

Learning Target(s): I am able to create the unit circle from memory.

I am able to evaluate the exact answer for the trigonometric function of any angle using the unit circle.

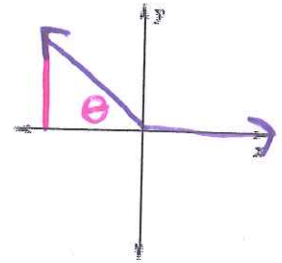
I am able to use a point on the terminal side of an angle θ and evaluate all six trigonometric functions.

I am able to use the unit circle to evaluate the six trigonometric functions of any special angle

13.3 Notes: Evaluate Trigonometric Functions of Any Angle

Reference Angle – the reference angle for θ is the acute angle θ ,

formed by the terminal side of θ and the x-axis.

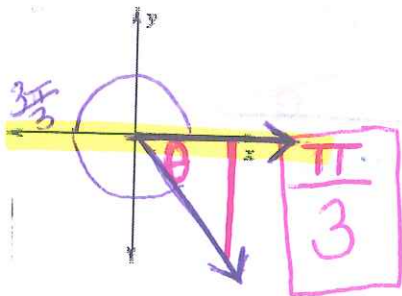


Ex. 1

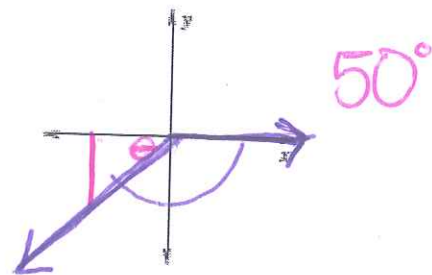
Sketch the angle, and then find the reference angle for the following.

**** Find a coterminal angle that is between 0° and 360° first!!**

a. $\frac{5\pi}{3}$



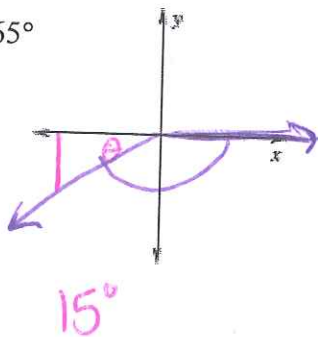
b. -130°



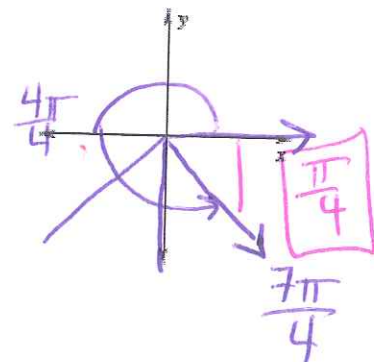
Try it!

1. Find the reference angle θ , for

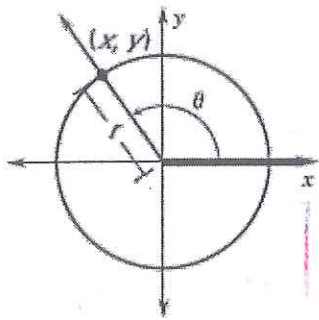
a. $\theta = -165^\circ$



b. $\theta = \frac{7\pi}{4}$



Definitions of trigonometric functions



$$\sin \theta = \frac{y}{r} \quad \csc \theta = \frac{r}{y}, y \neq 0$$

$$\cos \theta = \frac{x}{r} \quad \sec \theta = \frac{r}{x}, x \neq 0$$

$$\tan \theta = \frac{y}{x}, x \neq 0 \quad \cot \theta = \frac{x}{y}, y \neq 0$$

Ex. 2 (x, y)

Let $(-12, 5)$ be a point on the terminal side of an angle θ in standard position. Evaluate the 6 trig functions of θ

** To draw a reference triangle: Drop a \perp line to the x-axis.

$$\sin \theta = \frac{5}{13} \quad \csc \theta = \frac{13}{5}$$

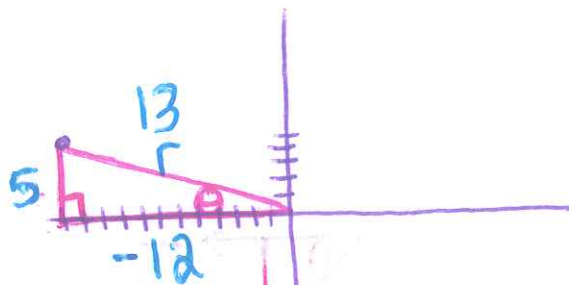
Soh

$$\cos \theta = \frac{-12}{13} \quad \sec \theta = \frac{13}{-12}$$

CaH

$$\tan \theta = \frac{5}{-12} \quad \cot \theta = \frac{-12}{5}$$

Toa



Need to find r

$$a^2 + b^2 = c^2$$

$$(5)^2 + (-12)^2 = r^2$$

$$25 + 144 = r^2$$

$$169 = r^2$$

$$13 = r$$

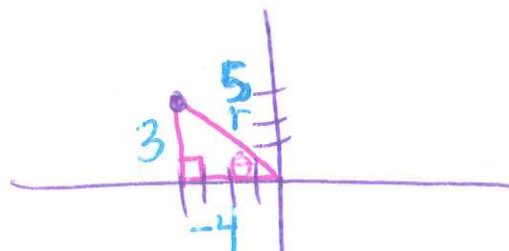
Try it!

2. Let $(-4, 3)$ be a point on the terminal side of an angle θ in standard position. Evaluate the six trigonometric functions of θ

$$\sin \theta = \frac{3}{5} \quad \csc \theta = \frac{5}{3}$$

$$\cos \theta = \frac{-4}{5} \quad \sec \theta = \frac{5}{-4}$$

$$\tan \theta = \frac{3}{-4} \quad \cot \theta = \frac{-4}{3}$$



$$(3)^2 + (-4)^2 = r^2$$

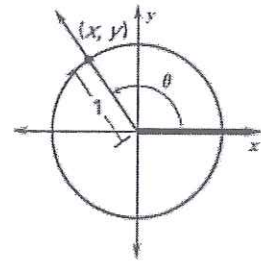
$$9 + 16 = r^2 \quad 5$$

$$25 = r^2$$

Unit Circle – Center $(0,0)$, radius = 1 , $x^2 + y^2 = 1$

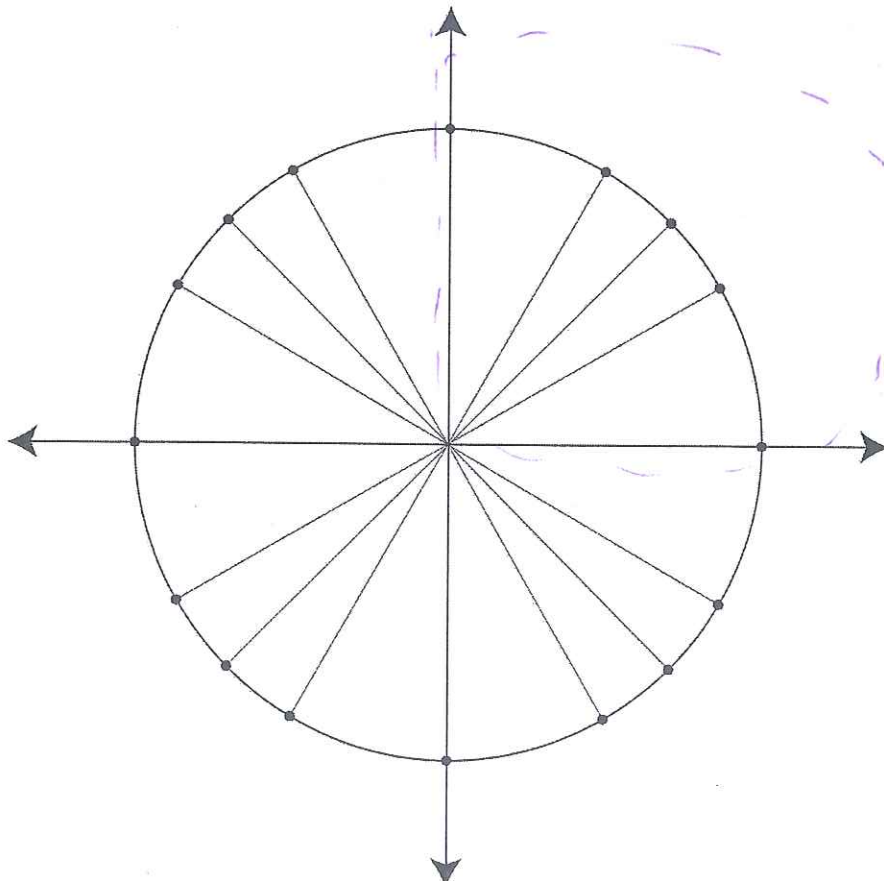
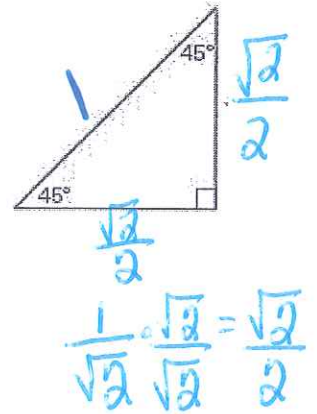
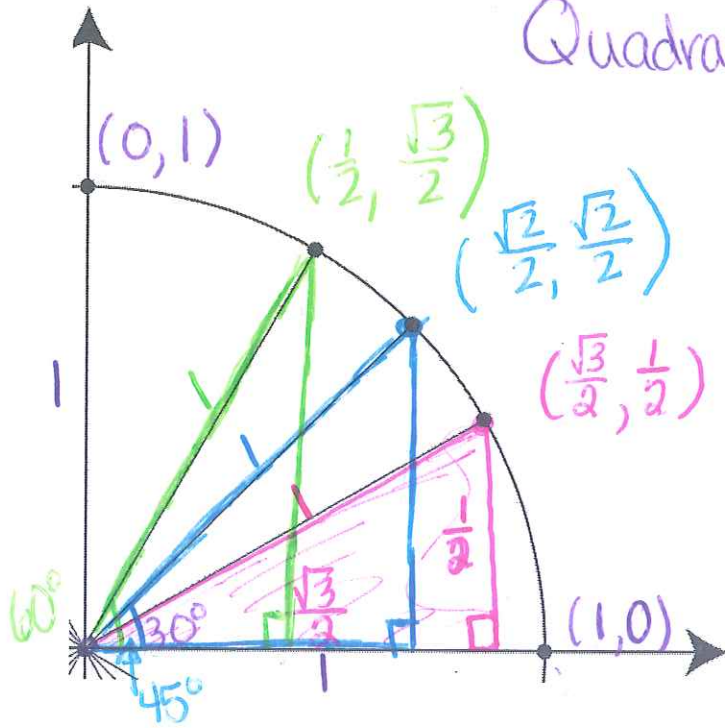
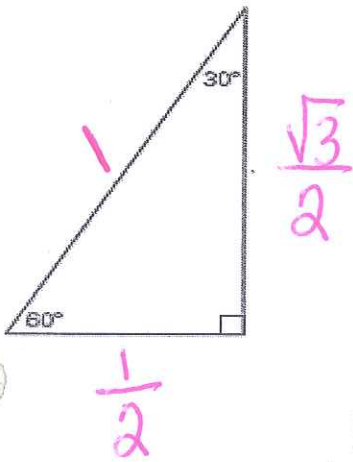
$\sin \theta = \frac{y}{r} = y$

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



Quadrantal Angle – An angle in standard position whose terminal side lies on an axis.

Quadrant I



Signs of Function Values

<p>Quadrant II</p> <p>$\sin \theta, \csc \theta: +$</p> <p>$\cos \theta, \sec \theta: -$</p> <p>$\tan \theta, \cot \theta: -$</p>	<p>Quadrant I</p> <p>$\sin \theta, \csc \theta: +$</p> <p>$\cos \theta, \sec \theta: +$</p> <p>$\tan \theta, \cot \theta: +$</p>
<p>Quadrant III</p> <p>$\sin \theta, \csc \theta: -$</p> <p>$\cos \theta, \sec \theta: -$</p> <p>$\tan \theta, \cot \theta: +$</p>	<p>Quadrant IV</p> <p>$\sin \theta, \csc \theta: -$</p> <p>$\cos \theta, \sec \theta: +$</p> <p>$\tan \theta, \cot \theta: -$</p>