Today's Learning Goal(s):

Date: ____________________

By the end of the class, I will be able to:

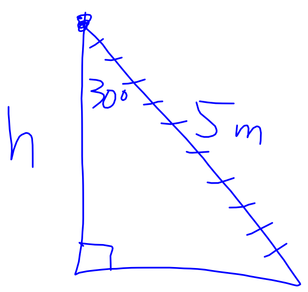
a) explain the relationship between the ratios of an angle in standard position, and the related acute angle (RAA).

b) determine the trig ratios of angles between 0^0 and 360^0.

Last day's work: pp. 286-287 # 1 – 9 [13 – 15]

8, 9

p. 287 **8.** A 5 m stepladder propped against a classroom wall forms an angle of 30° with the wall. Exactly how far is the top of the ladder from the floor? Express your answer in radical form. What assumption did you make?



$\cos 30^\circ = \frac{h}{5}$

$\frac{\sqrt{3}}{2} = \frac{h}{5}$

$h = \frac{5\sqrt{3}}{2}$ m

Wall is perpendicular to the floor.

p. 287 **9.** Show that $\tan 30^\circ + \frac{1}{\tan 30^\circ} = \frac{1}{\sin 30^\circ \cos 30^\circ}$.

$LS = \tan 30^\circ + \frac{1}{\tan 30^\circ}$

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

$= \frac{\sqrt{3}}{3} + \sqrt{3}$

$= \frac{\sqrt{3}}{3} + \frac{3\sqrt{3}}{3}$

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

$RS = \frac{1}{\sin 30^\circ \cos 30^\circ}$

$= \frac{1}{\left(\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right)}$

$= \frac{1}{\frac{\sqrt{3}}{4}}$

$= \frac{4}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

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

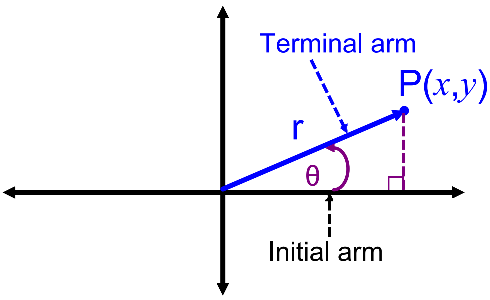
$\therefore LS = RS$

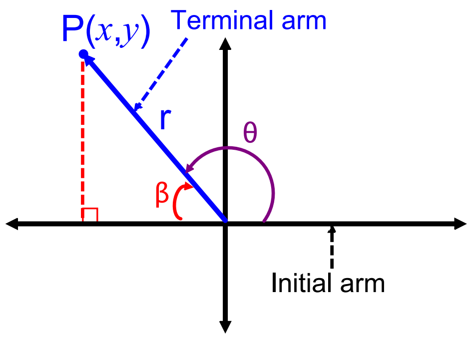
$\therefore$ QED.

Defining an angle in "standard position".

θ = Principal Angle

β = Related Acute Angle (RAA)





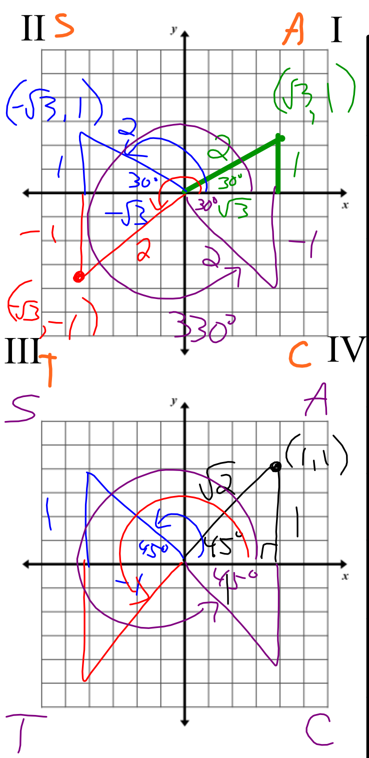
Note: In Quadrant I: θ = β

5.3 Exploring Trigonometric Ratios for Angles Greater Than 90°

Date: Apr. 25/19

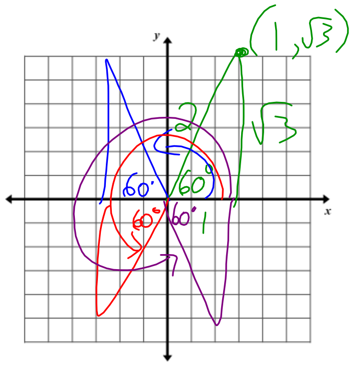
***Explore** the Math* pp. 289-291 A - J

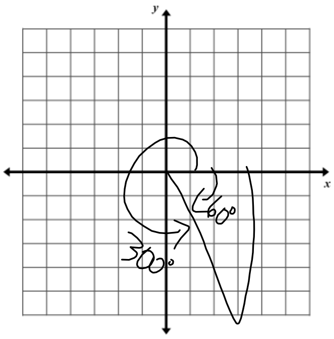
"CAST" Rule



Angles	Quadrant	Sine Ratio	Cosine Ratio	Tangent Ratio
Related Acute Angle $\beta = 30°$ $(= \theta)$	I	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
Principal Angle $\theta = 150°$	II	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{\sqrt{3}}$
$\theta = 210°$	III	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
$\theta = 330°$	IV	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$-\frac{1}{\sqrt{3}}$
$\beta = 45°$	I	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
$\theta = 135°$	II	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	-1
$\theta = 225°$	III	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	$+1$
$\theta = 315$	IV	$-\frac{1}{\sqrt{2}}$	$+\frac{1}{\sqrt{2}}$	-1

C
A
S
T
C





Angles	Quadrant	Sine Ratio	Cosine Ratio	Tangent Ratio
β = 60° (= θ)	I	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
θ = 120°	II	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$-\sqrt{3}$
θ = 240°	III	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$+\sqrt{3}$
θ = 300°	IV	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$-\sqrt{3}$
β = - 60° ∴ θ = 300°				
θ =				
θ =				
θ =				

5.4 Evaluating Trigonometric Ratios for $0^\circ \le \theta \le 360^\circ$ (Day1)

Ex.1

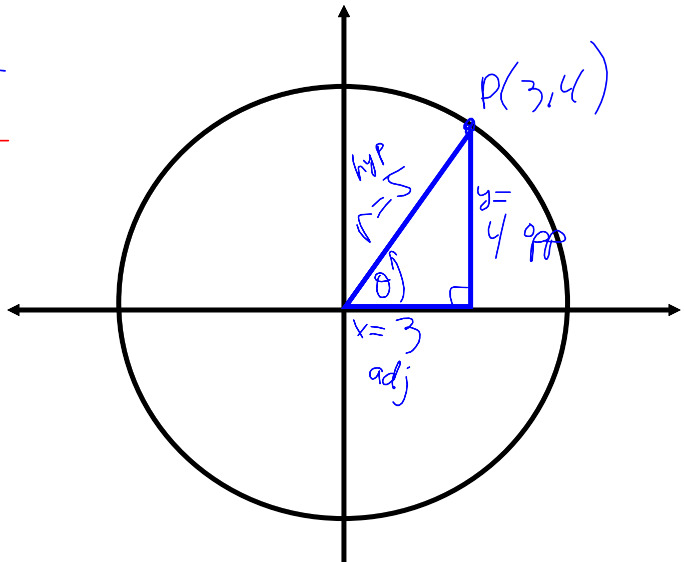
a) The point P(3,4) lies on the <u>terminal arm</u> of an angle θ.
Determine the primary trig ratios for θ.

$r^2 = x^2 + y^2$
$= (3)^2 + (4)^2$
$= 9 + 16$
$= 25$
$r = \pm\sqrt{25}$
$= \pm 5$
BUT, radius is ALWAYS POSITIVE
$\therefore r = 5$

$\sin\theta = \frac{4}{5}$
$= \frac{y}{r}$

$\cos\theta = \frac{3}{5}$
$= \frac{x}{r}$

$\tan\theta = \frac{4}{3}$
$= \frac{y}{x}$



SYR CXR TYX

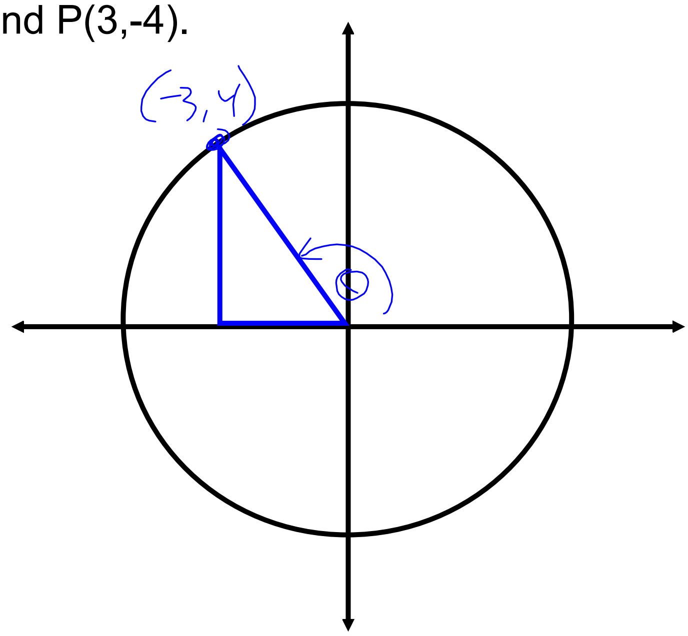
b) Repeat for P(-3,4), P(-3,-4) and P(3,-4).

$r^2 = x^2 + y^2$
$= (-3)^2 + (4)^2$
$= 9 + 16$
$\vdots$
$r = 5$

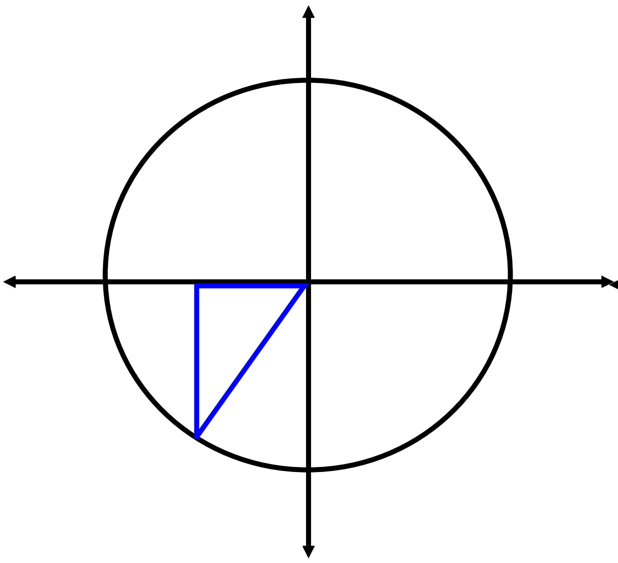
$\sin\theta = \frac{y}{r}$
$= \frac{4}{5}$

$\cos\theta = \frac{x}{r}$
$= \frac{-3}{5}$

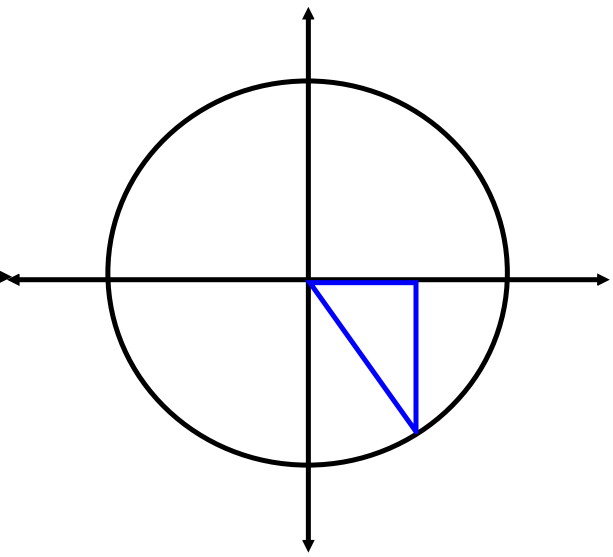
$\tan\theta = \frac{y}{x}$
$= \frac{-4}{3}$

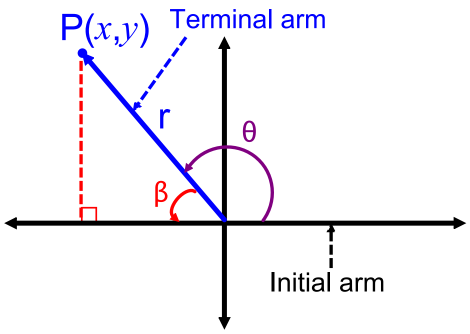


P(-3,-4)

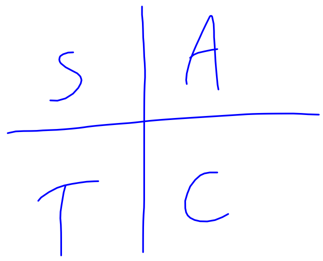


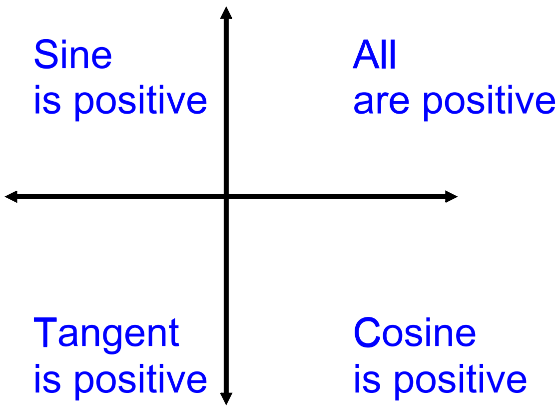
P(3,-4)





Circle Definitions for the Primary Trig Ratios





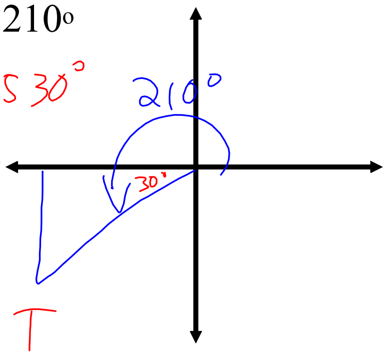
Ex.2 Determine the <u>exact</u> value for cos210°.

a) cos 210°

$= -\cos 30^\circ$

$= -\left(\frac{\sqrt{3}}{2}\right)$

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

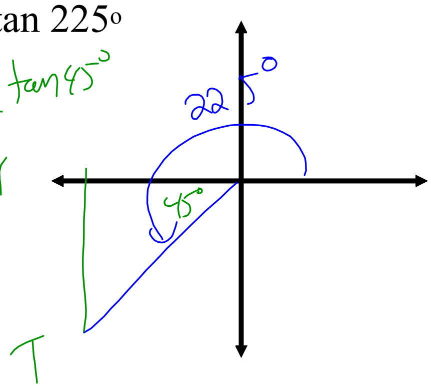


b) tan 225°

$= + \tan 45^\circ$

$= +1$

$= 1$



Ex.3 Determine the primary trig ratios for 180° and 270°.

$\sin 180^\circ = \frac{y}{r}$

$= \frac{0}{1}$

$= 0$

$\cos 180^\circ = \frac{x}{r}$

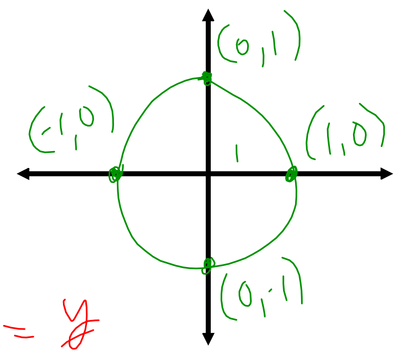
$= \frac{-1}{1}$

$= -1$

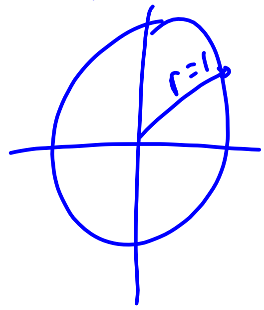
$\tan 180 = \frac{y}{x}$

$= \frac{0}{-1}$

$= 0$



"UNIT CIRCLE"



$\sin 270^\circ = \frac{y}{r}$

$= \frac{-1}{1}$

$= -1$

$\cos 270^\circ = \frac{x}{r}$

$= \frac{0}{1}$

$= 0$

$\tan 270^\circ = \frac{y}{x}$

$= \frac{-1}{0}$

= undefined

Today's Homework Practice includes: pp. 289-291 A – J (done via today's lesson)
p. 292 #1 – 4 **AND** pp. 299-300 #(1 – 5)ac

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 286-287 # 1 – 9 [13 – 15]

Today's Homework Practice includes:
pp. 289-291 A – J (done via today's lesson)
p. 292 #1 – 4 **AND**
pp. 299-300 #(1 – 5)ac