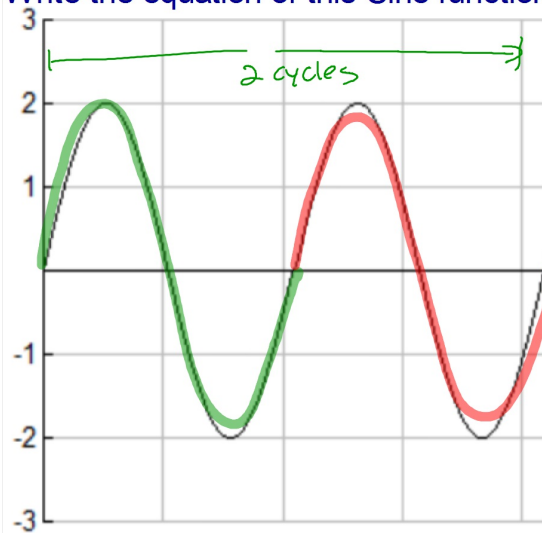


Write the equation of this Sine function.



Amplitude = 2

$$a = +2$$

$$\text{period} = \frac{4\pi}{3}$$

$$= \frac{4\pi}{3} \cdot \frac{1}{2} = \frac{2\pi}{3}$$

$$b = \frac{2\pi}{\frac{2\pi}{3}} = 2\pi \cdot \frac{3}{2\pi}$$

$$b = 3$$

Eq:

$$y = 2 \sin 3x$$

Graph of $y = \sin(x \pm h) \pm k$ Exploration

Reviewing information you already know:

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

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

h = Horizontal Translation

k = Vertical Translation

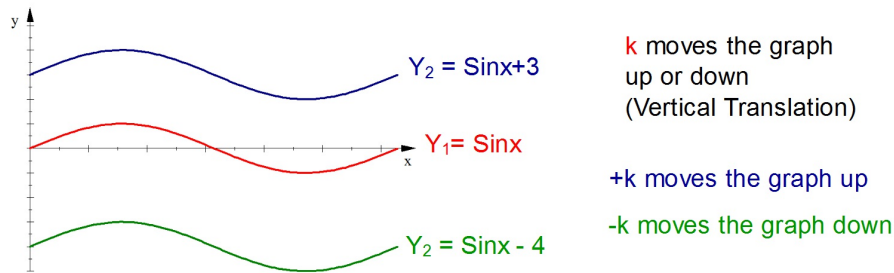
$$y = -2(x - 7)^2 + 3$$

- 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 $\text{Sin}x \pm k$ for different values of k .

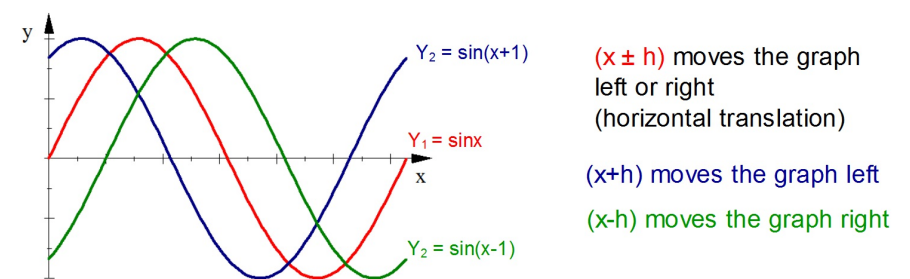
Summarize what the value of k does to the graph of $y = \text{Sin}x$.



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

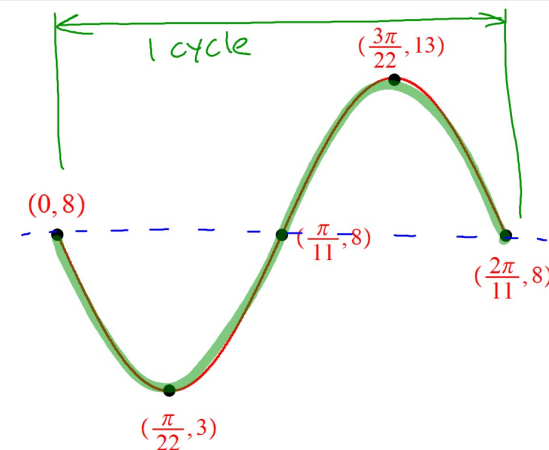
In Y_2 graph $\text{Sin}(x \pm h)$ for different values of h .

Summarize what the value of h does to the graph of $y = \text{Sin}x$.



Without graphing describe the transformations of the Parent Function $y = \text{Sin}x$ each equation represents.

1. $y = 6\text{Sin}(x + \frac{\pi}{3}) - 1$
- 6 Times Taller
- $\frac{\pi}{3}$ Left
- 1 down
2. $y = -4\text{Sin}3x + 5$
- upside down
- 4 Times Taller
- $b=3$ period = $\frac{2\pi}{3}$
- 5 up



Amplitude = $13 - 8 = 5$

Midline: $y = 8$

Period = $\frac{\frac{2\pi}{11} - 0}{1} = \frac{2\pi}{11}$

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

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 $\rightarrow y = k$

Amplitude = 5

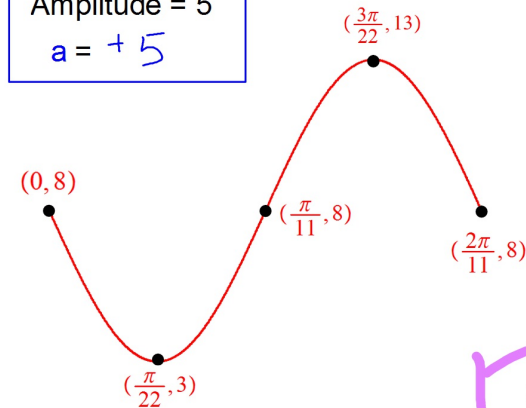
$$a = +5$$

Midline: $y = 8$

$$k = +8$$

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

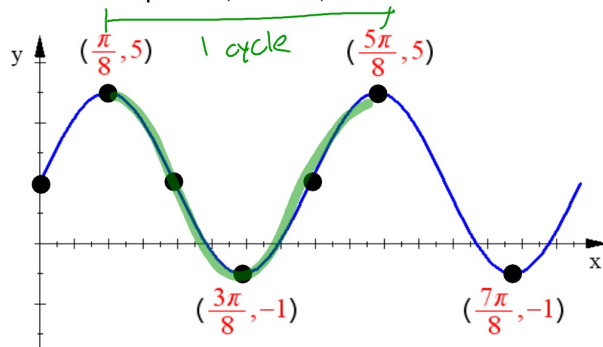
$$b = //$$



EQ:

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

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



$$\text{Amplitude} = \frac{5 - (-1)}{2} = 3$$

$$a = +3$$

Midline:

$$\frac{5 + (-1)}{2} \rightarrow y = 2$$

$$k = +2$$

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

$$= \frac{4\pi}{8} = \frac{\pi}{2}$$

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

$$b = 4$$

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