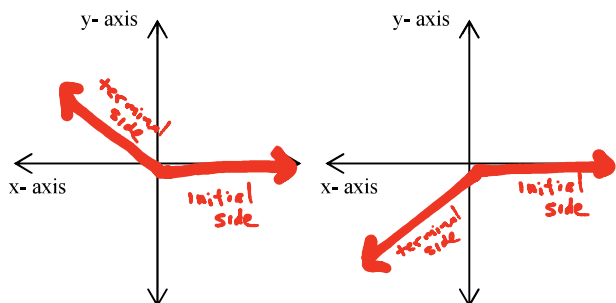


Notes 9.2 Introduction to Circular Trigonometry and the Unit Circle

A Focus on Terminology

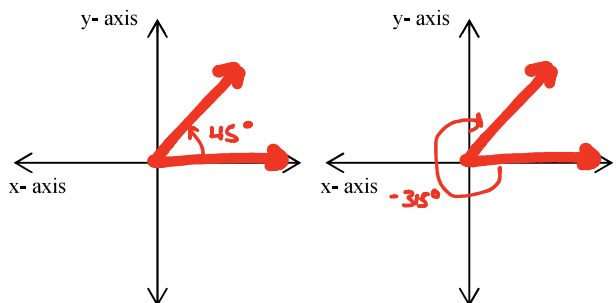
Initial Side of an Angle: A ray in an angle that remains fixed.

Terminal Side of an Angle: A ray in an angle that rotates.



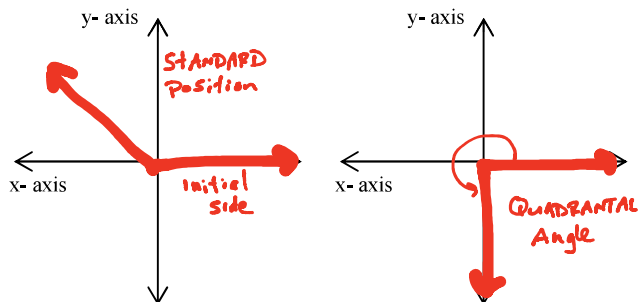
Positive Angle: An angle formed by the terminal side rotating counterclockwise.

Negative Angle: An angle formed by the terminal side rotating clockwise.

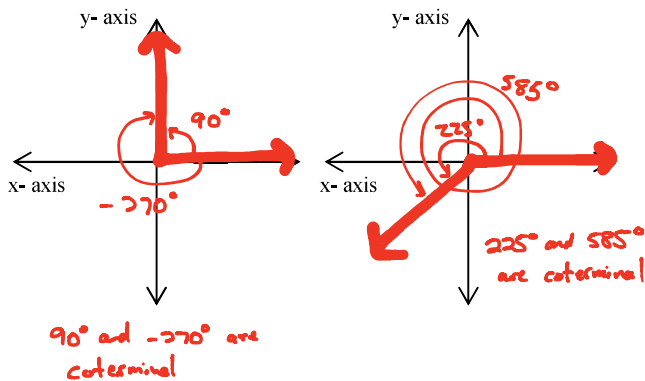


Standard Position: An angle with its vertex at the origin and its initial side along the positive x-axis.

Quadrantal Angle: An angle in standard position whose terminal side coincides with one of the axes.



Coterminal Angles: Two angles in standard position whose terminal sides coincide with each other.



Degrees: An angle has a measure of one degree if it results from $\frac{1}{360}$ of a complete revolution in the positive direction.

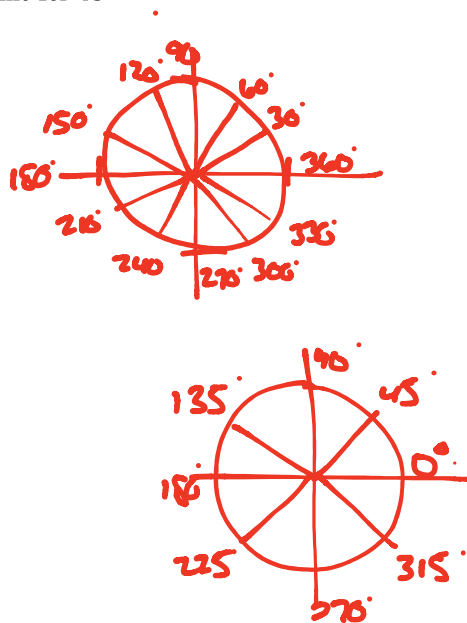
Minutes': Each degree is comprised of 60 of these.

$$1^\circ = 60'$$

Seconds'': Each minute is comprised of 60 of these.

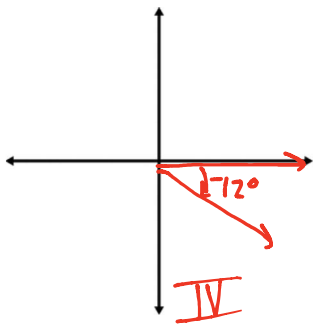
$$1' = 60''$$

Draw a circle with radius 1 whose center is at the origin. Label each angle around the circle counting by 30°. Do the same for 45°.

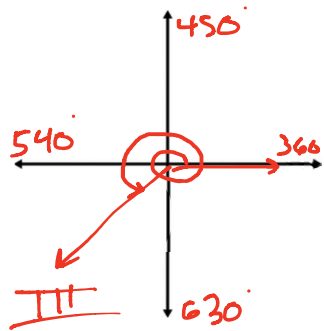


Draw an angle in standard position with the given measure and identify the quadrant in which the terminal sides lies.

#1) -12°

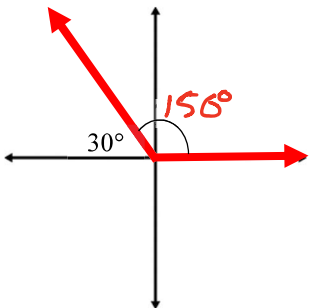


#2) 570°

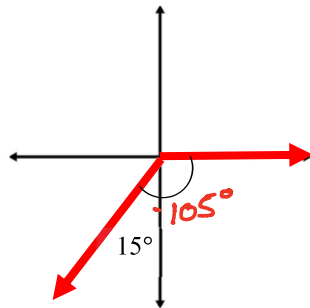


Find the measure of each angle in degrees.

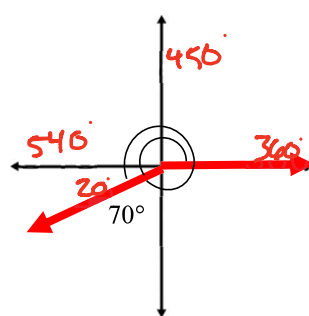
#3)



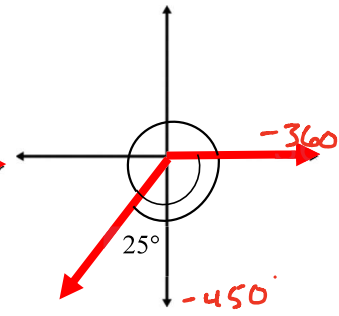
#4)



#5)



#6)



560°

-475°

Find one positive angle and one negative angle that is coterminal with each angle.

#7) 100°

positive

negative

$$\text{Coterminal} = 100^\circ + 360^\circ = 460^\circ$$

$$\text{Coterminal} = 100^\circ - 360^\circ = -260^\circ$$

Find a coterminal angle between 0° and 360° .

#8) -70°

$$\text{Coterminal} = -70^\circ + 360^\circ = 290^\circ$$

Find all angles that are coterminal with the given angle.

#9) 57° Coterminal = $57^\circ + 360^\circ n$
where n is an integer

Convert to degrees, minutes and seconds.

#10) $64.34567^\circ = 64^\circ + .34567(60)'$
 $= 64^\circ 20.7402'$
 $= 64^\circ 20' 44.4''$

#11) $-45.255555^\circ = -45^\circ 15' 20''$

Convert to decimal degrees with a precision of 0.00

#12) $-7^\circ 12' 45'' = -7.35^\circ$

$$-\left(7 + \frac{12}{60} + \frac{45}{3600}\right)^\circ$$

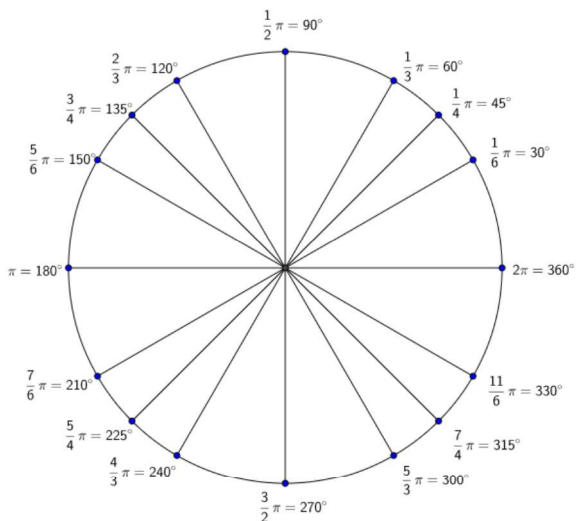
#13) $120^\circ 53' 22'' = 120.89^\circ$

$$\left(120 + \frac{53}{60} + \frac{22}{3600}\right)^\circ$$

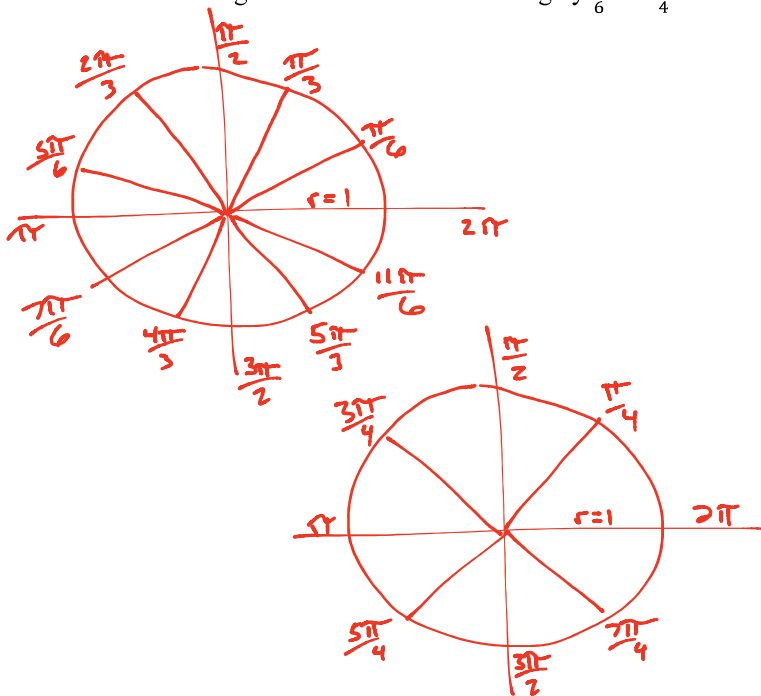
Radians: The radian measure of an angle in standard position is defined as the length of the corresponding arc on the unit circle.

Revolutions/Degrees/Radians Relationship

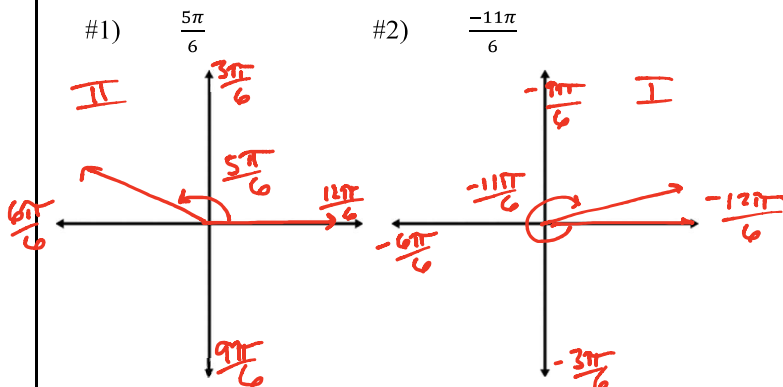
$1 \text{ Rev} = 360^\circ = 2\pi \text{ radians}$



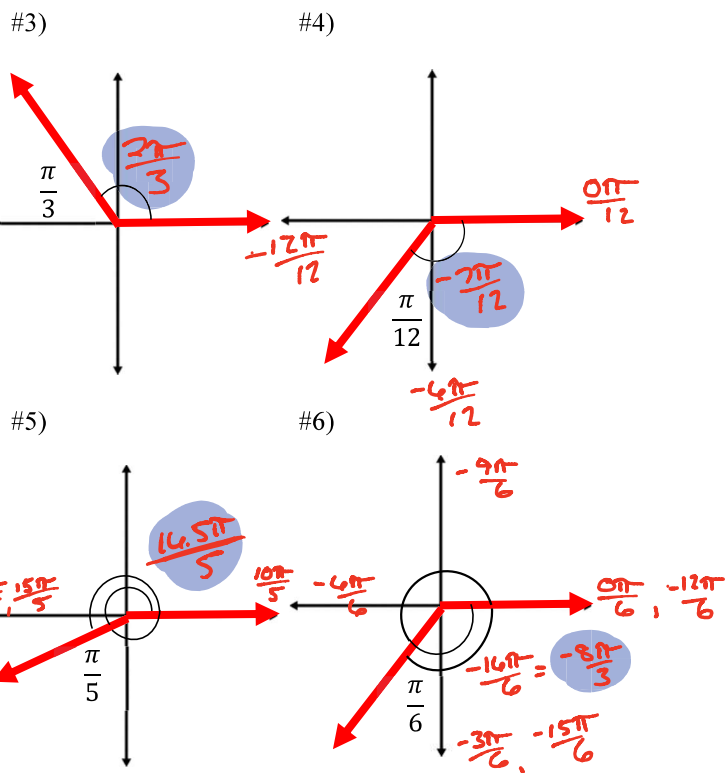
Draw a circle with radius 1 whose center is at the origin. Label each angle around the circle counting by $\frac{\pi}{6}$ and $\frac{\pi}{4}$.



Draw an angle in standard position with the given measure and identify the quadrant in which the terminal sides lies.



Find the measure of each angle in radians.



Find one positive angle and one negative angle that is coterminal with each angle.

#7) $\frac{7\pi}{6}$

positive $\frac{7\pi}{6} + \frac{12\pi}{6} = \frac{19\pi}{6}$

negative $\frac{7\pi}{6} - \frac{12\pi}{6} = \frac{-5\pi}{6}$

Find a coterminal angle between 0 and 2π .

#8) $-\frac{5\pi}{4}$

$$-\frac{5\pi}{4} + \frac{8\pi}{4} = \frac{3\pi}{4}$$

Find all angles that are coterminal with the given angle.

#9) $\frac{\pi}{12}$

$$\frac{\pi}{12} + 2\pi n, \text{ where } n \text{ is an integer}$$

Ex F: Convert to radians in terms of π

#10) 135°

$$\frac{135^\circ}{1} \cdot \frac{\pi}{180^\circ} = \frac{3\pi}{4}$$

#11) -45°

$$\frac{-45^\circ}{1} \cdot \frac{\pi}{180^\circ} = \frac{-\pi}{4}$$

Convert to degrees

#12) 3π

$$\frac{3\pi}{1} \cdot \frac{180^\circ}{\pi} = 540^\circ$$

#13) $-\frac{2\pi}{3}$

$$-\frac{2\pi}{3} \cdot \frac{180^\circ}{\pi} = -120^\circ$$