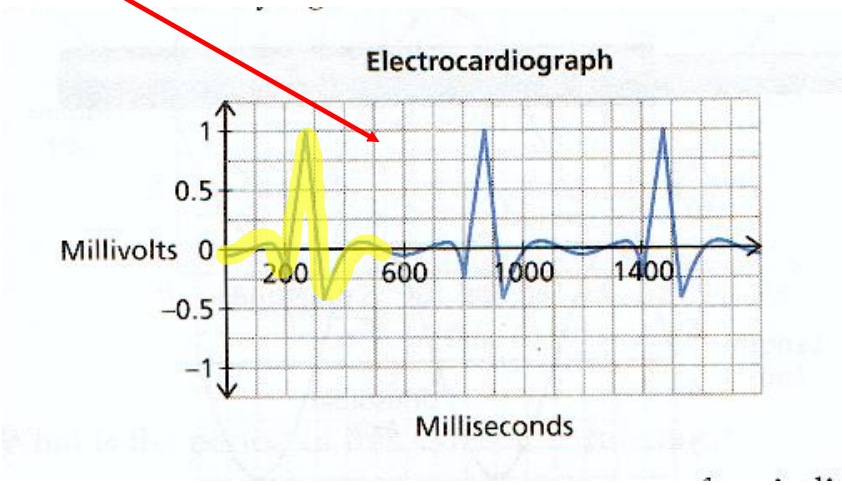
Sinusoidal Relations

Periodic Function: A function for which the dependent variable takes on the same set of values over and over again as the independent variable changes.

A function that repeats.

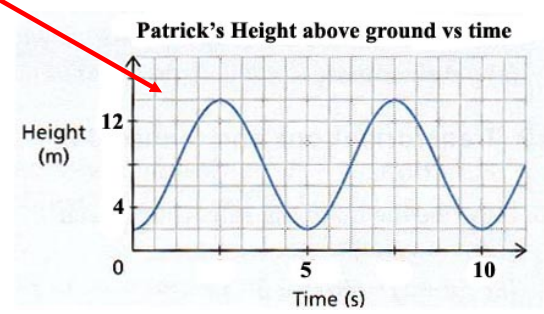
Example of periodic behavior



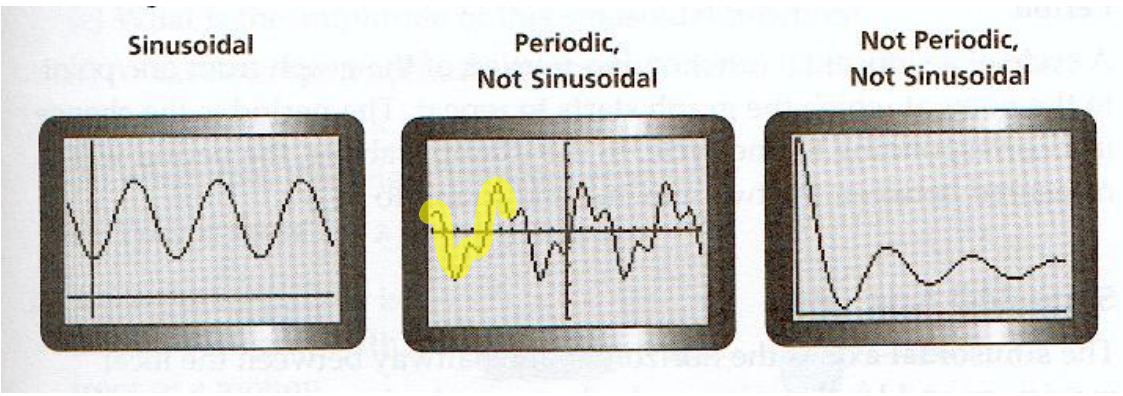
Sinusoidal Function: A periodic function that looks like waves, where any portion of the curve can be translated onto another portion of the curve.

Repeats and looks like wave

Example of sinusoidal behavior



These illustrations should summarize periodic and sinusoidal...

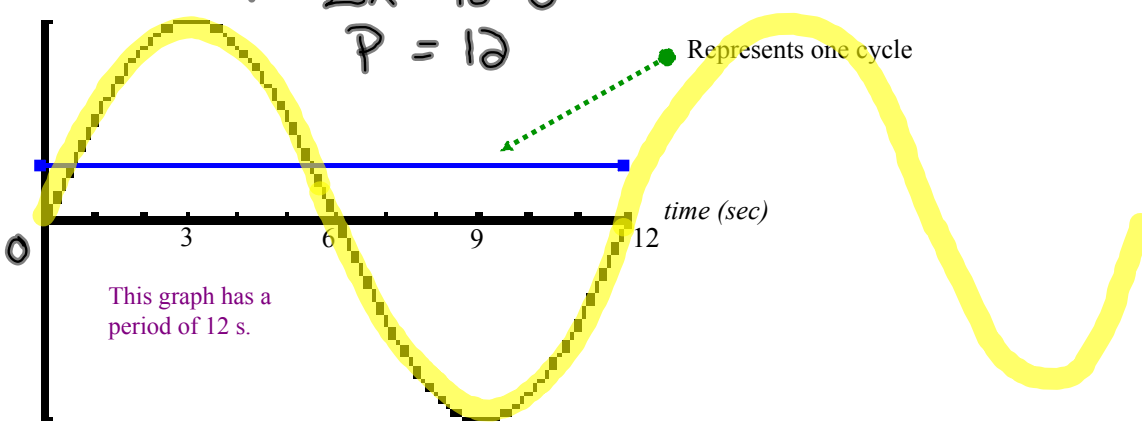


Vocabulary of Sinusoidal Functions

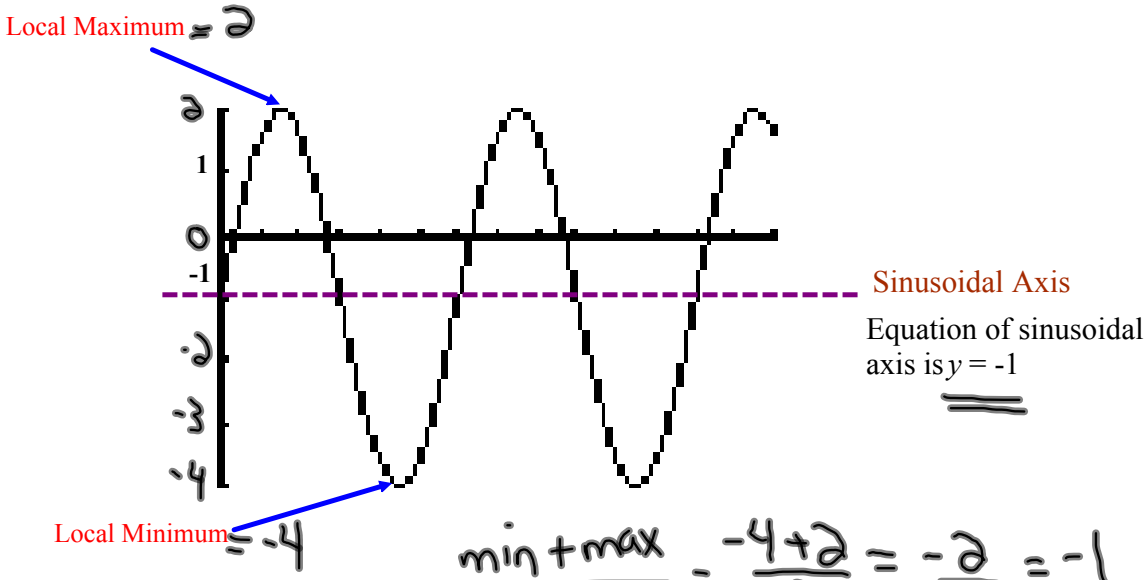
I. Period: The change in *x* corresponding to one cycle.

$P = \Delta x = 12 - 0$

$P = 12$



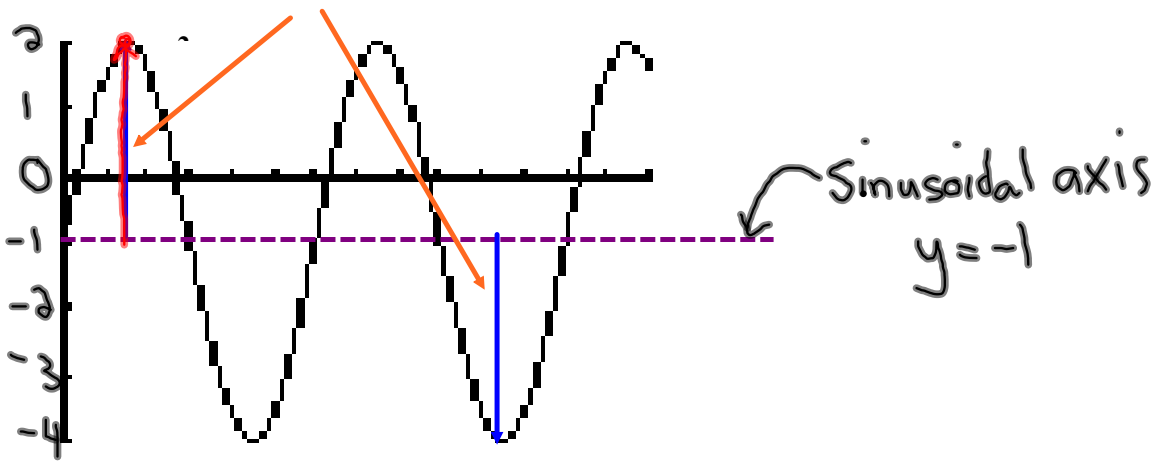
II. Sinusoidal Axis: The horizontal line halfway between the local maximum and local minimum.



$$\frac{\text{min} + \text{max}}{2} = \frac{-4+2}{2} = \frac{-2}{2} = -1$$

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

Amplitude would equa 3



Summarize...

$y = \sin x$

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

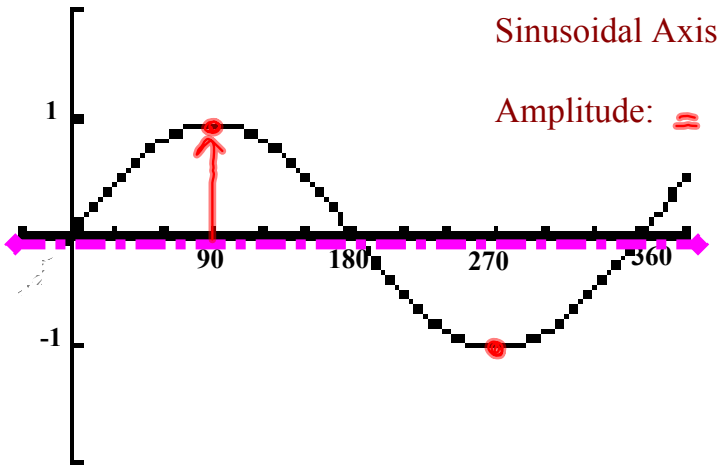
local max = 1

local min = -1

Period : = 360

Sinusoidal Axis: y = 0

Amplitude: = 1



Equations in Standard Form

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

cos

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

$B = \dfrac{360}{P}$ → influences how often the pattern repeats.

Period

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

"Phase Shift"

Inside Brackets

- 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

Homework

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

Find A, B, C, D and P

① $y = -3\sin 1(x+60^\circ) + 0$

$A=3$ $\boxed{B=1}$ $C=-60^\circ$ $D=0$ $\boxed{P=\frac{360}{B}=\frac{360}{1}=360}$

	A	K	P	C	D
b)	2	½	720	0	0
c)	2	2	180	-30	0
d)	4	¾	480	90	-2
e)	1	2	180	30	0
f)	3	36	10	10	1
g)	2	1	360	-60	-5
* h)	2	1	360	90	-4

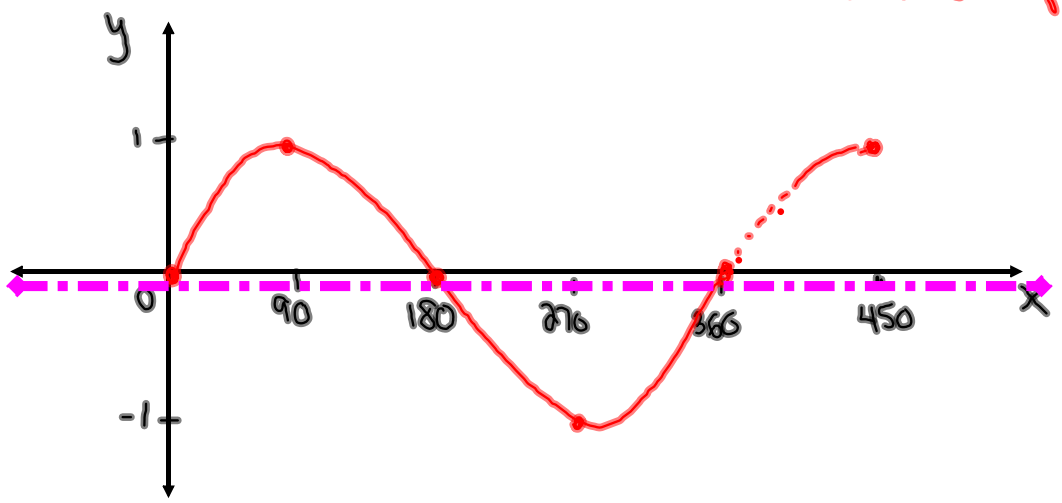
Let's examine the graph of $y = \sin\theta$

$y = \sin x$

θ	0	30	60	90	120	150	180	210	240	270	300	330	360
y	0	0.5	0.866	1	0.866	0.5	0	-0.5	-0.866	-1	-0.866	-0.5	0

Now plot the above points...

"Starts on the sinusoidal axis and moves up"



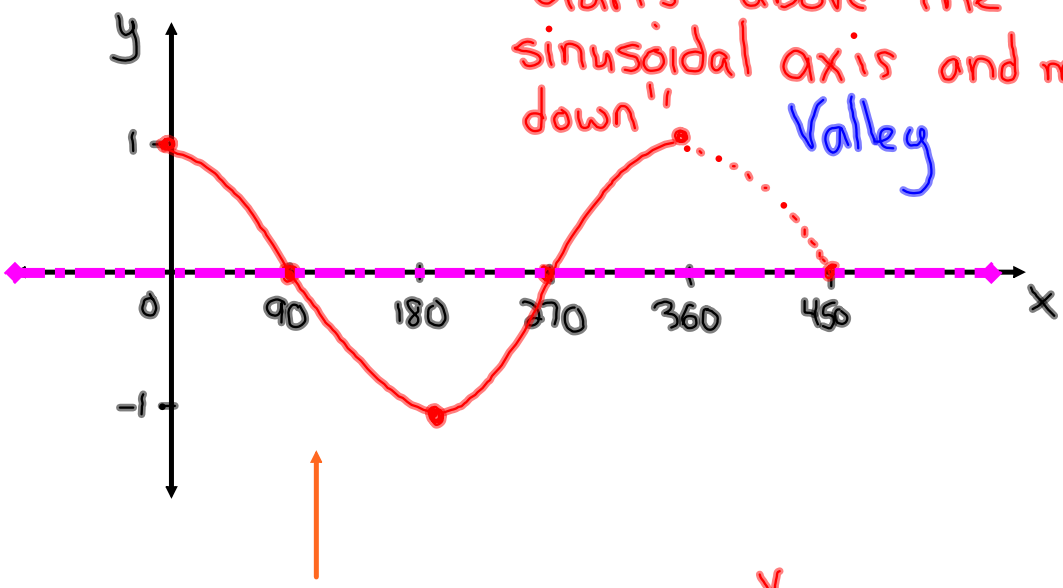
What about $y = \cos\theta$?

Complete the table of values and sketch below

θ	0	30	60	90	120	150	180	210	240	270	300	330	360
y	1	0.866	0.5	0	-0.5	-0.866	-1	-0.866	-0.5	0	0.5	0.866	1

"Starts above the sinusoidal axis and moves down"

Valley



Is this a sinusoidal function? Yes

What about the period, sinusoidal axis, and amplitude?