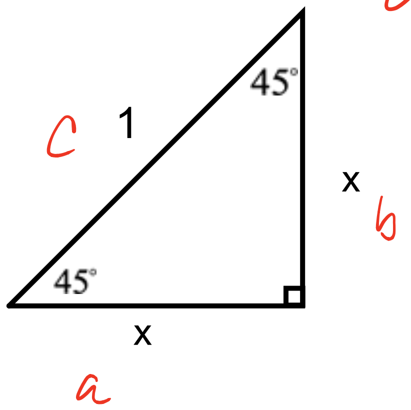
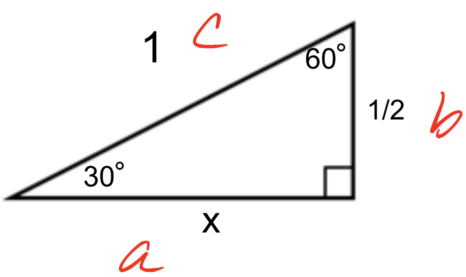
Starter: Use Pythagorean Theorem to find x...leave your answer in fraction form...

$a^2+b^2=c^2$





$x^2+x^2=1^2$

$\frac{2x^2}{2}=\frac{1}{2}$

$\sqrt{x^2}=\sqrt{\frac{1}{2}}$

$x=\sqrt{\frac{1}{2}}=\frac{\sqrt{1}}{\sqrt{2}}$

$x=\frac{1}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}=\frac{\sqrt{2}}{2}$

$x^2+\left(\frac{1}{2}\right)^2=1^2$

$x^2+\frac{1}{4}=1$

$-\frac{1}{4} \quad -\frac{1}{4}$

$\sqrt{x^2}=\sqrt{\frac{3}{4}}$

$x=\sqrt{\frac{3}{4}}=\frac{\sqrt{3}}{\sqrt{4}}=\frac{\sqrt{3}}{2}$

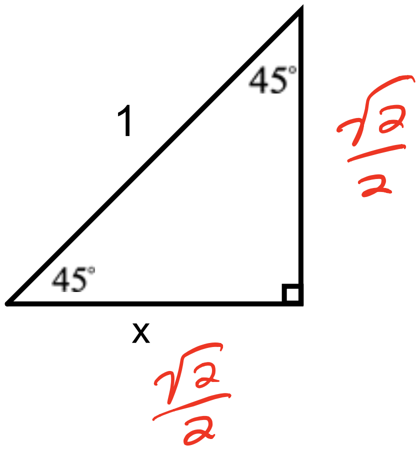
6-3 Trigonometric Ratios and the Unit Circle

Objectives:

6-3a: I can evaluate trigonometric expressions using the unit circle.

Special Right Triangles

45° - 45° - 90°



from the starter we found that the

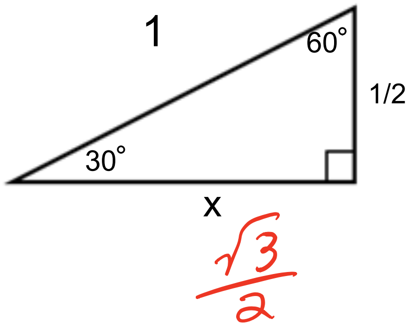
$x = \frac{\sqrt{2}}{2}$

because it is a 45° 45° 90° triangle the 2 legs are the same length.

Special Right Triangles

$30° - 60° - 90°$

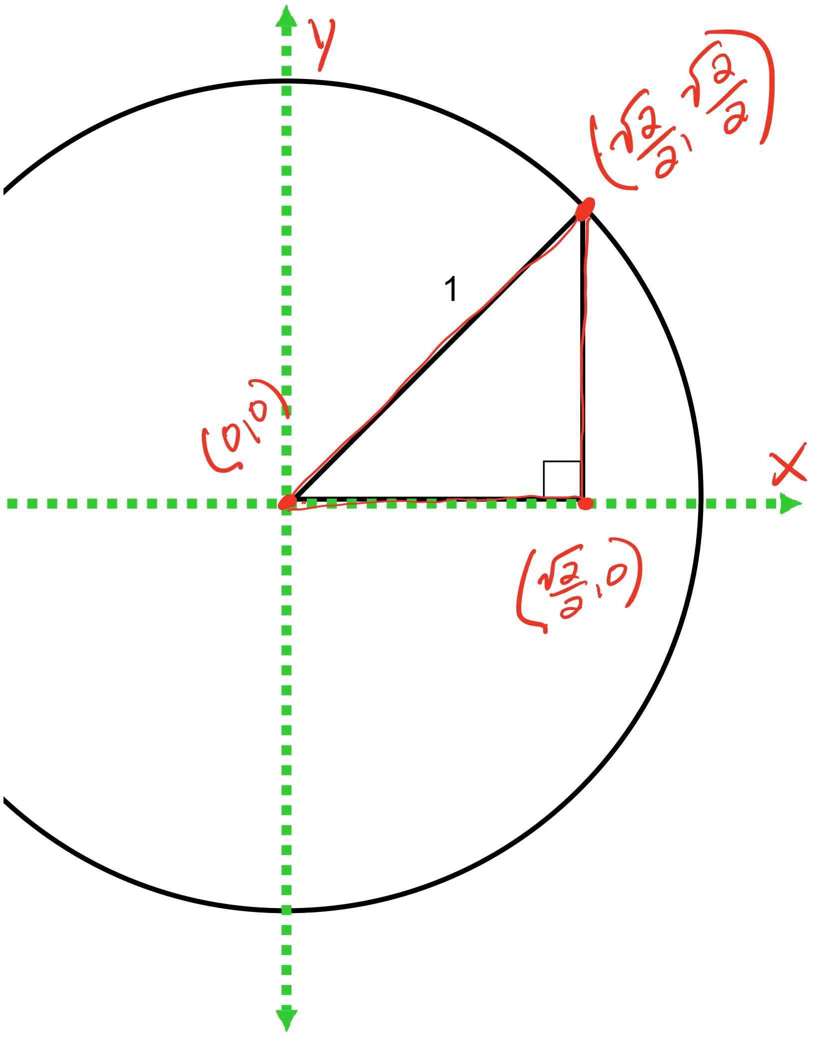
from the starter we found the $x = \frac{\sqrt{3}}{2}$



Now let's look at a coordinate plane with x-axis & y-axis - and let's

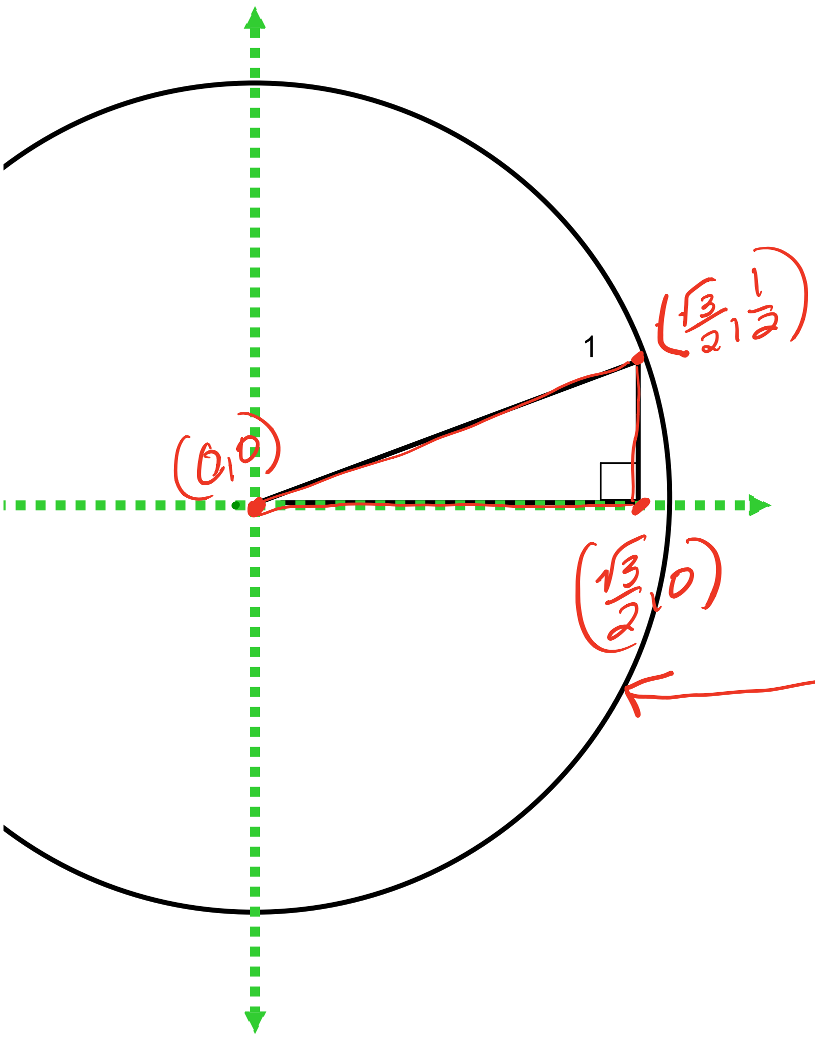
Special Triangles with a Hypotenuses of 1

draw a 45°-45°-90° triangle along the x-axis



Now let's draw a
$30° - 60° - 90°$

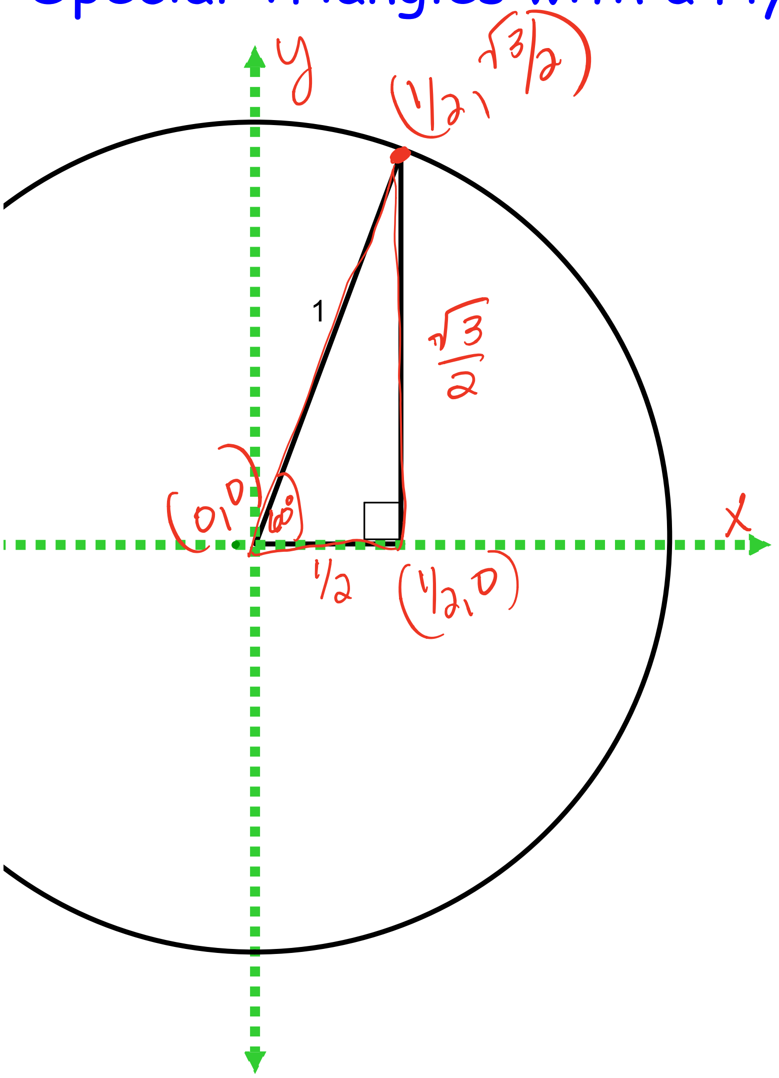
Special Triangles with a Hypotenuses of 1



Recognize these are points that form the triangle. Also notice the circle on the plane has a radius of 1.

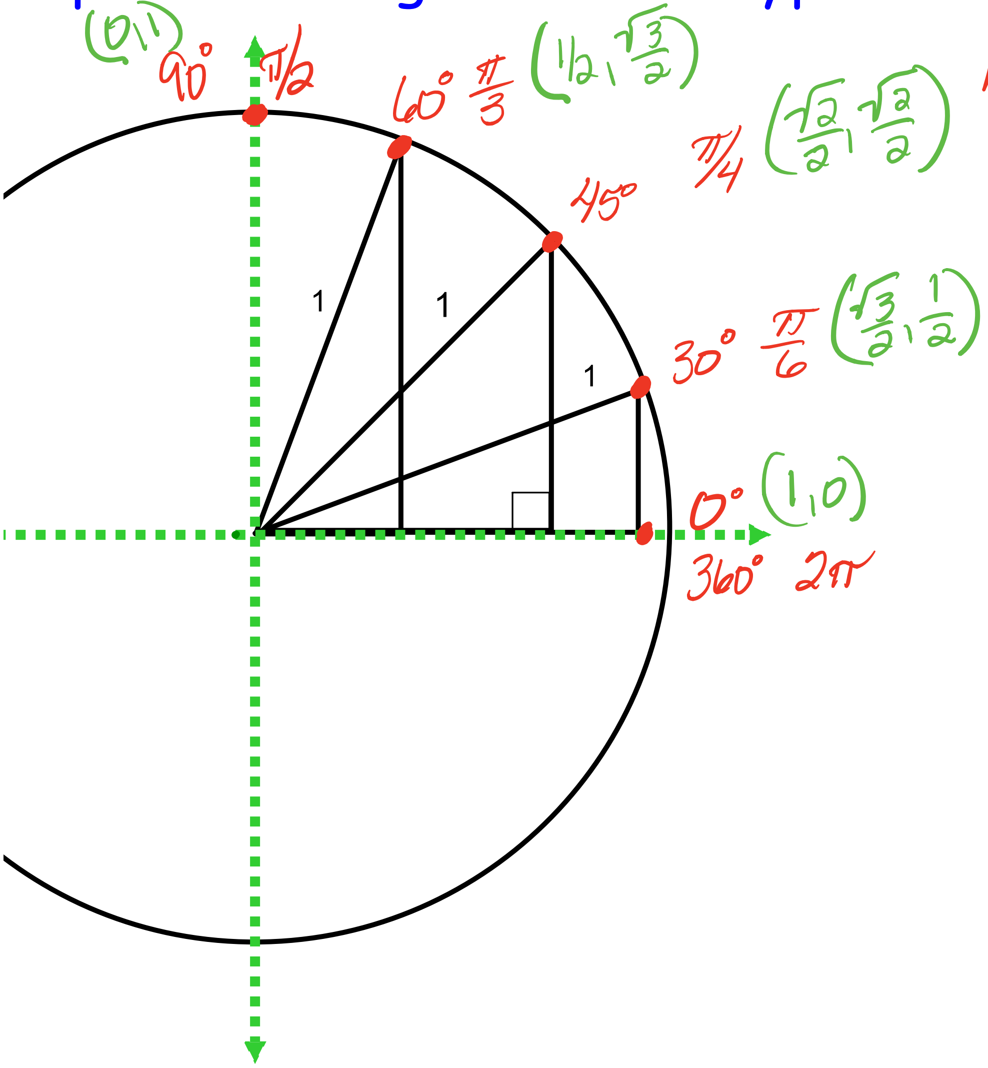
this is a 60°-30°-90° triangle.
another special Triangle.

Special Triangles with a Hypotenuses of 1



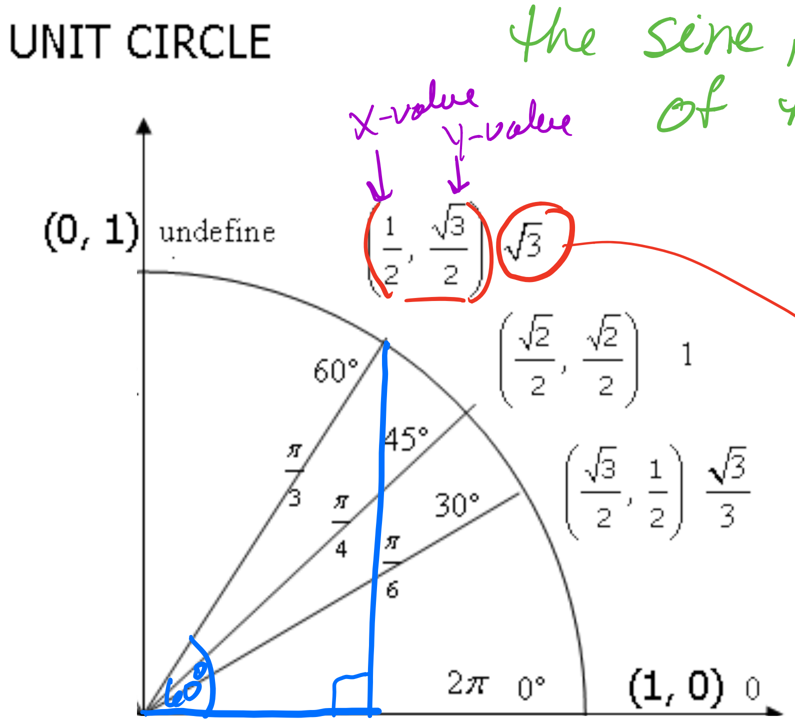
Think about our circles we have been learning about - with degrees and radians.

Special Triangles with a Hypotenuses of 1



Notice since we know the lengths of the legs of the triangles than we can find the coordinate pair at each of the red dots.

These coordinate pairs give us the sine, cosine and tangent of the angles.



x-value y-value

$(\cos\theta, \sin\theta)$

$$\boxed{\tan\theta = \frac{\sin\theta}{\cos\theta}}$$

The $\sin\theta$ is the same as $\frac{opp}{hyp}$, if the hyp is 1 - then the $\sin\theta$ = opposite side. And the opposite side is the y-value. Look at the △ with 60° - the opposite side has a length of $\frac{\sqrt{3}}{2}$. And this is the y-value of the coordinate pair. Therefore the

$\sin\theta = \frac{\sqrt{3}}{2}$

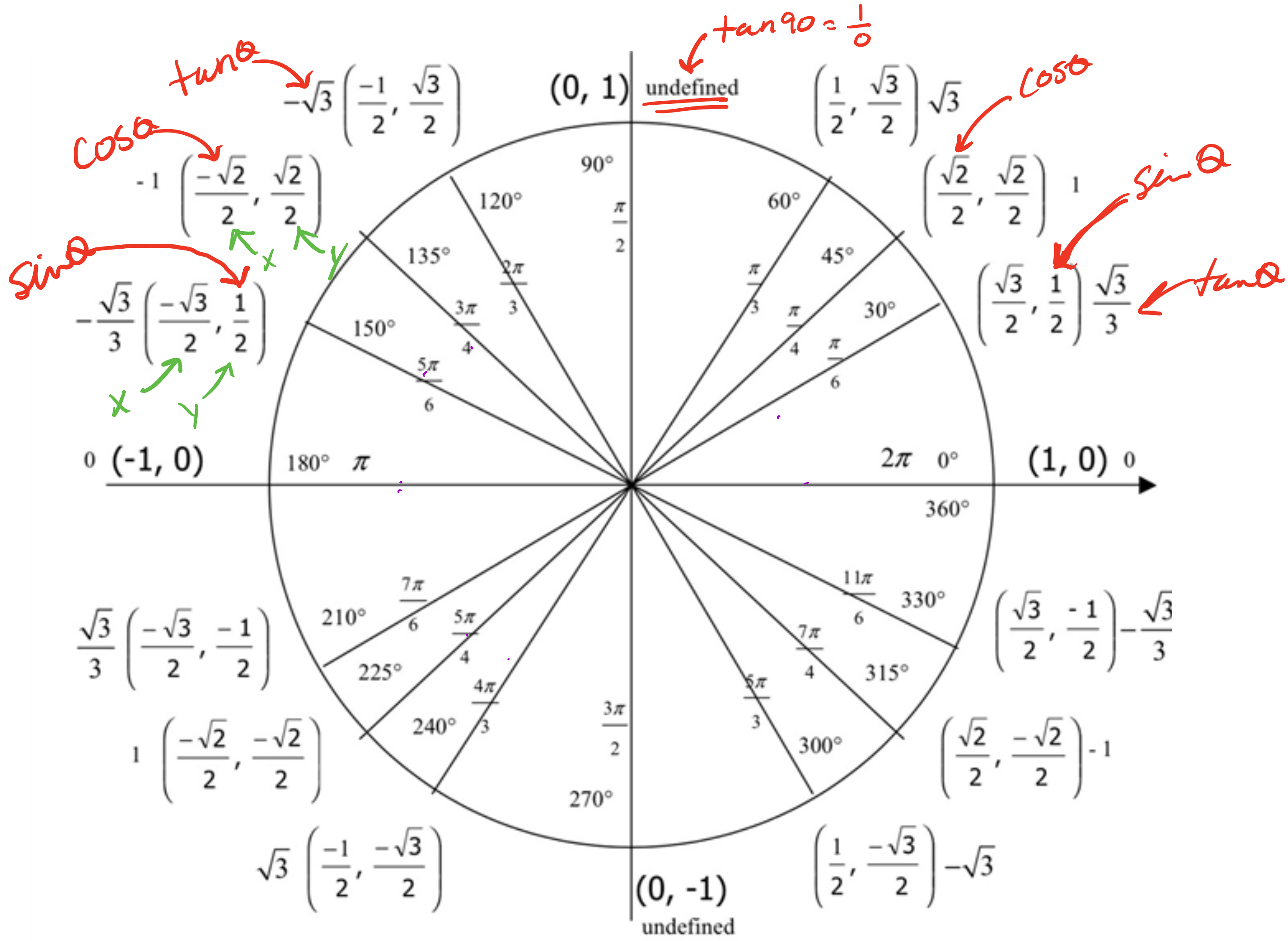
Likewise the $\cos\theta$ is the same as $\frac{adj}{hyp}$, if the hyp is 1 - then the $\cos\theta$ = adjacent side. And the adjacent side is the x-value. Look at the △ with 60° - the adjacent side have a length of ½ and this is the x-value of the coordinate pair. therefore the

$\cos\theta = \frac{1}{2}$

If the $\tan\theta = \frac{opp}{adj}$ and the opposite side of the

60° angle is $\frac{\sqrt{3}}{2}$ and the adj side is $\frac{1}{2}$ then $\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$.

This is what we call the unit circle. Look over the unit circle & find 3 similarities and 3 differences of each quadrants.



To evaluate - find the angle on the unit circle and determine the value... (get the unit circle from me)

Inverse trig - csc is sin flipped.

sec is cos flipped

cot is tan flipped.

Evaluate the following

1. $\sin \pi =$ sin is the y-value at $\pi = 0$.

2. $\cos \frac{3\pi}{4} =$ cos is the x-value at $3\pi/4 = \frac{-\sqrt{2}}{2}$

3. $\tan \frac{11\pi}{6} =$ tan is the $\frac{\sin}{\cos}$ or the $\frac{y}{x}$-values of $\frac{11\pi}{6} = \frac{-\sqrt{3}}{3}$

4. $\csc \frac{5\pi}{4} =$ 1st find the $\sin \frac{5\pi}{4}$ is the y-value at $\frac{5\pi}{4} = \frac{-\sqrt{2}}{2}$

So $\csc \frac{5\pi}{4} = \boxed{\frac{-2}{\sqrt{2}}}$

5. $\sec \frac{\pi}{6} =$ 1st find the $\cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}$

So the $\sec \frac{\pi}{6} = \boxed{\frac{2}{\sqrt{3}}}$

You may leave it like this

6. $\cot \frac{\pi}{3} =$ 1st find the $\tan \frac{\pi}{3} = \sqrt{3}$

So the $\cot \frac{\pi}{3} = \frac{1}{\sqrt{3}}$

But if you rationalize the denominator you get...

$\frac{-2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{-2\sqrt{2}}{2} = -\sqrt{2}$

$\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

$\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

You do not Have to do this.

Evaluate the following

this is more than one rotation...

$$\sin\frac{13\pi}{4} = \frac{-\sqrt{2}}{2}$$

$\frac{13\pi}{4} \approx \frac{5\pi}{4}$

$$\csc\frac{19\pi}{6}$$

$\frac{19\pi}{6} \approx 7\pi/6$

1st find the $\sin\frac{7\pi}{6} = \frac{-1}{2}$

$\csc\frac{19\pi}{6} = \frac{-2}{1} = -2$

$$\tan\left(-\frac{\pi}{4}\right) = -1$$

$\frac{-\pi}{4} \approx \frac{7\pi}{4}$

$$\sec\left(-\frac{3\pi}{2}\right)$$

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

1st find the $\cos\frac{-3\pi}{2}$

So $\sec\frac{-3\pi}{2} = 0$

Attachments

HW 6-2B Coterminal and Reference Angles.pdf