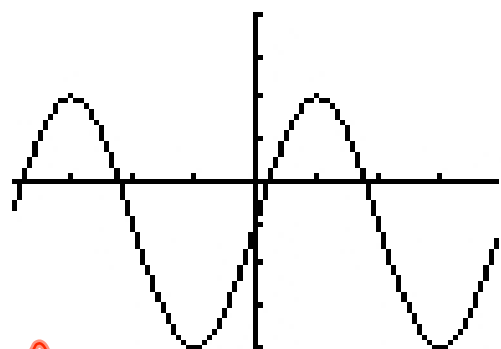


Analyzing Graphs of Sinusoidal Data: Phase Shift and Period

Review: What are the amplitude and vertical translation of the following graphs:

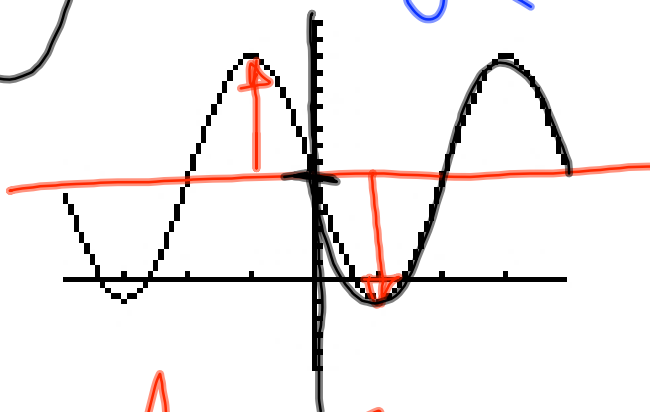
$$y = 3 \sin(x) - 1$$



A: 3

VD: down 1

$$y = -7 \sin(x) + 6$$



A: 7

VD: up 6

$$y = a \sin(x) + d$$

Analyzing Phase Shift

Altering the phase shift occurs in equations of the following form

$$y = \sin(x)$$

$$y = \sin(x - 90)$$

$$y = \sin(x)$$

$$y = \sin(x + 45)$$

Let's graph these pairs of equations on our calculator and see how our graphs are altered. Make sure to sketch your graphs on a sheet of graph paper.

$y = \sin(x - 90)$
 $x - 90 = 0$
 $x = 90$
P.S. right 90°

$x = -45^\circ$
P.S. left 45°

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Phase Shift:

$$y = \sin(x + c)$$

$c > 0$ moves left
 $c < 0$ move right

Without using your graphing calculator, describe the phase shift in each of the following graphs

$$y = \sin(x - 60)$$

$$y = \sin(x + 210)$$

P.S. 60° right P.S. left 210°

Analyzing Period

Altering the period occurs in equations of the following form

$$y = \sin(x)$$

$$y = \sin(2x)$$

$$y = \sin(x)$$

$$y = \sin 3(x)$$

$$y = \sin \frac{1}{b}(x)$$

Let's graph these pairs of equations on our calculator and see how our graphs are altered. Make sure to sketch your graphs on a sheet of graph paper.

$$\text{period} = \frac{360^\circ}{b}$$

$$\text{period} = \frac{360}{2} = 180^\circ$$

$$\text{period} = \frac{2\pi}{b}$$

$$\text{period} = \frac{2\pi}{2} = \pi$$

$$\text{period} = \frac{360}{3}$$

$$= 120^\circ$$

$$\text{period} = \frac{2\pi}{3}$$

Period:

Without using your graphing calculator, determine the period of each one of the following graphs

$$y = \sin(4x)$$

$$y = \sin 6(x)$$

$$\text{period: } \frac{360}{4} = 90^\circ$$

$$\text{period: } \frac{360}{6} = 60^\circ$$

$$\text{period: } \frac{2\pi}{4} = \frac{\pi}{2}$$

$$\text{period: } \frac{2\pi}{6} = \frac{\pi}{3}$$

Determining Characteristics of Sinusoidal Graphs

Determine the amplitude, period, phase shift and vertical translations for each of the following.

$$y = 2 \sin 2(x - 50^\circ) + 4$$

$$\underline{A: 2}$$

$$\underline{P: \frac{360}{2} = 180^\circ}$$

$$\underline{P.S.: \text{right } 50^\circ}$$

$$\underline{VD: \text{up } 4}$$

$$y = a \sin b(x + c) + d$$

\downarrow Amp \downarrow period \downarrow P.S. \downarrow VD

$$y = 5 \sin(3x - 90) - 8$$

$$y = 5 \sin 3(x - 30^\circ) - 8$$

$$\underline{A: 5}$$

$$\underline{P: \frac{360}{3} = 120^\circ}$$

$$\underline{P.S.: \text{right } 30^\circ}$$

$$\underline{VD: \text{down } 8}$$

$$y = -6 \sin 4(x - \pi/2) + 9$$

$$\underline{A: 6}$$

$$\underline{P: \frac{2\pi}{4} = \frac{\pi}{2}}$$

$$\underline{P.S.: \text{right } \frac{\pi}{2}}$$

$$\underline{VD: \text{up } 9}$$

Handout assignment