

Warm Up:

Complete the chart below:

	0°	30°	45°	60°	90°
sin $\theta$	$\frac{\sqrt{0}}{2} = 0$	$\frac{\sqrt{1}}{2} = \frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2} = 1$
cos $\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan $\theta$	$\frac{0}{1} = 0$	$\frac{1}{\cancel{2}} = \frac{1}{\sqrt{3}}$	$\frac{\sqrt{2}}{\cancel{2}} = 1$	$\frac{\sqrt{3}}{\cancel{2}} = \sqrt{3}$	$\frac{1}{0} = \text{und.}$

$$\frac{\sqrt{2}}{2}$$

reverse

$\frac{\sin \theta}{\cos \theta}$



Converting Between Degrees & Radians

**radians-** the unit of measure of a central angle that intercepts an arc equal in length to the radius of the circle



$\pi \text{ Rad} = 180^\circ$

reference sheet

Radians	1 radian = $\frac{180}{\pi}$ degrees
Degrees	1 degree = $\frac{\pi}{180}$ radians

**Examples:**

1) Express  $405^\circ$  in radian measure.

~~$\frac{\pi \text{ Rad}}{180^\circ} = \frac{x}{405^\circ}$~~

$\frac{405 \pi}{180} = \frac{180x}{180}$   $\frac{9\pi}{4}$

2) Find, to the nearest tenth of a degree, the angle whose measure is  $3.45$  radians.

~~$\frac{\pi \text{ Rad}}{180^\circ} = \frac{3.45 \text{ Rad}}{x}$~~

~~$\frac{\pi x}{\pi} = \frac{3.45(180)}{\pi}$~~   
 $x = 197.7$

3) Express  $\frac{2\pi}{9}$  radians in degree measure.

$\frac{2(180^\circ)}{9} = 40^\circ$

$\frac{405}{180}$

$\frac{9}{4}$

4) Express  $\frac{7\pi}{18}$  radians in degree measure.

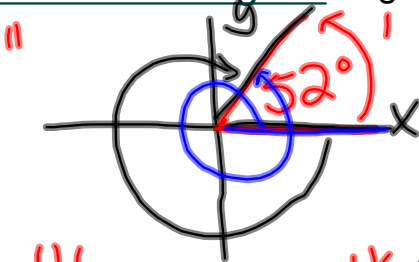
$3.45 * 180 / \pi$   
 $197.6704393$

$\frac{7(180)}{18} = 70^\circ$

Coterminal Angles

$1\pi = 180^\circ$   
 $2\pi = 360^\circ$

coterminal angles- angles in standard position that share a terminal side



$\theta \pm 360^\circ$   
 $\theta \pm 2\pi$

iii

iv one

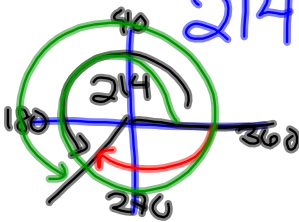
one

**Examples:**

Find two positive and two negative coterminal angles for each example.

1)  $214^\circ$   
 $214 + 360 = 574^\circ$   
 $214 - 360 = -146^\circ$

2)  $-86^\circ$   
 $-86 + 360 = 274^\circ$   
 $-86 - 360 = -446^\circ$



3)  $-\frac{\pi}{3}$   
 $-\frac{\pi}{3} + \frac{2\pi}{3} \cdot 3$

4)  $\frac{2\pi}{7}$   
 $\frac{2\pi}{7} - 7 \cdot \frac{2\pi}{7}$

Pos:

$-\frac{\pi}{3} + \frac{6\pi}{3}$   
 $\frac{5\pi}{3}$

Neg:

$\frac{2\pi}{7} - \frac{14\pi}{7}$   
 $-\frac{12\pi}{7}$

Going back to **co-terminal angles**... in radians now

Find co-terminal angles with the given angle such that  $0 \leq \theta < 2\pi$

1)  $\frac{3\pi}{2}$

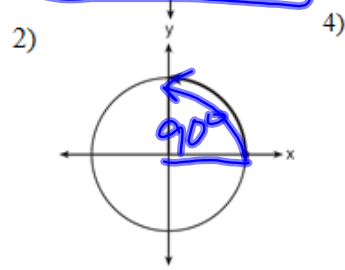
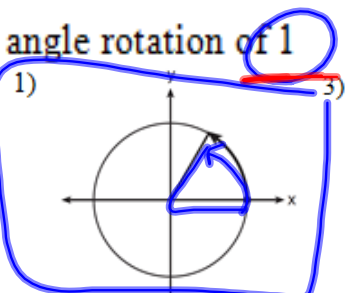
2)  $-\frac{\pi}{6}$

3)  $\frac{5\pi}{3}$

Which diagram shows an angle rotation of 1 radian on the unit circle?



~~$\pi \text{ Rad} = 180^\circ$~~   
 ~~$180 = \pi$~~



$180/\pi$   
 $57.29577951$

