

Special Angles

A convenient way to produce a chart of the trigonometric functions values for special angles is shown below.

θ°	θ	$\sin \theta$	$\cos \theta$	$\tan \theta$
0°	0	$\sqrt{0}/2$	$\sqrt{4}/2$	0
30°	$\pi/6$	$\sqrt{1}/2$	$\sqrt{3}/2$	$1/\sqrt{3}$
45°	$\pi/4$	$\sqrt{2}/2$	$\sqrt{2}/2$	1
60°	$\pi/3$	$\sqrt{3}/2$	$\sqrt{1}/2$	$\sqrt{3}$
90°	$\pi/2$	$\sqrt{4}/2$	$\sqrt{0}/2$	Und.

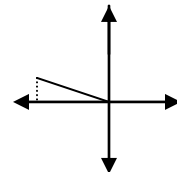
The values are obtained when the fractions are simplified. The tangent is obtained by dividing sine by cosine, and the values of the other trigonometric functions are obtained by using the reciprocal relations.

To find the trigonometric functions of non-acute angles:

- 1) Draw the angle in standard position (from the positive x -axis).
- 2) Find the reference angle (angle with the x -axis) See [Angle Spectrum](#) link (click the link) in the Practice Problems section of the course material.
- 3) Since the reference angle is acute, use the values of the trigonometric functions in the table above with the sign of the trigonometric function in that quadrant.

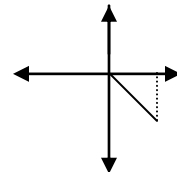
Eg.1 Evaluate $\cos(5\pi/6)$.

Since $5\pi/6$ is in quadrant II (cosine negative) with reference angle of $\pi/6$, $\cos(5\pi/6) = -\cos(\pi/6) = -\sqrt{3}/2$



Eg.2 Evaluate $\tan(-\pi/3)$.

Since $-\pi/3$ is in quadrant IV (tangent negative) with reference angle of $\pi/3$, $\tan(-\pi/3) = -\tan(\pi/3) = -\sqrt{3}$, from the table above.



Quadrantal Angles

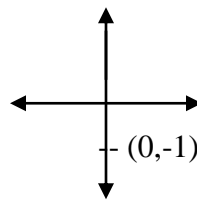
To find quadrantal angles, we do the same we did before when the angle measure was degree. We select the point on the terminal side of the angle with distance one unit from the origin. The coordinate of that point will be $(x, y) = (\cos \theta, \sin \theta)$

You can then use the points on the axis $(x, y) = \{(1, 0), (0, 1), (-1, 0), (0, -1)\}$, depending on the axis where the terminal side of the angle lies.

Eg.3 Evaluate $\sin(3\pi/2)$

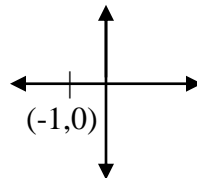
Since the terminal side is in the negative y-axis, the point will be

$(0, -1) = (\cos 3\pi/2, \sin 3\pi/2)$, so $\sin 3\pi/2 = -1$.



Eg.4 Evaluate $\cos(\pi)$

Since the terminal side is in the negative x-axis, the point on the terminal side of the angle will be $(-1, 0) = (\cos(\pi), \sin(\pi))$, so $\cos(\pi) = -1$.



Eg.5 Evaluate $\tan(3\pi/2)$

Since $\sin(3\pi/2) = -1$ and $\cos(3\pi/2) = 0$, from **Eg.3** above,

$$\tan(3\pi/2) = \frac{\sin(3\pi/2)}{\cos(3\pi/2)} = \frac{-1}{0} \text{ or undefined.}$$