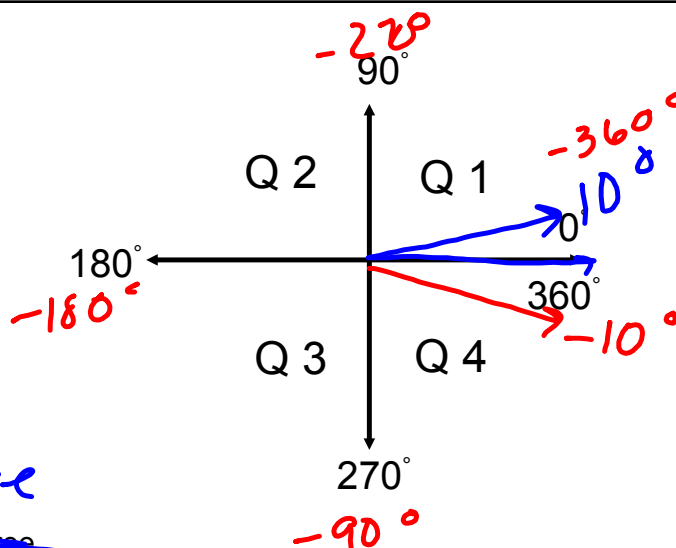
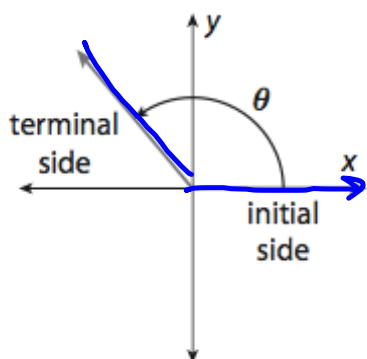


10-1 Angles and Radians Review

Objectives:

I can find co-terminal and reference angles

I can convert from radians to degrees and vice versa



negative

Clockwise rotation: ~~Positive degree~~

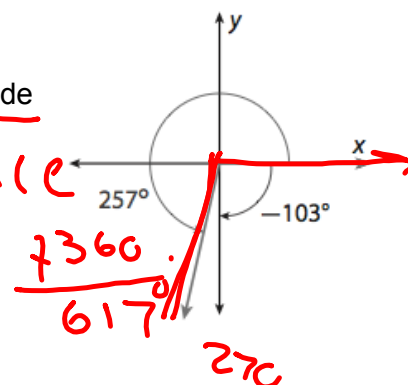
Counter Clockwise rotation: ~~Negative degree~~

positive

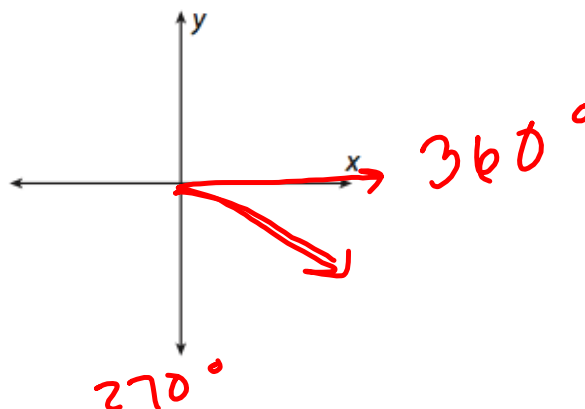
Coterminal Angles: Angles that share the same terminal side

Ex. 257° and -103°

Same place



- (A) Draw an angle of rotation of 310° . In what quadrant is the terminal side of the angle?



- (B) On the same graph from the previous step, draw a positive coterminal angle. What is the angle measure of your angle?

$$670^\circ$$

$$\begin{array}{r} \text{add } 360^\circ \\ 310^\circ \end{array}$$

- (C) On the same graph from the previous two steps, draw a negative coterminal angle. What is the angle measure of your angle?

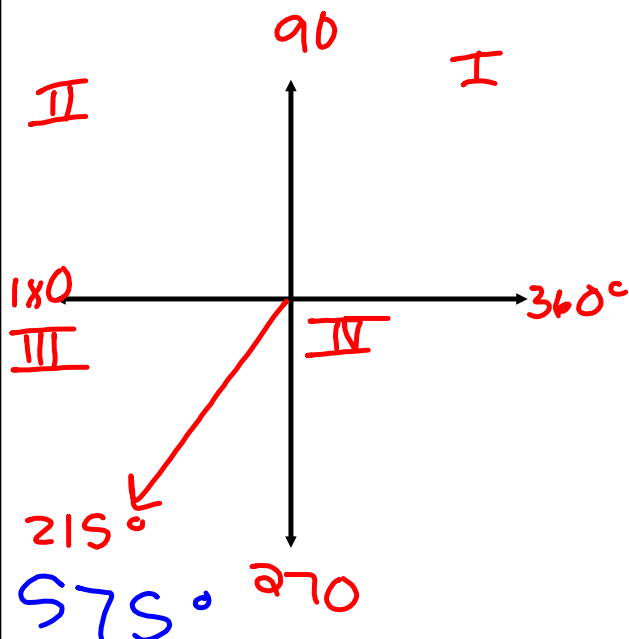
$$\begin{array}{r} 310^\circ \\ -360^\circ \\ \hline -50^\circ \end{array}$$

$$\text{SUBTRACT } 360^\circ$$

Draw and give the measure of the new angle

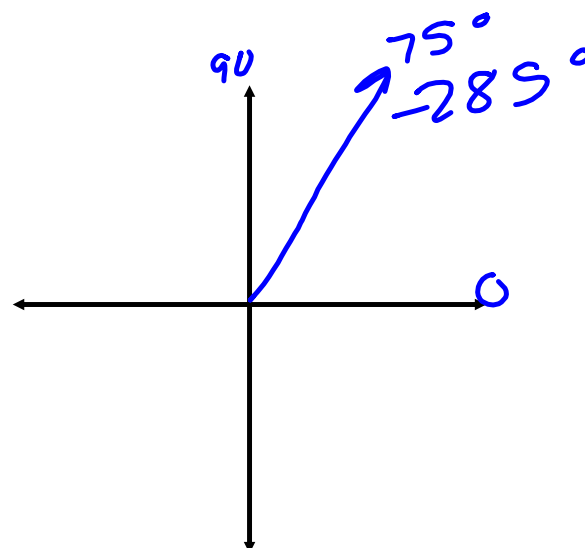
add

A positive angle
coterminal to 215°



SUBTRACT

A negative angle
coterminal to 75°

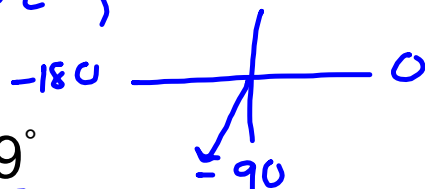


For each angle, find the nearest two positive coterminal angles and the nearest two negative coterminal angles.

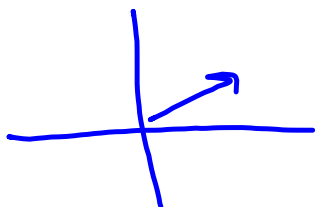
$$\underline{-102^\circ}$$

$$+ : 258^\circ, 618^\circ$$

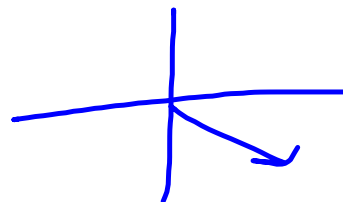
$$- : -462^\circ, -822^\circ$$



$$\underline{19^\circ}$$

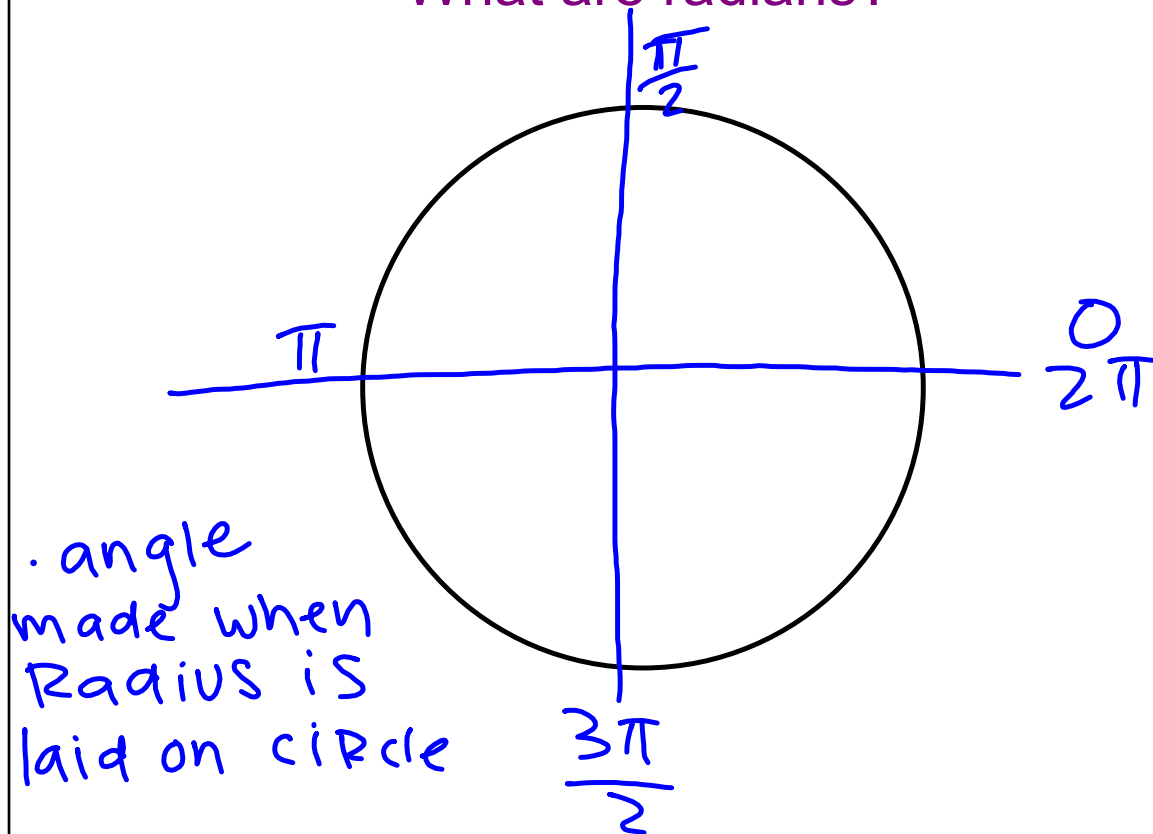


$$328^\circ$$



$$\underline{\underline{225^\circ}}$$

What are radians?



CONVERTING DEGREES TO RADIANS

Multiply the number of degrees by $\left(\frac{\pi \text{ radians}}{180^\circ}\right)$.

CONVERTING RADIANS TO DEGREES

Multiply the number of radians by $\left(\frac{180^\circ}{\pi \text{ radians}}\right)$.

A

Degree measure	Radian measure
20°	$\frac{\pi}{180^\circ} \cdot 20^\circ = \frac{\pi}{9}$
315°	$\frac{\pi}{180^\circ} \cdot 315^\circ = \frac{7\pi}{4}$
600°	$\frac{\pi}{180^\circ} \cdot 600^\circ = 10\pi/3$
-60°	$-\pi/3$
-540°	-3π

B

Radian measure	Degree measure
$\frac{\pi}{8}$	$\frac{180^\circ}{\pi} \cdot \frac{\pi}{8} = 22.5^\circ$
$\frac{4\pi}{3}$	$\frac{180^\circ}{\pi} \cdot \frac{4\pi}{3} = 240^\circ$
$\frac{9\pi}{2}$	810°
$-\frac{7\pi}{12}$	-105°
$-\frac{13\pi}{6}$	-130°

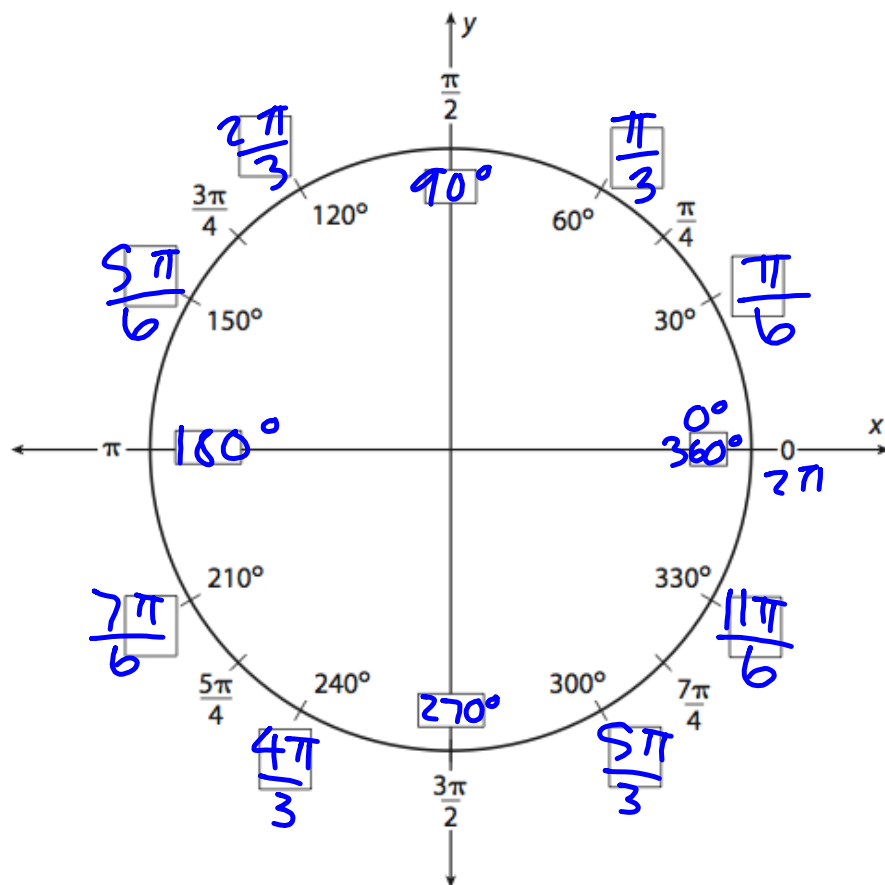
$$20 \cdot \frac{\pi}{180} = \frac{\pi}{9}$$

$$\frac{\pi}{8} \cdot \frac{180^\circ}{\pi}$$

$$\frac{4\pi}{3} \cdot \frac{180}{\pi}$$

$$-\frac{7\pi}{12} \cdot \frac{180}{\pi}$$

7. The unit circle below shows the measures of angles of rotation that are commonly used in trigonometry, with radian measures outside the circle and degree measures inside the circle. Provide the missing measures.



For each angle, find the nearest two positive coterminal angles and the nearest two negative coterminal angles.

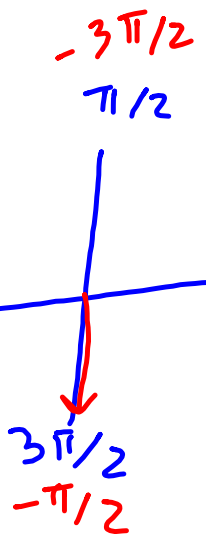
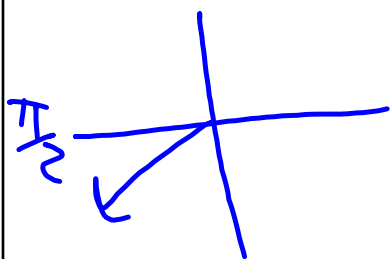
$$-\frac{\pi}{2}$$

$$+ : \frac{3\pi}{2}, \frac{7\pi}{2}$$

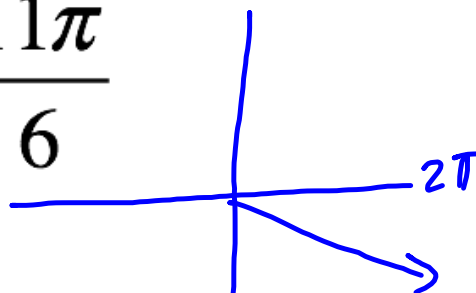
$$- : -\frac{5\pi}{2}, -\frac{9\pi}{2}$$

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

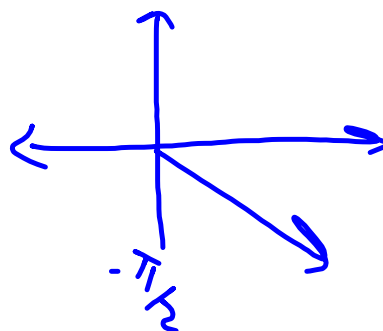
$$-\pi$$



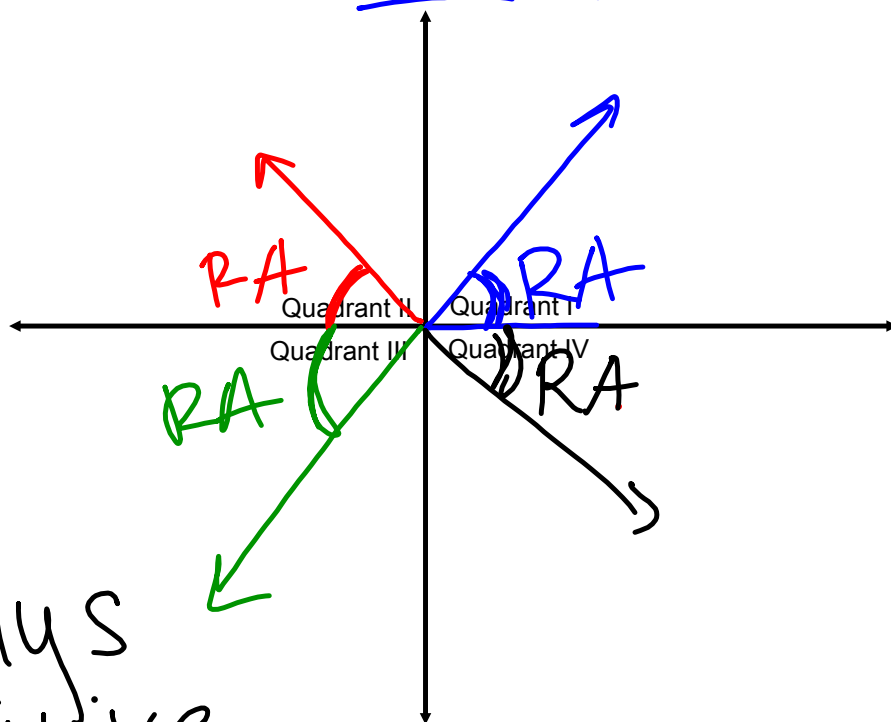
$$\frac{11\pi}{6}$$



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

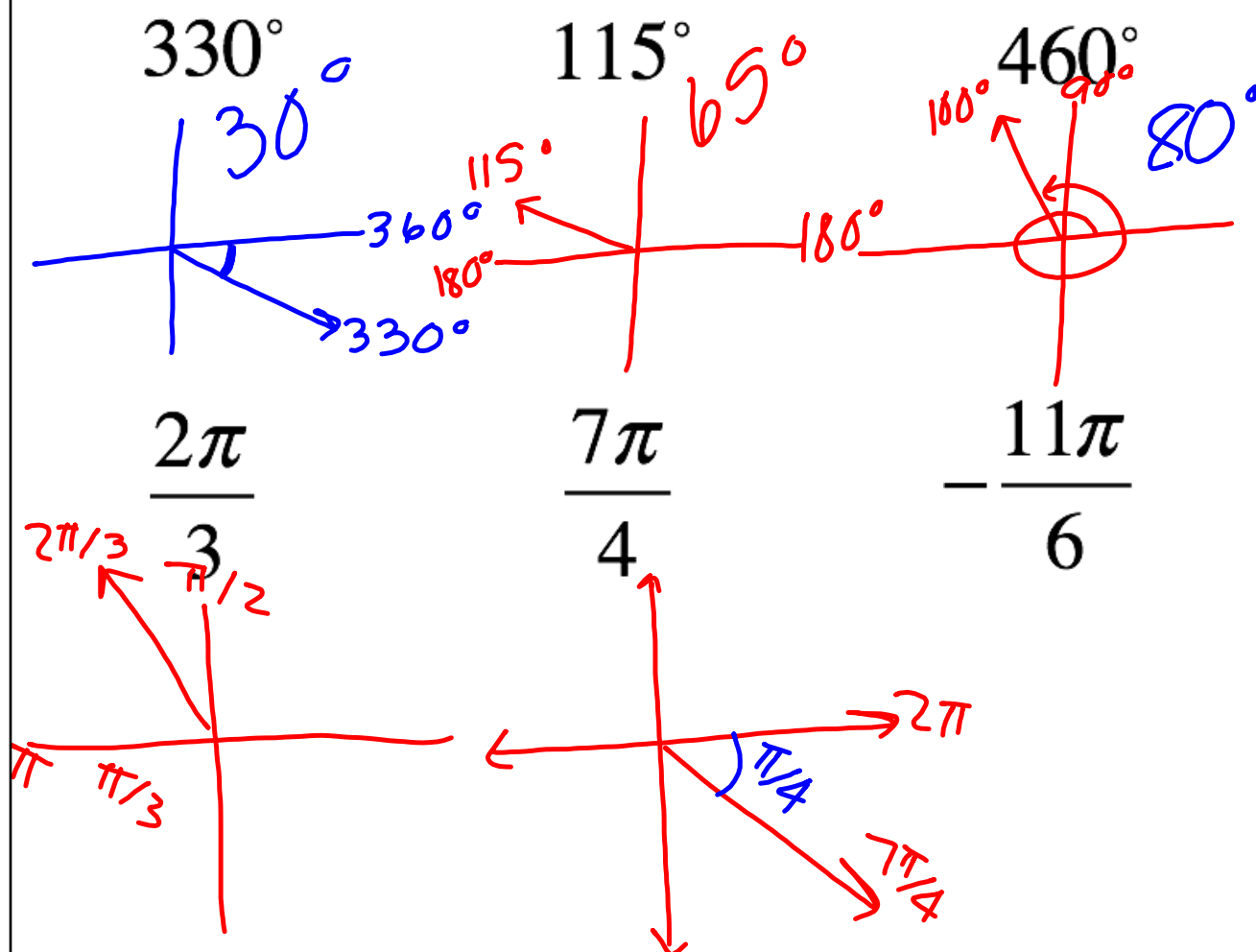


Reference Angles: The acute angle formed by the terminal side and the x-axis. $< 90^\circ$



• always
positive

Given the angle, find the reference angle:



$$\text{Angular velocity} = \frac{\theta}{t}$$

Arclength:

$$\text{given in degree: } s = \frac{\theta}{360} \cdot 2\pi r$$

$$\text{given in radians: } s = r\theta$$

Astronomy A neutron star (an incredibly dense collapsed star) in the Sagittarius Galaxy has a radius of 10 miles and completes a full revolution every 0.0014 seconds. Find the angular velocity of the star in radians per second, then use this velocity to determine how far a point on the equator of the star travels each second. How does this compare to the speed of light (about 186,000 mi/sec)?

Geography The northeastern corner of Maine is due north of the southern tip of South America in Chile. The difference in latitude between the locations is 103° . Using both degree measure and radian measure, and a north-south circumference of Earth of 24,860 miles, find the distance between the two locations.