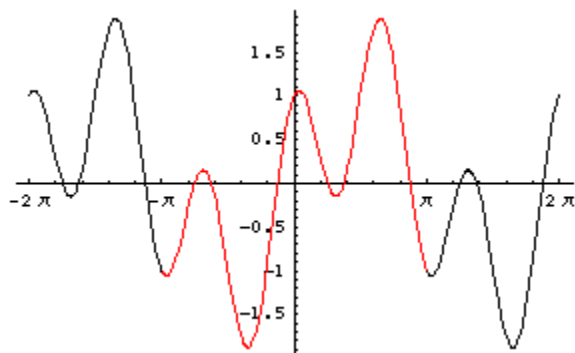


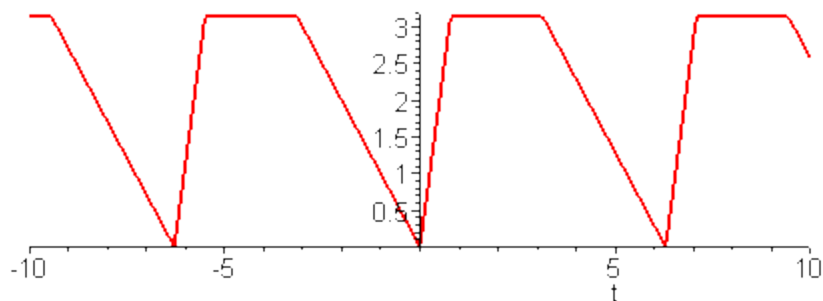
Periodic Graphs

Highlight the repeating pattern. What is the period?

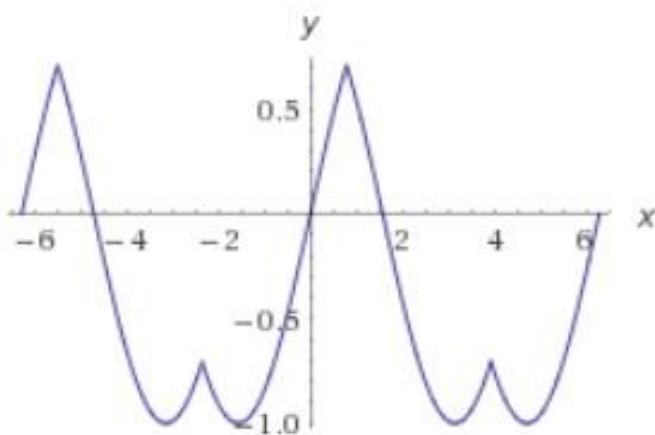
1.



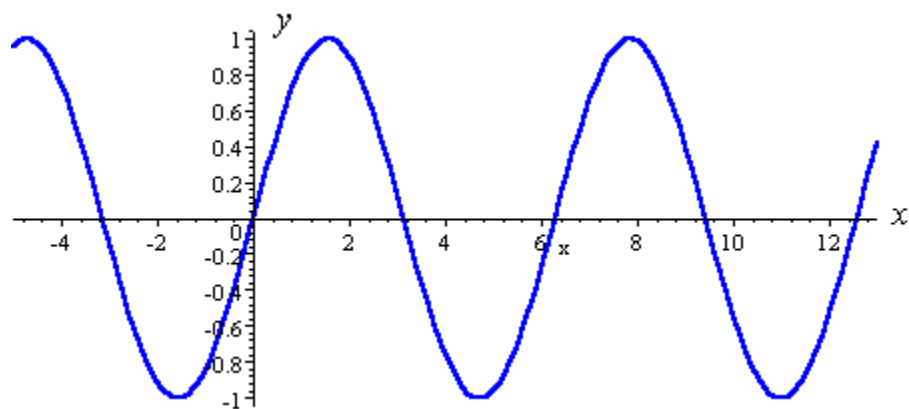
2.



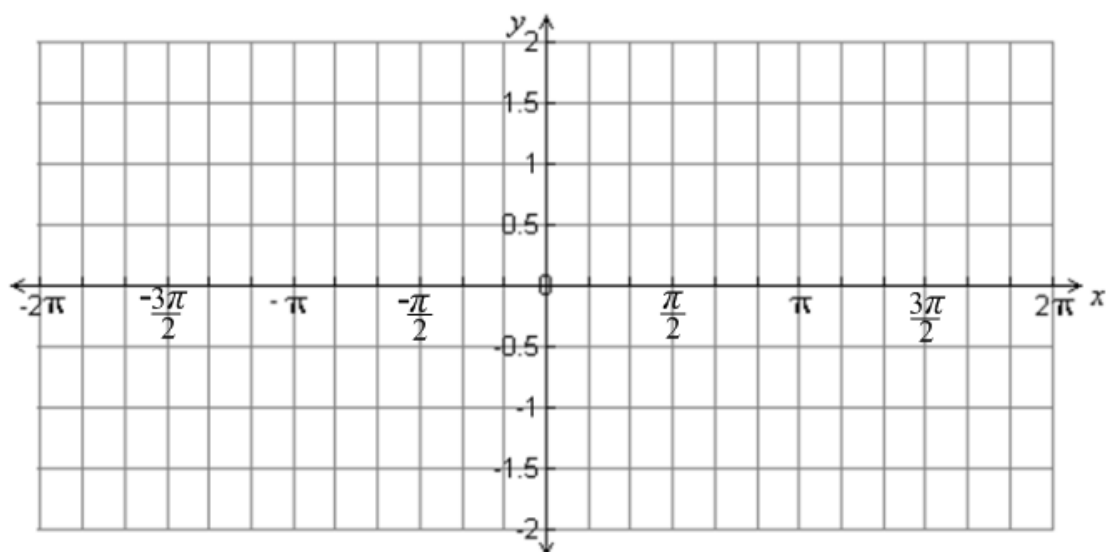
3.



4.



Use your unit circle and graph $y = \sin \theta$.



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?

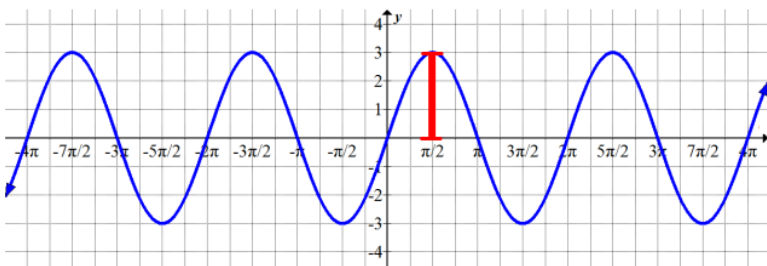
What are the minimum values and where do they occur?

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) $f(x) = 2 \sin x$
- b) $f(x) = \sin x + 2$
- c) $f(x) = \sin(x - 2)$
- d) $f(x) = \sin(2x)$

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



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

Equation of a sinusoid with all the transformations.

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

or

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

$|a|$: amplitude

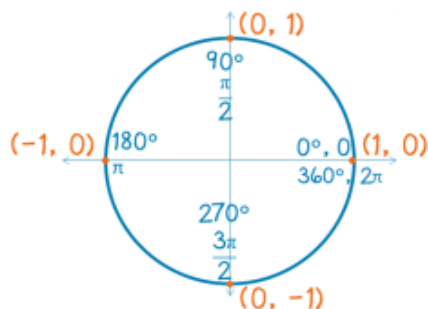
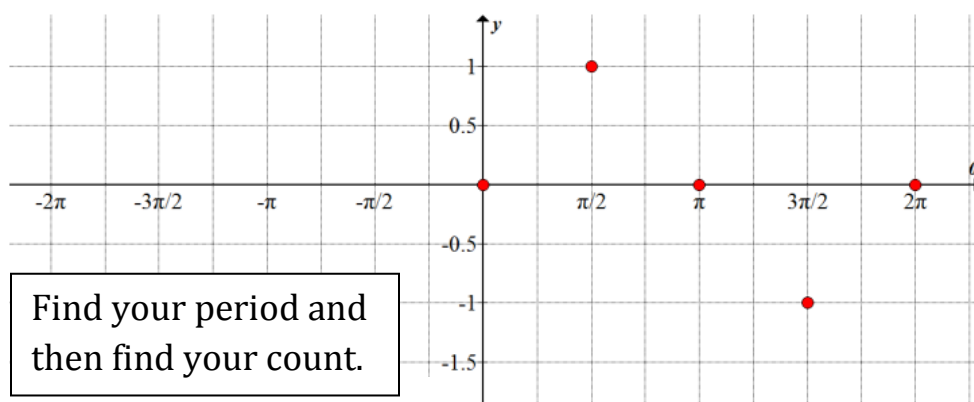
$$\text{period} = \frac{2\pi}{|b|}$$

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

h : the horizontal phase shift
(solve the parentheses for θ)

k : vertical translation

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



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

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

1. $y = 2\sin\theta$

2. $y = -3\sin x$

3. $y = 3\sin\theta + 4$

4. $y = -5\sin x - 7$

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

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

7. $y = \sin 2(\theta + \pi/2) - 6$

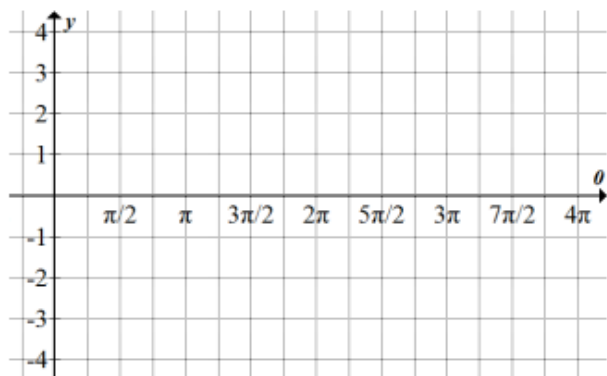
8. $y = \sin(2\theta + \pi/2) - 6$

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

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

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

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



amplitude:

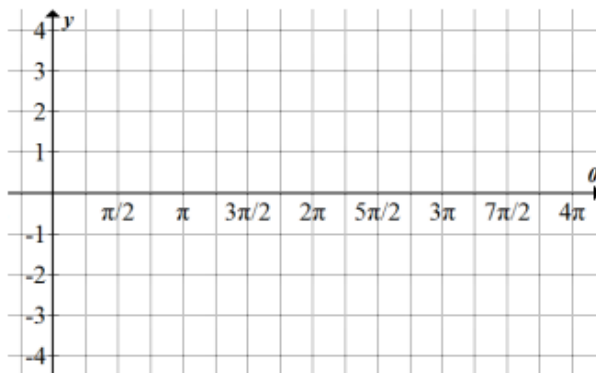
period:

count:

domain:

range:

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



amplitude:

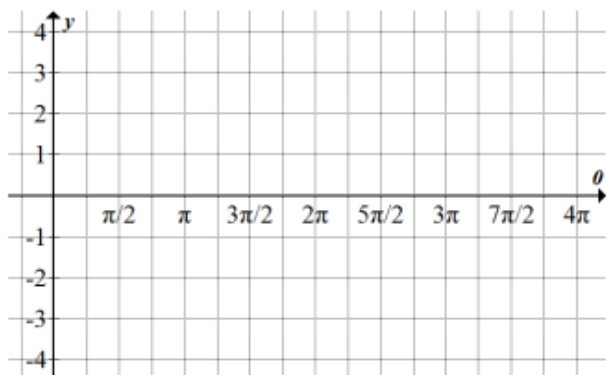
period:

count:

domain:

range:

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



amplitude:

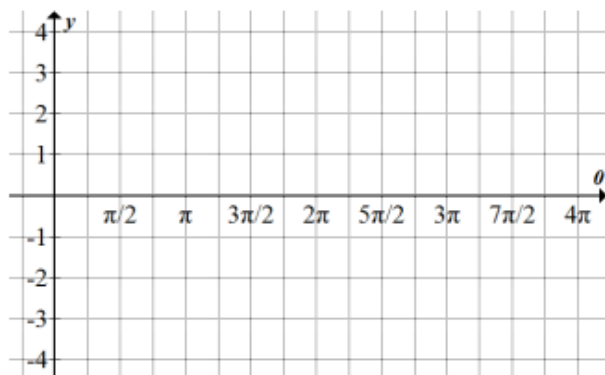
period:

count:

domain:

range:

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



amplitude:

period:

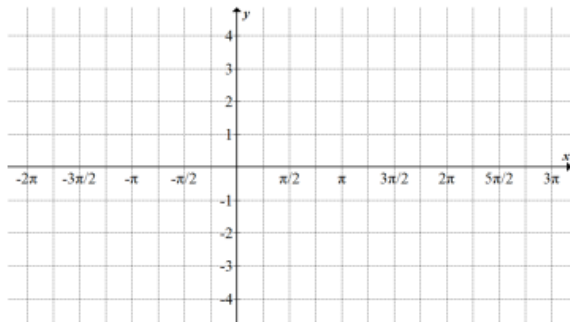
count:

domain:

range:

Can you put it all together?

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



amplitude:

period:

count:

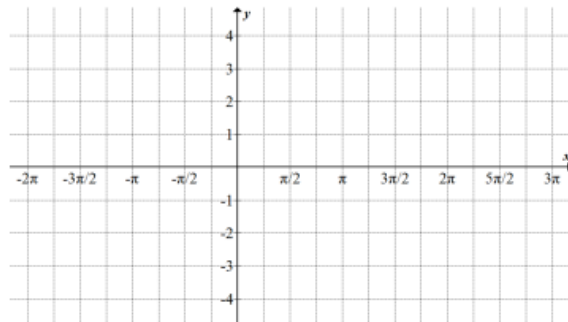
phase shift (L/R):

vertical shift:

domain:

range:

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



amplitude:

period:

count:

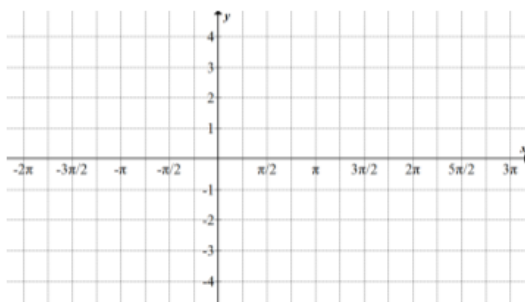
phase shift (L/R):

vertical shift:

domain:

range:

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



amplitude:

period:

count:

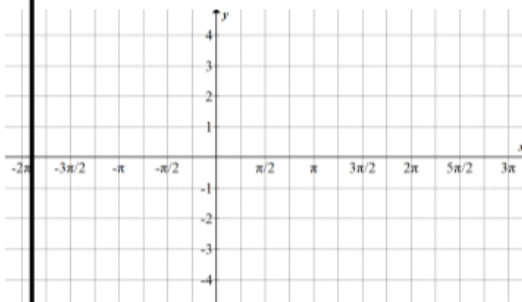
phase shift (L/R):

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: