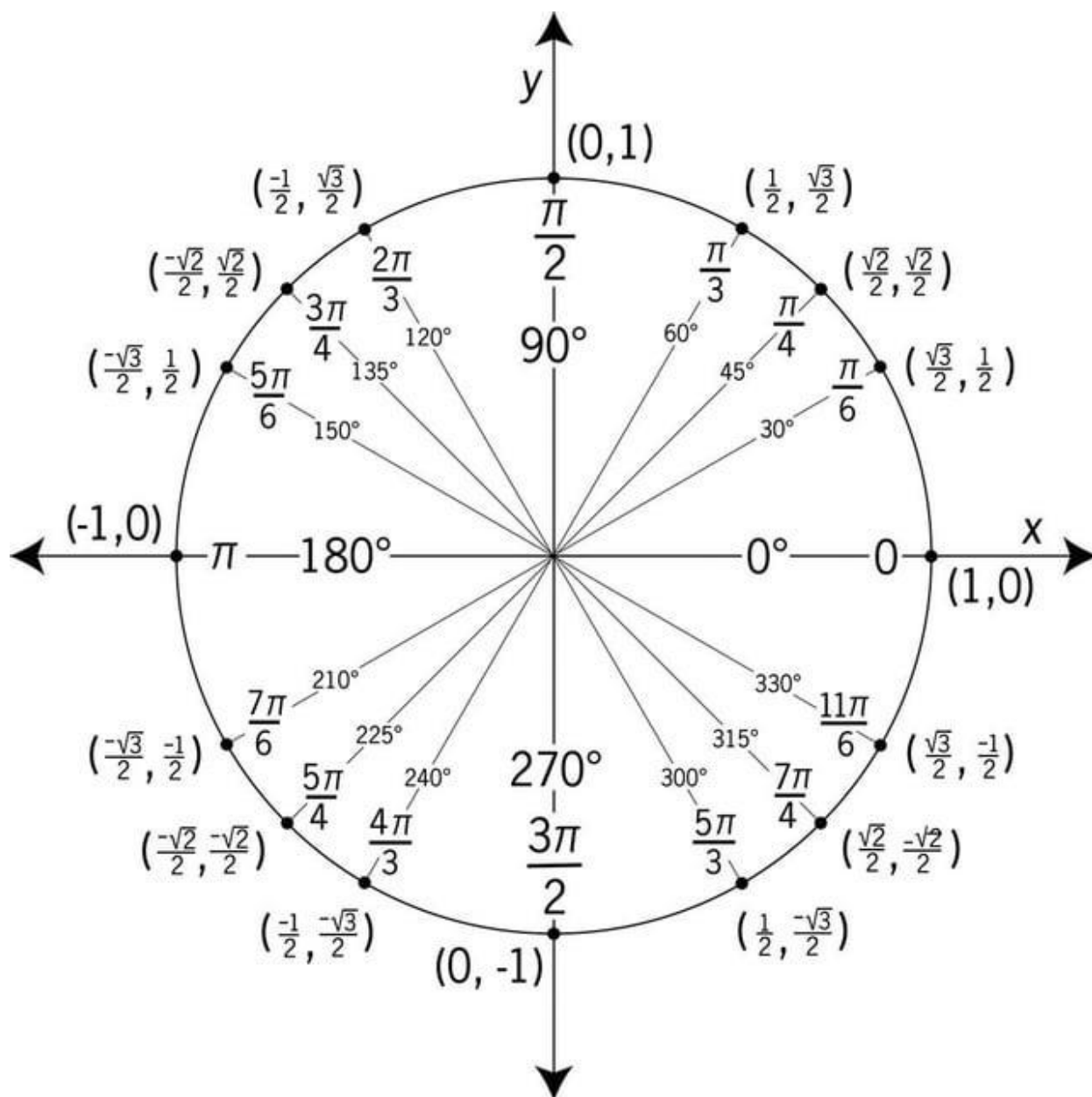


Trigonometry Review

Unit Circle:



Unit Circle Reference Table

Angle (Degrees)	Angle (Radians)	Coordinates (x, y)
0°	0	(1,0)
30°	$\pi/6$	$(\sqrt{3}/2, 1/2)$
45°	$\pi/4$	$(\sqrt{2}/2, \sqrt{2}/2)$
60°	$\pi/3$	$(1/2, \sqrt{3}/2)$
90°	$\pi/2$	(0,1)
120°	$2\pi/3$	$(-1/2, \sqrt{3}/2)$
135°	$3\pi/4$	$(-\sqrt{2}/2, \sqrt{2}/2)$
150°	$5\pi/6$	$(-\sqrt{3}/2, 1/2)$
180°	π	(-1,0)
210°	$7\pi/6$	$(-\sqrt{3}/2, -1/2)$
225°	$5\pi/4$	$(-\sqrt{2}/2, -\sqrt{2}/2)$
240°	$4\pi/3$	$(-1/2, -\sqrt{3}/2)$
270°	$3\pi/2$	(0, -1)
300°	$5\pi/3$	$(1/2, -\sqrt{3}/2)$
315°	$7\pi/4$	$(\sqrt{2}/2, -\sqrt{2}/2)$
330°	$11\pi/6$	$(\sqrt{3}/2, -1/2)$
360°	2π	(1,0)

Trigonometric Identities:

- Reciprocal

$$\sin u = \frac{1}{\csc u} \quad \cos u = \frac{1}{\sec u}$$

$$\tan u = \frac{1}{\cot u} \quad \cot u = \frac{1}{\tan u}$$

$$\csc u = \frac{1}{\sin u} \quad \sec u = \frac{1}{\cos u}$$

- Quotient

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

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

- Pythagorean

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

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

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

- Even & Odd

$$\sin(-u) = -\sin u$$

$$\tan(-u) = -\tan u$$

$$\csc(-u) = -\csc u$$

$$\cos(-u) = \cos u$$

$$\cot(-u) = -\cot u$$

$$\sec(-u) = \sec u$$

- Sum & Difference

$$\sin(u \pm v) = \sin u \cos v \pm \cos u \sin v$$

$$\cos(u \pm v) = \cos u \cos v \mp \sin u \sin v$$

$$\tan(u \pm v) = \frac{\tan u \pm \tan v}{1 \mp \tan u \tan v}$$

- Half Angle

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

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

$$\tan^2 u = \frac{1 - \cos(2u)}{1 + \cos(2u)}$$

$$\cos u \sin v = \frac{1}{2} [\sin(u + v) - \sin(u - v)]$$

- Product-to-Sum

$$\sin u \sin v = \frac{1}{2} [\cos(u - v) - \cos(u + v)]$$

$$\cos u \cos v = \frac{1}{2} [\cos(u - v) + \cos(u + v)]$$

$$\sin u \cos v = \frac{1}{2} [\sin(u + v) + \sin(u - v)]$$

- Double Angle

$$\sin(2u) = 2 \sin u \cos u$$

$$\cos(2u) = \cos^2 u - \sin^2 u$$

$$= 2 \cos^2 u - 1$$

$$= 1 - 2 \sin^2 u$$

$$\tan(2u) = \frac{2 \tan u}{1 - \tan^2 u}$$

- Sum-to-Product

$$\sin u + \sin v = 2 \sin\left(\frac{u + v}{2}\right) \cos\left(\frac{u - v}{2}\right)$$

$$\sin u - \sin v = 2 \cos\left(\frac{u + v}{2}\right) \sin\left(\frac{u - v}{2}\right)$$

$$\cos u + \cos v = 2 \cos\left(\frac{u + v}{2}\right) \cos\left(\frac{u - v}{2}\right)$$

$$\cos u - \cos v = -2 \sin\left(\frac{u + v}{2}\right) \sin\left(\frac{u - v}{2}\right)$$

Inverse Trigonometric Functions Table

Function	Domain	Range
$\sin^{-1}\theta = \arcsin\theta$	$[-1,1]$	$\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
$\cos^{-1}\theta = \arccos\theta$	$[-1,1]$	$[0, \pi]$
$\tan^{-1}\theta = \arctan\theta$	$(-\infty, \infty)$	$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
$\cot^{-1}\theta = \operatorname{arccot}\theta$	$(-\infty, \infty)$	$\left[-\frac{\pi}{2}, 0\right) \cup \left(0, \frac{\pi}{2}\right]$
$\sec^{-1}\theta = \operatorname{arcsec}\theta$	$(-\infty, -1] \cup [1, \infty)$	$\left[0, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \pi\right]$
$\csc^{-1}\theta = \operatorname{arccsc}\theta$	$(-\infty, -1] \cup [1, \infty)$	$\left[-\frac{\pi}{2}, 0\right) \cup \left(0, \frac{\pi}{2}\right]$

For more information on trigonometry, make an appointment with a [content tutor](#).
 Appointments are available in person at the [Student Success Center](#) or online.