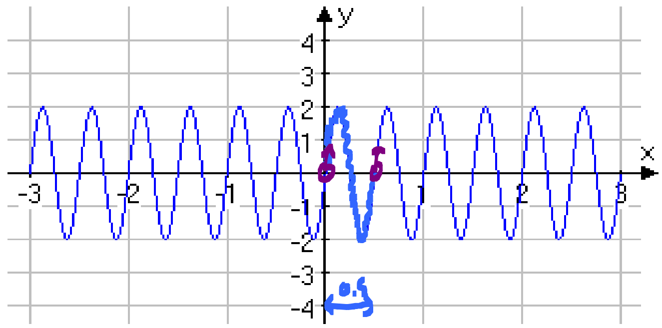
Name:

1. Find a possible equation of the following graphs.

a.



Amp = 2 Per = 0.5 Phase shift = 0 Vert. Shift = 0

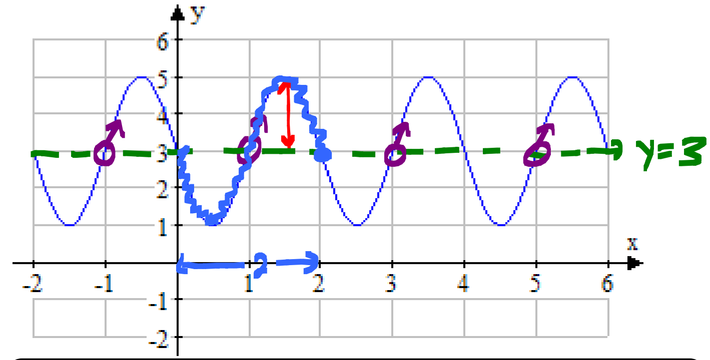
Equation as a Sine Wave:

$$y = a \cdot \sin\left(\frac{2\pi}{P}(x - c)\right) + d$$

$$y = 2\sin\left(\frac{2\pi}{0.5}(x - 0)\right) + 0$$

Plot1 Plot2 Plot3
\Y1=2sin((2π)/.5(X-0))+0
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=

b.



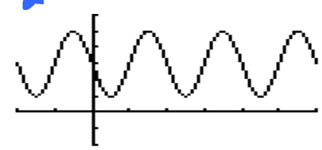
Amp = 2 Per = 2 Phase shift = 1 Vert. Shift = 3

Equation as a Sine Wave:

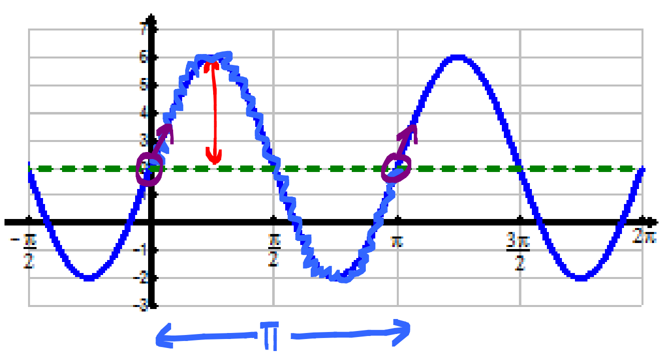
$$y = a \cdot \sin\left(\frac{2\pi}{P}(x - c)\right) + d$$

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

Plot1 Plot2 Plot3
\Y1=2sin(π(X-1))+3
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=



c



Amp = 4 Per = π Phase shift = 0 Vert. Shift = 2

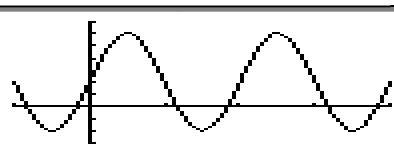
Equation as a Sine Wave:

$$y = a \cdot \sin\left(\frac{2\pi}{P}(x - c)\right) + d$$

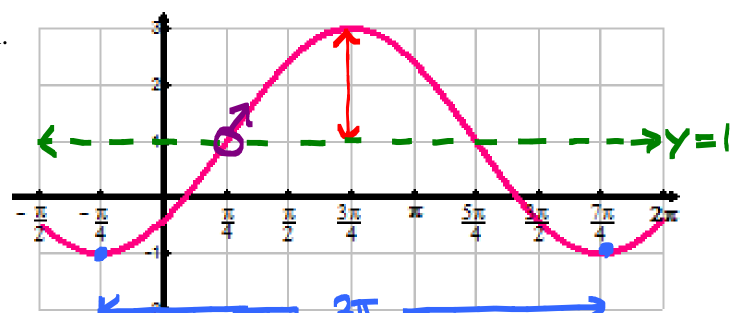
$$y = 4\sin\left(\frac{2\pi}{\pi}(x - 0)\right) + 2$$

$$y = 4\sin(2x) + 2$$

Plot1 Plot2 Plot3
\Y1=4sin(2X)+2
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=



d.



PERIOD = $\frac{7\pi}{4} - -\frac{\pi}{4} = \frac{8\pi}{4} = 2\pi$

Amp = 2 Per = 2π Phase shift = $\frac{\pi}{4}$ Vert. Shift = 1

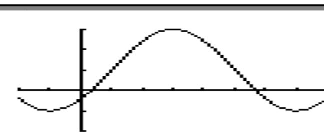
Equation as a Sine Wave:

$$y = a \cdot \sin\left(\frac{2\pi}{P}(x - c)\right) + d$$

$$y = 2\sin\left(\frac{2\pi}{2\pi}(x - \pi/4)\right) + 1$$

$$y = 2\sin(x - \pi/4) + 1$$

Plot1 Plot2 Plot3
\Y1=2sin(X-π/4)+1
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=



2. Graph the following equation.

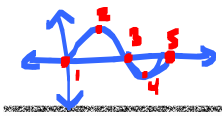
a. $$y = 2\sin\left(\frac{\pi}{2}(x-3)\right)+5$$

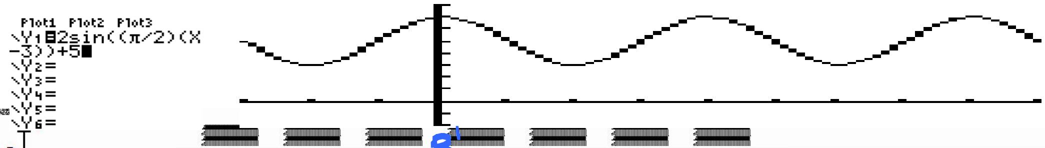
STEP #1

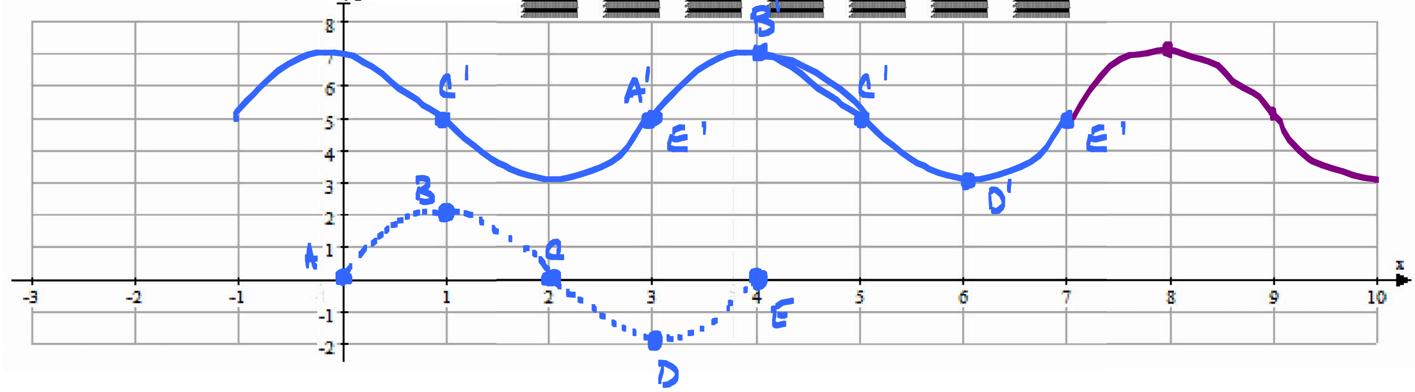
AMP = 2

$\text{PERIOD} = \frac{2\pi}{\pi/2} = 2\pi \div \frac{\pi}{2}$

$= 2\cancel{\pi} \cdot \frac{2}{\cancel{\pi}} = 4$







b. $$y = 3\sin\left(\frac{1}{2}\left(x-\frac{3\pi}{2}\right)\right)+4$$

STEP #1

AMP = 3

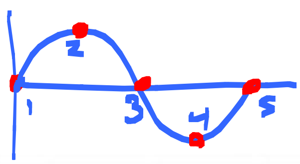
$\text{PER} = \frac{2\pi}{1/2} = 2\pi \div \frac{1}{2}$

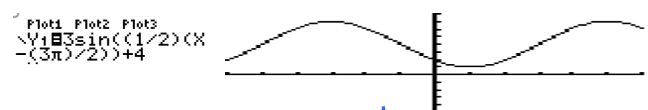
$= 2\pi \cdot \frac{2}{1} = 4\pi$

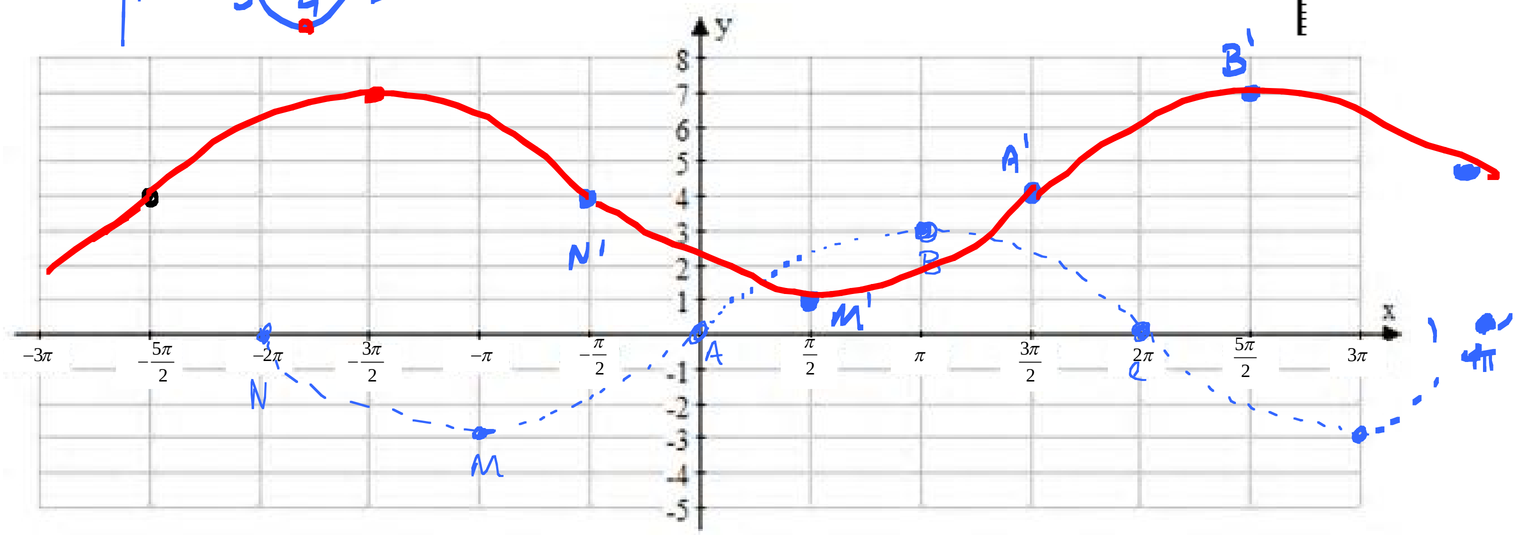
STEP #2

PHASE: RIGHT $3\pi/2$

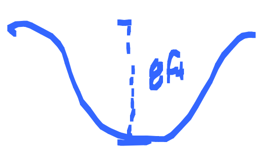
VERTICAL: UP 4

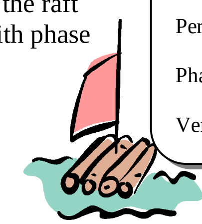






3. The Coast Guard observes a raft floating on the water bobbing up and down a total of 8 feet. Beginning at the top of the wave, the raft completes a full cycle every 5 seconds. Write an equation with phase shift 0 to represent the height of the raft after t seconds.





Amplitude = 4

Period = 5

Phase Shift = 0

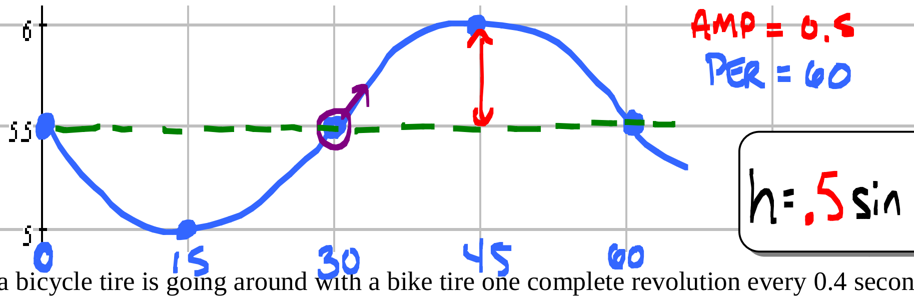
Vertical Shift = 0

h

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

$y = a\sin\left(\frac{2\pi}{T}(x-c)\right)+d$

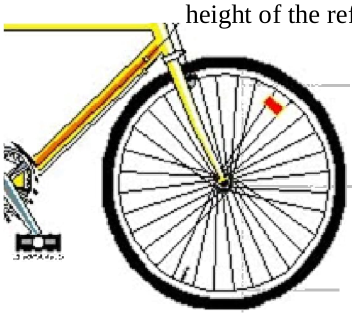
4. An insect is stuck on the very tip of a second hand of a wall clock for a couple of minutes. The tip of the second hand is 5 feet above the floor at its lowest point and 6 feet above the floor at its highest. The bug landed on the second hand at exactly 15 seconds after 10:10 pm. Describe the bug's height as a function of time. (remember a second hand takes exactly 60 seconds to complete a full cycle)

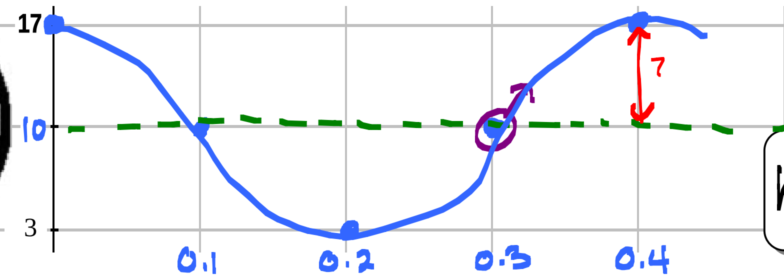


AMP = 0.5
PER = 60
PHASE = 30
VERT = 5.5

$$h = .5\sin\left(\frac{2\pi}{60}(t-30)\right) + 5.5$$

5. A reflector on a bicycle tire is going around with a bike tire one complete revolution every 0.4 seconds. At its highest point the reflector is 17 inches off the ground. At its lowest point it 3 inches of the ground. Write an equation that describes the height of the reflector as a function of time if the reflector starts out at its highest point.

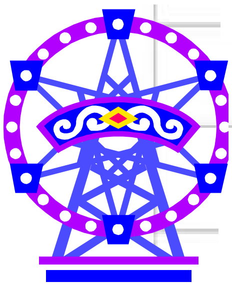


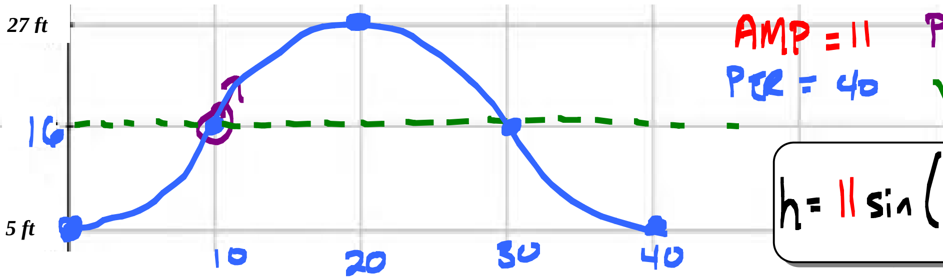


AMP = 17
PER = 0.4
PHASE = 0.3
VERT = 10

$$h = 7\sin\left(\frac{2\pi}{.4}(t-.3)\right) + 10$$

6. A person gets on a Ferris wheel that starts off 5 ft above ground and at its highest is 27 ft above ground. If the Ferris wheel completes a full rotation in 40 seconds. The person starts at the bottom. Write an equation that describes the height of the rider as a function of time.

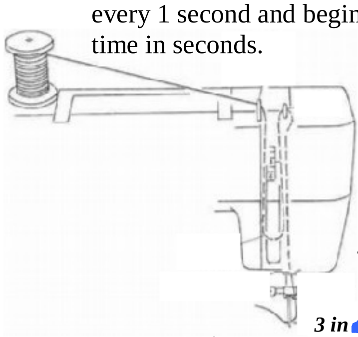




AMP = 11
PER = 40
PHASE = 10
VERT = 16

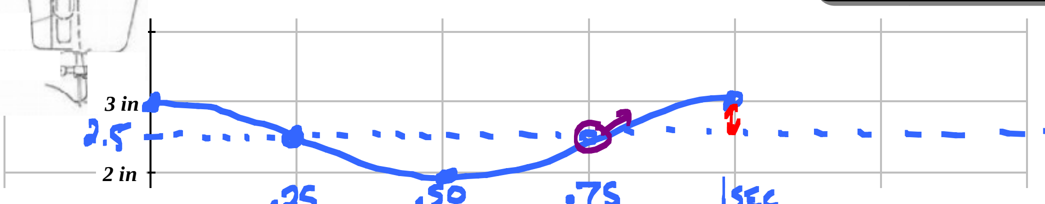
$$h = 11\sin\left(\frac{2\pi}{40}(t-10)\right) + 16$$

7. A sewing machine needle is bouncing up and down between 3 and 2 inches off the table. If the needle completes a full cycle every 1 second and begins at the top of a cycle then write an equation that describes the height of the needle as a function of time in seconds.

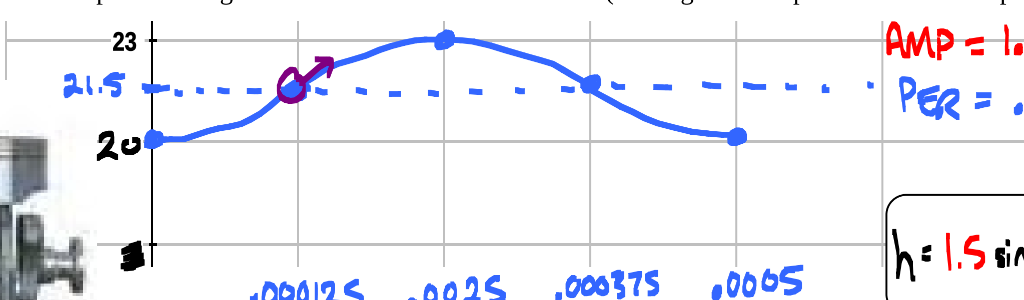


AMP = 0.5
PER = 1 sec
PHASE = 0.75
VERT = 2.5

$$h = .5\sin\left(\frac{2\pi}{1}(x-.75)\right) + 2.5$$



8. A piston inside of an engine turns a crank shaft at 2000 times a second or once every .0005 seconds. The top of the piston is 20 inches above the ground at its lowest point and 23 inches above ground at its highest point. Create a function that describes the piston's height as a function of time in seconds (starting with the piston at its lowest point)



AMP = 1.5
PER = .0005
PHASE = .000125
VERT = 21.5

$$h = 1.5\sin\left(\frac{2\pi}{.0005}(x-.000125)\right) + 21.5$$

9. The average high temperature of a day in Atlanta can be modeled by the equation:

$$T = \underset{\text{AMP}}{20}\sin(0.017(d + 1.816)) + \underset{\text{MIDLINE}}{69}$$

'***T***' represents the temperature in Fahrenheit and '***d'*** is day number of the year (e.g. Feburary 2nd would be day 33)

a. Using the model what is the average high temperature on February 28th?

20sin(.017(59+1.816))+69
86.18571873

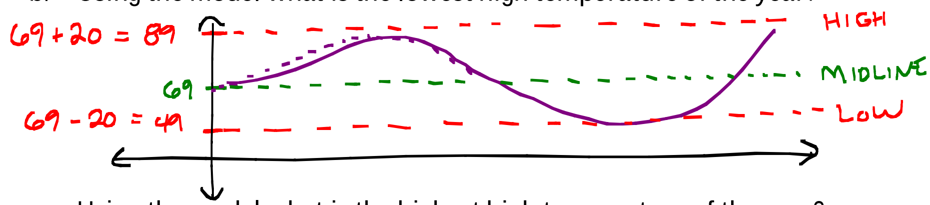
FEB 28TH = 31 + 28 = DAY 59

(DAYS IN JANUARY)

I THINK THE MODEL'S PHASE SHIFT IS OFF

BE SURE YOUR CALCULATOR IS IN RADIAN MODE → $T = 20\sin(0.017(59 + 1.816)) + 69 \approx 86°$

b. Using the model what is the lowest high temperature of the year?

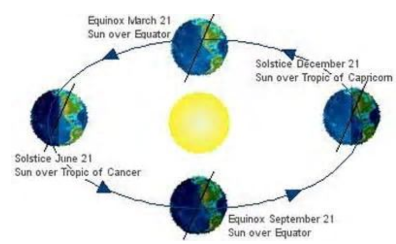


$\boxed{49°F}$

c. Using the model what is the highest high temperature of the year?

$\boxed{89°F}$

10. The number of minutes of sun each day in Louisiana can modeled by the equation:



$$M = \underset{\text{AMPLITUDE}}{113.3}\sin(0.017(d + 1.319)) + \underset{\text{MIDLINE}}{727}$$

'***M'*** represents the number of minutes of sunshine each day and '***d'*** is day number of the year (e.g. Feburary 2nd would be day 33)

$$M = 113.3\sin(0.017(59 + 1.319)) + 727$$

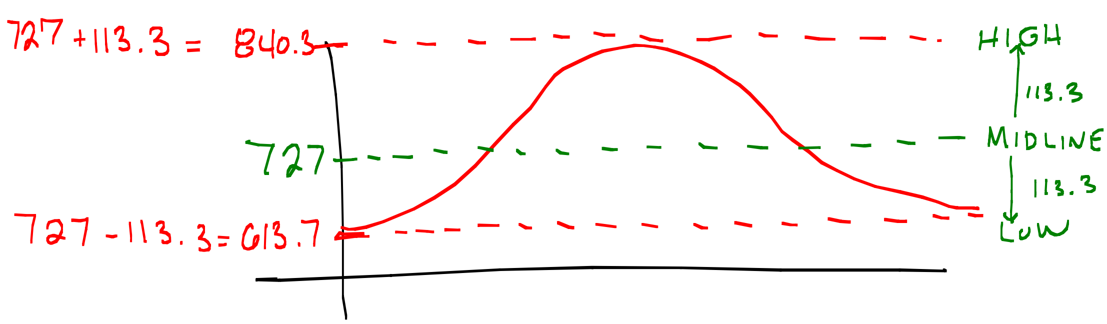
a. Using the model how many minutes of sunshine should there be on February 28th?

FEB 28TH = 31 + 28 = DAY 59

(DAYS IN JANUARY)

$$MIN = 113.3\sin(0.017(59 + 1.319)) + 727 \approx 824 \text{ MINUTES}$$

b. Using the model how many minutes of sunshine are there on the longest day?



$\boxed{\approx 840.3 \text{ MINUTES}}$