Algebra II
13.3 Coordinate Trigonometric Functions

Name KEY
Date_____ Period_____

Trigonometric Functions According to Quadrants (*BOW TIE*)

THINK SOH - CAH - TOA WITH EACH TRIANGLE

Quadrant II $(-x, y)$

$\sin\theta = \frac{y}{R}$

$\cos\theta = \frac{-x}{R}$

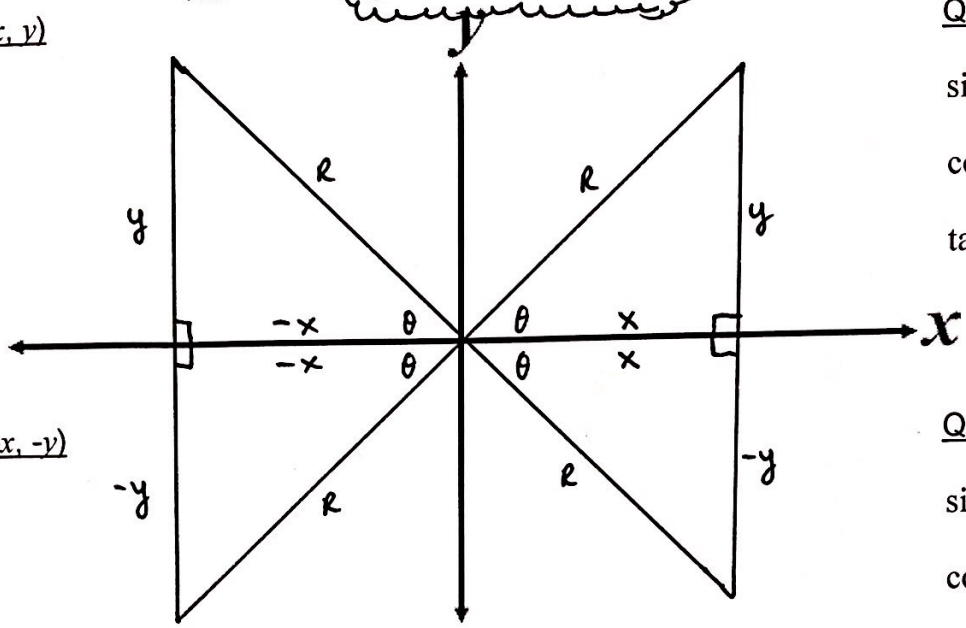
$\tan\theta = \frac{y}{-x}$

Quadrant I (x, y)

$\sin\theta = \frac{y}{R}$

$\cos\theta = \frac{x}{R}$

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



Quadrant III $(-x, -y)$

$\sin\theta = \frac{-y}{R}$

$\cos\theta = \frac{-x}{R}$

$\tan\theta = \frac{-y}{-x} = \frac{y}{x}$

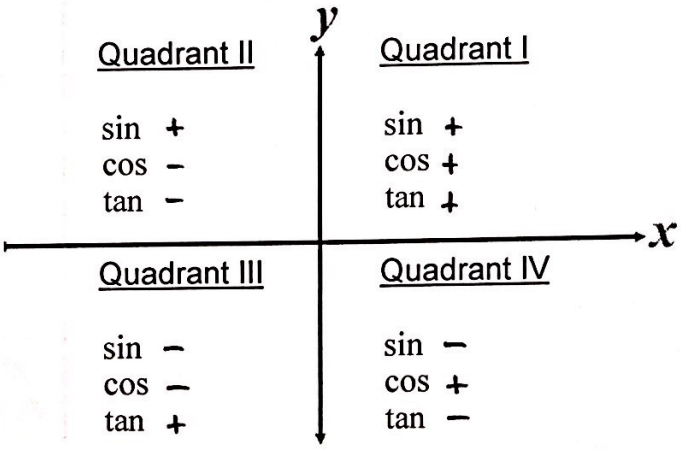
Quadrant IV $(x, -y)$

$\sin\theta = \frac{-y}{R}$

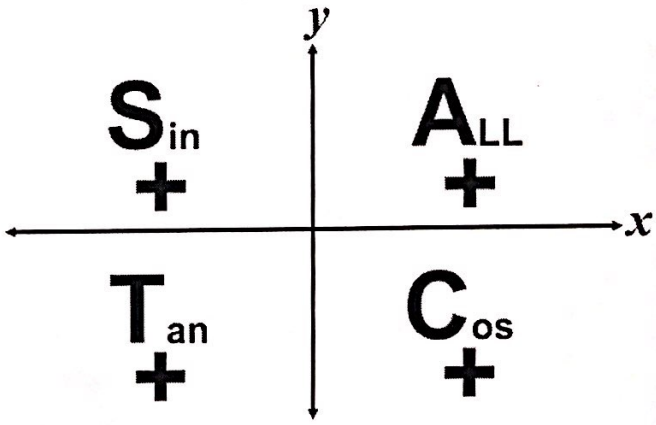
$\cos\theta = \frac{x}{R}$

$\tan\theta = \frac{-y}{x}$

Charge of Trigonometric Functions According to Quadrants

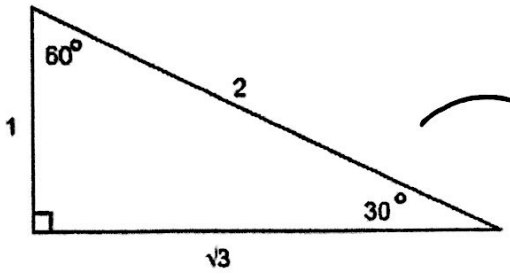


THIS SHOWS YOU WHICH TRIG FUNCTIONS ARE POSITIVE AND NEGATIVE IN EACH RESPECTIVE QUADRANT

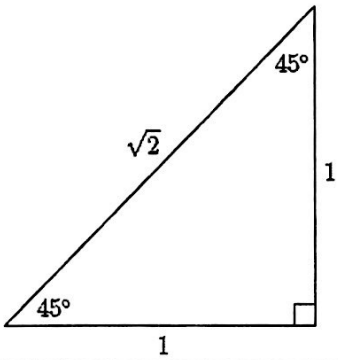


All **S**tudents **T**ake **C**lasses

THIS IS USED TO HELP YOU REMEMBER WHICH TRIG FUNCTIONS ARE POSITIVE IN EACH RESPECTIVE QUADRANT.



#1 FITS THIS SCENARIO



FITS #2 SETUP

Find the values of the six, simplified trigonometric functions of angle ϑ.

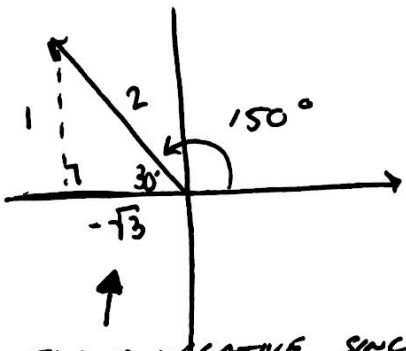
THESE ARE RECIPROCALS OF SIN, COS, TAN

1.) $\theta = 150°$

$\sin\vartheta = \frac{1}{2}$ → $\csc\vartheta = \frac{2}{1} = 2$

$\cos\vartheta = \frac{-\sqrt{3}}{2}$ → $\sec\vartheta = \frac{2}{-\sqrt{3}}$

$\tan\vartheta = \frac{1}{-\sqrt{3}}$ → $\cot\vartheta = \frac{-\sqrt{3}}{1}$



USE SOH-CAH-TOA FROM THE REF. ∡ TO ANSWER THE QUESTIONS

THIS IS NEGATIVE SINCE WE MOVED LEFT OF THE y-AXIS

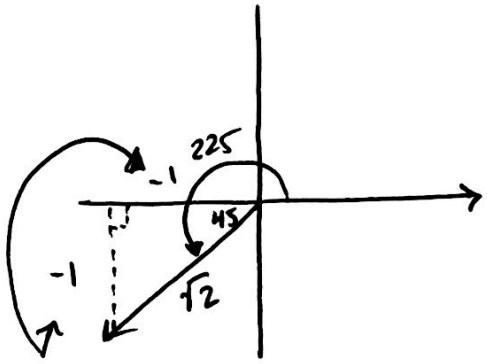
2.) $\theta = 225°$

RECIPROCALS

$\sin\vartheta = \frac{-1}{\sqrt{2}}$ $\csc\vartheta =$ _____

$\cos\vartheta = \frac{-1}{\sqrt{2}}$ $\sec\vartheta =$ _____

$\tan\vartheta = \frac{-1}{-1} = 1$ $\cot\vartheta =$ _____



NEGATIVE BECAUSE WE ARE LEFT OF y-AXIS AND BELOW x-AXIS

YOU TRY:

3.) $\theta = 300°$

$\sin\vartheta =$ _____ $\csc\vartheta =$ _____

$\cos\vartheta =$ _____ $\sec\vartheta =$ _____

$\tan\vartheta =$ _____ $\cot\vartheta =$ _____

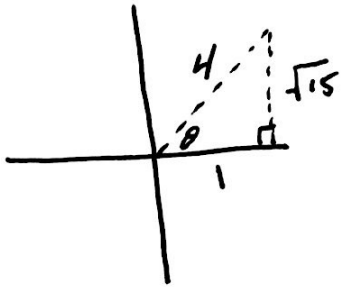
Finding Function Values of Coordinates

Given point (x, y), use the Pythagorean Theorem $\left(x^2 + y^2 = r^2\right)$ to figure out the value of r.

Find the values of the six, simplified trigonometric functions of angle ϑ.

4.) Point $(1, \sqrt{15})$

* PRETEND LIKE YOU'RE PLOTTING A POINT WHICH CREATES A RIGHT TRIANGLE



USE PYTHAGOREAN THEOREM TO FIND MISSING SIDE

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

$(1)^2 + (\sqrt{15})^2 = r^2$

$1 + 15 = r^2$

$\sqrt{16} = \sqrt{r^2}$

$4 = r$

$\sin\vartheta = \frac{\sqrt{15}}{4}$ $\csc\vartheta = \frac{4}{\sqrt{15}}$

$\cos\vartheta = \frac{1}{4}$ $\sec\vartheta = \frac{4}{1}$

$\tan\vartheta = \frac{\sqrt{15}}{1}$ $\cot\vartheta = \frac{1}{\sqrt{15}}$

RECIPROCAL

YOU TRY

5.) Point $(20, -48)$

$\sin\vartheta =$ _____ $\csc\vartheta =$ _____

$\cos\vartheta =$ _____ $\sec\vartheta =$ _____

$\tan\vartheta =$ _____ $\cot\vartheta =$ _____

YOU TRY

6.) Point $(3, \sqrt{7})$

$\sin\vartheta =$ _____ $\csc\vartheta =$ _____

$\cos\vartheta =$ _____ $\sec\vartheta =$ _____

$\tan\vartheta =$ _____ $\cot\vartheta =$ _____