

Name: _____

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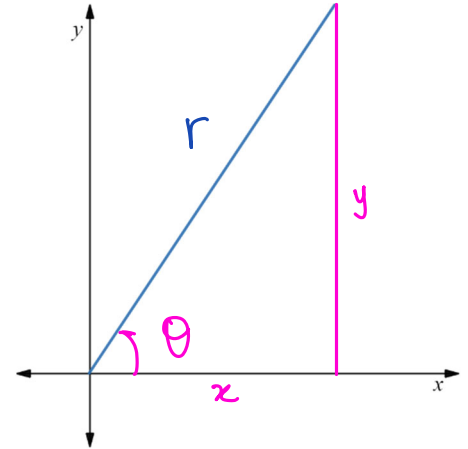
Learning Goal 4.1	Examining angles in standard position in both radians and degrees. Exploring the unit circle, reference and coterminal angles and special angles.
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In the diagram, consider θ any angle in standard position. $P(x, y)$ is any point on the terminal arm of angle θ .

$r =$ the length of the line created by connecting P to the origin

The three **primary trigonometric ratios** are:

$$\sin \theta = \frac{y}{r} \quad \cos \theta = \frac{x}{r} \quad \tan \theta = \frac{y}{x}$$



Reciprocal Trigonometric Ratios

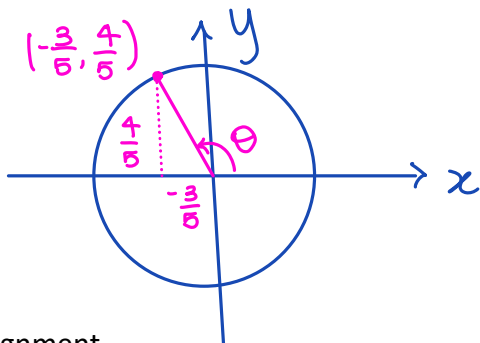
<p>cosecant</p> $\csc \theta = \frac{1}{\sin \theta} = \frac{r}{y}$	<p>secant</p> $\sec \theta = \frac{1}{\cos \theta} = \frac{r}{x}$	<p>cotangent</p> $\cot \theta = \frac{1}{\tan \theta} = \frac{x}{y}$
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Points on the unit circle

- will always follow Pythagoras (or the equation for the unit circle.)

Example The point $(-\frac{3}{5}, \frac{4}{5})$ is the point of intersection of the terminal arm of the unit circle and angle, θ , in standard position.

- Draw θ .
- Find the exact value of the six trigonometric ratios for θ .



$$\sin \theta = \left(\frac{4}{5}\right) = \frac{4}{5}$$

$$\cos \theta = \left(\frac{-3}{5}\right) = -\frac{3}{5}$$

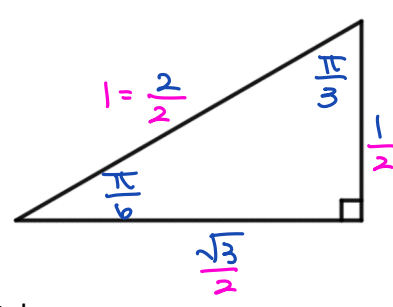
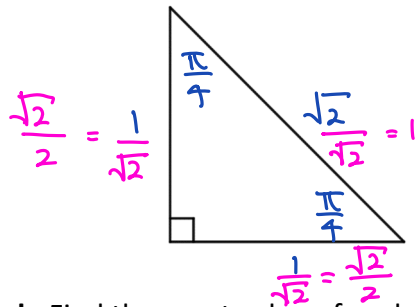
$$\tan \theta = \left(\frac{4}{5}\right) / \left(\frac{-3}{5}\right) = \frac{4}{5} \times \frac{-5}{3} = -\frac{4}{3}$$

$$\csc \theta = \frac{1}{\sin \theta} = \frac{5}{4}$$

$$\sec \theta = \frac{1}{\cos \theta} = -\frac{5}{3}$$

$$\cot \theta = \frac{1}{\tan \theta} = -\frac{3}{4}$$

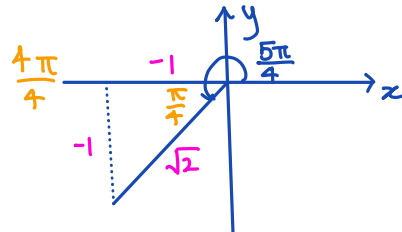
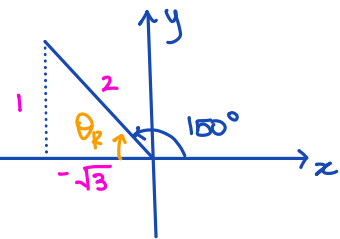
Special Triangles **AGAIN!!**



Example Find the exact value of each of the following, include a sketch.

a. $\cos 150^\circ = -\frac{\sqrt{3}}{2}$

b. $\sin\left(\frac{5\pi}{4}\right) = -\frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{2} = -\frac{\sqrt{2}}{2}$



$\theta_R = 180 - 150 = 30^\circ$

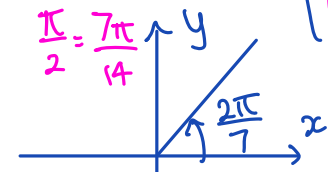
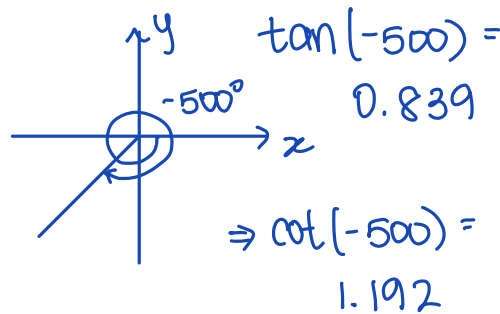
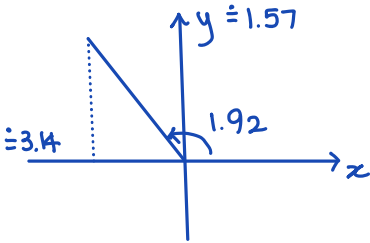
$\theta_R = \frac{5\pi}{4} - \frac{4\pi}{4} = \frac{\pi}{4}$

Example Find the approximate value of each of the following. Include a sketch. Round your answer to three decimal places. *** CALCULATOR PROBLEMS ***

a. $\sin(1.92) = 0.940$

b. $\cot(-500^\circ)$

c. $\sec\left(\frac{2\pi}{7}\right) = \sec\left(\frac{4\pi}{14}\right)$



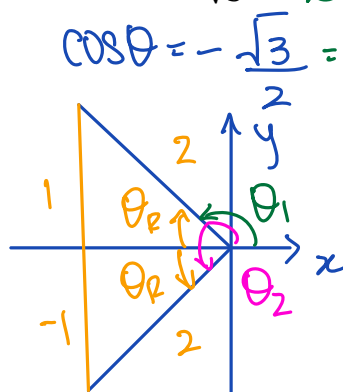
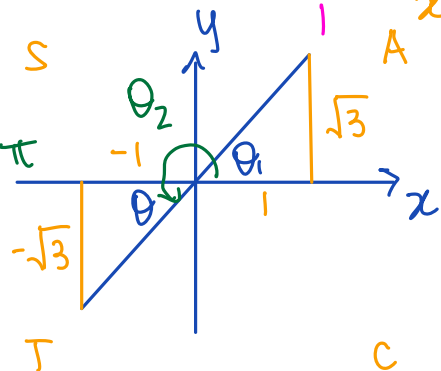
$\cos\left(\frac{2\pi}{7}\right) = 0.623$

$\sec\left(\frac{2\pi}{7}\right) = 1.604$

Example Solve each of the following equations, $0 \leq \theta < 2\pi$. *** NOT A CALCULATOR PROBLEM *** **RADIANS**

a. $\tan \theta = \sqrt{3} = \frac{y}{x} = \frac{1}{1/\sqrt{3}}$

b. $\sec \theta = -\frac{2}{\sqrt{3}} = \frac{r}{x}$



$\theta_1 = 60^\circ = \frac{\pi}{3}$
 $\theta_2 = \frac{3\pi}{3} + \frac{\pi}{3} = \frac{4\pi}{3}$

$\theta_R = \frac{\pi}{6} (30^\circ)$
 $\theta_1 = \frac{6\pi}{6} - \frac{\pi}{6} = \frac{5\pi}{6}$
 $\theta_2 = \frac{6\pi}{6} + \frac{\pi}{6} = \frac{7\pi}{6}$