Entry #: _____

Lesson 5.1 & 5.2: The Unit Circle and Trigonometric Functions

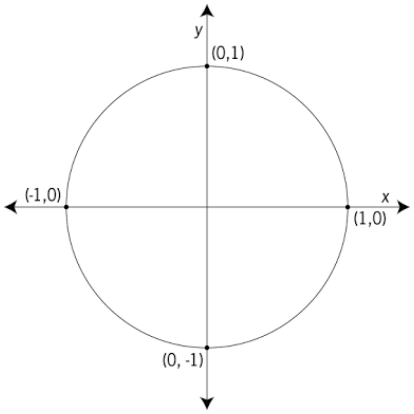
The Unit Circle

The unit circle is a circle of radius _____ centered at the _____ .

The equation of the unit circle is: _____ .

If a point is on the unit circle, it satisfies the above equation.

Example: The point $\left(\frac{\sqrt{3}}{2}\ ,\ y\right)$ is on the unit circle. Find the y-coordinate.



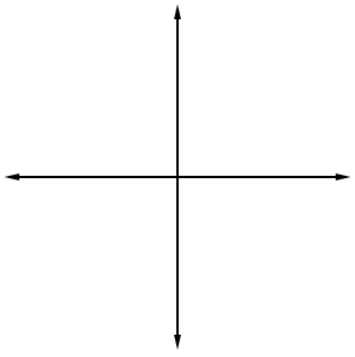
Terminal Points on the Unit Circle

Let *t* be a real number representing the distance from the point $(1\ ,0)$ to another point on the unit circle $(x\ ,y)$. When traveling clockwise, *t* is _____ and when traveling counterclockwise, *t* is _____ .

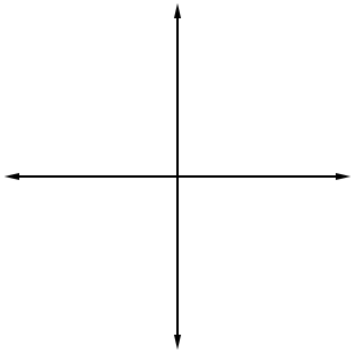
The circumference of the unit circle is:

Example: Find the terminal point on the unit circle determine by each real number t.

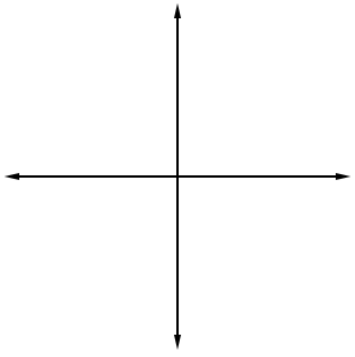
a. $t = \frac{\pi}{2}$



b. $t = -\pi$

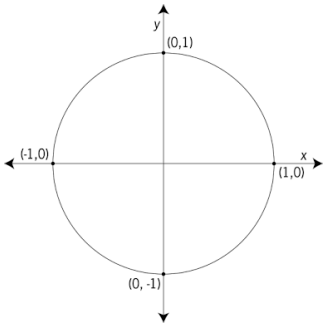


c. $t = 3\pi$



Notice that different values of *t* can get you to the same _____ .
This is because the unit circle is symmetric with respect to $y = x$.

Example: Find the terminal point when $t = \frac{\pi}{4}$. (Hint: Graph the line $y = x$ first.)

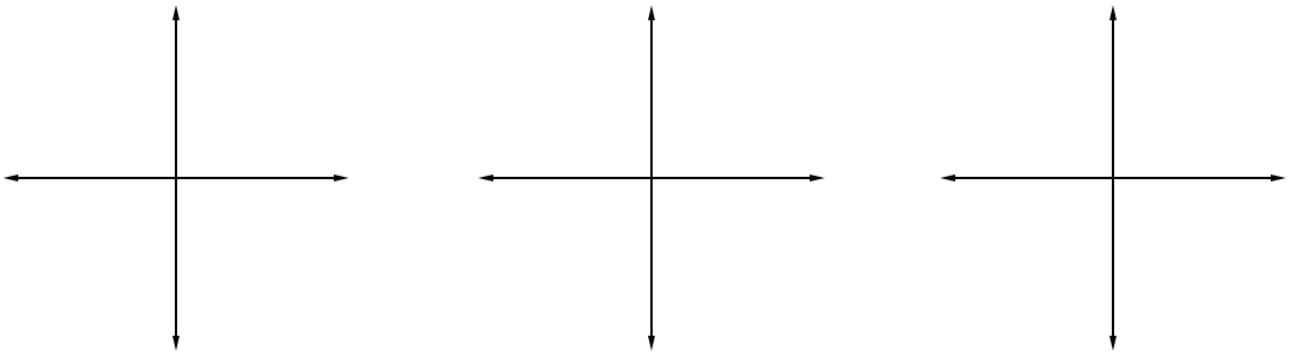


<u>The Reference Number</u>

Let *t* be a real number. The reference number $\bar{t}$ associated with *t* is the _____ distance along the unit circle between the terminal point determined by *t* and the *x*-axis.

Example: Find the reference numbers for each of the following values of *t*.

a. $t = \frac{5\pi}{6}$ b. $t = \frac{7\pi}{4}$ c. $t = 5.80$



<u>Using Reference Numbers to Find Terminal Points</u>

To find the terminal point P determined by any value of *t*, we use the following steps:

1.

2.

3.

Example: Find the terminal point determined by each given real number t.

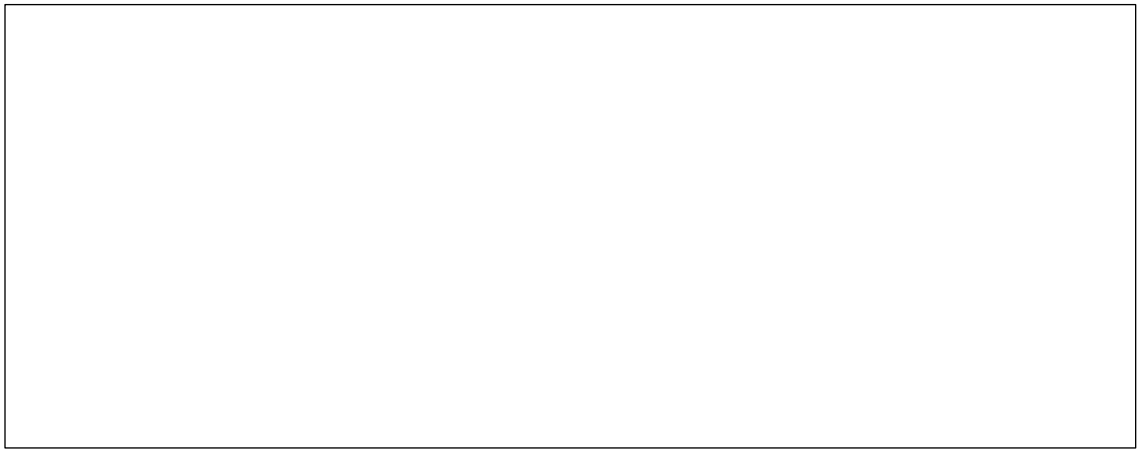
a. $t = \frac{5\pi}{6}$ b. $t = \frac{7\pi}{4}$ c. $t = -\frac{2\pi}{3}$

Example: Now find the terminal point for $t = \frac{29\pi}{6}$. Compare it to your answer for a above.

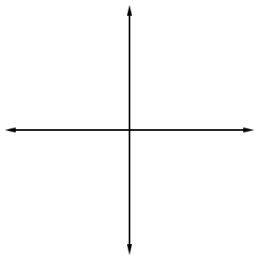
$t = \frac{5\pi}{6}$ and $t = \frac{29\pi}{6}$ are called _____ because these two rotations lead to the same _____ .

Trigonometric Functions

Trigonometric Functions represent points (x, y) on the _____ .



Quadrants and Signage: Remember: **A**ll **S**tudents **T**ake **C**alculus!



Trigonometric Properties and Identities

Reciprocals
Pythagorean Identity
Other Useful Identities