

$$y = a(x-h)^2 + k$$

a = Vertical Stretch or Shrink Factor
if $a < 0$ x-axis reflection

h = Horizontal Translation

k = Vertical Translation

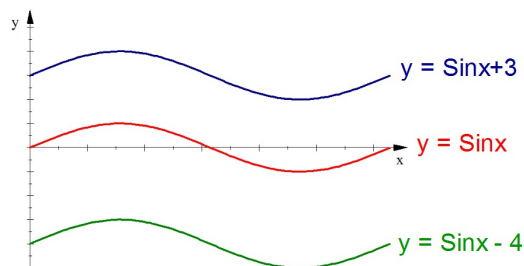
$$y = -2(x - 7)^2 + 3$$

- 2 • Upside Down
- Two times taller
- 7 • Moved 7 units right
- +3 • Moved 3 units up

Part 1 Use this Window: $x : [0, 2\pi]$ $y : [-5, 5]$

In Y_2 graph $\sin x \pm k$ for different values of k .

Summarize what the value of k does to the graph of $y = \sin x$.



k moves the graph
up or down
(Vertical Translation)

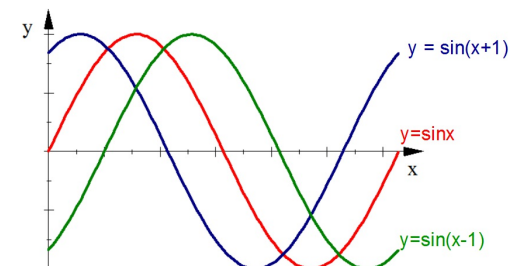
+ k moves the graph up

- k moves the graph down

Part 2 Use this Window: $x : [0, 2\pi]$ $y : [-1, 1]$

In Y_2 graph $\sin(x \pm h)$ for different values of h .

Summarize what the value of h does to the graph of $y = \sin x$.



$(x \pm h)$ moves the graph
left or right
(horizontal translation)

 $(x+h)$ moves the graph left

 $(x-h)$ moves the graph right

Without graphing describe the transformations of the Parent Function $y = \sin x$ each equation represents.

1. $y = 6\sin(x + \frac{\pi}{3}) - 1$ 2. $y = -4\sin 3x + 5$

6 times taller (Amplitude = 6)

Upside down (x-axis reflection)

moved 1 unit down

4 times taller (Amplitude = 4)

moved $\frac{\pi}{3}$ units to the left

Period = $2\pi/3$

moved 5 units up

Describe the transformations represented in each equation:

$y = 7\sin(x - \frac{\pi}{3}) + 4$

$y = -3\sin(5x) - 6$

7 times taller (Amplitude = 7)

Upside-down (x-axis reflection)

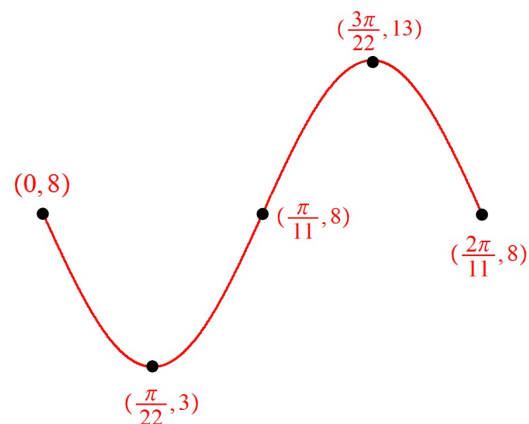
moved 4 units up

3 times taller (Amplitude = 3)

moved $\frac{\pi}{3}$ units to the right

Period = $2\pi/5$

moved 6 units down



Amplitude = 5

Period = $\frac{2\pi}{11}$

Midline: $y = 8$

$y = a\sin(bx) + k$

a Vertical stretch/shrink = Amplitude

If $a < 0$: Upside down (x-axis reflection)

b Horizontal stretch or shrink

Period = $2\pi/b$

k Vertical shift = Midline

Amplitude = 5

$$a = -5$$

Midline: $y = 8$

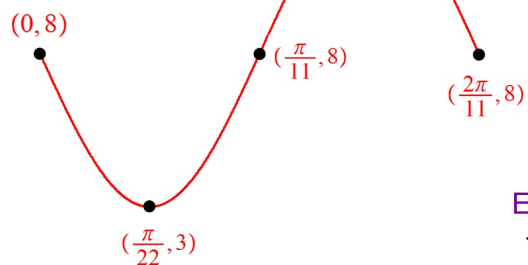
$$k = +8$$

$$\text{Period} = \frac{2\pi}{11}$$

$$b = \frac{2\pi}{\frac{2\pi}{11}} = 2\pi \cdot \frac{11}{2\pi}$$

EQ:

$$y = -5\sin 11x + 8$$

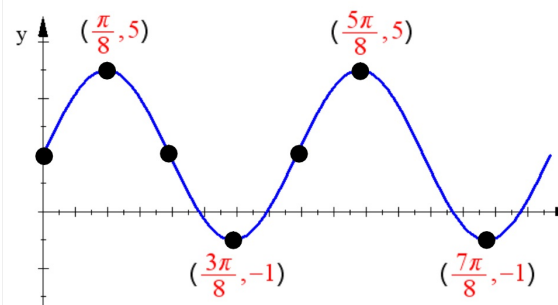


Find the Amplitude, Period, and Midline of this Sine Function:

Amplitude = 3

$$\text{Period} = \frac{5\pi}{8} - \frac{\pi}{8} = \frac{4\pi}{8}$$

Midline: $y = 2$



Equation: $y = 3\sin(4x) + 2$

$$b = \frac{2\pi}{\frac{\pi}{2}} \text{ or } 2\pi \cdot \frac{2}{\pi} = 4$$