

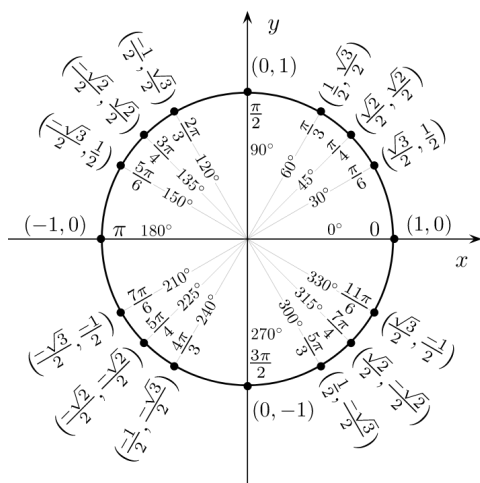


# -- Trigonometry --

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}} \quad \cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}} \quad \tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

## Unit Circle

### Picture



### Memorization Tricks

to memorize the angles in radians, memorize the pattern of the denominators and the rules for each quadrant.

note that in every quadrant, the denominators of the radian angles follow the pattern 6, 4, 3 as you get farther away from the x-axis

- Quadrant 1:  $\pi / \text{denominator}$
- Quadrant 2:  $(\text{denominator} - 1)\pi / \text{denominator}$
- Quadrant 3:  $(\text{denominator} + 1)\pi / \text{denominator}$
- Quadrant 4:  $(2\text{denominator} - 1)\pi / \text{denominator}$

if this isn't helpful, you can find more tricks on youtube :)

### Converting

degrees  $\cdot \frac{\pi}{180} = \text{radians}$   
^^ (get a  $\pi$  in numerator since rads always have  $\pi$ )

radians  $\cdot \frac{180}{\pi} = \text{degrees}$   
^^ ( $\pi$  is in denom, since you wanna cancel out the  $\pi$  in the radians)

## Formulas

### Pythagorean Identity

$$\sin^2 \theta + \cos^2 \theta = 1$$

ex. given that  $\cos \theta = -0.901$  and  $\pi < \theta < \frac{3\pi}{2}$ , find  $\sin \theta$   
 the boundaries show that  $\theta$  is in the 3<sup>rd</sup> quadrant, so  $\sin \theta$  is -  
 $\sin^2 \theta + (-0.901)^2 = 1 \rightarrow \sin^2 \theta = 0.188199 \rightarrow \sin \theta = \pm .433819$

since we established that  $\sin \theta$  is negative,  $\sin \theta = -0.433819$

### Arc Measure

central angle =  $\frac{\text{arc length}}{\text{radius}}$  aka  $\theta = \frac{s}{r}$   
(make sure  $\theta$  is in radians)

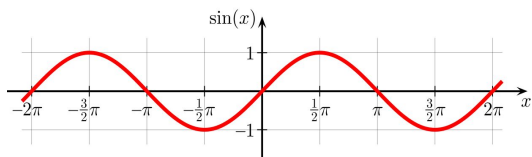
ex. find the length of the arc subtended by a central angle of 150° in a circle whose radius is 18 inches.

150°  $\rightarrow \frac{5\pi}{6}$  rads       $\theta = \frac{s}{r} \rightarrow s = \theta r$   
 $s = (\frac{5\pi}{6})(18) = 15\pi$  inches

## Graphing

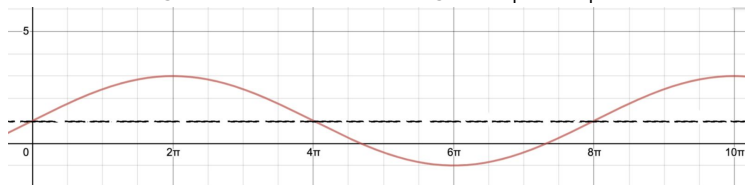
### Sine

parent function:



$$f(x) = 2\sin(x(\frac{1}{4}x)) + 1$$

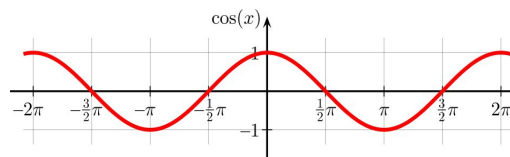
$a = 2$       period =  $\frac{2\pi}{b} = \frac{2\pi}{1/4} = 8\pi$   
 midline:  $y = 1$       counting by =  $\frac{\text{period}}{4} = \frac{8\pi}{4} = 2\pi$



midline  $\rightarrow$  up  $\rightarrow$  midline  $\rightarrow$  down  $\rightarrow$  midline  
 (the up and down are "the variable a" distance from the midline)

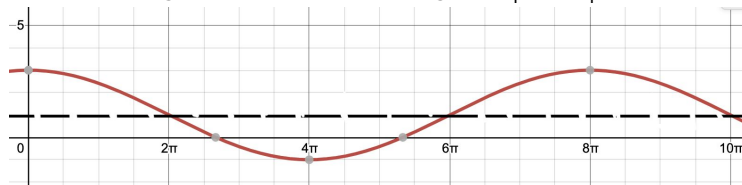
### Cosine

parent function:



$$f(x) = 2\cos(x(\frac{1}{4}x)) + 1$$

$a = 2$       period =  $\frac{2\pi}{b} = \frac{2\pi}{1/4} = 8\pi$   
 midline:  $y = 1$       counting by =  $\frac{\text{period}}{4} = \frac{8\pi}{4} = 2\pi$



up  $\rightarrow$  midline  $\rightarrow$  down  $\rightarrow$  midline  $\rightarrow$  up  
 (the up and down are "the variable a" distance from the midline)