Warm-up 1/13/17

Evaluate using a calculator, then find the exact answer.

1. $\sin 45° = \frac{\sqrt{2}}{2} \approx .707$

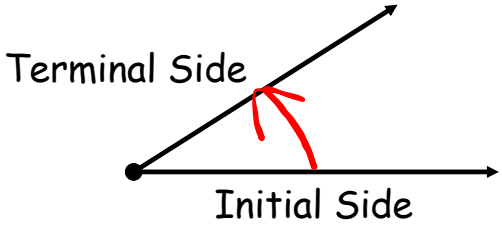
2. $\sec\left(\frac{\pi}{3}\right) = \frac{1}{\cos \pi/3} = \frac{1}{1/2} = 2$

	$45°, \frac{\pi}{4}$	$30°, \frac{\pi}{6}$	$60°, \frac{\pi}{3}$
sin	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
cos	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
tan	1	$\frac{\sqrt{3}}{3}$	$\sqrt{3}$

4.3: Trigonometry Extended: The Circular Functions

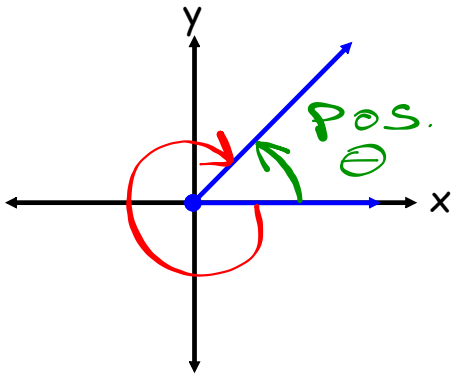
If two rays are drawn with a common vertex, they form an angle. We call one of the rays of the angle the initial side and the other the terminal side.

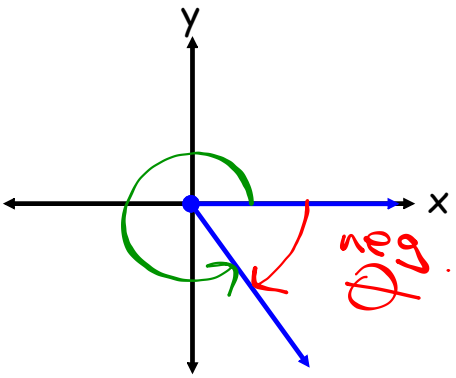
The angle that is formed is identified by showing the direction and amount of rotation from the initial side to the terminal side.

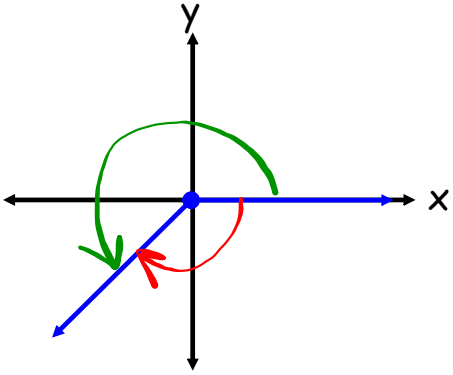


If the rotation is in the counterclockwise direction, the angle is positive; if the rotation is clockwise, the angle is negative.

An angle θ is said to be in standard position if its vertex is at the origin of a rectangular coordinate system and its initial side coincides with the positive x-axis.



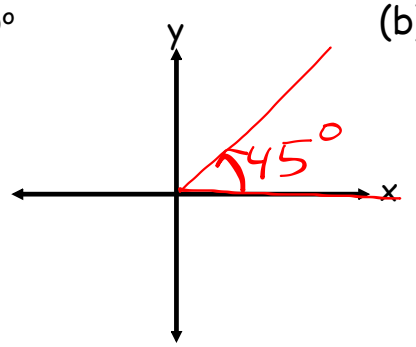




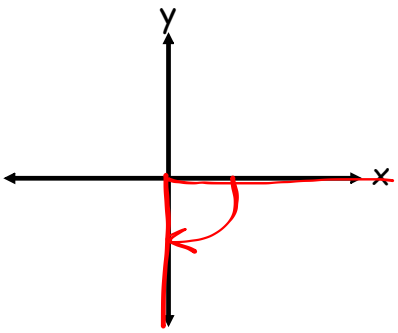
Coterminal angles have the same initial side and terminal side, but different measures.

Draw each angle.

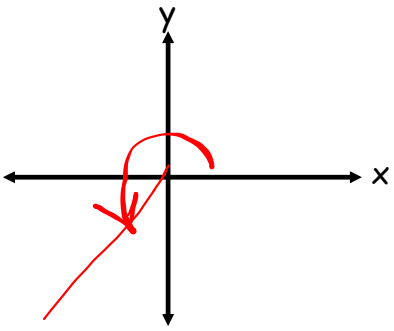
(a) 45°



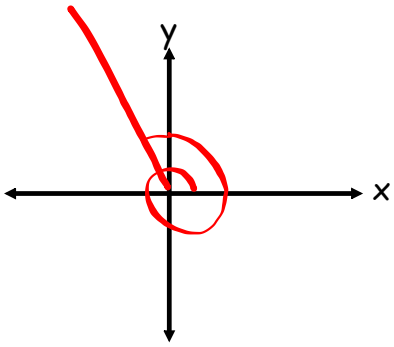
(b) -90°



(c) 225°



(d) 480°



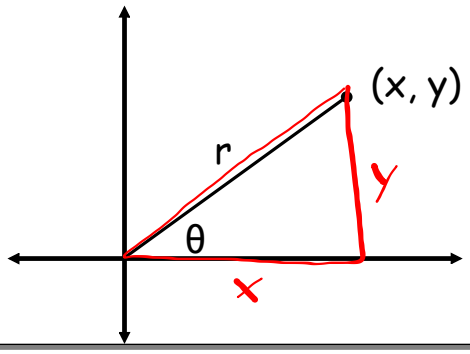
DEFINITION Trigonometric Functions of any Angle

Let θ be an angle in standard position and let P(x, y) be any point on the terminal side of the angle (except the origin). Let r denote the distance from P(x, y) to the origin, i.e., let $r = \sqrt{x^2 + y^2}$. Then

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

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

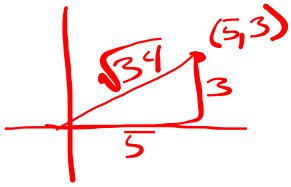
$\tan\theta = \frac{y}{x}$ $\quad\quad$ $\cot\theta = \frac{x}{y}$



$x^2 + y^2 = r^2$

$\sqrt{x^2 + y^2} = r$

Let θ be the acute angle in standard position whose terminal side contains the point (5, 3). Find the six trigonometric functions of θ.



$r = \sqrt{5^2 + 3^2}$

$r = \sqrt{34}$

$\sin\theta = \frac{3\sqrt{34}}{34}$ $\quad \csc\theta = \frac{\sqrt{34}}{3}$

$\cos\theta = \frac{5\sqrt{34}}{34}$ $\quad \sec\theta = \frac{\sqrt{34}}{5}$

$\tan\theta = \frac{3}{5}$ $\quad \cot\theta = \frac{5}{3}$

$\frac{3}{\sqrt{34}}$ $\quad \frac{5}{\sqrt{34}}$

Let θ be the angle in standard position whose terminal side contains the point (-5, 12). Find the six trigonometric functions of θ.

$\sin\theta = \frac{12}{13}$ $\quad \csc\theta = \frac{13}{12}$

$\cos\theta = -\frac{5}{13}$ $\quad \sec\theta = -\frac{13}{5}$

$\tan\theta = -\frac{12}{5}$ $\quad \cot\theta = -\frac{5}{12}$

Assignment: p. 347
1 - 20