta &= \text{opp}/\text{adj} \end{aligned}$$

Pythagorean Theory



Odd and Even Functions

Odd	Even
$\sin(-t) = -\sin t$	$\cos(-t) = \cos t$
$\csc(-t) = -\csc t$	$\sec(-t) = \sec t$
$\tan(-t) = -\tan t$	
$\cot(-t) = -\cot t$	

Formulas

- Arc length: $S = r\theta$
- Area of a sector: $A = 1/2 r^2 \theta$
- Linear speed: $V = s/t = r\theta/t = rw$
- Angular speed: $w = \theta/t$
- R: $r = \sqrt{x^2 + y^2}$

Unit circle θ

θ		$\sin \theta$	$\cos \theta$	$\tan \theta$	$\csc \theta$	$\sec \theta$	$\cot \theta$
Rad	Deg						
0	0	0	1	0	Undef	1	Undef
$\pi/6$	30	1/2	$\sqrt{3}/2$	$\sqrt{3}/3$	2	$2\sqrt{3}/3$	$\sqrt{3}$
$\pi/4$	45	$\sqrt{2}/2$	$\sqrt{2}/2$	1	$\sqrt{2}$	$\sqrt{2}$	1
$\pi/3$	60	$\sqrt{3}/2$	1/2	$\sqrt{3}$	$2\sqrt{3}/3$	2	$\sqrt{3}/3$
$\pi/2$	90	1	0	Undef	1	Undef	0
$2\pi/3$	120	$\sqrt{3}/2$	-1/2	$-\sqrt{3}$	$2\sqrt{3}/3$	-2	$-\sqrt{3}/3$
$3\pi/4$	135	$\sqrt{2}/2$	$-\sqrt{2}/2$	-1	$\sqrt{2}$	$-\sqrt{2}$	-1
$5\pi/6$	150	1/2	$-\sqrt{3}/2$	$-\sqrt{3}/3$	2	$-2\sqrt{3}/3$	$-\sqrt{3}$
π	180	0	-1	0	Undef	-1	Undef
$7\pi/6$	210	-1/2	$-\sqrt{3}/2$	$\sqrt{3}/3$	-2	$-2\sqrt{3}/3$	$\sqrt{3}$
$5\pi/4$	225	$-\sqrt{2}/2$	$-\sqrt{2}/2$	1	$-\sqrt{2}$	$-\sqrt{2}$	1
$4\pi/3$	240	$-\sqrt{3}/2$	-1/2	$-\sqrt{3}$	$-2\sqrt{3}/3$	-2	$\sqrt{3}/3$
$3\pi/2$	270	-1	0	Undef	-1	Undef	0
$5\pi/3$	300	$-\sqrt{3}/2$	1/2	$-\sqrt{3}/3$	-2	$-2\sqrt{3}/3$	$-\sqrt{3}$
$7\pi/4$	315	$-\sqrt{2}/2$	$\sqrt{2}/2$	-1	$-\sqrt{2}$	$\sqrt{2}$	-1
$11\pi/6$	330	-1/2	$\sqrt{3}/2$	$-\sqrt{3}/3$	-2	$2\sqrt{3}/3$	$-\sqrt{3}$