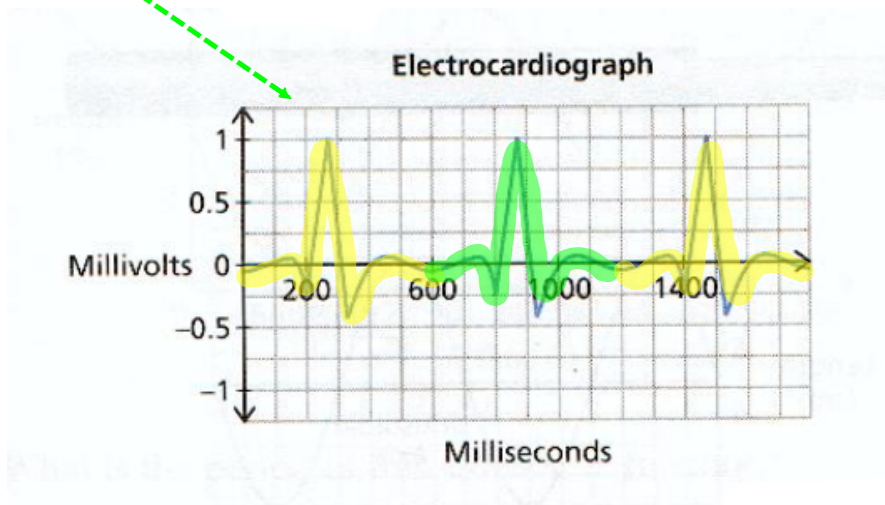
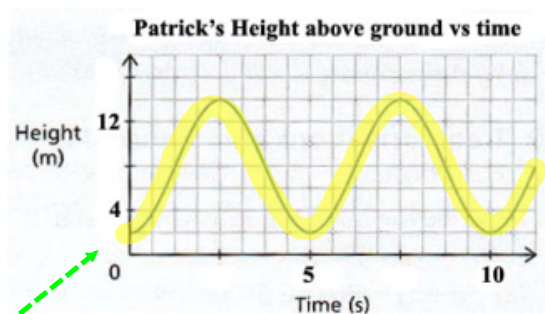


Remember!

Periodic Functions Repeat!

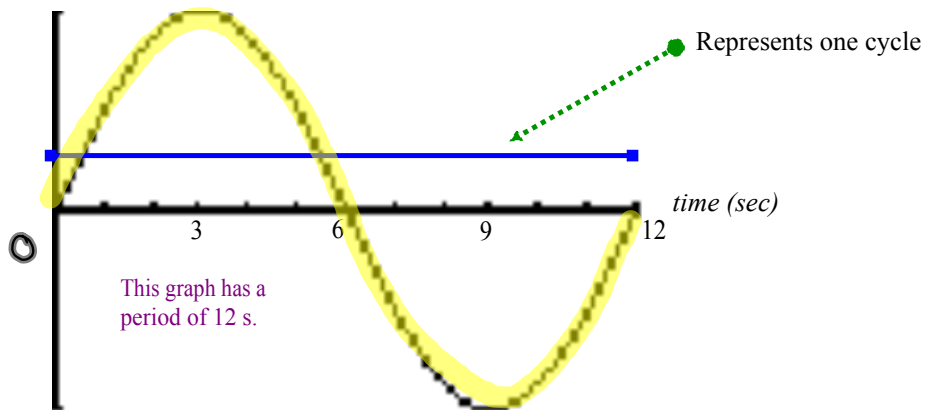


Sinusoidal Function: A periodic function that looks like waves, where any portion of the curve can be translated onto another portion of the curve.

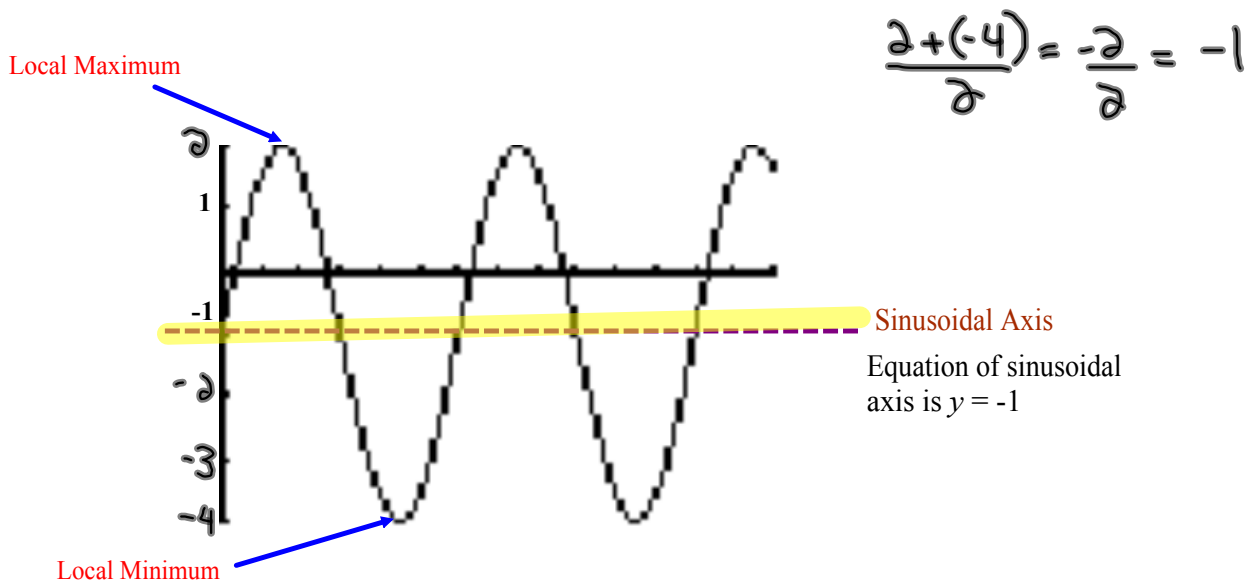


Repeats and looks like waves!

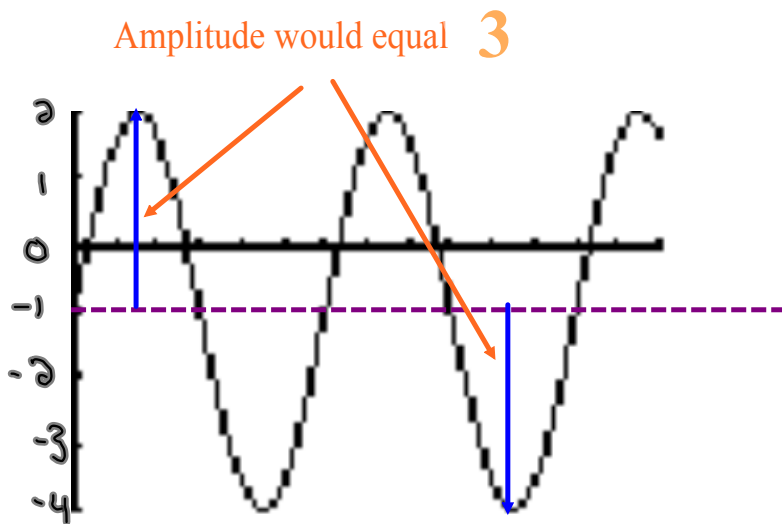
I. Period: The change in x corresponding to one cycle.



II. Sinusoidal Axis: The horizontal line halfway between the local maximum and local minimum.



III. Amplitude: The vertical distance from the sinusoidal axis to a local maximum or local minimum. (Positive)



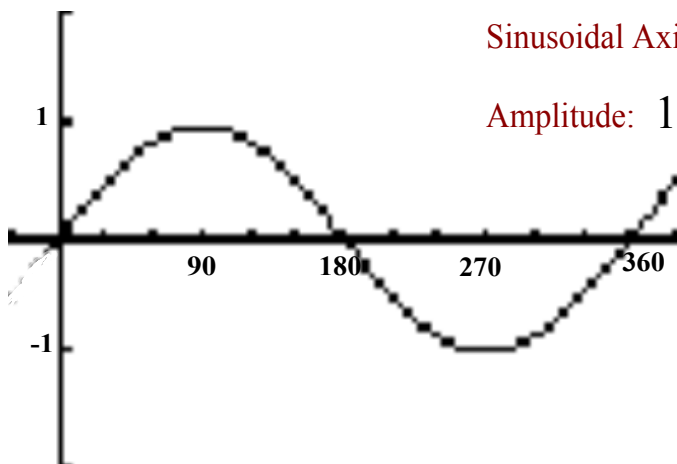
Summarize...

Here is the graph of $y = \sin \theta$

Period: 360

Sinusoidal Axis: $y = 0$

Amplitude: 1

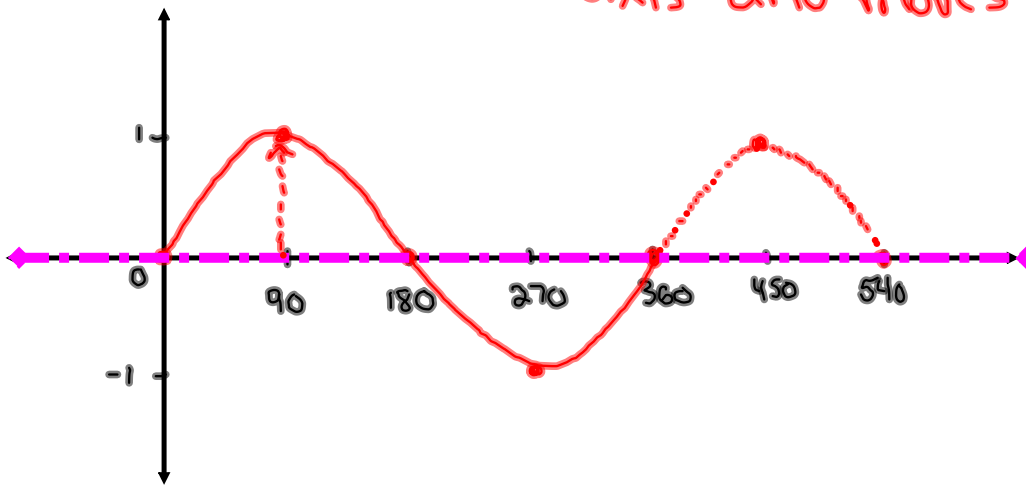


Let's examine the graph of $y = \sin \theta$ or $y = \sin x$

x	0	30	60	90	120	150	180	210	240	270	300	330	360
y	0	0.5	0.86	1	0.86	0.5	0	-0.5	-0.86	-1	-0.86	-0.5	0

Now plot the above points...

Starts on the sinusoidal axis and moves up



Is this a sinusoidal function? **Yes**

Find:

Amplitude = 1

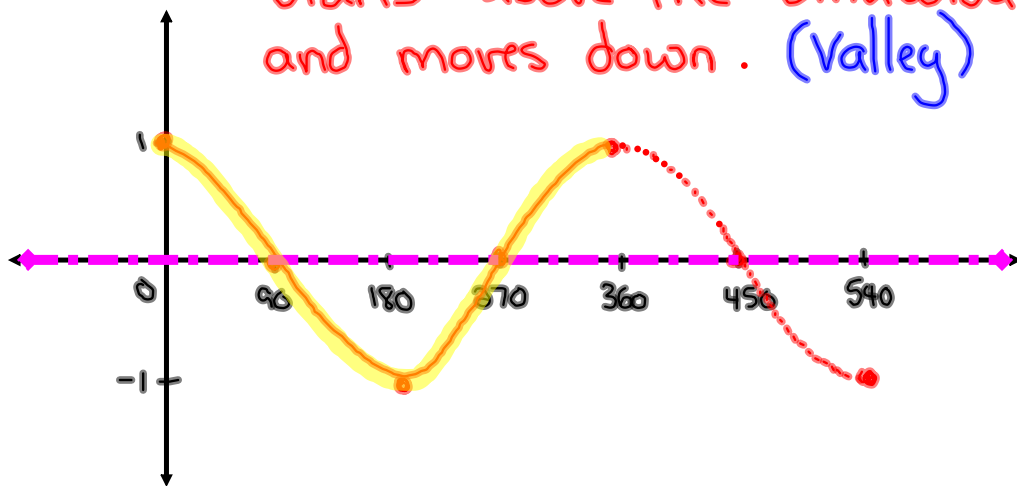
Period = 360

Equation of Sinusoidal Axis : $y = 0$

What about $y = \cos \theta$? or $y = \cos x$

θ	0	30	60	90	120	150	180	210	240	270	300	330	360
y	1	0.86	0.5	0	-0.5	-0.86	-1	-0.86	-0.5	0	0.5	0.86	1

Starts above the sinusoidal axis and moves down. (Valley)



Is this a sinusoidal function? Yes

Find:

Amplitude = 1

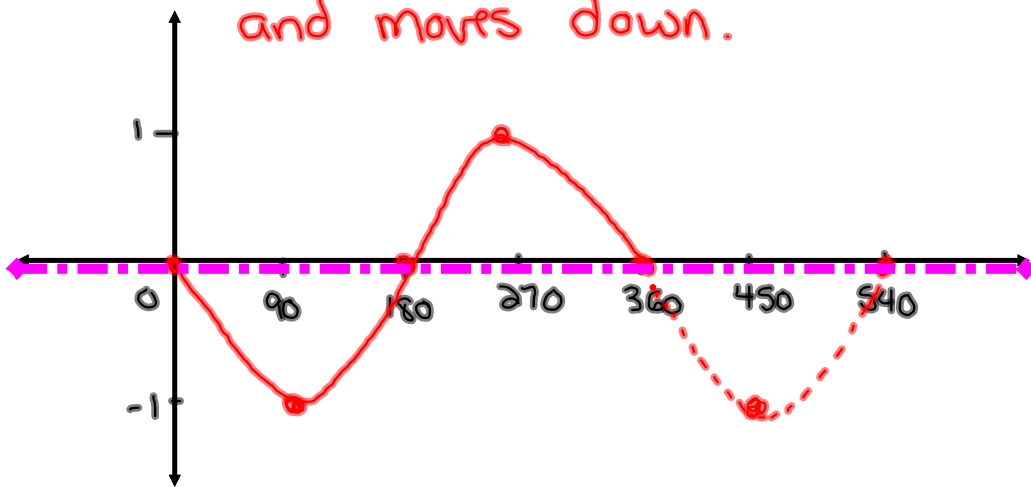
Period = 360

Equation of Sinusoidal Axis : $y = 0$

What about $y = -\sin x$

x	0	90	180	270	360
y	0	-1	0	1	0

Starts on the sinusoidal axis
and moves down.



Is this a sinusoidal function? **Yes**

Find:

Amplitude = 1

Period = 360

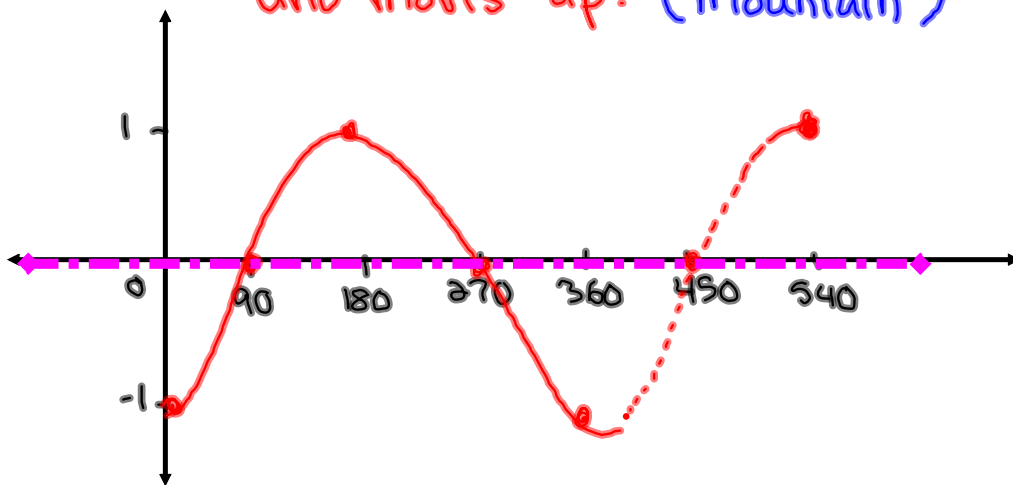
Equation of Sinusoidal Axis : $y=0$

..

What about $y = -\cos x$

x	0	90	180	270	360
y	-1	0	1	0	-1

Starts below the sinusoidal axis and moves up. (Mountain)



Is this a sinusoidal function? **Yes**

Find:

Amplitude = 1

Period = 360

Equation of Sinusoidal Axis : $y=0$

Equations in Standard Form

$$y = A \sin[k(x - C)] + D$$

A = **Amplitude** → influences how tall the sine curve is.

$K = \frac{360}{P}$ → influences how often the pattern repeats.

C = **Horizontal Translation** → Influences how far to the left or the right that the graph will shift.

- If C is positive → Shift Left
- If C is negative → Shift Right

D = **Vertical Translation** → influences how far up and down the graph will shift.

- If D is positive → Shift Up
- If D is negative → Shift Down

• Equal to your sinusoidal Axis

$$\textcircled{1} \text{ a) } y = -\underline{3} \sin[(x + \underline{60})] + \underline{0}$$

$$A = 3$$

$$C = -60$$

$$P = \frac{360}{k} = \frac{360}{1} = 360$$

$$k = 1$$

$$D = 0$$

$$\text{h) } 2y + 2 = 4 \cos(x - 90) - 6 \rightarrow -2$$

$$\frac{2y}{2} = \frac{4 \cos[(x - 90)] - 8}{2}$$

$$y = \underline{2} \cos[(x - \underline{90})] - \underline{4}$$

$$A = 2$$

$$C = 90$$

$$P = \frac{360}{k} = \frac{360}{1} = 360$$

$$k = 1$$

$$D = -4$$

$$\text{b) } y = \underline{2} \cos\left[\frac{1}{\underline{2}}(x)\right]$$

$$A = 2$$

$$C = 0$$

$$P = \frac{360}{k} = \frac{360}{\frac{1}{2}} = 720$$

$$k = \frac{1}{2}$$

$$D = 0$$

$$\text{e) } y = \sin(2x - 60)$$

$$y = -\sin[2(x - \underline{30})]$$

$$A = 1$$

$$C = 30$$

$$P = \frac{360}{k} = \frac{360}{2} = 180$$

$$k = 2$$

$$D = 0$$