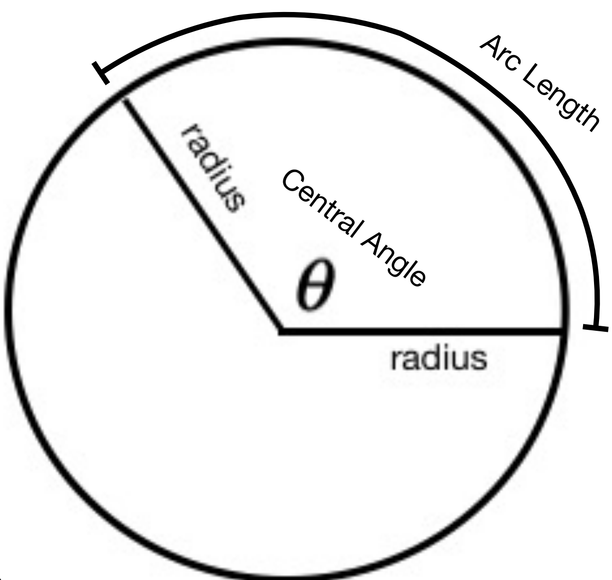
What's this?

1. What is a radian? How does it relate to degrees?
2. What are Linear and Angular Speed and how do I calculate them?
3. What is Arc Length and Sector Area and how do I calculate them?
4. What is the Unit Circle and what is it used for?
5. REVIEW - SOH CAH TOA

Vocabulary to get started

1. *Arc Length:* The distance along the curved line making up an arc. Usually represented as "s."
2. *Central Angle*: An angle whose vertex is on the center of the angle.
3. *Supplementary Angles*: Add to 180 degrees.
4. *Complementary Angles*: Add to 90 degrees.



Other Greek letter often used for angle variables

$\alpha = \text{alpha}$

$\beta = \text{beta}$

$\theta = \text{theta}$

$\omega = \text{omega}$

$\phi = \text{phi}$

Arithmetic and Calculator Skills needed to get started

$\frac{\pi}{3} - \frac{\pi}{4} =$

$\frac{\pi}{6} + \frac{\pi}{12} =$

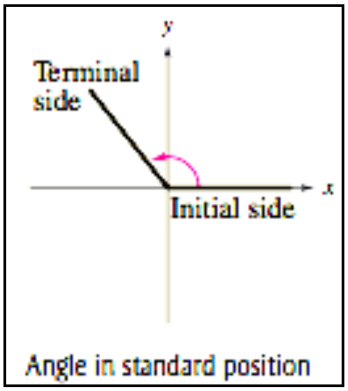
Finding Radians and Degrees on your Calculator

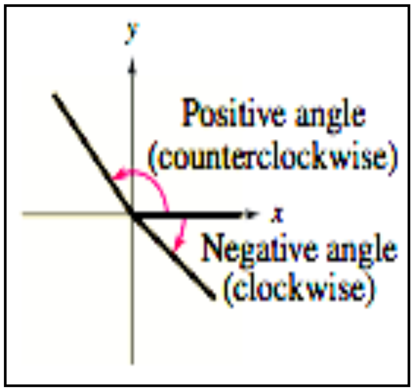
rationalizing denominators

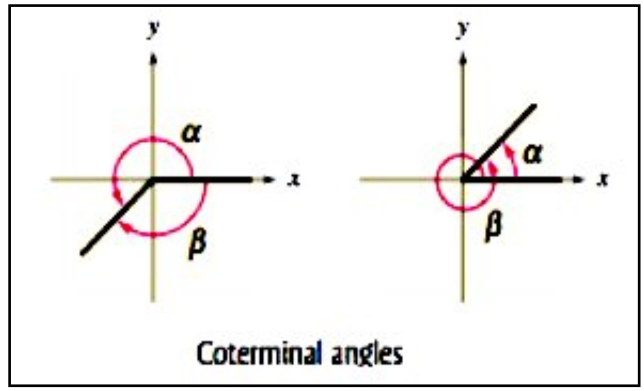
$\frac{3}{\sqrt{2}}$

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

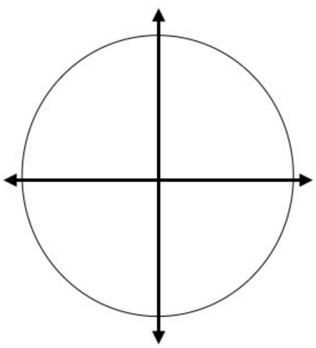
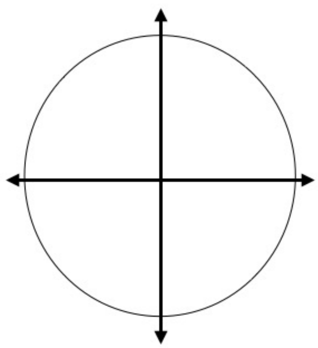
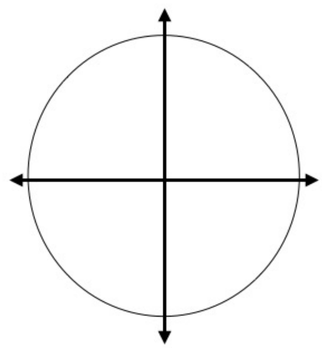
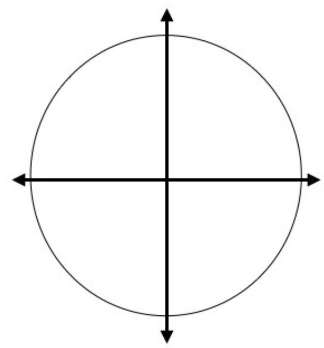
Understanding and Sketching Central Angles







Sketch the following angles for practice. Then give a coterminal angle of the angle you sketched.

225^o $\quad -90^o$ $\quad 405^o$ $\quad -210^o$

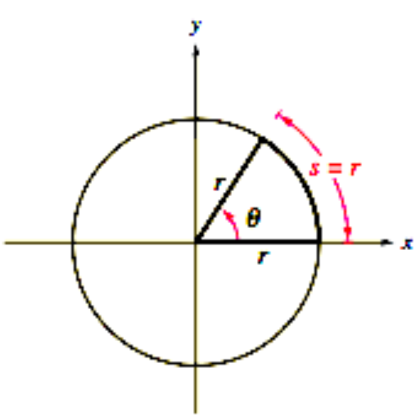
coterminal angle: ______ coterminal angle: ______ coterminal angle: ______ coterminal angle: ______

What is a radian and how does it relate to degrees?

<u>What is a Radian?</u>

One Radian is the measure of a central angle that intercepts an arc "s" equal in length to the radius of the circle. Radians are calculated more generally as

$$\text{Radians} = \frac{\text{Arc Length}}{\text{Radius}}$$



One Radian

<u>How many radians are there in one full circle?</u>

Since arc length (s) is going to go around the whole circle, it has the same value of the circle's circumference.

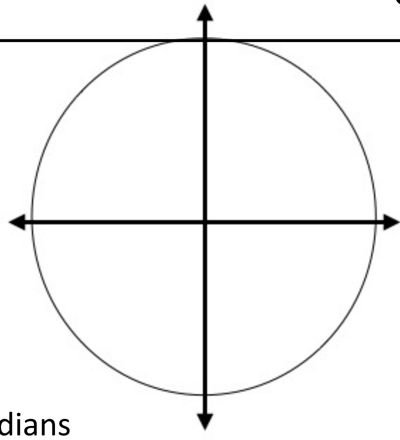
$$\text{Radians} = \frac{\text{Arc Length}}{\text{Radius}}$$

$C = 2\pi r$ Circumferece Formula

$$\text{Radians} = \frac{2\pi r}{r} = 2\pi$$

So there are 2π radians in one whole circle

Practice converting degrees <—> radians



$$\frac{\theta_d}{360} = \frac{\theta_r}{2\pi}$$

Convert to Radians

$135^o \rightarrow$

$-60^o \rightarrow$

$15^o \rightarrow$

Convert to Degree

$\frac{4\pi}{3} \rightarrow$

$-3\pi \rightarrow$

$\frac{5\pi}{8} \rightarrow$

SOH-CAH-TOA

Sine = $\frac{\text{opposite}}{\text{hypotenuse}}$

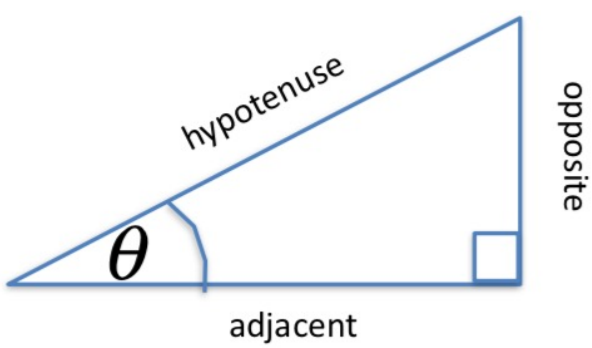
Cosine = $\frac{\text{adjacent}}{\text{hypotenuse}}$

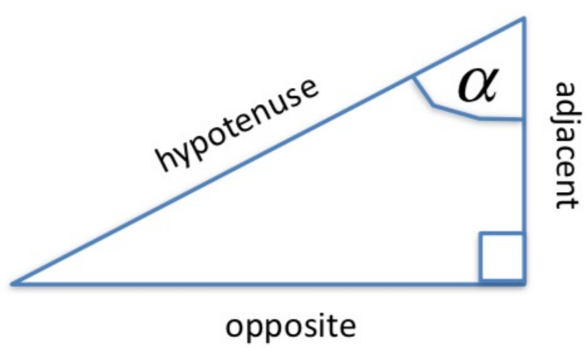
Tangent = $\frac{\text{opposite}}{\text{adjacent}}$

Cosecant = $\frac{\text{hypotenuse}}{\text{opposite}}$

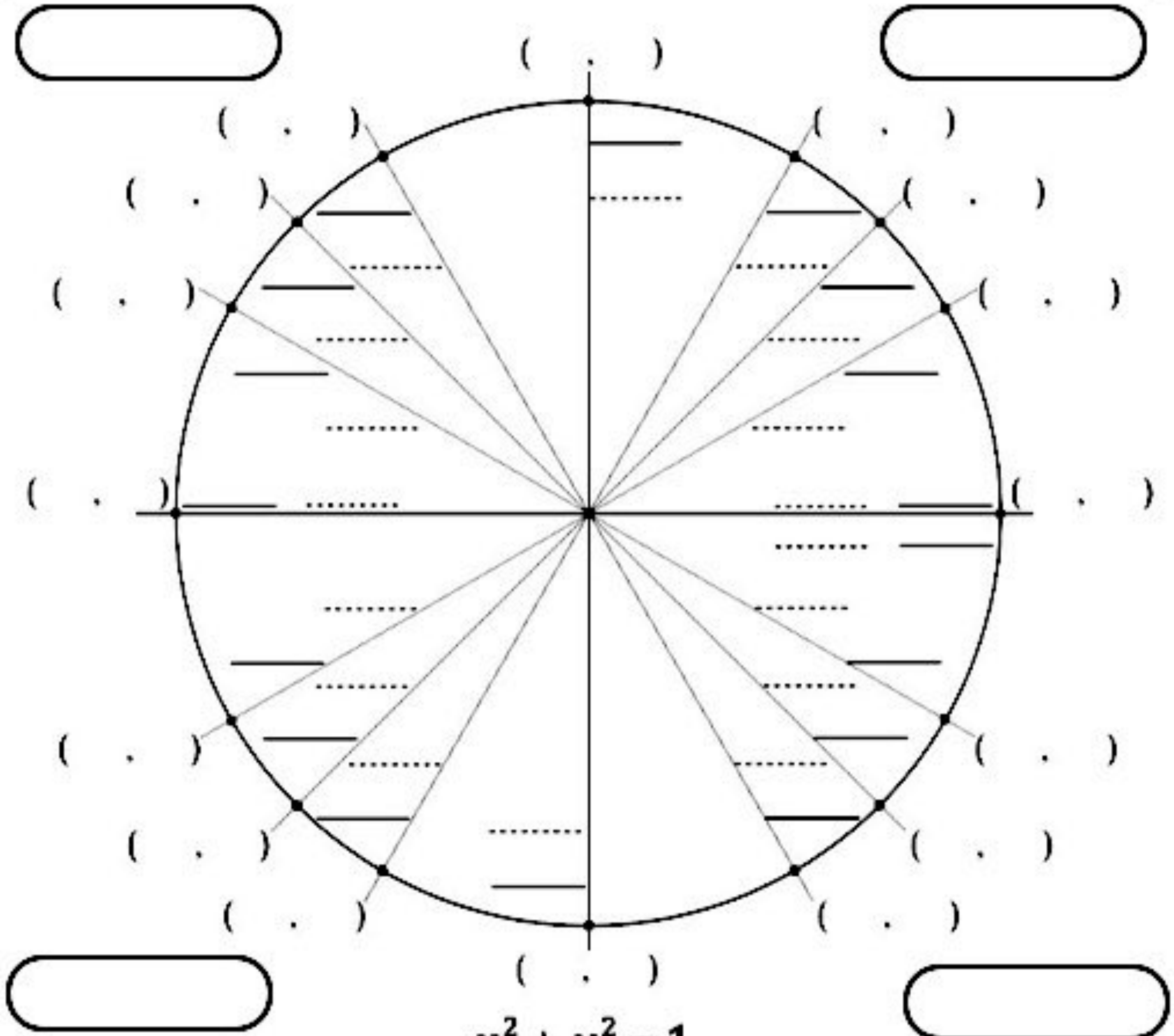
Secant = $\frac{\text{hypotenuse}}{\text{adjacent}}$

Cotangent = $\frac{\text{adjacent}}{\text{opposite}}$





Unit Circle



$$x^2 + y^2 = 1$$

Unit Circle Formula

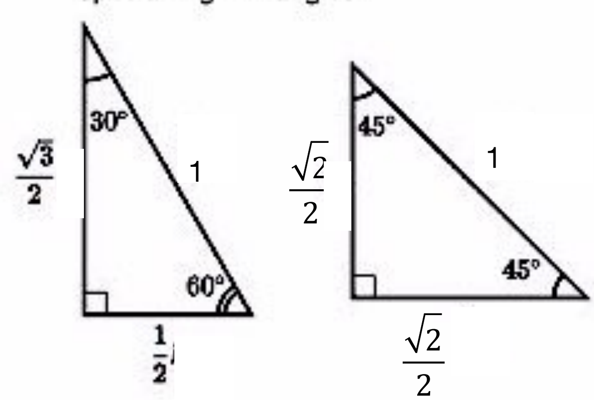
Trig definitions from unit circle

$\sin(\theta) = \frac{y}{1}$ $\csc(\theta) = \frac{1}{y}$

$\cos(\theta) = \frac{x}{1}$ $\sec(\theta) = \frac{1}{x}$

$\tan(\theta) = \frac{y}{x}$ $\cot(\theta) = \frac{x}{y}$

Special Right Triangles



Math III

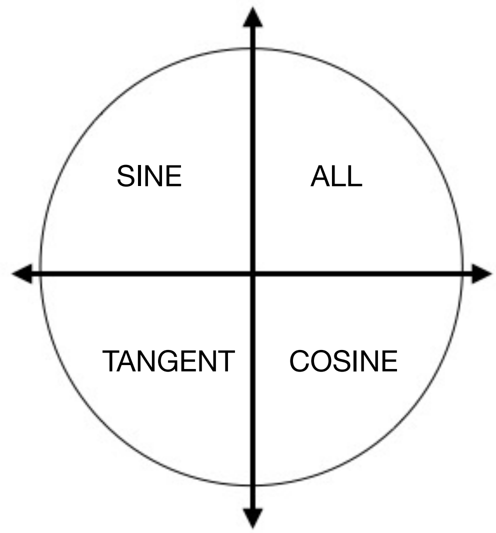
Intro to Trig - The Basics

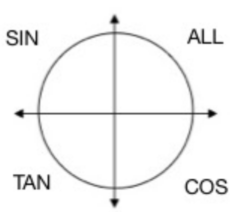
θ in degrees	θ in radians	reference angle	$\sin(\theta)$	$\cos(\theta)$	$\tan(\theta)$	$\csc(\theta)$	$\sec(\theta)$	$\cot(\theta)$	
0^o									axis
30^o									
45^o									Quadrant one
60^o									
90^o									axis
120^o									
135^o									Quadrant two
150^o									
180^o									axis
210^o									
225^o									Quadrant three
240^o									
270^o									axis
300^o									
315^o									Quadrant four
330^o									
360^o									axis

Using the TRIG CHART to evaluate trigonometric ratios strategically

θ (Deg)	θ (Rad)	Ref Angle	$\sin\theta$	$\cos\theta$	$\tan\theta$
0°					
30°					
45°					
60°					
90°					

Reference Angle: The angle that is made with the x-axis and the terminal side of angle.

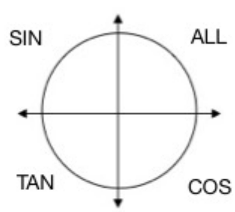




Reference Angle: ______________

Rewrite: ____________________

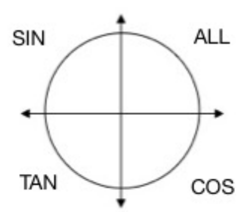
Solution: ____________________



Reference Angle: ______________

Rewrite: ____________________

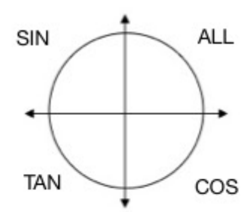
Solution: ____________________



Reference Angle: ______________

Rewrite: ____________________

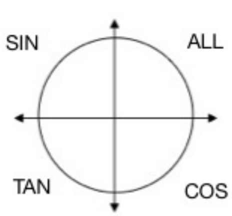
Solution: ____________________



Reference Angle: ______________

Rewrite: ____________________

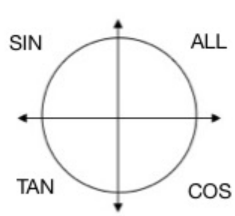
Solution: ____________________



Reference Angle: ______________

Rewrite: ____________________

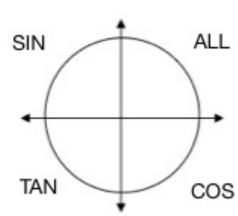
Solution: ____________________



Reference Angle: ______________

Rewrite: ____________________

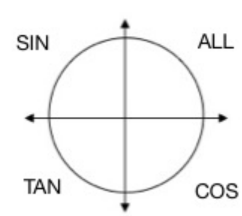
Solution: ____________________



Reference Angle: ______________

Rewrite: ____________________

Solution: ____________________

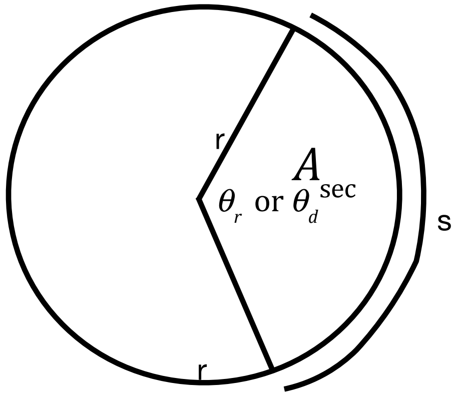


Reference Angle: ______________

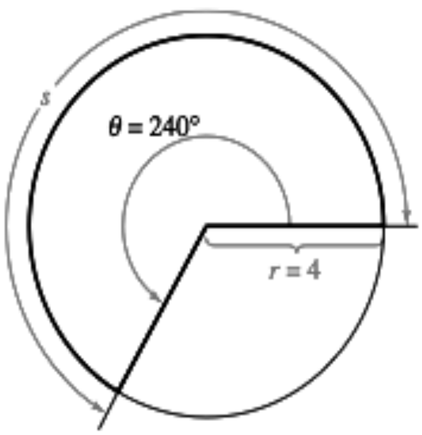
Rewrite: ____________________

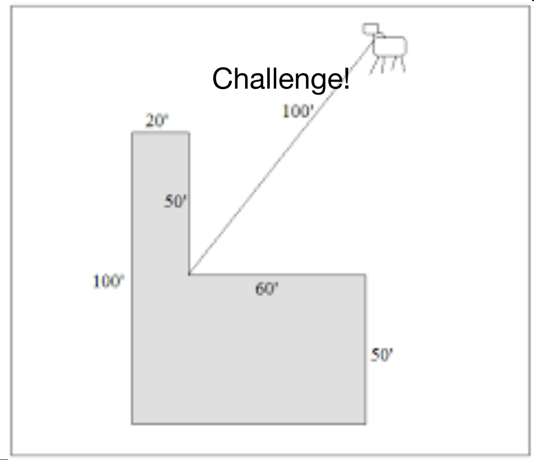
Solution: ____________________

Find Arc Length or Sector Area.



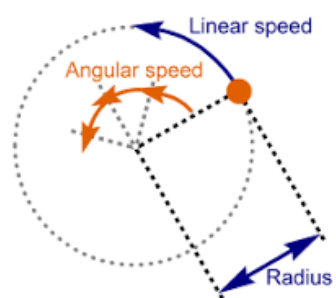
$$\frac{\theta_d}{360} = \frac{\theta_r}{2\pi} = \frac{s}{2\pi r} = \frac{A_{sec}}{\pi r^2}$$





Angular and Linear Speed

The radius of each wheel of the car is 15 inches. If the wheels are turning at a rate of 3 revolutions per second, how fast is the car moving? Express your answer in inches per second and miles per hour.



Next, find the angular speed of the wheel in degrees per second AND radian per second.