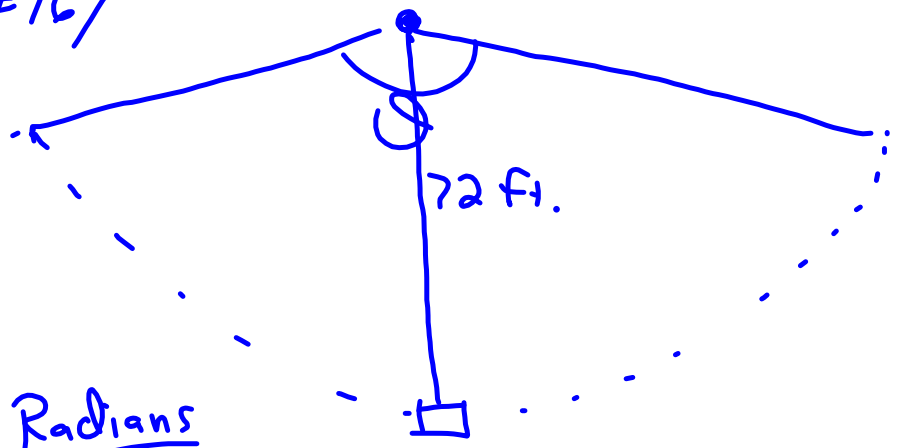
Pg. 177
#16/



Radians

a) $\theta = \frac{a}{r}$

$\theta = \frac{170}{72} = 2.36\ Rad$

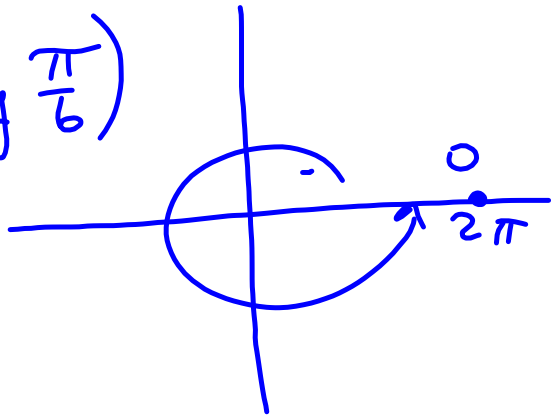
b) $2.36\ Rad \times \frac{180^\circ}{\pi\ Rad} = 135.2^\circ$

ex.

Radians (Every $\frac{\pi}{6}$)

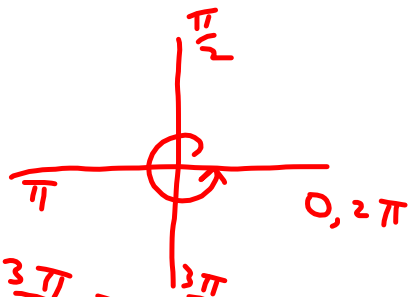
$0, \frac{\pi}{6}, \frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}$

$\frac{2\pi}{6}$ $\frac{3\pi}{6}$ $\frac{4\pi}{6}$



$\frac{5\pi}{6}, \pi, \frac{7\pi}{6}, \frac{4\pi}{3}, \frac{3\pi}{2}, \frac{5\pi}{4}, \frac{11\pi}{6}, 2\pi$

Every $\frac{\pi}{4}$



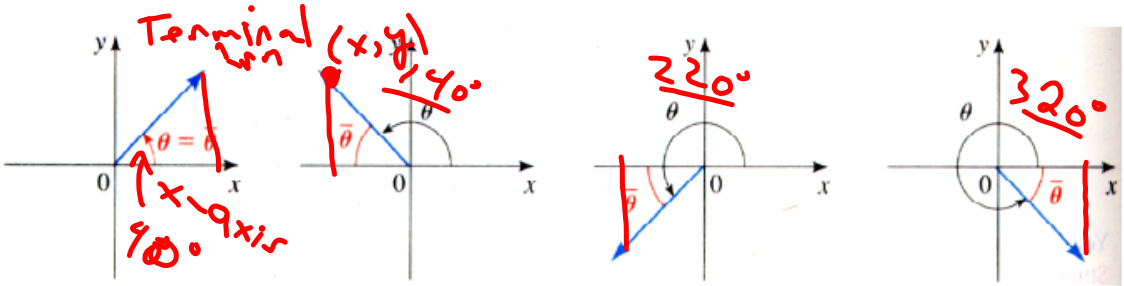
$0, \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \pi, \frac{5\pi}{4}, \frac{3\pi}{2}, \frac{7\pi}{4}, 2\pi$

$0, \frac{1\pi}{4}, \frac{2\pi}{4}, \frac{3\pi}{4}, \frac{4\pi}{4}$

Reference Triangles:

Definition 17 *The reference angle $\overline{\theta}$ of an angle θ in standard position is the acute angle (between 0 and 90°) the terminal side makes with the x-axis.*

The picture below illustrates this concept.

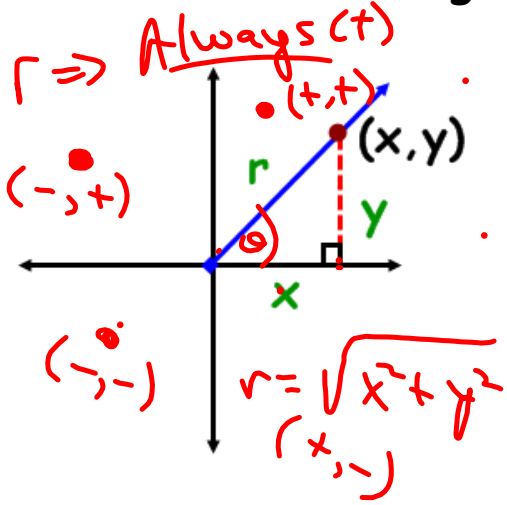


What is the significance of reference angles?

Angles on the Cartesian Plane

- **Reference Angle** - an acute angle formed between the terminal arm and the x-axis.

- **Reference Triangle** - a triangle formed by drawing a perpendicular line from a point on the terminal to the x-axis.

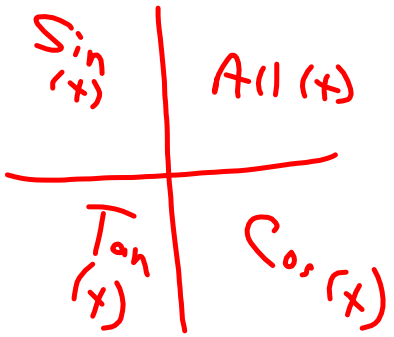


Notice what will happen if the rotation moves into other quadrants?

TRIG RATIOS on the CARTESIAN PLANE

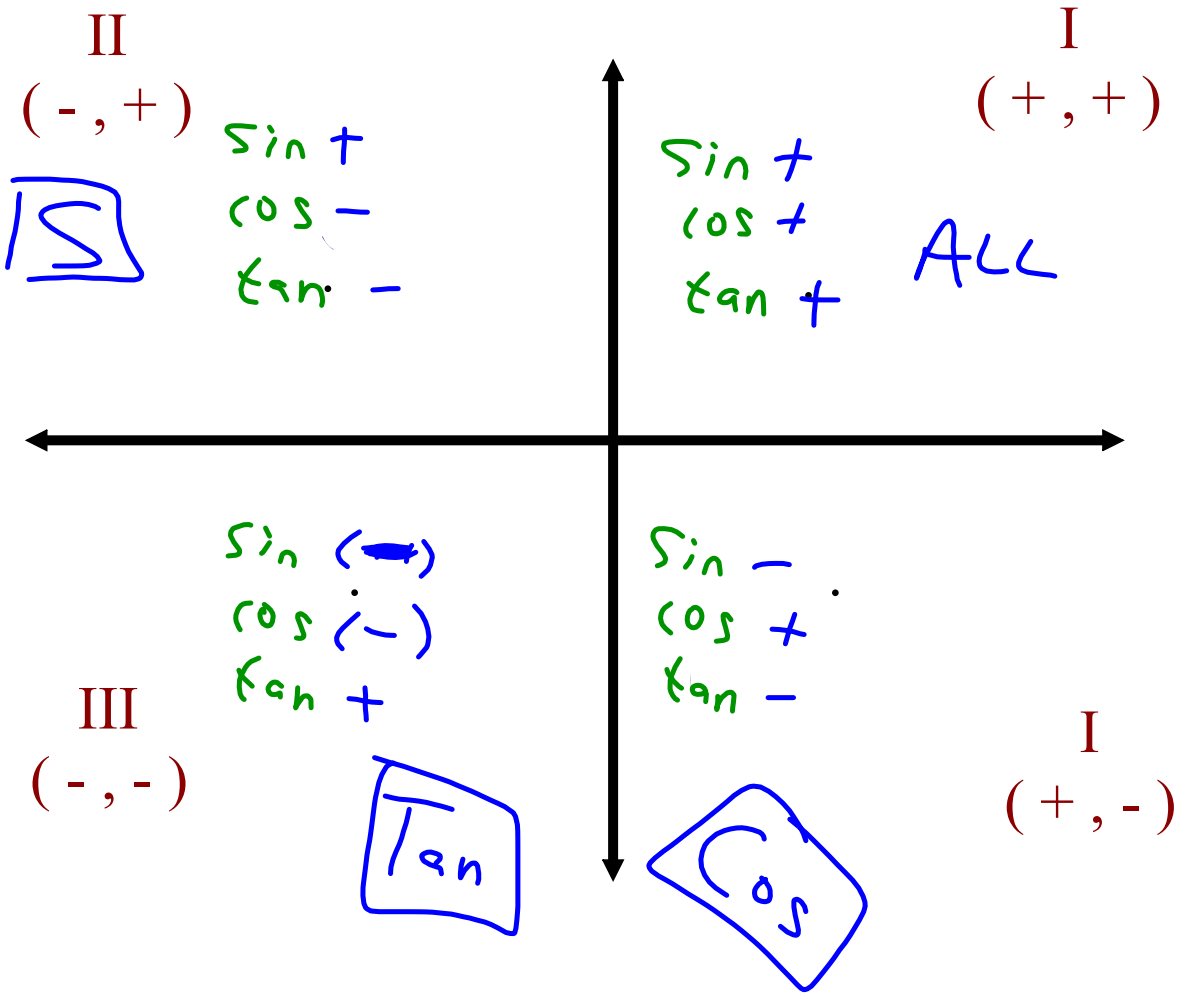
"Primary"	"Reciprocal"
$\sin\theta = \frac{y}{r}$ (+)	$\csc\theta = \frac{r}{y}$
$\cos\theta = \frac{x}{r}$ (+)	$\sec\theta = \frac{r}{x}$
$\tan\theta = \frac{y}{x}$	$\cot\theta = \frac{x}{y}$

CAST Rule



TRIG RATIOS IN ALL 4 QUADRANTS

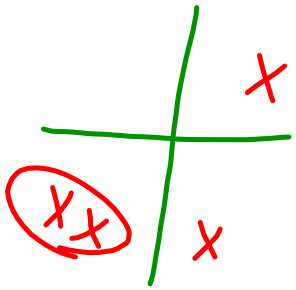
What primary trig ratios are POSITIVE in...



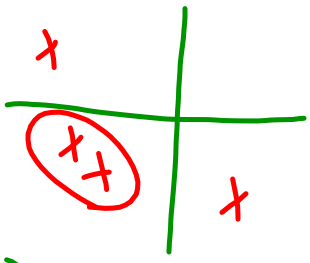
Quadrant Game??

(y) (y/x)
$\sin\theta < 0$ & $\tan\theta > 0$

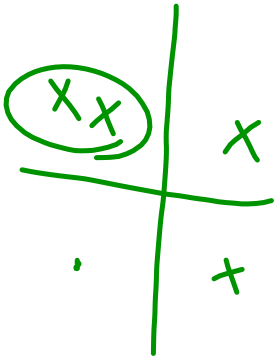
Q3



(x) (y)
$\sec\theta < 0$ & $\sin\theta < 0$

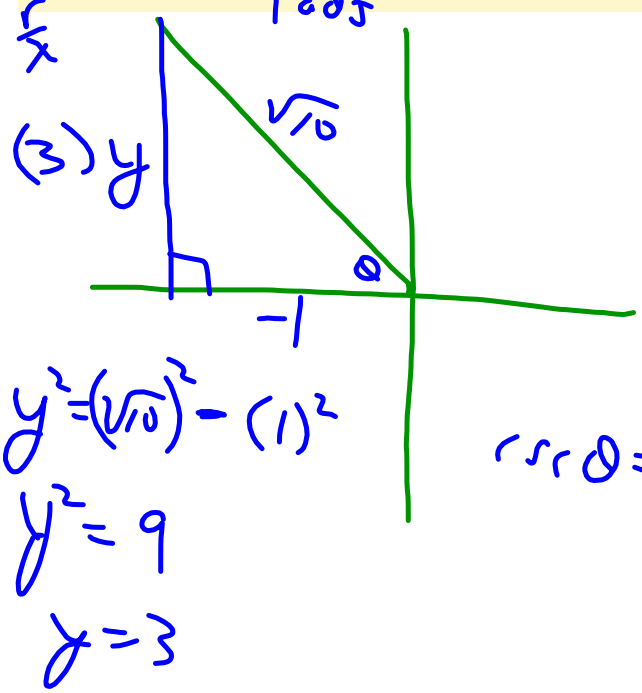


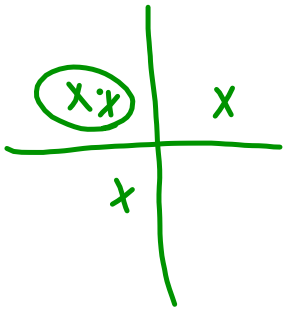
(y/x) (y)
$\cot\theta < 0$ and $\csc\theta > 0$



If $\sec\theta = -\frac{\sqrt{10}}{1}$ and $\sin\theta > 0$, determine the value of $\csc\theta$

(x) hyp (y) adj





$y^2 = (\sqrt{10})^2 - (1)^2$

$y^2 = 9$

$y = 3$

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

Example

Determine the measure (in radians) of an angle whose terminal arm passes through the ordered pair $(-2\sqrt{3}, -4)$