

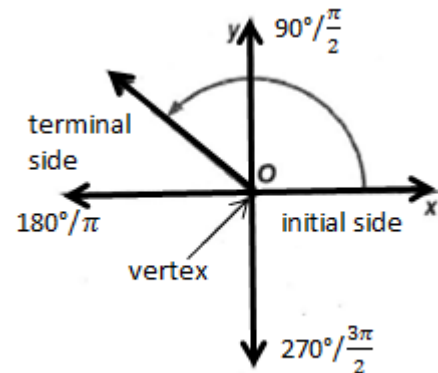
****What do we do when angles are greater than 180 degrees?***

Important Vocabulary Terms

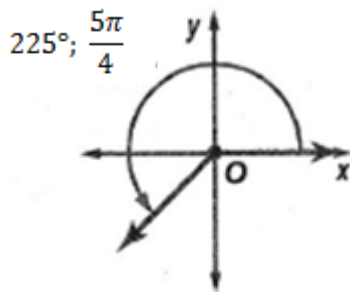
Initial side: _____

Terminal side: _____

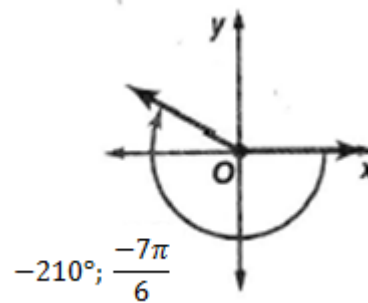
Standard Position: _____



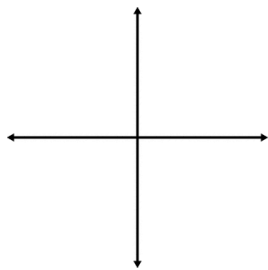
**Positive Angle Measure
counterclockwise**



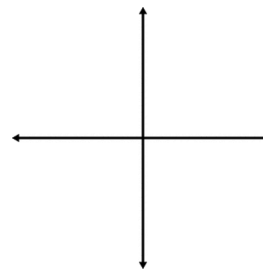
**Negative Angle Measure
clockwise**



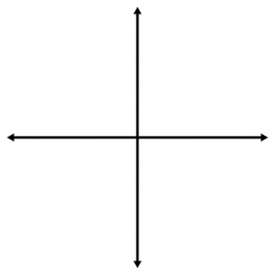
Ex.1 Draw a 150° angle in standard position.



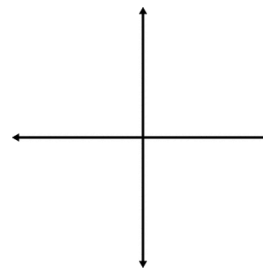
Ex. 2 Draw a $(-\frac{5\pi}{6})$ angle in standard position.



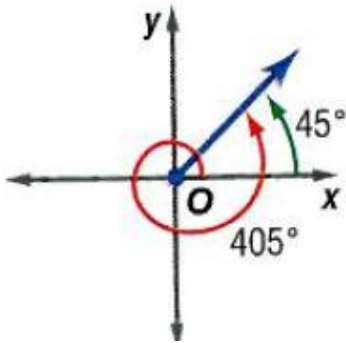
Ex. 3 Draw (-315°) in standard position.



Ex. 4 Draw $\frac{5\pi}{3}$ in standard position.



• **Coterminal Angles** – _____



Ex. Find one angle with a positive measure and one angle with a negative measure that is coterminal with a $\frac{4\pi}{3}$ angle.

Ex. Find one angle with a positive measure and one angle with a negative measure that is coterminal with a 100° angle.

****Key Concept**

To find a positive measure angle:

To find a negative measure angle:

Ex. Find one angle with a positive measure and one angle with a negative measure that is coterminal with a $\frac{7\pi}{9}$ angle.

Ex. Find one angle with a positive measure and one angle with a negative measure that is coterminal with a -90° angle.

• **Reference Angle θ'** : _____

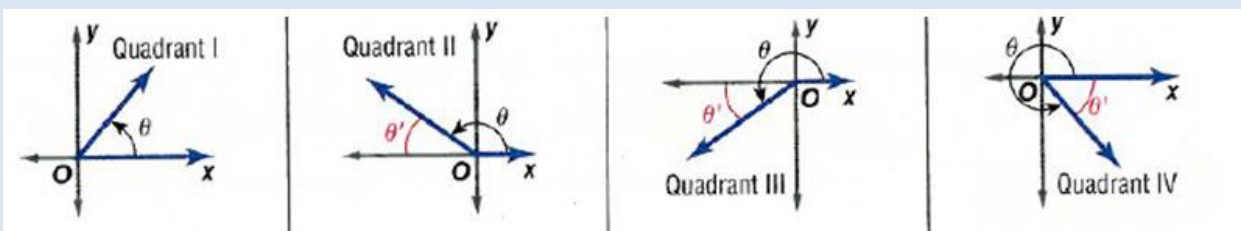
Ex 1. What is the reference angle for 240° ?

Ex 2. What is the reference angle for $-\frac{5\pi}{4}$?

Ex 3. What is the reference angle 390° ?

Ex 4. What is the reference angle for $\frac{11\pi}{3}$?

****Key Concept**



You Try. Find the reference angle.

1. 135°

2. $-\frac{11\pi}{6}$

3. $\frac{\pi}{4}$

4. $\frac{7\pi}{6}$

5. -60°

6. 690°

7. -225°

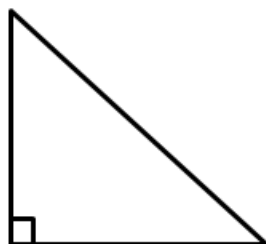
8. $-\frac{3\pi}{2}$

Prior Knowledge:

Special Right Triangles

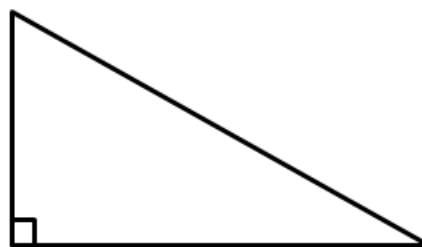
45 – 45 – 90

$\frac{\pi}{4} - \frac{\pi}{4} - \frac{\pi}{2}$



30 – 60 – 90

$\frac{\pi}{6} - \frac{\pi}{3} - \frac{\pi}{2}$



Recall:

1. $\sin 30^\circ =$ _____

2. $\cos 60^\circ =$ _____

3. $\tan \frac{\pi}{6} =$ _____

4. $\cos \frac{\pi}{4} =$ _____

5. $\tan 45^\circ =$ _____

6. $\sin \frac{\pi}{3} =$ _____

****Key Concept: How do you find the exact value and correct sign of the trig function?**

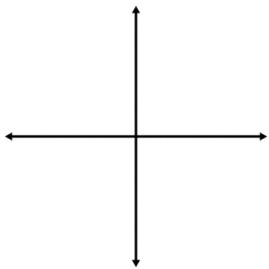
1. Find the reference angle.
2. Find the value of the Trig Function.
3. Assign the proper sign to your value from step 2.

Ex: Find: $\sin 120^\circ$

Ex: Find: $\tan \frac{-13\pi}{6}$

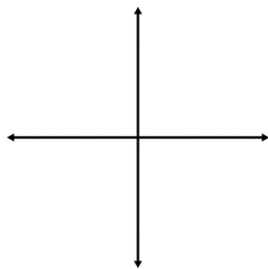
• Quadrantal Angles – _____

Draw each of the positive quadrantal angles on the coordinate planes below (use degrees and radians).



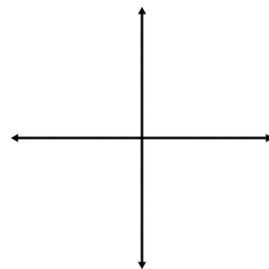
$\theta =$ _____

$x =$ _____



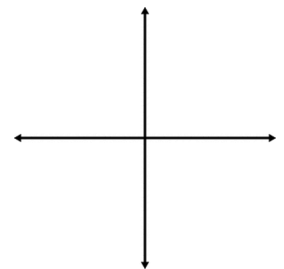
$\theta =$ _____

$x =$ _____



$\theta =$ _____

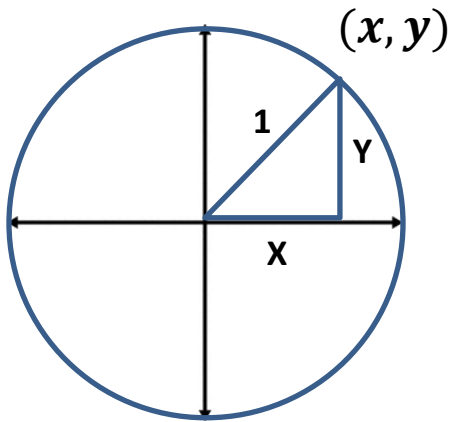
$x =$ _____



$\theta =$ _____

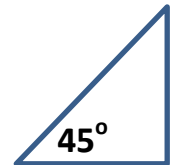
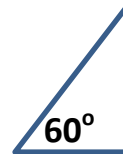
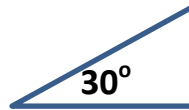
$x =$ _____

How to find the exact value of a Quadrantal

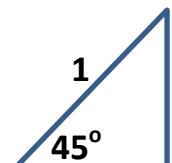
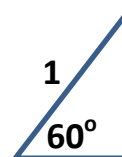
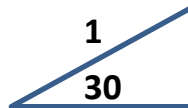


In a unit circle, the radius is one.

Reminder of our special right triangle ratios.



How would they look if you changed the hypotenuse to 1?



Look at the horizontal (x) values? Do they look familiar?

What about the vertical (y) values?

How do you find $\tan\theta$ (what is the ratio)?

How can you relate that to what you just found about x and y?

You try: Find

$$\sin\left(-\frac{\pi}{2}\right)$$

$$\sec 450^\circ$$

$$\tan(-5\pi)$$

$$\csc 720^\circ$$

You Try. Find the exact value (no calculator!!!)

1. $\cos(-300^\circ)$

2. $\tan \frac{5\pi}{4}$

3. $\sin \frac{11\pi}{4}$

4. $\tan(-210^\circ)$

5. $\sin\left(-\frac{2\pi}{3}\right)$

6. $\cos 180^\circ$

7. $\tan 120^\circ$

8. $\sin 270^\circ$

9. $\sin\left(\frac{\pi}{4}\right)$

10. $\tan 225^\circ$

11. $\sin 90^\circ$

12. $\cos\left(\frac{7\pi}{6}\right)$

13. $\cos 360^\circ$

14. $\sin\left(\frac{\pi}{3}\right)$

15. $\tan(-120^\circ)$

16. $\tan\left(\frac{3\pi}{4}\right)$

17. $\cos\left(\frac{\pi}{3}\right)$

18. $\sin 300^\circ$

Key Concept: Let's meet the other trigonometric ratios that we haven't discussed yet!

$$\csc\theta = \frac{\text{hyp}}{\text{opp}}$$

$$\sec\theta = \frac{\text{hyp}}{\text{adj}}$$

$$\cot\theta = \frac{\text{adj}}{\text{opp}}$$

Find the exact values of the following:

1. $\cot 120^\circ$

2. $\csc\left(-\frac{\pi}{4}\right)$

3. $\sec\left(-\frac{8\pi}{3}\right)$

4. $\csc\left(\frac{2\pi}{3}\right)$

5. $\sec(-330^\circ)$

6. $\cot -\pi$

7. $\sec 180^\circ$

8. $\cot 225^\circ$

9. $\csc\left(\frac{11\pi}{6}\right)$

Ex: In Quadrant IV, $\cos\theta = \frac{\sqrt{3}}{2}$. Find the exact values of the other five trig ratios.

You Try. Find the exact values of the other 5 trig ratios.

1. In Quadrant II the $\cos\theta = -\frac{1}{2}$.

2. In Quadrant III the $\sin\theta = -\frac{1}{\sqrt{2}}$.

3. In Quadrant II the $\tan\theta = -1$.

4. In Quadrant IV the $\cot\theta = -\frac{\sqrt{3}}{2}$.