Check-Up

1) Find a negative angle co-terminal with $\frac{1387\pi}{5}$ $(-\frac{3\pi}{5})$

Radians:

$\frac{1385\pi}{5} + \frac{2\pi}{5}$

$277\pi + \frac{2\pi}{5}$

$\frac{\pi}{1} + \frac{2\pi}{5} = \frac{7\pi}{5} - \frac{2\pi}{1}$

$= -\frac{3\pi}{5}$

odd

$49932° \div 360°$

138.7

138 Rev.

$.7 \cdot 360° = 252°$

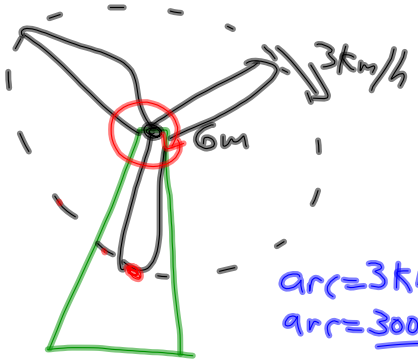
$-108°$

$-\frac{108\pi}{180} = -\frac{3\pi}{5}$

2) A windmill with blades 6m in length is spinning at 3 km/h.

(a) Determine the angular velocity of the blades (0.11 Rad/sec)

(b) How far would the tip of a blade travel in 15 minutes?



$V_A = \frac{\theta}{t}$ $\theta = \frac{a}{r}$

arc = 3km } 1 hour
arr = 3000m

$\theta = \frac{3000m}{6m}$

$\theta = 500\,Rad$

$V_A = \frac{500\,Rad}{1\,hr} \times \frac{1\,hr}{60\,min}$

$V_A = 8.\overline{3}\,Rad/min.$

(b) In 15 minutes . . .

$\theta = 8.\overline{3}\,\frac{Rad}{min} \times 15\,min = 125$

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

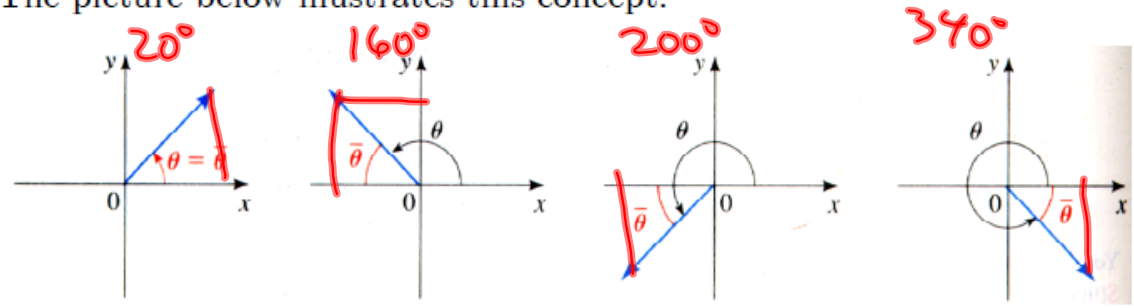
$125\,Rad = \frac{a}{6m}$

$a = 750m$

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.

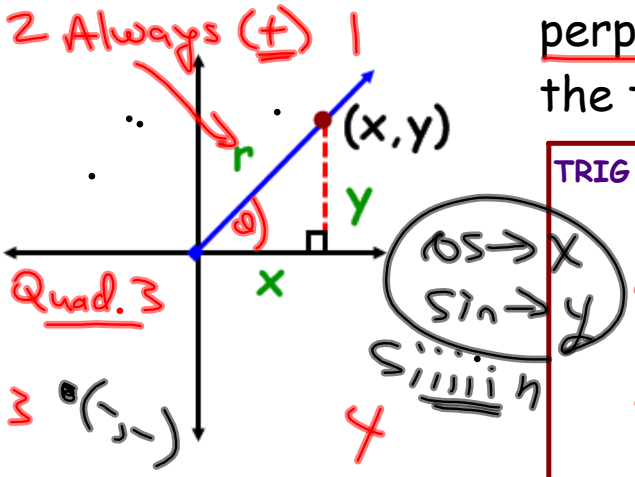


What is the significance of reference angles?

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.



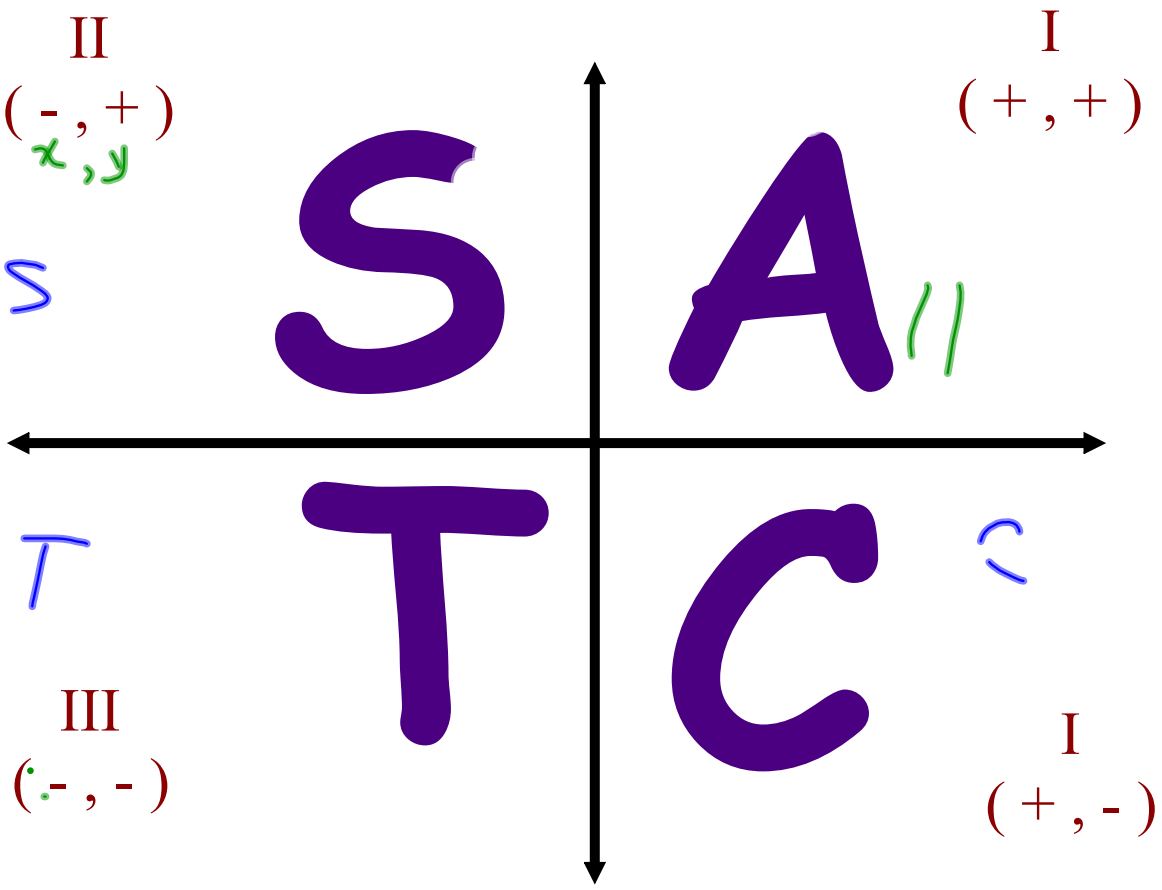
Notice what will happen if the rotation moves into other quadrants?

TRIG RATIOS on the CARTESIAN PLANE

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

TRIG RATIOS IN ALL 4 QUADRANTS

What primary trig ratios are POSITIVE in...



$\csc\theta < 0$

$(\sin\theta)$

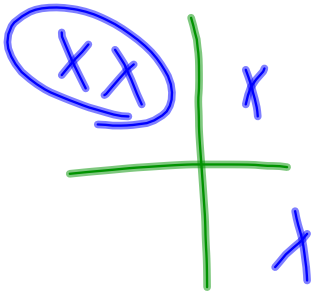
① $\sin\theta < 0$ & $\tan\theta < 0$

(y) (x & y)

Where is θ?

② $\csc\theta > 0$ & $\cot\theta < 0$

(y) (y, x)

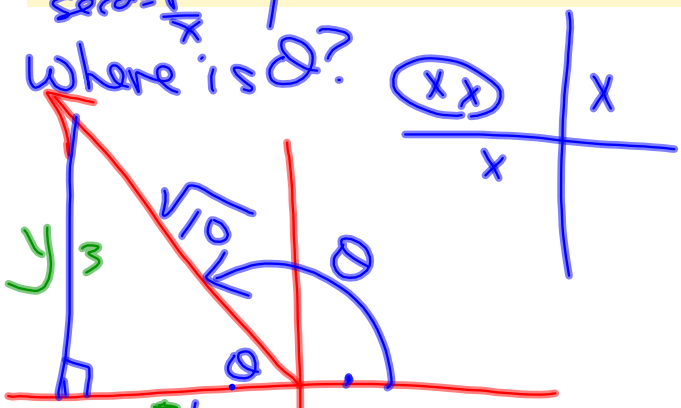


If $\sec\theta = -\frac{\sqrt{10}}{1}$ and $\sin\theta > 0$, determine the value of $\csc\theta$

(x) (y)

$\sec\theta = \frac{r}{x}$

Where is θ?



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

$y^2 = 9$

$y = 3$

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