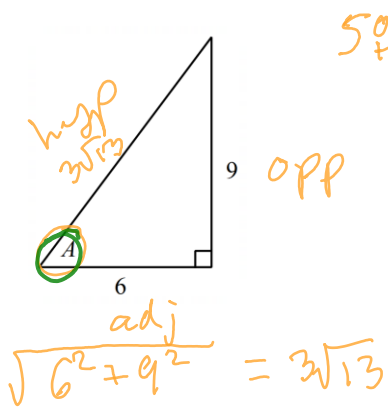


8.6

Date: 3/6/24

Objective: I can find ordered pairs using trig.

Review: Find the exact values of all 6 trigonometric functions. Write answer in simplest form.



S_θ C_θ T_θ

$$\sin A = \frac{9}{3\sqrt{13}} = \frac{3}{\sqrt{13}} \quad \cos A = \frac{6}{3\sqrt{13}} = \frac{2}{\sqrt{13}}$$

$$\tan A = \frac{9}{6} = \frac{3}{2} \quad \sec A = \frac{\sqrt{13}}{2}$$

$$\csc A = \frac{\sqrt{13}}{3} \quad \cot A = \frac{2}{3}$$

Find the degree measure of θ in the above triangle.

$$\tan^{-1}\left(\frac{3}{2}\right) \approx 56.3^\circ$$

Vocabulary:

Standard position:

Initial side:

Terminal side:

Reference angle:

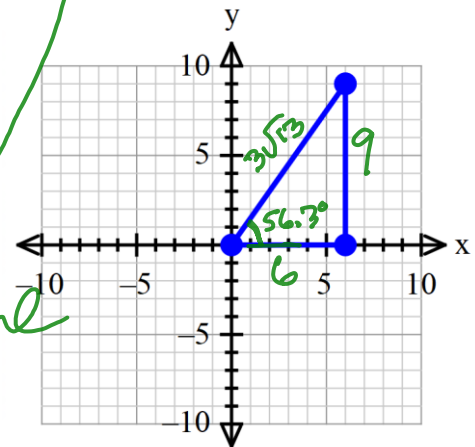
What if I put the above triangle in standard position in the first quadrant?

What is the x-coordinate?

What is the y-coordinate?

What is the hypotenuse?

See above same



sin A = cos A = tan A =
 sec A = csc A = cot A =

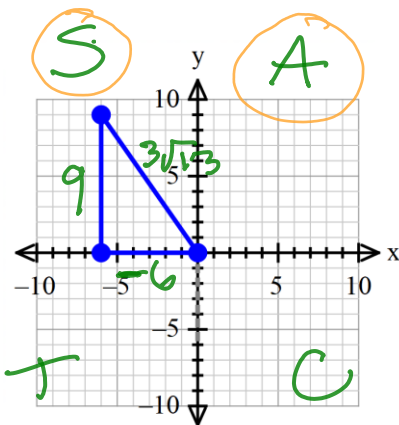
What do you notice about the signs of the x- and y-coordinates and the 6 trig functions?

Now do the same thing with the triangle in the second quadrant.

What is the x -coordinate?

What is the y -coordinate?

What is the hypotenuse?



$$\sin A = \frac{3}{\sqrt{3}} \quad \cos A = \frac{-2}{\sqrt{3}} \quad \tan A = -\frac{3}{2} \quad \sec A = \frac{\sqrt{3}}{-2} \quad \csc A = \frac{\sqrt{3}}{3} \quad \cot A = -\frac{2}{3}$$

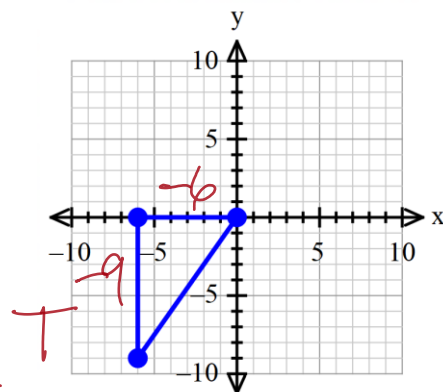
What do you notice about the signs of the x - and y -coordinates and the 6 trig functions?

How about the third quadrant?

What is the x -coordinate?

What is the y -coordinate?

What is the hypotenuse?



$$\sin A = \frac{-3}{\sqrt{3}} \quad \cos A = \frac{-2}{\sqrt{3}} \quad \tan A = \frac{3}{2} \quad \sec A = \frac{-\sqrt{3}}{2} \quad \csc A = \frac{-\sqrt{3}}{3} \quad \cot A = \frac{2}{3}$$

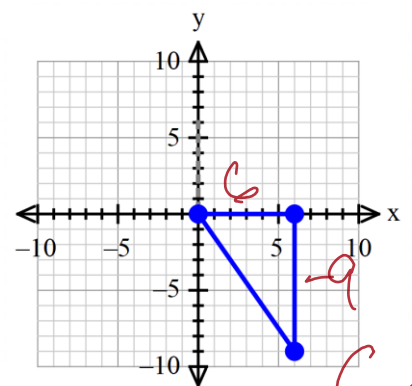
What do you notice about the signs of the x - and y -coordinates and the 6 trig functions?

How about the fourth quadrant?

What is the x -coordinate?

What is the y -coordinate?

What is the hypotenuse?



$$\sin A = \frac{-3}{\sqrt{3}} \quad \cos A = \frac{2}{\sqrt{3}} \quad \tan A = -\frac{3}{2} \quad \sec A = \frac{\sqrt{3}}{2} \quad \csc A = \frac{-\sqrt{3}}{3} \quad \cot A = -\frac{2}{3}$$

What do you notice about the signs of the x - and y -coordinates and the 6 trig functions?

What side does the x -coordinate equal on a right triangle with θ at the origin?

What side does the y -coordinate equal on a right triangle with θ at the origin?

Write the 6 trig functions using x, y, h instead of opposite, adjacent, hypotenuse.

$\sin A =$ $\cos A =$ $\tan A =$ $\sec A =$ $\csc A =$ $\cot A =$

The *signs* of the trigonometric functions depend on the quadrant in which the angle lies and the corresponding signs of x and y (remember r is always positive).

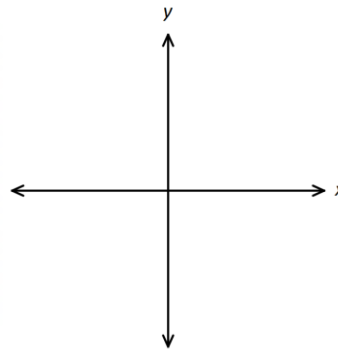
A good mnemonic to remember which functions are positive in each quadrant is “**All Students Take Calculus**”.

Quadrant I:

Quadrant II:

Quadrant III:

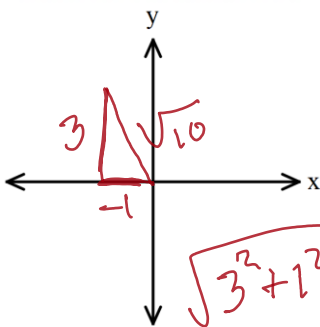
Quadrant IV:



Examples:

Find the exact values of $\sin \theta$, $\cos \theta$, $\tan \theta$, $\csc \theta$, $\sec \theta$, and $\cot \theta$ where θ is an angle in standard position whose terminal side contains the given point. Write answers in simplest form.

1. $(-1, 3)$



SOH $\sin \theta = \frac{3}{\sqrt{10}}$

$\csc \theta = \frac{\sqrt{10}}{3}$

CAH $\cos \theta = -\frac{1}{\sqrt{10}}$

$\sec \theta = -\sqrt{10}$

TOA $\tan \theta = -3$

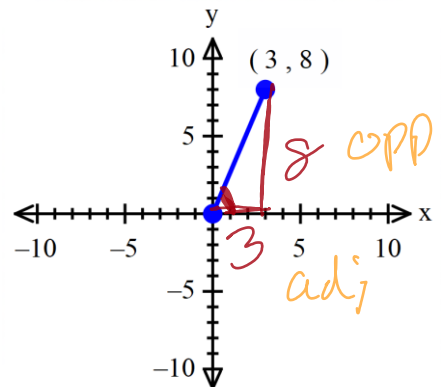
$\cot \theta = -\frac{1}{3}$

Find the degree of the angle (round to the nearest tenth of a degree), in standard position, whose terminal side contains the given point.

2. $(3, 8)$

$\theta = 69.4^\circ$

$\tan^{-1}\left(\frac{8}{3}\right)$



REMEMBER: There are 2 quadrants where each trig function is positive and 2 quadrants where each trig function is negative.

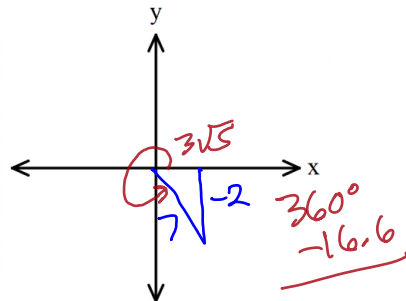
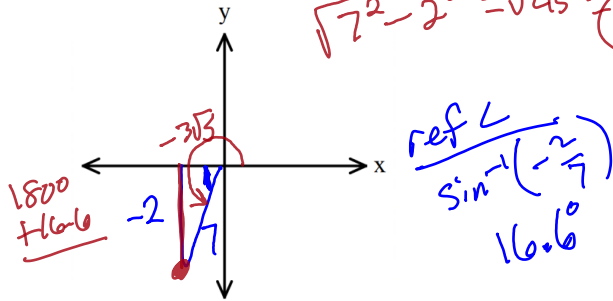
Draw the two triangles for the trig functions and find the coordinates that go with it. There will be 2 answers. Leave answers in simplest radical form. (Remember All Students Take Calculus). Then find the angles from $[0, 360^\circ)$ in standard position (round to the nearest tenth of a degree).

3. $\sin \theta = -\frac{2}{7}$

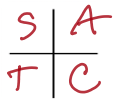


Coordinates: $(-3\sqrt{5}, -2)$ and $(3\sqrt{5}, -2)$ Angles: 196.6° and 343.4°

$\sqrt{7^2 - 2^2} = \sqrt{45} = 3\sqrt{5}$

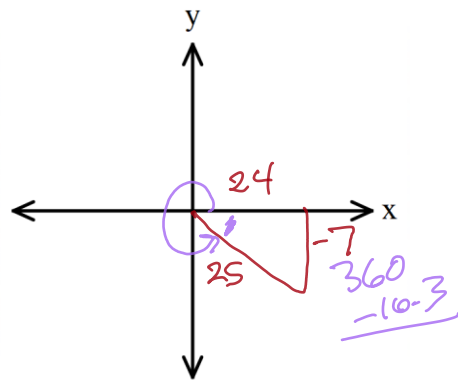
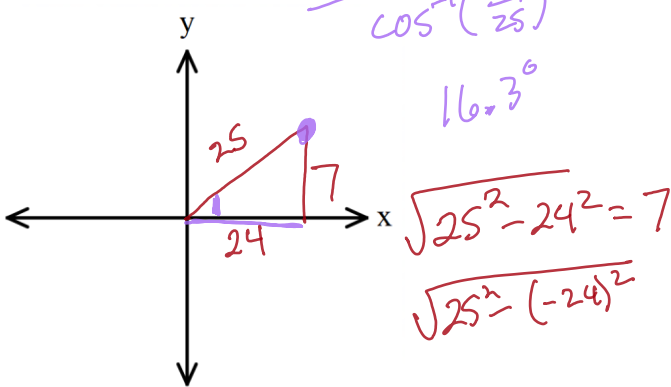


4. $\cos \theta = \frac{24}{25}$



Coordinates: $(24, 7)$ and $(24, -7)$ Angles: 16.3° and 343.7°

$\cos^{-1}(\frac{24}{25}) = 16.3^\circ$



5. $\tan \theta = -\frac{2}{5}$



Coordinates: _____ and _____ Angles: _____ and _____

