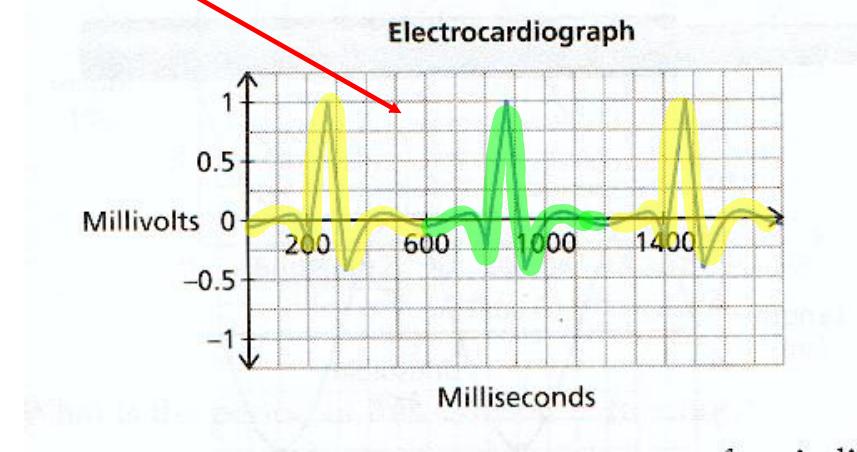


Sinusoidal Functions

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

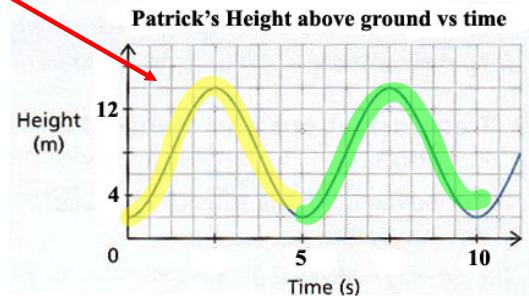
Example of periodic behavior



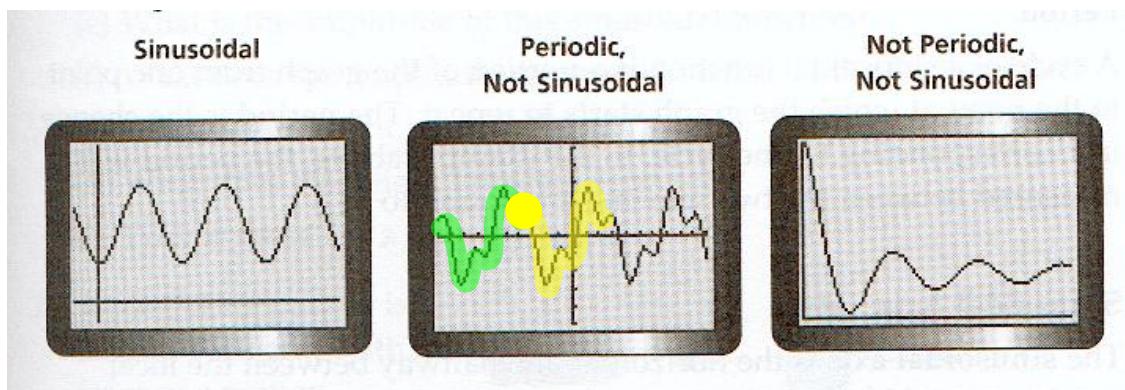
Sinusoidal Function: A periodic function that looks like waves, where any portion of the curve can be translated onto another portion of the curve.

Repeats and looks like waves.

Example of sinusoidal behavior

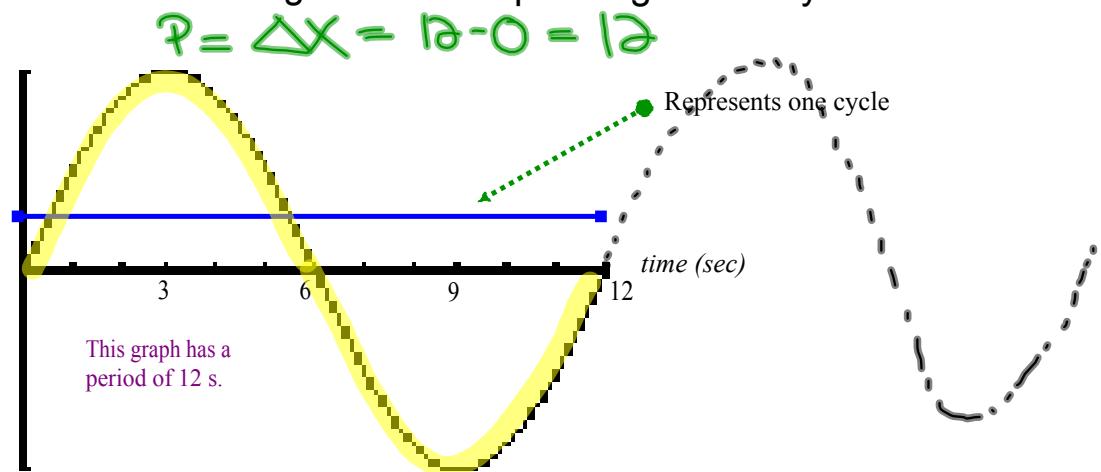


These illustrations should summarize periodic and sinusoidal...

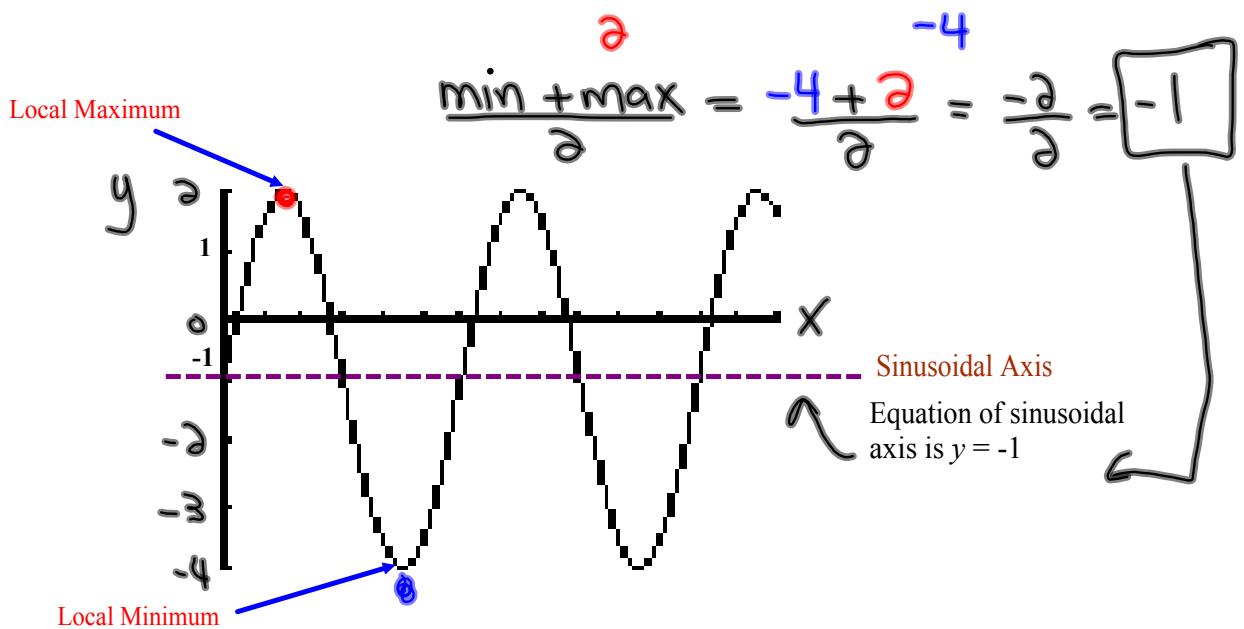


Vocabulary of Sinusoidal Functions

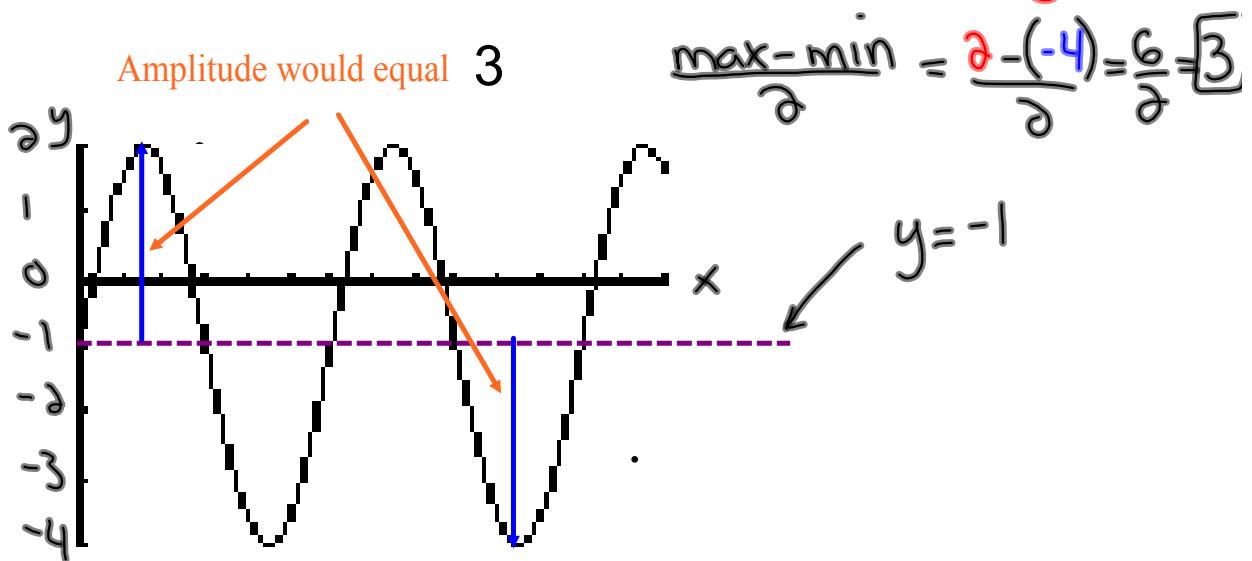
I. Period: The change in x corresponding to one cycle.



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. (*Always Positive*)



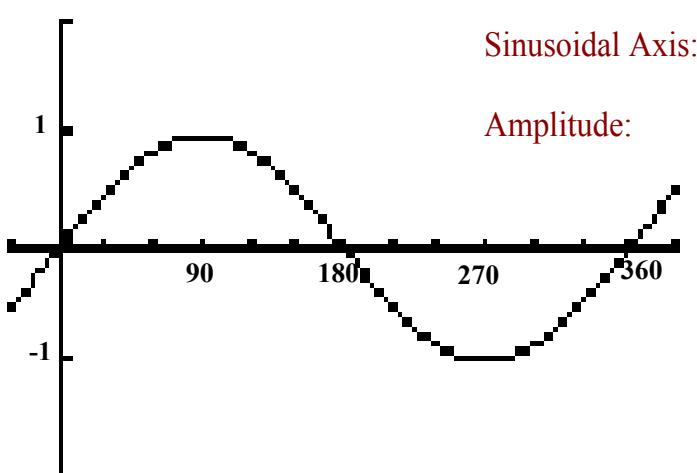
Summarize...

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

Period :

Sinusoidal Axis:

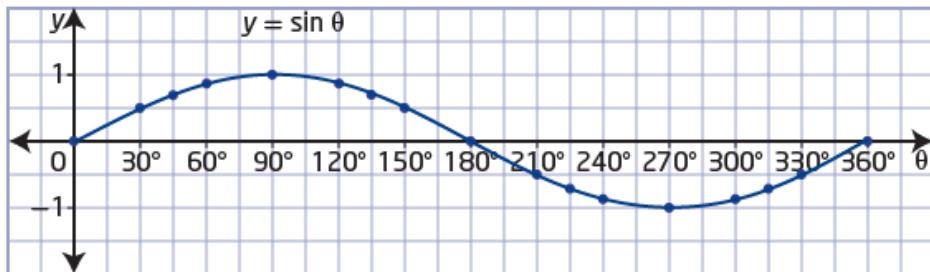
Amplitude:



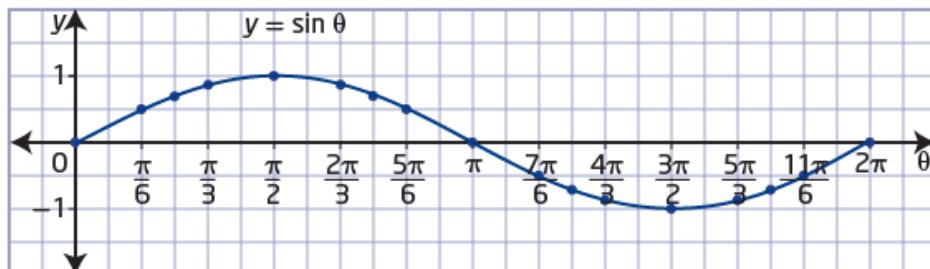
Let's examine the graph of $y = \sin \theta$

θ	Degrees	0°	30°	45°	60°	90°	120°	135°	150°	180°	210°	225°	240°	270°	300°	315°	330°	360°
θ	Radians	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π
θ	$\sin \theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0

Degrees



Radians



From the graph of the sine function, you can make general observations about the characteristics of the sine curve:

- The curve is periodic.
- The curve is continuous.
- The domain is $\{\theta \mid \theta \in \mathbb{R}\}$.
- The range is $\{y \mid -1 \leq y \leq 1, y \in \mathbb{R}\}$.
- The maximum value is +1.
- The minimum value is -1.
- The **amplitude** of the curve is 1.
- The period is 360° or 2π .
- The y -intercept is 0.

In degrees, the θ -intercepts are $\dots, -540^\circ, -360^\circ, -180^\circ, 0^\circ, 180^\circ, 360^\circ, \dots$, or $180^\circ n$, where $n \in \mathbb{I}$.

The θ -intercepts, in radians, are $\dots, -3\pi, -2\pi, -\pi, 0, \pi, 2\pi, \dots$, or $n\pi$, where $n \in \mathbb{I}$.

Which points would you determine to be the key points for sketching a graph of the sine function?

Look for a pattern in the values.

What about $y = \cos \theta$?

Complete the table of values and sketch below

θ	θ	30	60	90	120	150	180	210	240	270	300	330	360
y													



Is this a sinusoidal function?

What about the period, sinusoidal axis, and amplitude?

Equations in Standard Form

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

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

B = $\frac{360}{P}$ → 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