

Warm-Up:

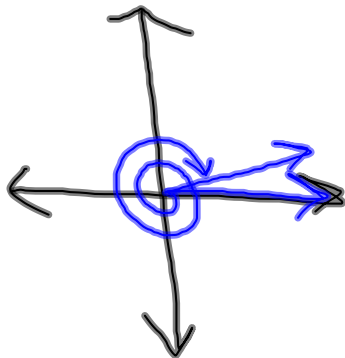
Find two angles coterminal to the given angle.

1)  $\frac{\pi}{2} \pm 2\pi$        $\frac{\pi}{2} + \frac{4\pi}{2}$

$\frac{5\pi}{2}, \frac{-3\pi}{2}$

Draw the angle with the given measure in standard position.

2)  $-710^\circ$



34, 42, 46

34)  $A = \frac{1}{2}r^2\theta$      $\theta = \frac{4\pi}{3}$      $r = 10$  in

$A = \frac{1}{2}(10)^2\left(\frac{4\pi}{3}\right)$

$A = 50 \cdot \frac{4\pi}{3}$

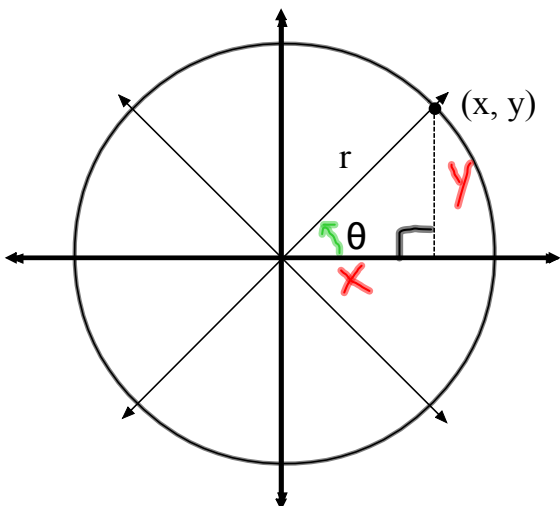
$A = \frac{200\pi}{3} \text{ in}^2$

42)  $158^\circ \cdot \frac{\pi}{180}$

$\frac{79\pi}{90}$

46)  $9 \cdot \frac{180}{\pi} = \frac{1620^\circ}{\pi}$

### Section 13-3: Trigonometric Functions of General Angles



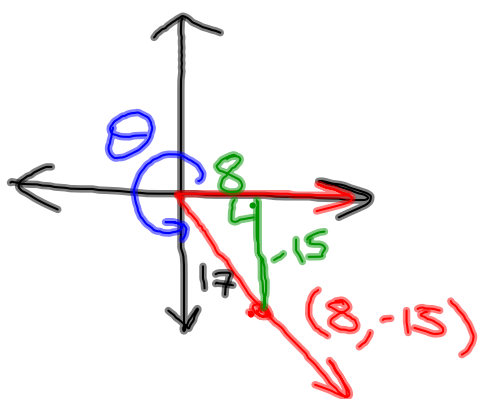
$$\sin\theta = \frac{y}{r} \quad \csc\theta = \frac{r}{y}$$

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

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

Examples:

1) Find the exact values of the six trig functions of  $\theta$  if the terminal side of  $\theta$  contains the point  $(8, -15)$ .



$$8^2 + (-15)^2 = r^2$$

$$64 + 225 = r^2$$

$$289 = r^2$$

$$17 = r$$

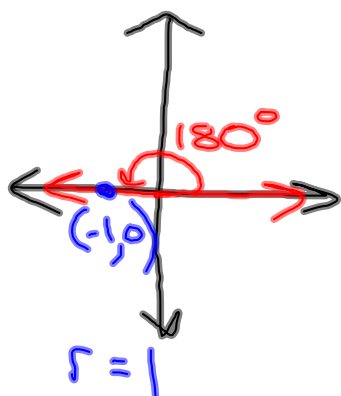
$$\sin\theta = \frac{-15}{17} \quad \csc\theta = \frac{17}{-15}$$

$$\cos\theta = \frac{8}{17} \quad \sec\theta = \frac{17}{8}$$

$$\tan\theta = \frac{-15}{8} \quad \cot\theta = \frac{8}{-15}$$

Examples:

2) Find the values of the six trig functions for an angle in standard position that measures  $180^\circ$ .



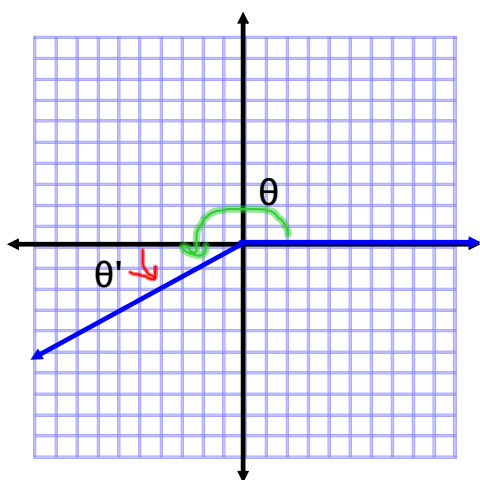
$$\sin 180^\circ = \frac{0}{1} = 0 \quad \csc 180^\circ = \text{undefined}$$

$$\cos 180^\circ = \frac{-1}{1} = -1 \quad \sec 180^\circ = -1$$

$$\tan 180^\circ = \frac{0}{-1} = 0 \quad \cot 180^\circ = \text{undefined}$$

A **reference angle** (labeled  $\theta'$ ) is the acute angle formed between the terminal side of an angle and the x-axis.

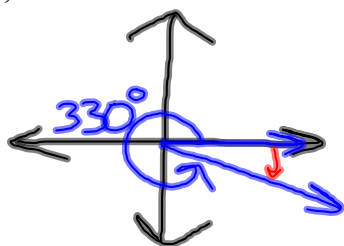
Reference angles are used to find trig ratios when  $\theta > 90^\circ$ .



Examples:

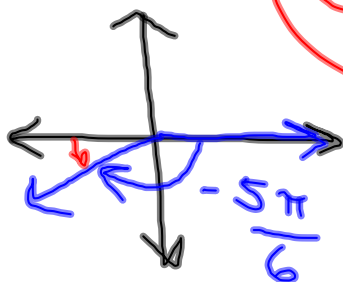
Sketch the angle, then find its reference angle.

3)  $330^\circ$



$$\theta' = 30^\circ$$

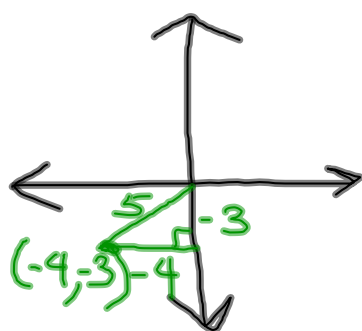
4)  $-\frac{5\pi}{6}$



$$\theta' = \frac{\pi}{6}$$

Examples:

5) Suppose  $\theta$  is an angle whose terminal side is in Quadrant III and  $\csc\theta = -5/3$ . Find the remaining five trig functions.



$$\csc\theta = \frac{-5}{3} = \frac{r}{y}$$

$$\begin{aligned} r &= 5 \\ y &= -3 \\ x &= -4 \end{aligned}$$

$$\sin\theta = \frac{-3}{5}$$

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

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

$$\begin{aligned} (-3)^2 + x^2 &= 5^2 \\ 9 + x^2 &= 25 \\ x^2 &= 16 \\ x &= 4 \end{aligned}$$

Homework: pg. 782-783 #14-20 even, 34-44 even, 54

Section 13-3 Vocab

Quiz Next Class over Sections 13-1, 13-2