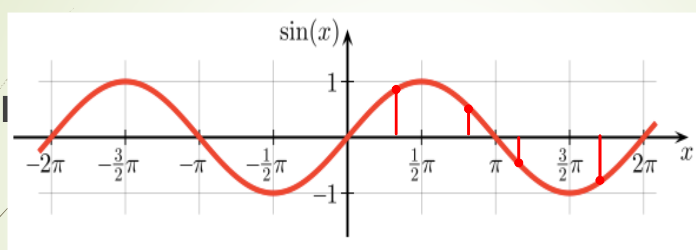
13-4: The Sine Curve

Algebra 2

Mr. Gallo

The Sine Curve $y = \sin(x)$



Estimate:

(a) $\sin(2)$

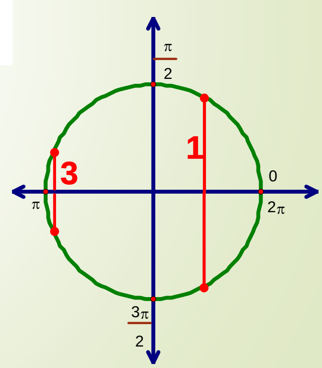
$\frac{\pi}{2} \approx 1.57$

$2 \approx .91$

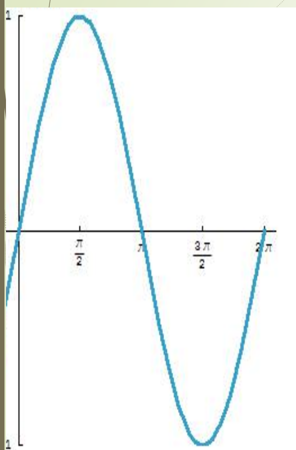
(b) $\sin(\frac{3\pi}{4})$

$\frac{\pi}{2} \approx 1.57$

$\frac{3\pi}{4} \approx 2.36$



Graphing y = a sin(bx)



|a| = amplitude of function.

b = number of complete cycles from 0 to 2π

$\frac{2\pi}{b}$ is the period of the function.

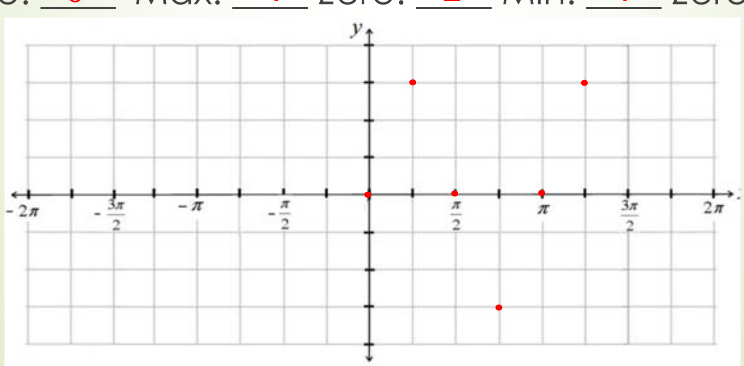
1. Calculate the amplitude, # of cycles, and period in order to graph a sine function.
2. For one period, identify the x-values for: *zero*, *max*, *zero*, *min*, *zero* **by dividing the period by 4**.
3. Above the *max* x-value, plot a point using the amplitude as your height.
4. Below the *min* x-value, plot a point using the amplitude as your height.
5. Connect the points with a smooth curve.
6. Repeat the cycle across the rest of the graph.

Graph $y = 3\sin(2\theta)$

Amplitude: 3 # of cycles from 0 to 2π: 2

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

Zero: 0 Max: $\frac{\pi}{4}$ Zero: $\frac{\pi}{2}$ Min: $\frac{3\pi}{4}$ Zero: π

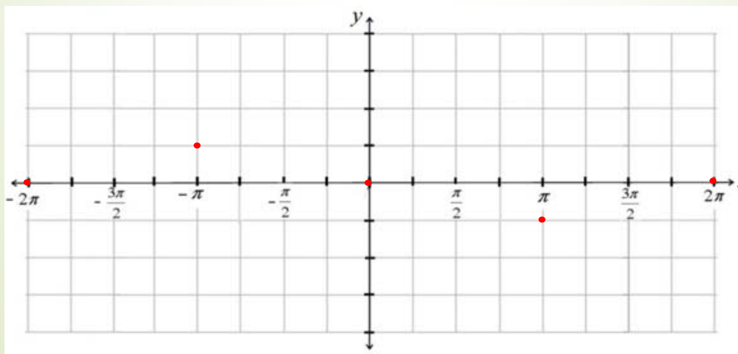


Graph $y=-\sin\left(\frac{\theta}{2}\right)$

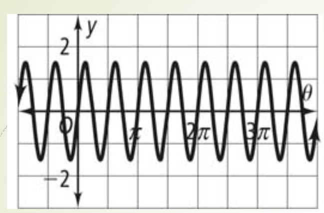
Amplitude: ___1___ # of cycles from 0 to 2π: $\frac{1}{2}$

Period: $\frac{2\pi}{b}=\frac{2\pi}{1/2}=4\pi$

Zero: -2π Max: $-\pi$ Zero: 0 Min: π Zero: 2π



(a) Determine the period and amplitude of each graph.
(b) Determine the equation of the sine curve in each graph.

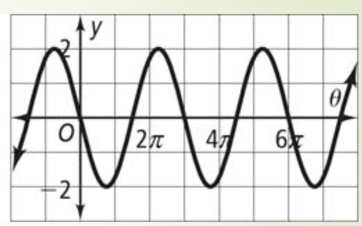


a). Period $\frac{2\pi}{4}=\frac{\pi}{2}$

Amplitude $\frac{1.5-(-1.5)}{2}=\frac{3}{2}$

b). $y=a\sin(b\theta)$

$y=\frac{3}{2}\sin(4\theta)$



a). Period 3π

Amplitude $\frac{2-(-2)}{2}=2$

b). $y=a\sin(b\theta)$

$y=-2\sin\left(\frac{2}{3}\theta\right)$

In New Jersey, the spring and fall equinox each have 12 hours of daylight. The summer solstice has 15 hours of daylight, and the winter solstice has 9 hours of daylight. Let y = the number of hours of variation from the spring equinox. (For example, y = 3 for the summer solstice and y = -3 for the winter solstice.)

a. What would the independent variable *x* represent in this situation?

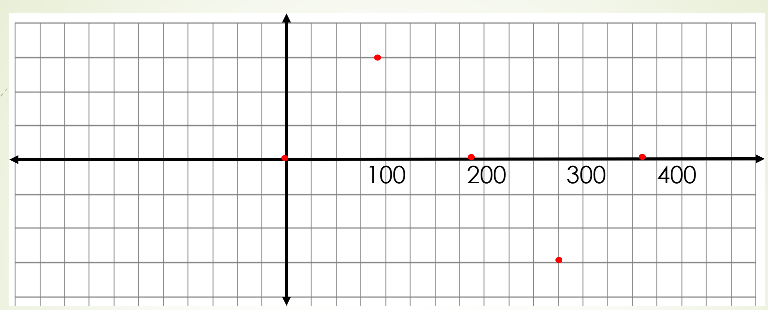
The number of days after the spring equinox.

b. What is the amplitude and period of the function?

Amplitude: $\frac{3-(-3)}{2}=3$

Period: 365

Write a sine function that would model the amount of sunlight hours for a certain amount of days after the spring equinox. Then, graph your function below.



Using your equation, predict the hours of daylight in NJ on May 21, which is 60 days after the spring equinox.

$a=3$

$\frac{2\pi}{b}=365$

$\frac{2\pi}{365}=b$

$y=3\sin\left(\frac{2\pi}{365}x\right)=3\sin\left(\frac{2\pi}{365}(60)\right)=2.58$

There is 12 + 2.58 = 14.58 hours of daylight on May 21.

Homework: p.856 #7-29 odd, 41, 45, 48 (a-d)