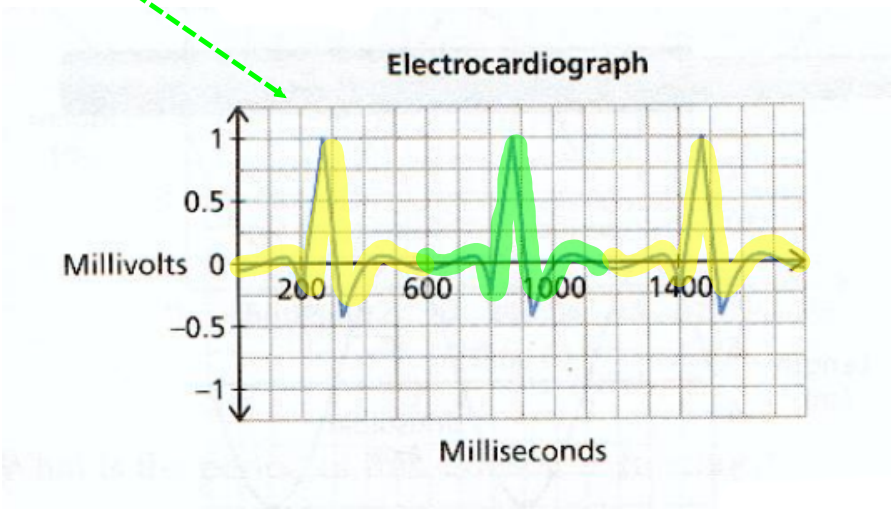
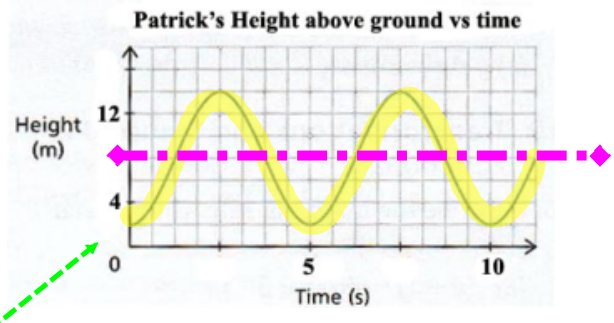
Remember!

Periodic Functions Repeat!

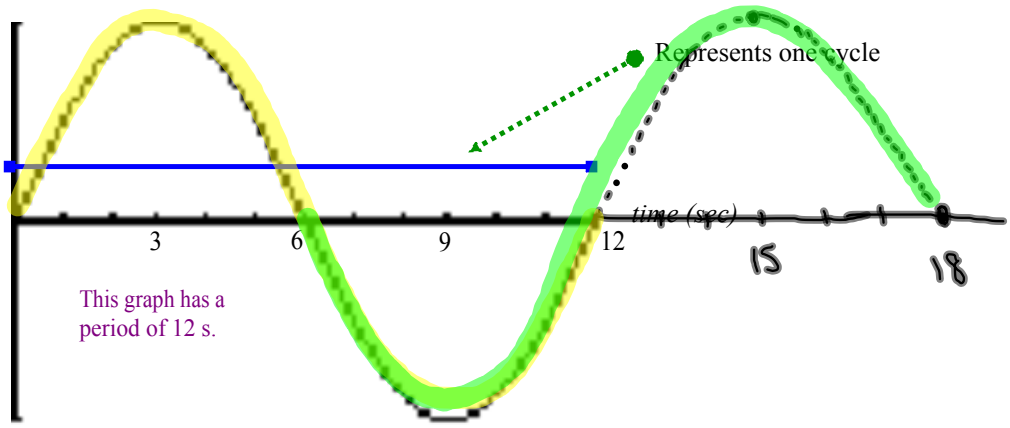


Sinusoidal Function: A periodic function that looks like waves, where any portion of the curve can be translated onto another portion of the curve.



Repeats and looks like waves!

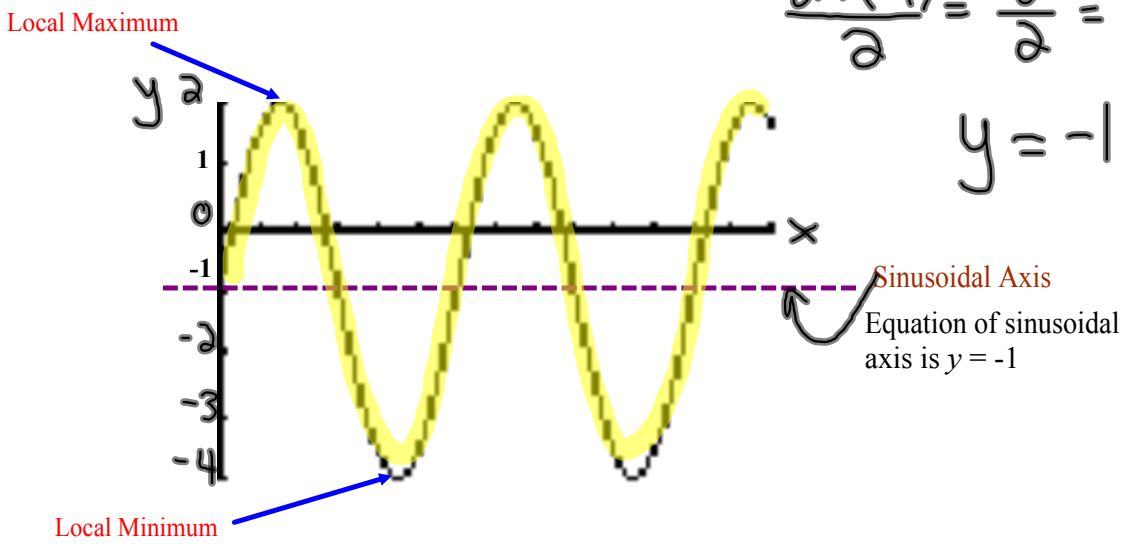
I. Period: The change in *x* corresponding to one cycle.



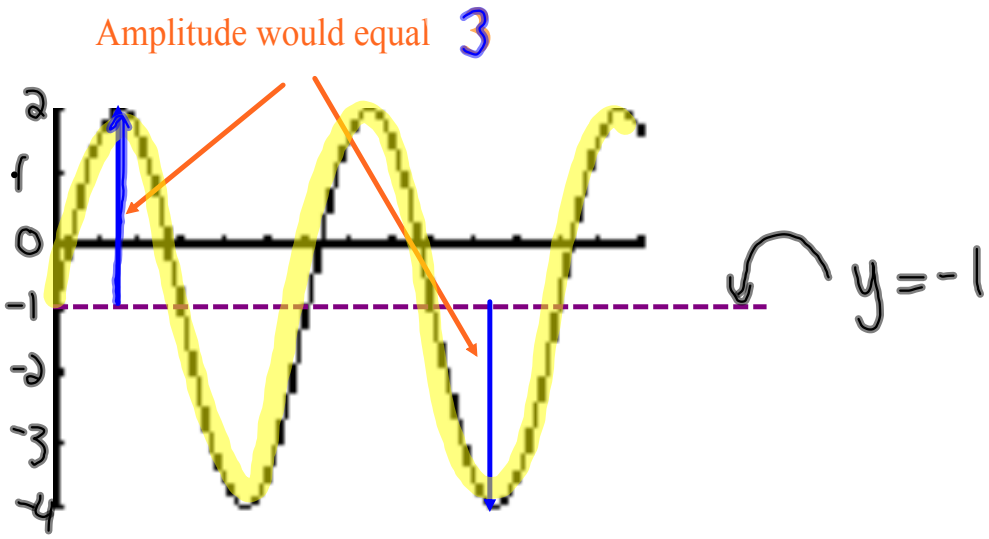
II. Sinusoidal Axis: The horizontal line halfway between the local maximum and local minimum.

$$\frac{2+(-4)}{2} = \frac{-2}{2} = -1$$

$$y = -1$$



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



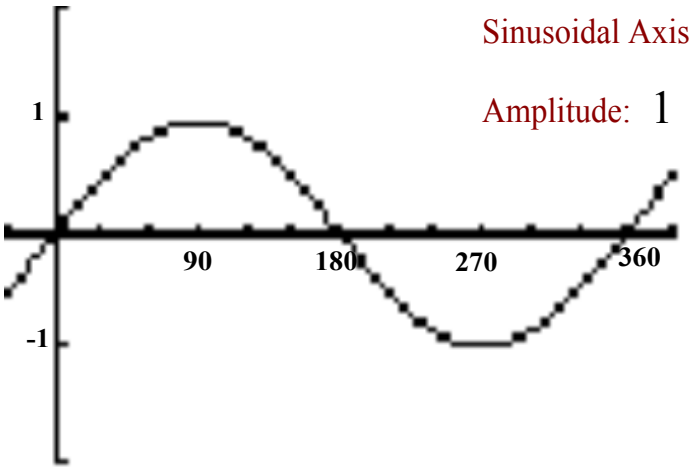
Summarize...

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

Period : 360

Sinusoidal Axis: y = 0

Amplitude: 1



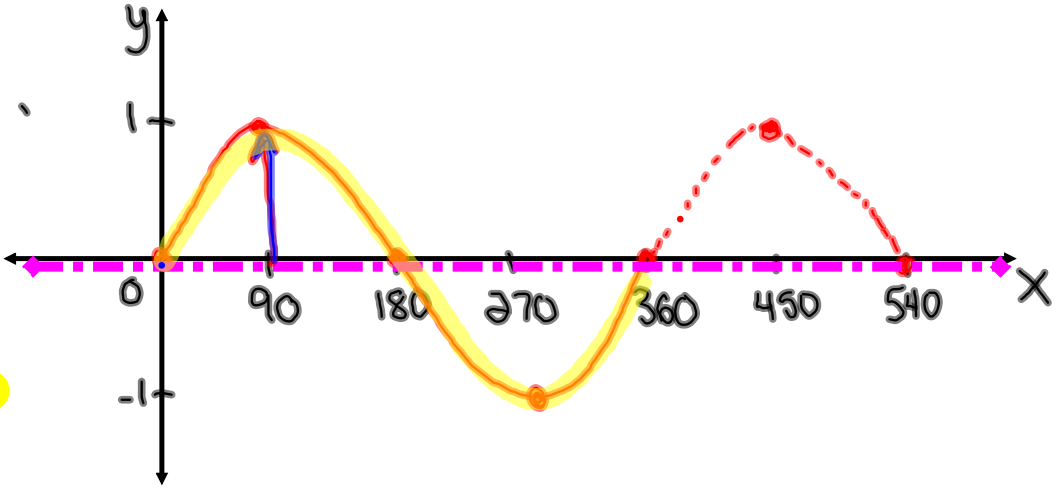
Let's examine the graph of $y = \sin\theta$

$y = \sin x$

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

* Starts on the sinusoidal axis and moves up

Now plot the above points...



Is this a sinusoidal function? Yes

Find:

Amplitude $A = 1$

Period : $P = 360$ | $k = \frac{360}{P} = \frac{360}{360} = 1$

*Equation of Sinusoidal Axis $y = 0$

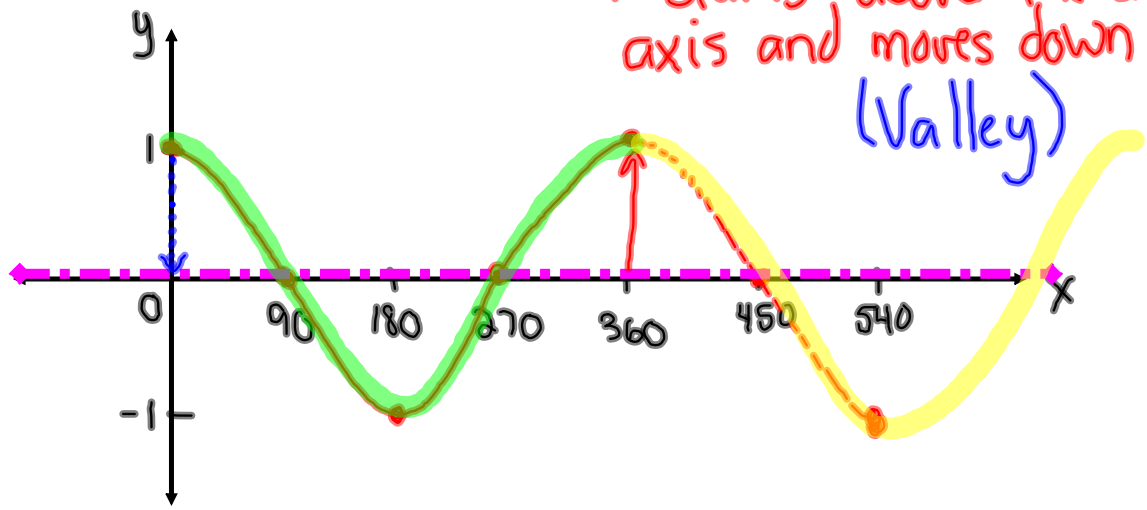
Vertical Translation : $D = 0$

Horizontal Translation : $C = 0$

What about $y = \cos\theta$?

$y = \cos x$

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 $A = 1$

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

* Equation of Sinusoidal Axis $y = 0$

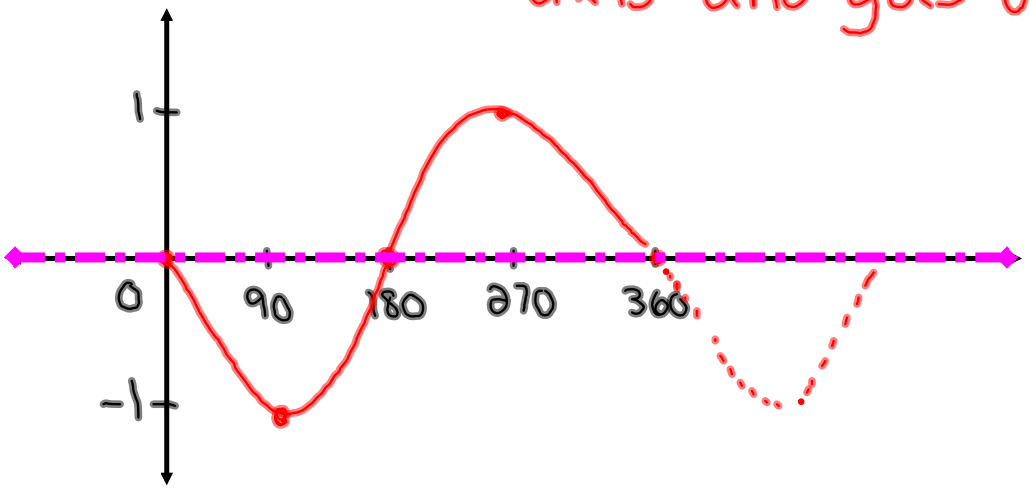
$D = 0$

$C = 0$

What about $y = -\sin x$

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

* Starts on the sinusoidal axis and goes down



Is this a sinusoidal function? Yes

Find:

Amplitude

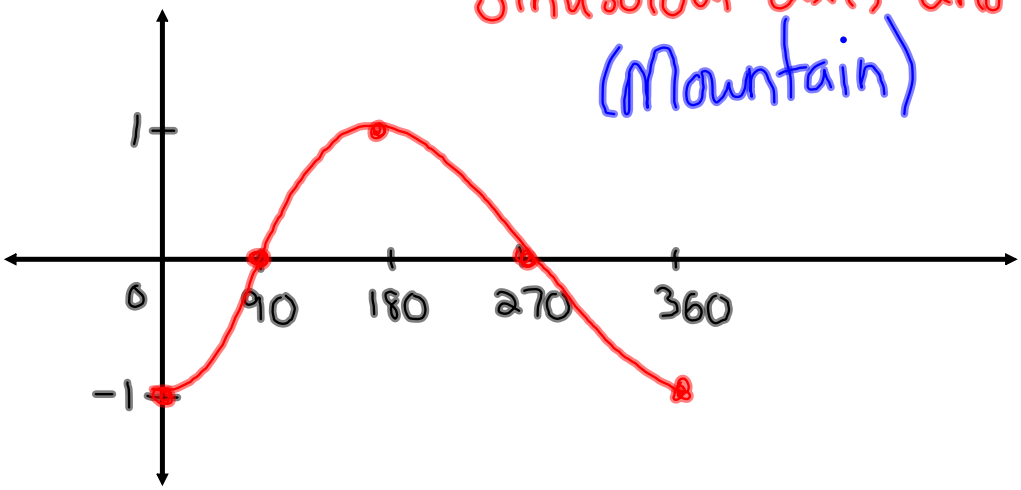
Period

Equation of Sinusoidal Axis

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?

Find:

Amplitude

Period

Equation of Sinusoidal Axis

a) $y = -3\sin(x+60) + 0$

$A = 3$

$k = 1$

$C = -60$

$D = 0$

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

b) $y = 2\cos\left[\left(\frac{1}{2}\right)(x)\right] + 0$

$A = 2$

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

$C = 0$

$D = 0$

$P = \frac{360}{\frac{1}{2}} = 360 \times 2 = \boxed{720}$