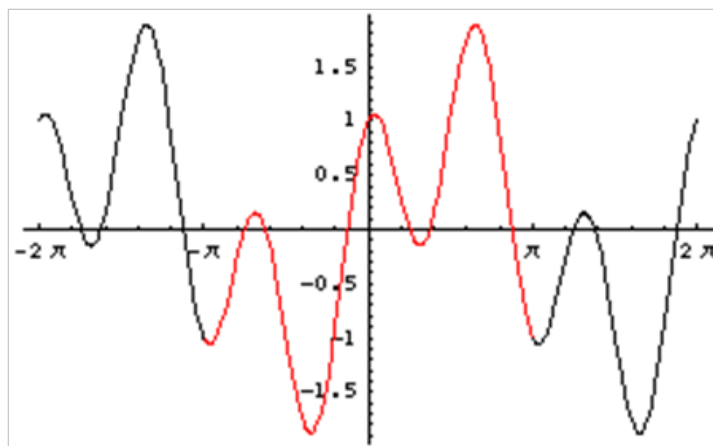
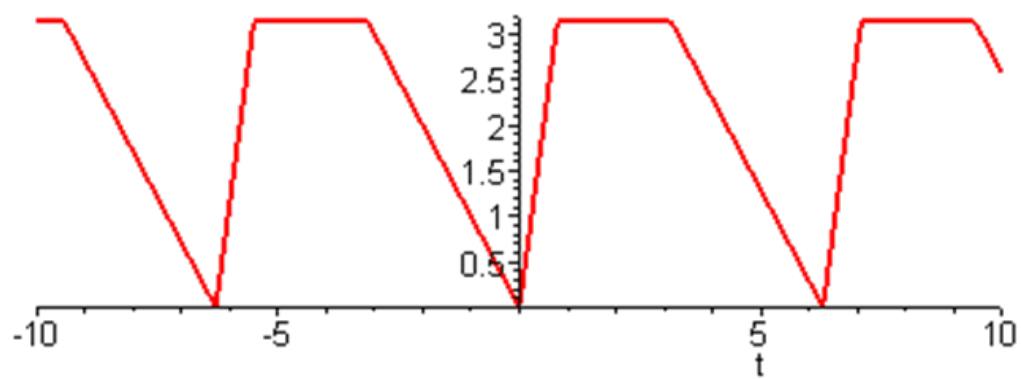


Section 4.5 A Graphing sine

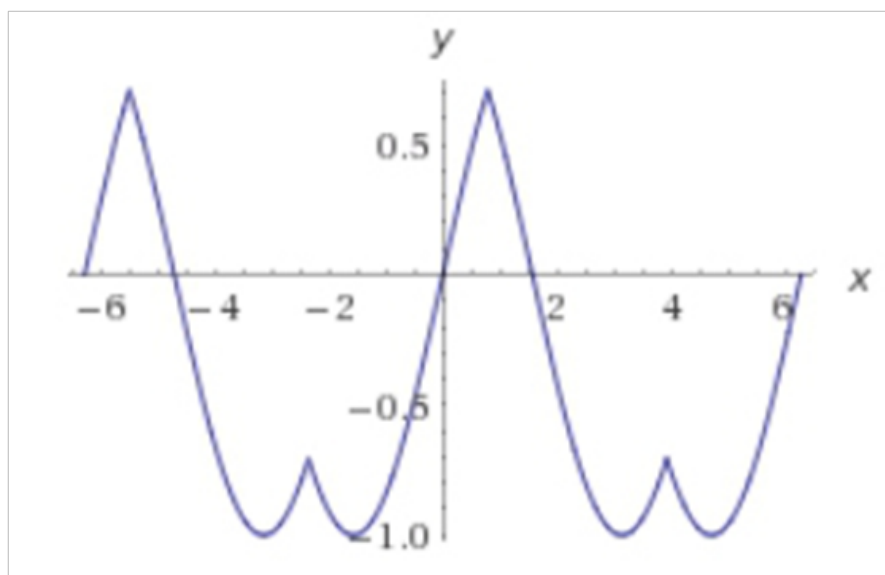
1.



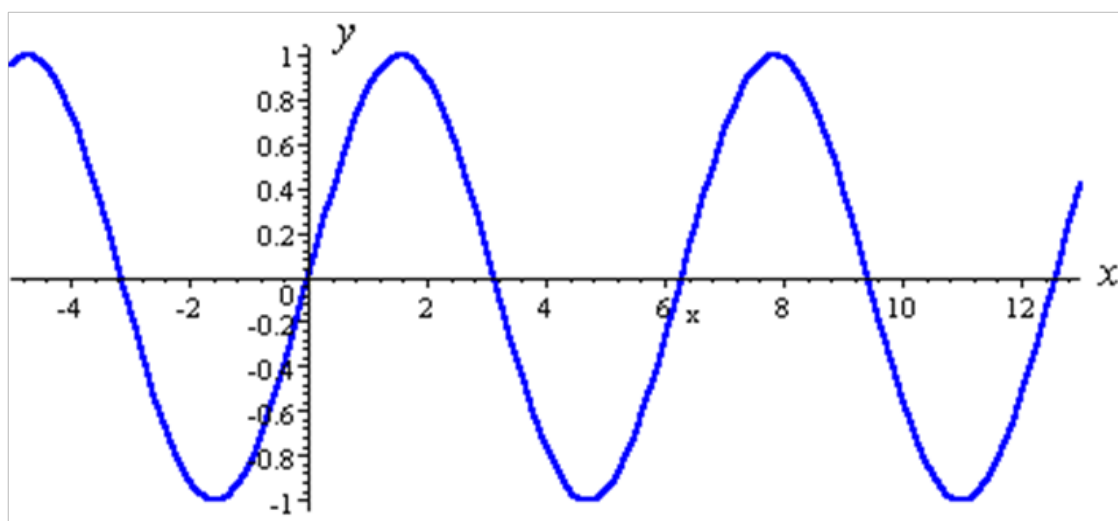
2.

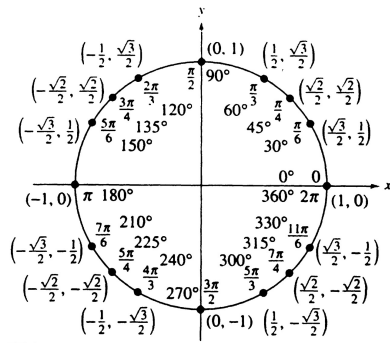


3.

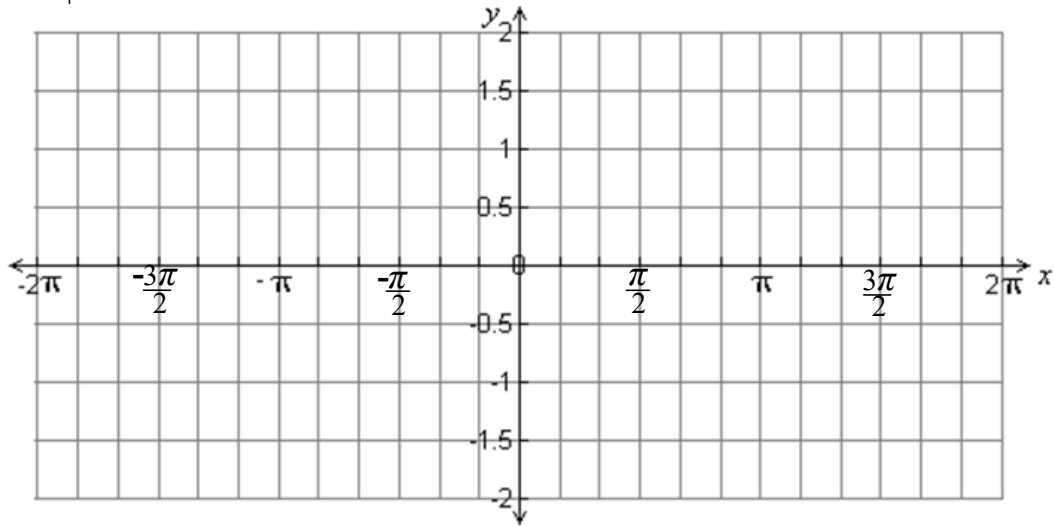


4.





$$y = \sin \theta$$



Study the graph to answer the following questions:

What is the period?

What is the domain?

What is the range?

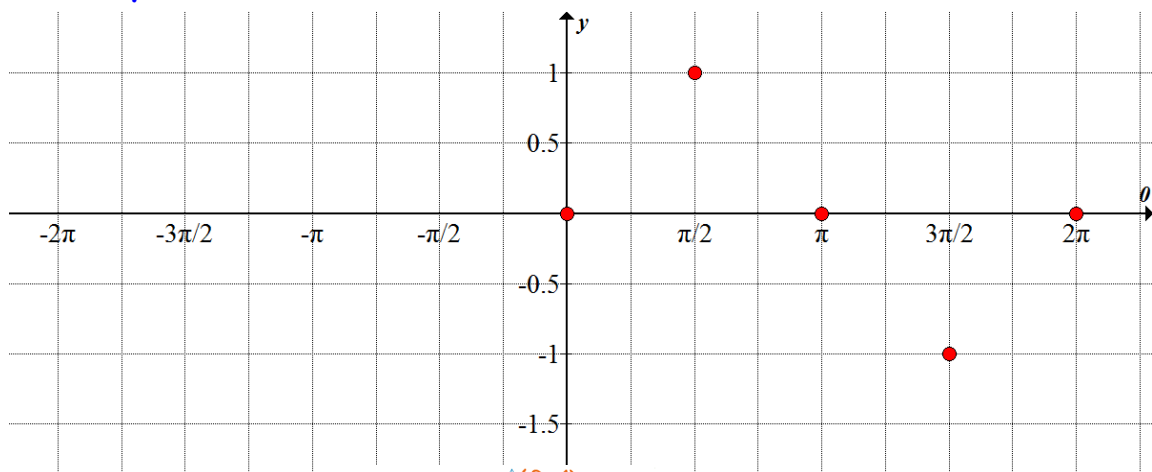
What is the y-intercept?

Where do the x-intercepts occur?

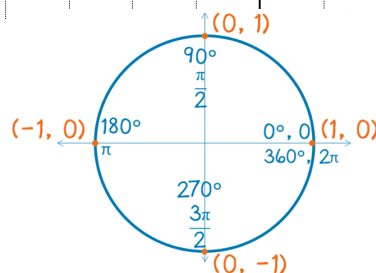
What are the maximum values and where do they occur?

What are the minimum values and where do they occur?

Use this five point pattern to help you sketch the sinusoid accurately!



Find your period and then find your count.



The five points come from the intercepts of the unit circle!

Notation Note: I've been using $f(\theta) = \sin \theta$ to avoid confusion with various x-values, but you will more commonly see: $f(x) = \sin x$

It's all the same folks!
Just be sure to label
your axis accordingly!

$$f(t) = \sin t$$

$$f(x) = \sin(x)$$

$$f(t) = \sin(t)$$

Make a conjecture!

Using your hitherto awesome graphing skills, make a quick guess about the effect the number 2 will have on the graph of each sinusoid.


a. $f(x) = 2 \sin x$

 <https://www.desmos.com/calculator/rcv1racftd>


b. $f(x) = \sin x + 2$

 <https://www.desmos.com/calculator/rgpocrfjq;>

c. $f(x) = \sin(x - 2)$

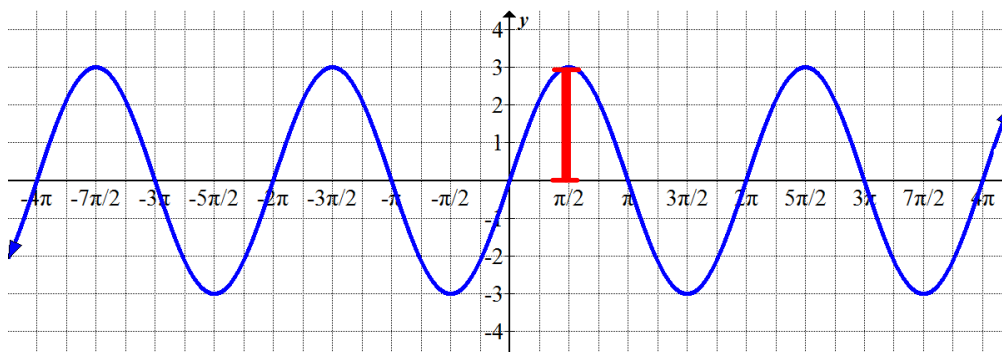
 How does h change the graph?

d. $f(x) = \sin(2x)$

 How does b change the sinusoid?

The Amplitude of the function is $|a|$.

$$f(x) = 3 \sin x$$



$$y = a \sin(b(\theta - h) + k) \quad \text{or} \quad y = a \sin(b\theta - h) + k$$

$|a|$: amplitude

$$\text{period} = \frac{2\pi}{|b|}$$

$$\frac{1}{p} \Rightarrow \text{Frequency}$$

h : the horizontal phase shift

(solve the parentheses for θ)

k : vertical translation

Find the period, amplitude, phase shift and vertical translation.

1. $y = -3\sin x$

2. $y = 5\sin\theta + 4$

3. $y = \frac{3}{4}\sin(\theta - \pi/2) + 2$

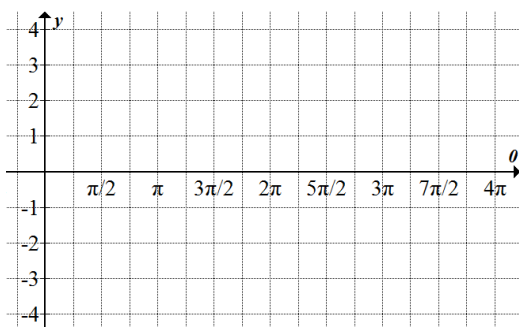
4. $y = 4\sin(x + \pi/6)$

5. $y = -2\sin 4(\theta - \pi)$

6. $y = -2\sin(4\theta - \pi)$

Let's try it! Sketch the function (2 periods please).

$$f(x) = 3 \sin x$$



amplitude:

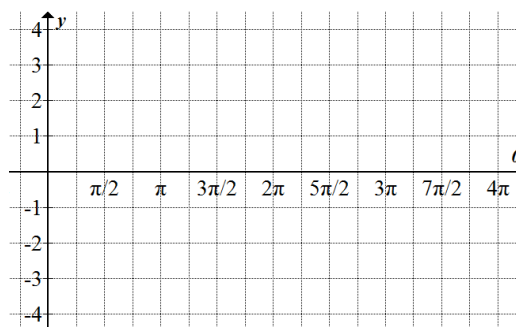
period:

count:

domain:

range:

$$f(x) = -2 \sin x$$



amplitude:

period:

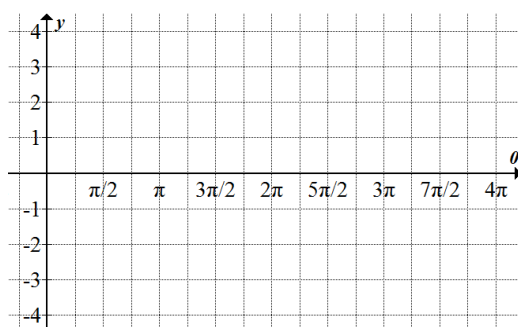
count:

domain:

range:

Sketch the function (Number of periods as appropriate).

$$f(x) = \sin 4x$$



Period:

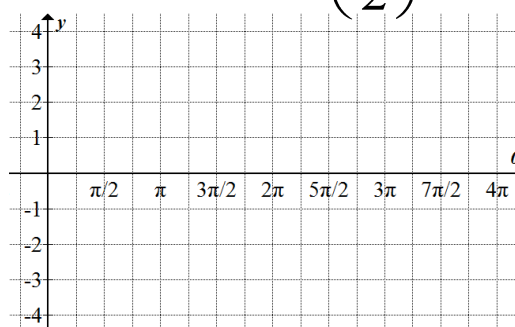
count:

amplitude:

domain:

range:

$$f(x) = \sin\left(\frac{x}{2}\right)$$



Period:

count:

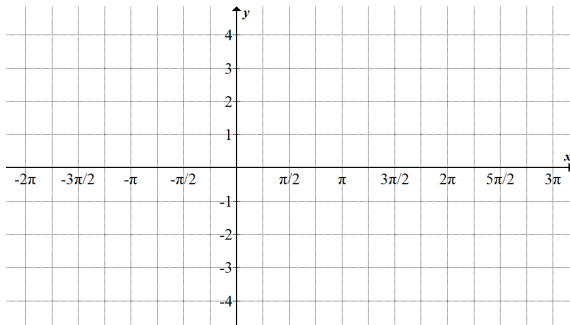
amplitude:

domain:

range:

Can you put it all together?

$$f(x) = \frac{1}{2} \sin 2x$$



amplitude:

period:

count:

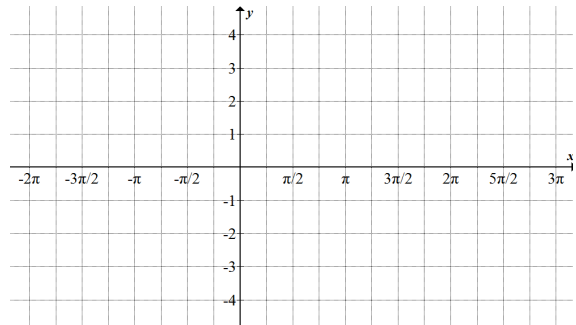
phase shift (L/R):

vertical shift:

domain:

range:

$$g(x) = 2 \sin \left(x - \frac{3\pi}{4} \right)$$



amplitude:

period:

count:

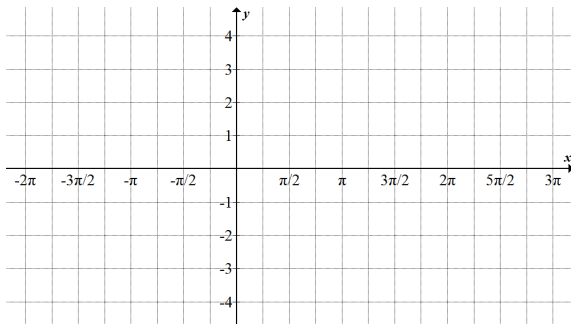
phase shift (L/R):

vertical shift:

domain:

range:

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



amplitude:

period:

count:

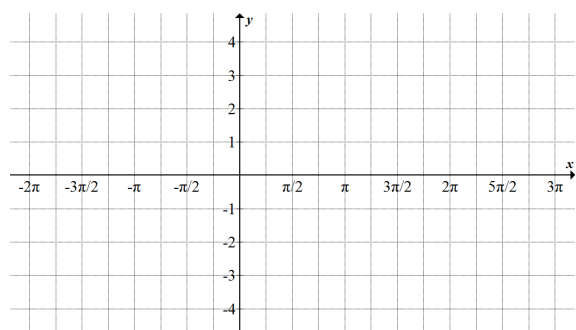
phase shift (L/R):

vertical shift:

domain:

range:

$$j(x) = 3 \sin \left(x + \frac{\pi}{4} \right) - 1$$



amplitude:

period:

count:

phase shift (L/R):

vertical shift:

domain:

range: