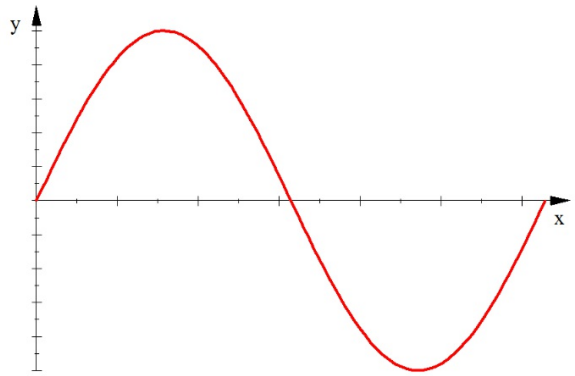
The Parent Function: y = Sinx



Period= 2π

Amplitude= 1

Eq of Midline: y = 0

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

|a| = Amplitude

a<0 represents an x-axis reflection (upside down)

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

k: Vertical Translation (midline: y=k)

1. Sketch one period of this Sine function. Label the coordinates of all Max, Min, and points on the midline.

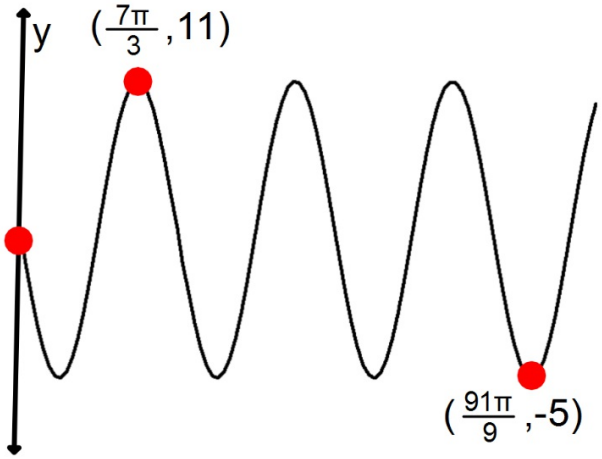
$y = -8\sin 12x - 3$

Amplitude =

Eq of Midline:

Period =

2. Write the equation of this sine graph.



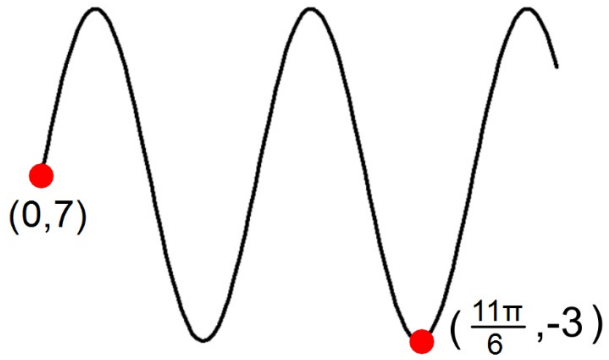
Amplitude =

Eq of Midline:

Period =

EQ:

3. Write the equation of this sine graph.



Amplitude =

Eq of Midline:

Period =

EQ:

Amplitude = 5

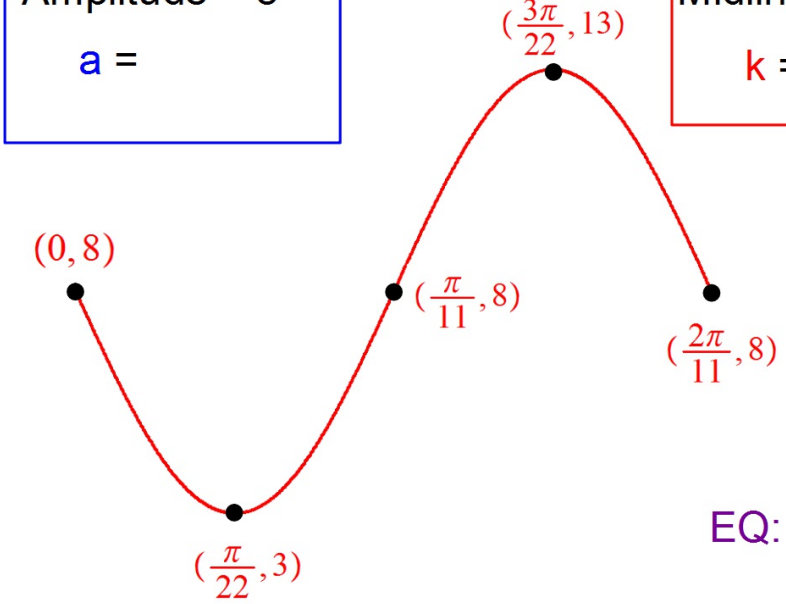
a =

Midline: y = 8

k =

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

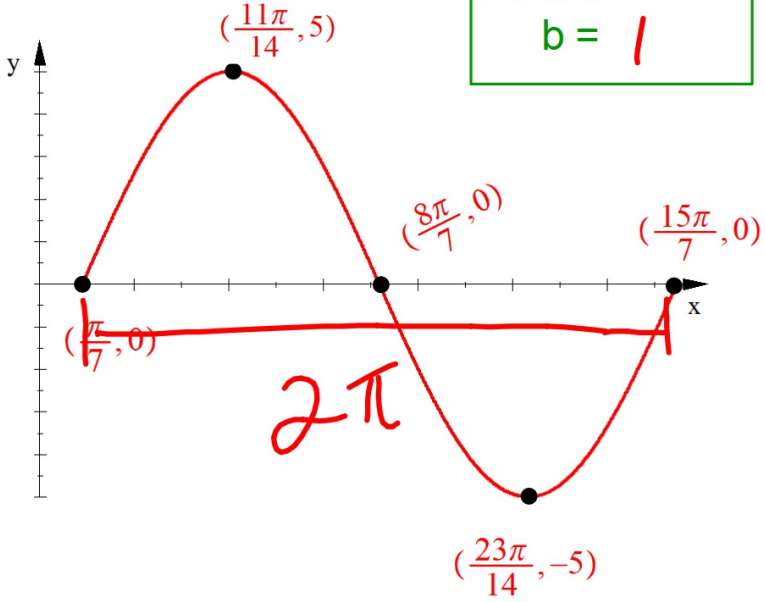
b =



EQ:

$y = a\sin(x - h) + k$

h: Phase Shift



Period = 2π

b = 1

Amplitude = 5

a = 5

Midline: y = 0

k = 0

Phase Shift: $\frac{\pi}{7}$ right

$(x \pm h) \longrightarrow x - \frac{\pi}{7}$

EQ: $y = 5\sin(x - \frac{\pi}{7})$

$y = a\sqrt{x \pm h}$ Phase Shift of h units

$y = -a\sqrt{x \pm h}$ Phase Shift of h units and Upside Down (x-axis reflection)

$y = a\sqrt{-(x \pm h)}$ Phase Shift of h units and Backwards (y-axis reflection)

y = Sinbx

b affects the period
(horiz stretch or shrink)

y= Sin(x - h)

h affects the horizontal position.
(horiz translation left or right)

How do you write an equation that has both a b and an h?

y = Sin(b(x-h))

Write the equation of this function.

Parent function: Sinx Phase Shift: $\frac{\pi}{6}$ left Period = 8π

Graph is upside-down

Midline: y = -3

Amplitude = 10

$y=a\sin(b(x\pm h))+k$ $\frac{1}{4}=b$ $\frac{2\pi}{8\pi}$ $a=neg.$ $a=10$ $k=-3$

EQ: $y=-10\sin\left(\frac{1}{4}\left(x+\frac{\pi}{6}\right)\right)-3$

$y = a\sin(x-h) + k$

Starting Point: (h,k)

$y = \text{Sin}bx$

b affects the period
(horiz stretch or shrink)

$y = \text{Sin}(x - h)$

h affects the horizontal position.
(horiz translation left or right)

How do you write an equation that has both a b and an h?

$y = \text{Sin}(b(x-h))$

$$y = a\text{Sin}(b(x-h)) + k$$

a ⟶ Amplitude - Vert strecth or shrink.
Also x-axis reflection if negative

b ⟶ Leads to the Period = $2\pi/b$ - Horiz stretch or shrink

h ⟶ Horiz translation - Phase Shift

k ⟶ Vert translation - Eq of the Midline

Write the equation of the transformed Sine function with the following characteristics.

- Amplitude = 3 → $a = -3$
- Upside down
- Period = $\frac{3\pi}{4}$ → $\frac{2\pi}{\frac{3\pi}{4}} \cdot \frac{4}{3\pi} = \frac{8\pi}{3\pi}$ $b = \frac{8}{3}$
- Midline: $y = -7 = k$
- Phase Shift: $\frac{\pi}{6}$ right $= h$

$y = -3\sin\left(\frac{8}{3}\left(x - \frac{\pi}{6}\right)\right) - 7$

$$y = 17\sin\left(9\left(x + \frac{2\pi}{5}\right)\right) - 4$$

Use the above equation to find the following:

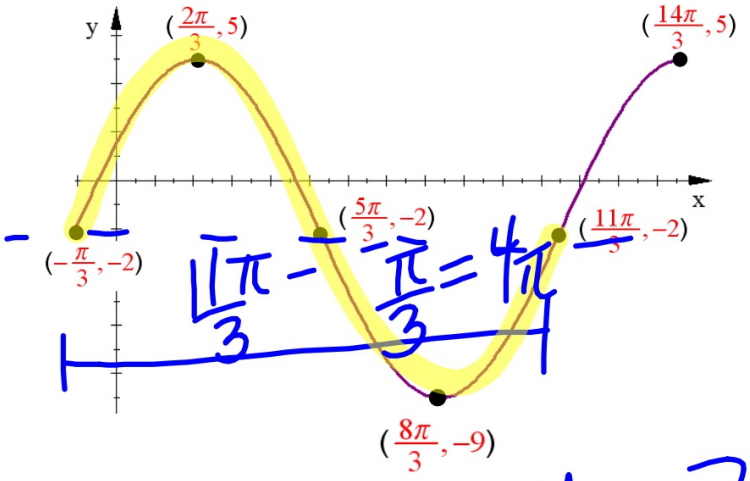
Period = $\frac{2\pi}{9}$

Amplitude = 17

Phase Shift: $\frac{2\pi}{5}$ left

Eq of Midline: $y = -4$

Write the equation of this graph as a Sine Function



$\frac{11\pi}{3} - \frac{\pi}{3} = 4\pi$

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

Period = 4π

Amplitude = 7

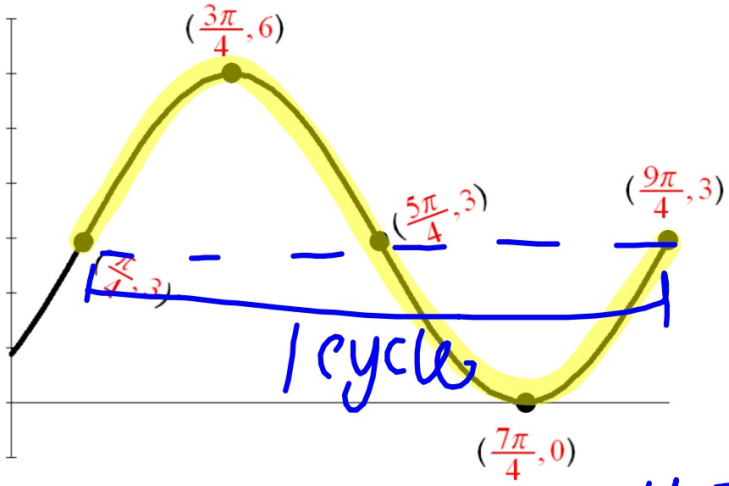
Eq of Midline: $y = -2$

Phase Shift:

$\frac{\pi}{3}$ left

$y = 7\sin\left(\frac{1}{2}\left(x + \frac{\pi}{3}\right)\right) - 2$

Write a Sine equation for this graph.



Period = 2π

Amplitude = 3

Eq of Midline: $y = 3$

Phase Shift:

$\frac{\pi}{4}$ Rt

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