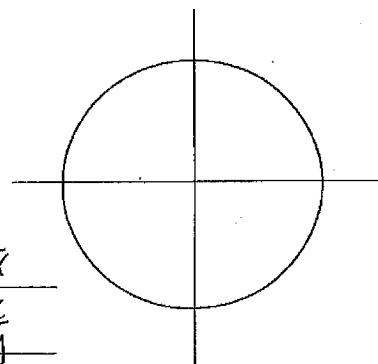


1.14 Trig with the Unit Circle & Reference Angles

To find values of trig functions anywhere on the unit circle:

- Determine the quadrant of the given angle and reference angle.
- Give the coordinates. Check signs!
- Evaluate the trig function.



Remember: if the coordinates of any point on the unit circle are (x, y) , then

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

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

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

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

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

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

Find the value of each using the steps outlined above.

1) $\cos 120^\circ = -\frac{1}{2}$

a) quadrant: 2

b) reference angle: 60°

c) coordinates: $(-\frac{1}{2}, \frac{\sqrt{3}}{2})$

3) $\sin 315^\circ = -\frac{\sqrt{2}}{2}$

a) quadrant: 4

b) reference angle: 45°

c) coordinates: $(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

5) $\cos 210^\circ = -\frac{\sqrt{3}}{2}$

a) quadrant: 3

b) reference angle: 30°

c) coordinates: $(-\frac{\sqrt{3}}{2}, -\frac{1}{2})$

2) $\tan \frac{4\pi}{3} = \sqrt{3}$

a) quadrant: 3

b) reference angle: $\frac{\pi}{3}$

c) coordinates: $(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$

4) $\tan \frac{5\pi}{4} = 1$

a) quadrant: 3

b) reference angle: $\frac{\pi}{4}$

c) coordinates: $(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

6) $\tan \frac{5\pi}{6} = -\frac{\sqrt{3}}{3}$

a) quadrant: 2

b) reference angle: $\frac{\pi}{6}$

c) coordinates: $(-\frac{\sqrt{3}}{2}, \frac{1}{2})$

1.14 Complete the information for each angle provided:

Angle	Quadrant	Reference Angle	Check Signs	Coordinates	Trigonometric Ratio
300°	4	60°	(+, -)	$(\frac{1}{2}, -\frac{\sqrt{3}}{2})$	$\sin 300^\circ = -\frac{\sqrt{3}}{2}$
$\frac{7\pi}{6}$	3	$\frac{\pi}{6}$	(-, -)	$(-\frac{\sqrt{3}}{2}, -\frac{1}{2})$	$\csc \frac{7\pi}{6} = -2$
240°	3	60°	(-, -)	$(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$	$\tan 240^\circ = \sqrt{3}$
$\frac{\pi}{6}$	1	$\frac{\pi}{6}$	(+, +)	$(\frac{\sqrt{3}}{2}, \frac{1}{2})$	$\sec \frac{\pi}{6} = \frac{2\sqrt{3}}{3}$
330°	4	30°	(+, -)	$(\frac{\sqrt{3}}{2}, -\frac{1}{2})$	$\cot 330^\circ = -\sqrt{3}$
$\frac{\pi}{2}$	+y axis	n/a 90°	(0, +)	(0, 1)	$\sec \frac{\pi}{2} = \text{undef}$
$\frac{11\pi}{6}$	4	$\frac{\pi}{6}$	(+, -)	$(\frac{\sqrt{3}}{2}, -\frac{1}{2})$	$\cos \frac{11\pi}{6} = \frac{\sqrt{3}}{2}$
$\frac{\pi}{3}$	1	$\frac{\pi}{3}$	(+, +)	$(\frac{1}{2}, \frac{\sqrt{3}}{2})$	$\sec \frac{\pi}{3} = 2$
135°	2	45°	(-, +)	$(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$	$\cot 135^\circ = -1$
$\frac{2\pi}{3}$	2	$\frac{\pi}{3}$	(-, +)	$(-\frac{1}{2}, \frac{\sqrt{3}}{2})$	$\sec \frac{2\pi}{3} = -2$
$\frac{3\pi}{2}$	-y axis	n/a 90°	(0, -)	(0, -1)	$\tan \frac{3\pi}{2} = \text{undef}$
$\frac{5\pi}{3}$	4	$\frac{\pi}{3}$	(+, -)	$(\frac{1}{2}, -\frac{\sqrt{3}}{2})$	$\tan \frac{5\pi}{3} = -\sqrt{3}$
$\frac{\pi}{4}$	1	$\frac{\pi}{4}$	(+, +)	$(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$	$\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2}$
π	-x axis	n/a 0	(-, 0)	(-1, 0)	$\csc \pi = \text{undef}$