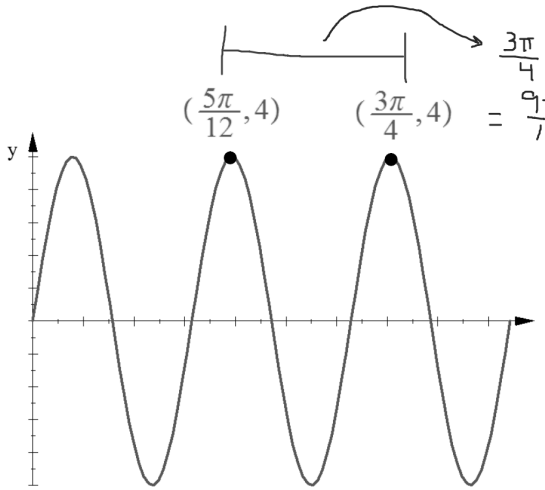
Write the equation of this sine function.



$a = +4$

$\frac{3\pi}{4} - \frac{5\pi}{12}$

$= \frac{9\pi}{12} - \frac{5\pi}{12} = \frac{4\pi}{12} = \frac{\pi}{3}$

This is the width of 1 cycle

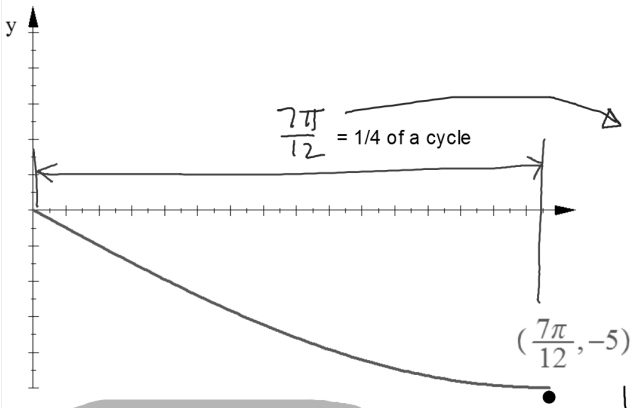
period $= \frac{\pi}{3}$

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

$b = 6$

$y = 4 \sin 6x$

Write the equation of this sine function.



$a = -5$

$\frac{\frac{7\pi}{12}}{\frac{1}{4}} = \frac{7\pi}{12} \cdot \frac{4}{1} = \frac{7\pi}{3}$

period $= \frac{7\pi}{3}$

$b = \frac{2\pi}{\frac{7\pi}{3}} = 2\pi \cdot \frac{3}{7\pi}$

$b = \frac{6}{7}$

$y = -5 \sin \frac{6x}{7}$

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

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

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

h = Horizontal Translation

k = Vertical Translation

$y = a|x-h| + k$

$y = a\sqrt{x-h} + k$

regardless of the parent function a, h and k have the same effect.

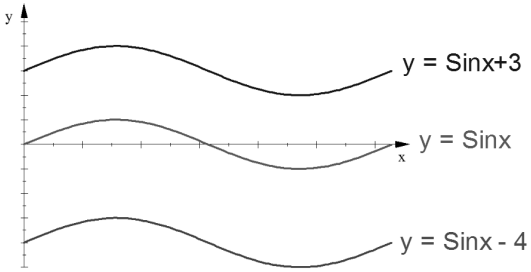
$y = -2(x - 7)^2 + 3$

-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)

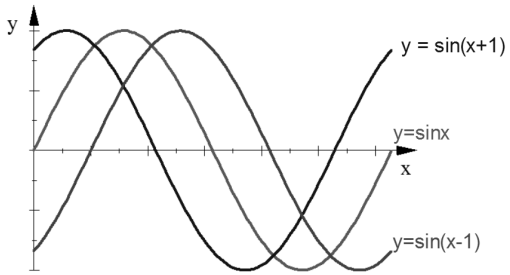
+k moves the graph up

-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

Sin(x ± h) shows a Horizontal Translation

This is more commonly referred to as a

PHASE SHIFT

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

1. $y = 6\text{Sin}(x + \frac{\pi}{3}) - 1$

shifted 1 unit down

Phase shift $\frac{\pi}{3}$ to the left

6 times taller
(amplitude = 6)

2. $y = -4\text{Sin}3x + 5$

shifted 5 units up

b=3
which means the
Period = $\frac{2\pi}{3}$

4 times taller
(amplitude = 4)
and
Upside Down