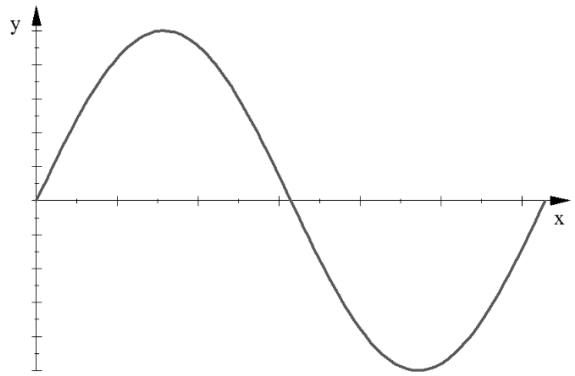
The Parent Function: y = Sinx



Period= 2π

Amplitude= 1

Eq of Midline: y = 0

y = asinbx

|a| = Amplitude

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

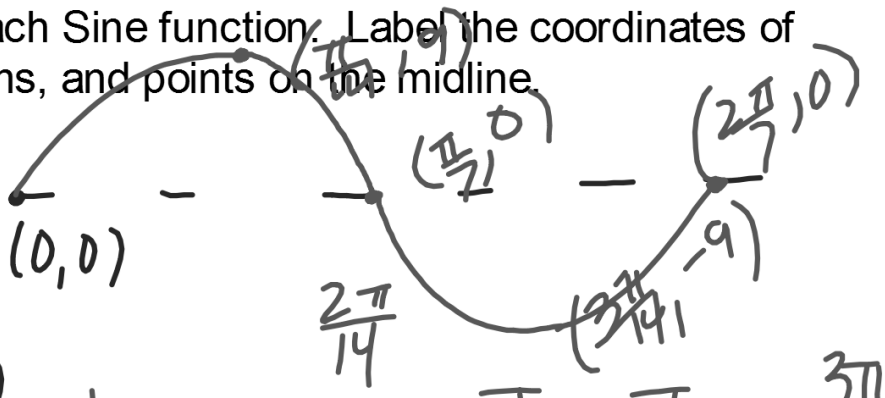
b: ⟶ Period = $\frac{2\pi}{b}$

Sketch one period of each Sine function. Label the coordinates of all minimums, maximums, and points on the midline.

1. $y = 9\sin 7x$

$A = 9$
opens up
midline $y=0$
period $\frac{2\pi}{7} \cdot \frac{1}{4}$

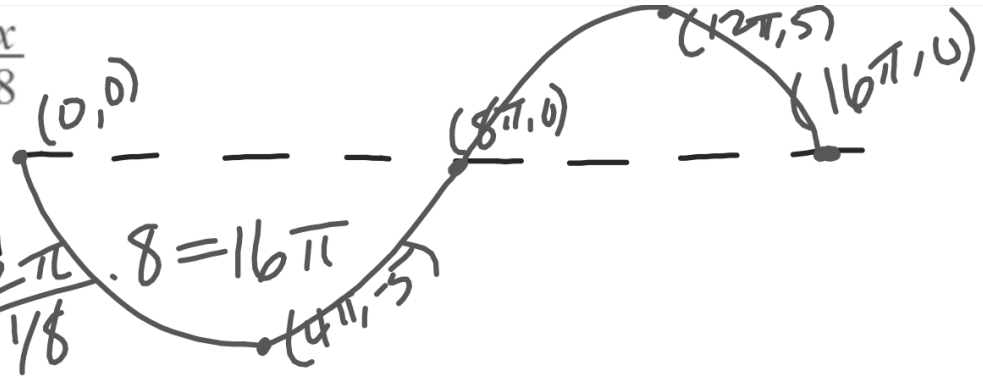
$\frac{2\pi}{28} = \frac{\pi}{14}$



$2 \cdot \frac{\pi}{7} + \frac{\pi}{14} = \frac{3\pi}{14}$
$2 \cdot 7$

2. $y = -5\sin\frac{x}{8}$

amp $= 5$
upside down
period $= \frac{2\pi}{1/8}$ $\cdot 8 = 16\pi$
midline $y=0$ $16\pi \cdot \frac{1}{4} = 4\pi$



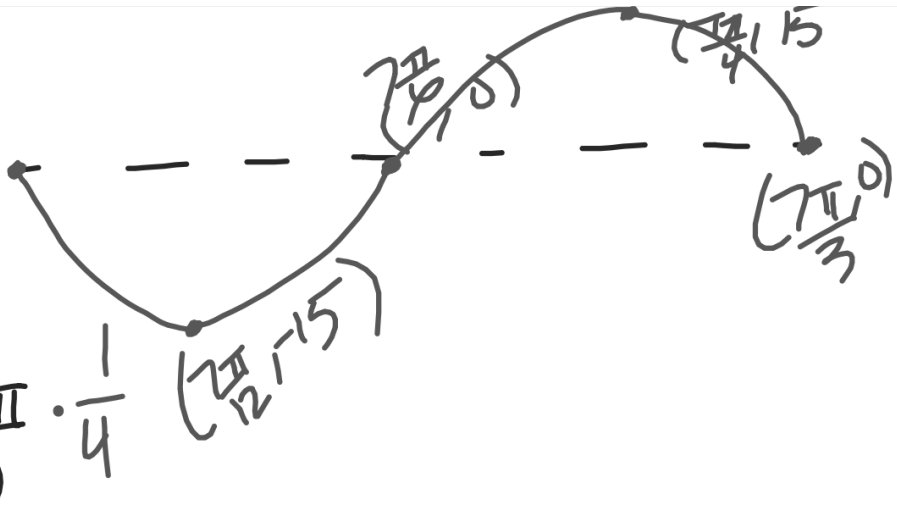
3. $y = -15 \sin \frac{6x}{7}$

amp = 15

open down

midline y = 0

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



Using y = asinbx

1. To find find the value of a on a given graph all you need to know is the amplitude.

2. If the cycle in your graph starts on the midline and goes up to a maximum a is Positive

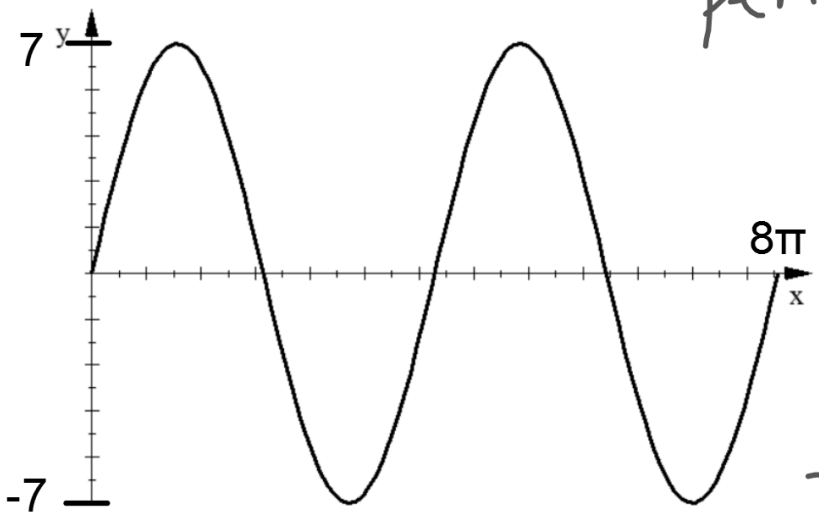
3. If the cycle in your graph starts on the midline and goes down to a minimum a is Negative

Using $y = a\sin bx$ Period $= \frac{2\pi}{b}$

Solving for b you get: $b = \frac{2\pi}{\text{Period}}$

Therefore, to find the value of b given a graph all you need to know is the period.

What is the value of a and b for this Sine graph?



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

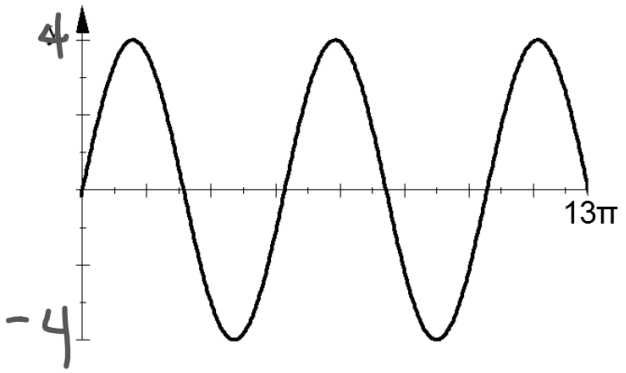
$a = 7$

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

$\frac{1}{4}$

Write the equation of this sine graph. $y = 7\sin\left(\frac{x}{4}\right)$

Find the Amplitude and Period then figure out the values of a and b.
Write the equation of this graph in the form y = aSinbx



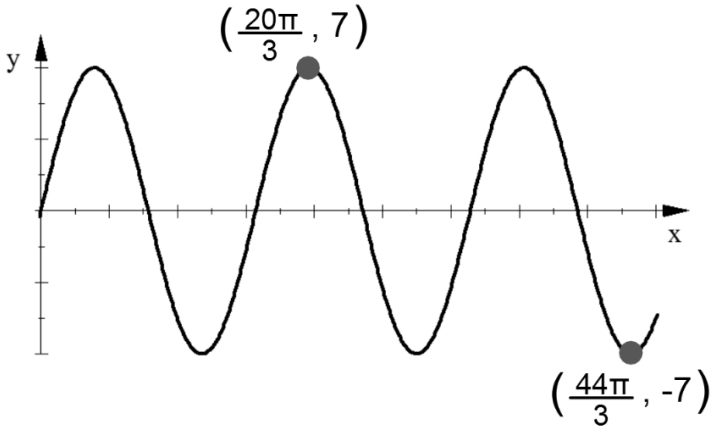
a= 4

b= $\frac{2\pi}{\frac{26\pi}{5}} \cdot \frac{5}{2\pi} = \frac{5}{13}$

$\frac{13\pi}{\frac{5}{2}} \cdot \frac{2}{5} = \frac{26\pi}{5}$

EQ: $y = 4\sin\left(\frac{5}{13}x\right)$

Find the Amplitude and Period then figure out the values of a and b.
Write the equation of this graph in the form y = aSinbx

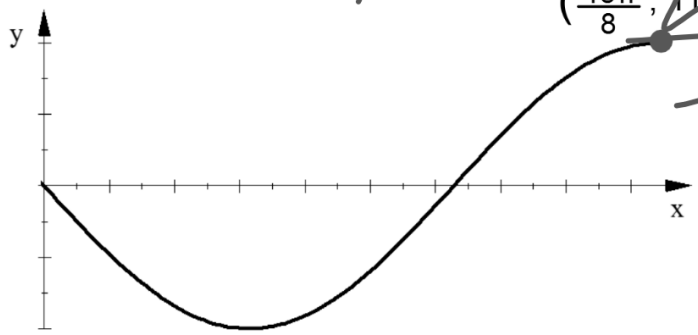


a= 7

b=

EQ:

Find the Amplitude and Period then figure out the values of a and b.
Write the equation of this graph in the form y = aSinbx



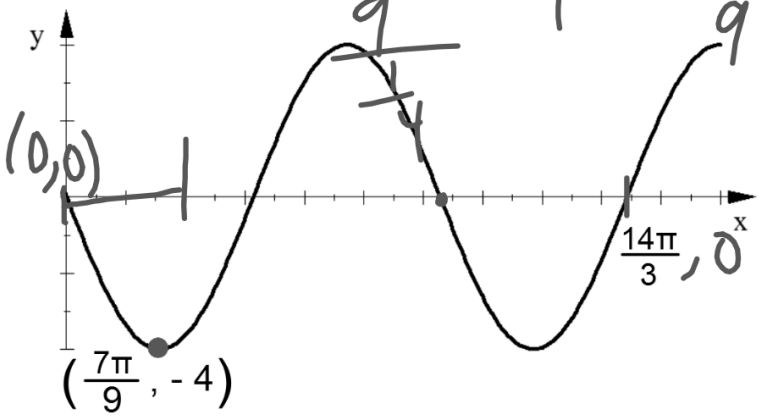
Period $\frac{15\pi}{8} \div \frac{3}{4} = \frac{15\pi}{8} \cdot \frac{4}{3} = \frac{5\pi}{2}$

a= 11

b= $\frac{2\pi}{\frac{5\pi}{2}} \cdot \frac{2}{5\pi} = \frac{4}{5}$

EQ: $y = -11\sin\left(\frac{4x}{5}\right)$

Find the Amplitude and Period then figure out the values of a and b.
Write the equation of this graph in the form y = aSinbx



$\frac{7\pi}{9} \cdot \frac{4}{1} = \frac{28\pi}{9}$

a= 4

b= $\frac{2\pi}{\frac{28\pi}{9}} \cdot \frac{9}{28\pi} = \frac{9}{14}$

EQ: $y = -4\sin\left(\frac{9x}{14}\right)$

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

a = Vertical Stretch or Shrink Factor: |a| = Amplitude
if a<0 x-axis reflection

h = Horizontal Translation This is called: Phase Shift

k = Vertical Translation Midline: y = k

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

Vertex: (h,k)

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

Vertex: (h,k)

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

Starting Point: (h,k)

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

Starting Point: (h,k)

Describe the transformations represented in each equation:

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

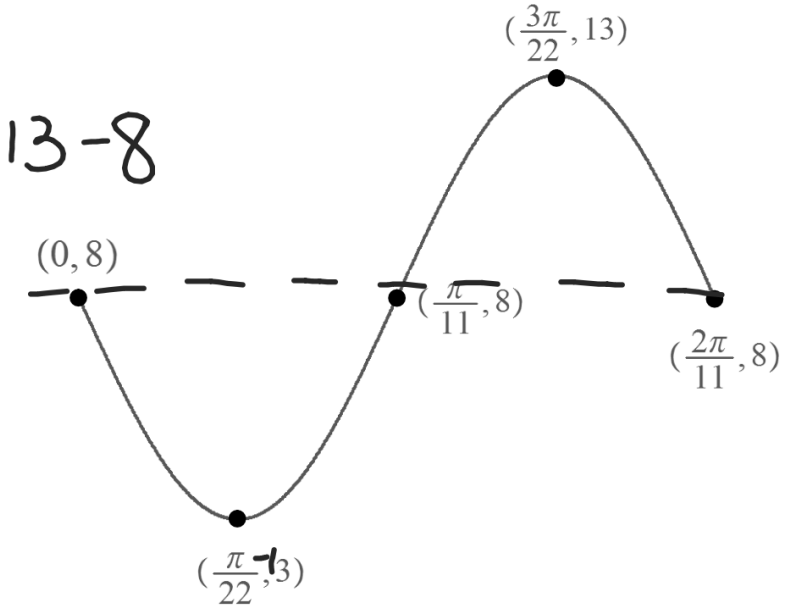
amp 7
vertical stretch of 7 7* taller
rt $\frac{\pi}{4}$
up 4 units
$y = 4$

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

- upside down
- 3 * taller

midline $y = -6$
shifted down 6 units

Horiz shrink factor of 1/5
5* narrower



13 - 8

Amplitude = 5

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

Midline: $y = 8$

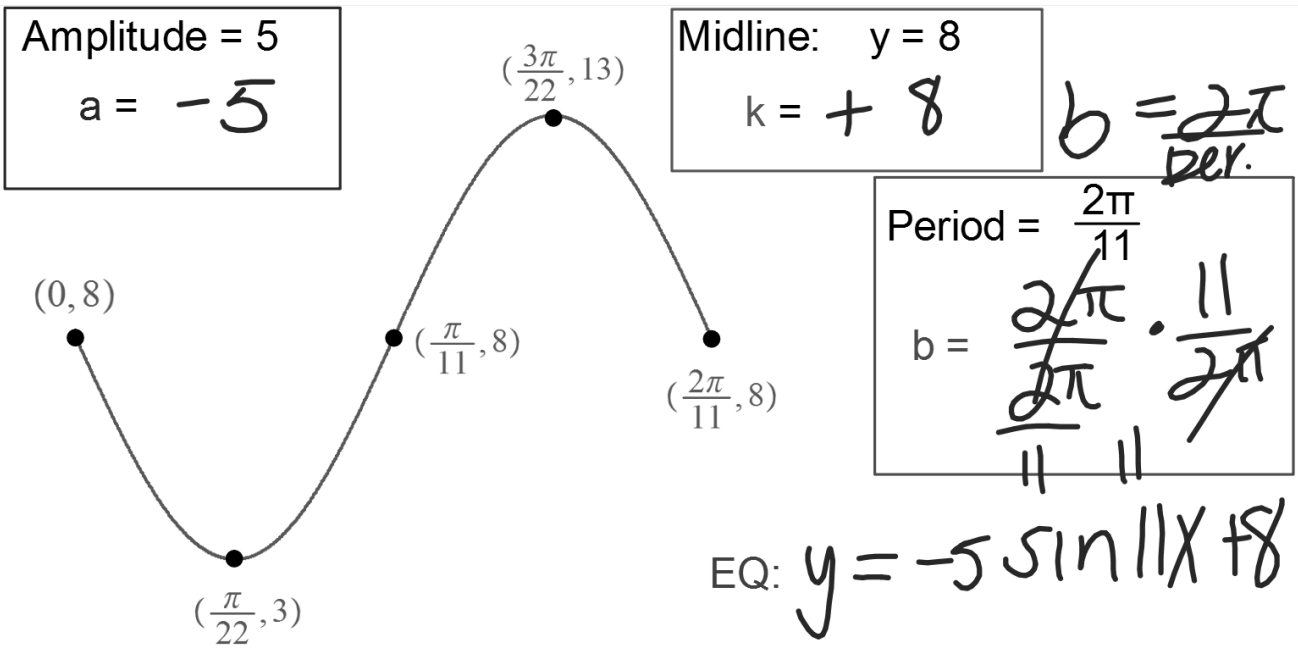
$$y = a\sin(bx) + k$$

a Vertical stretch/shrink = Amplitude

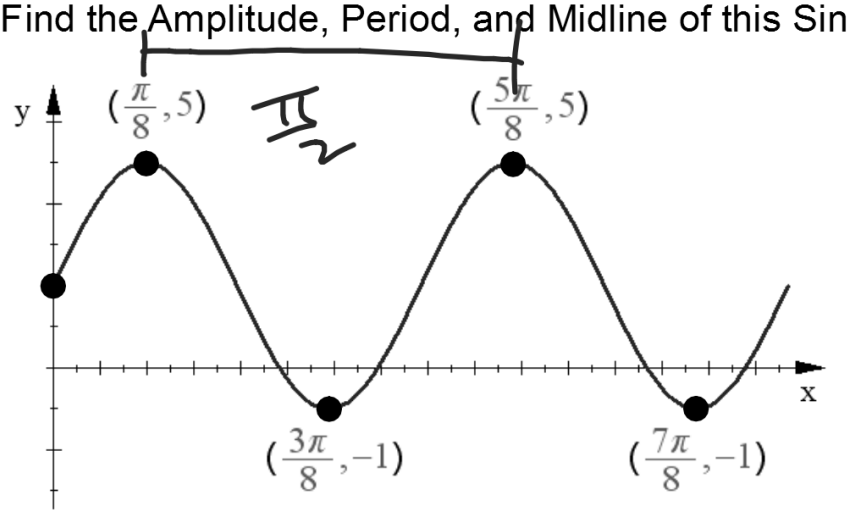
If a<0: Upside down (x-axis reflection)

b Horizontal stretch or shrink Period = $2\pi/b$

k Veritcal shift = Midline



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



Amplitude= 3

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

Midline: $y = 2$

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

$= 4$

Equation: y = 3Sin(4x) + 2