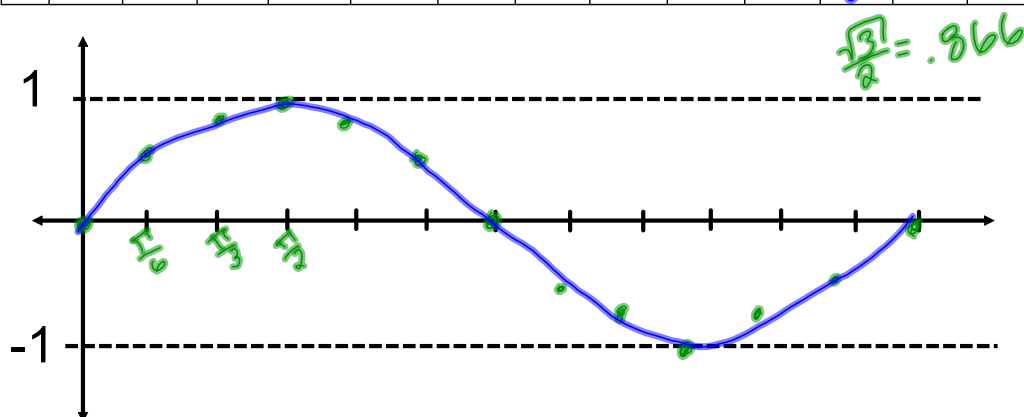


## Chapter 4.5: Graphs of Sine/Cosine

Fill in the table for  $y = \sin(x)$ 

x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	$\pi$	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	$2\pi$
y	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0



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

amplitude:  $\text{abs}(a)$  vertical stretch/shrink  $|a|$

Period:  $2\pi/b$  length of one cycle  $\frac{2\pi}{b}$

$h/b$ : phase shift left and right (starting point)  $\frac{h}{b}$   
opp.

$k$ : shift up and down

Max/Min will occur at .25period and .75period

$$0 \quad \frac{\text{period}}{4} \quad \frac{1}{4} \quad \frac{\text{period}}{2} \quad \frac{3\text{period}}{4} \quad \frac{3}{4} \quad \text{period}$$

How to graph:

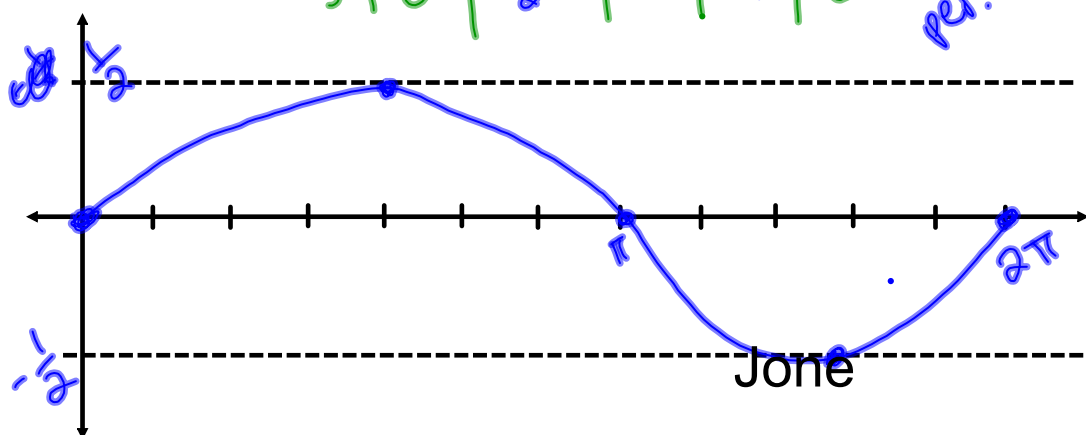
1. Find the amplitude and period
2. Find 5 key points ( $0 + .25\text{period} + .25\text{period} + \dots$ )
3. Find the y values for the key points
4. Connect with smooth curve
5. Extend to left and right

garph

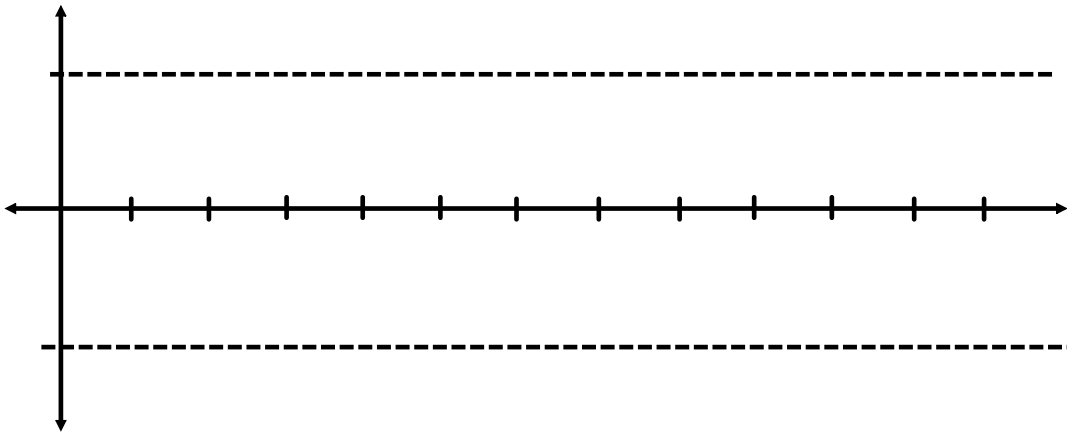
$$y = \frac{1}{2} \sin x \quad 0 \leq x \leq 2\pi$$

x	0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
y	0	$\frac{1}{2}$	0	$-\frac{1}{2}$	0

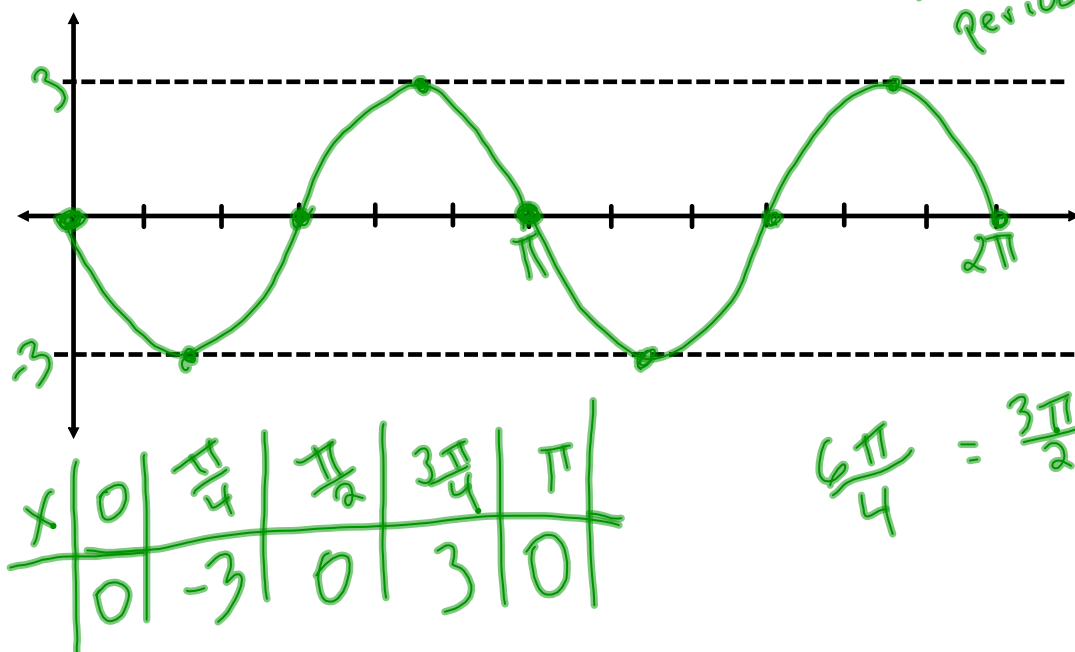
amp =  $\frac{1}{2}$   
per. =  $2\pi$



Graph  $y = -2\sin(x)$   $-\pi \leq x \leq 3\pi$



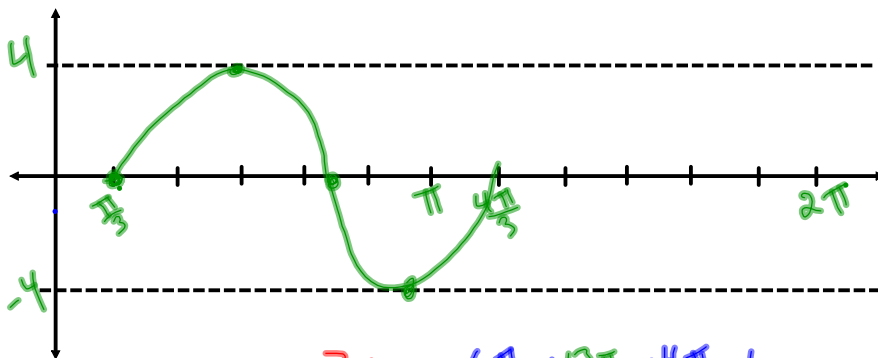
Graph:  $y = -3\sin 2x$   $0 \leq x \leq 2\pi$



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

$\left[\frac{2\pi}{3} \cdot \frac{2}{2}\right] - \frac{2\pi}{6} = -\frac{\pi}{3}$

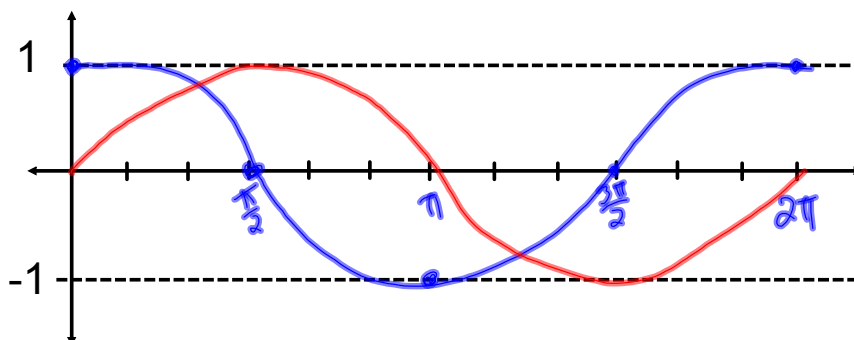
Amplitude: 4    Period: ~~4~~    Phase Shift:  $\frac{\pi}{3}$



x	$\frac{\pi}{3}$	$\frac{7\pi}{12}$	$\frac{5\pi}{6}$	$\frac{13\pi}{12}$	$\frac{4\pi}{3}$
y					

Fill in the table for  $y = \cos(x)$

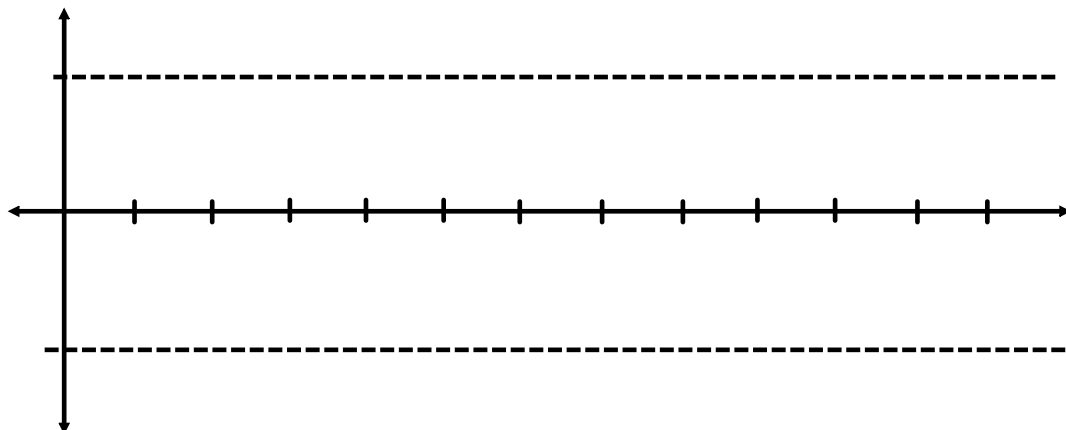
x										
y										



$\cos x = \sin\left(x + \frac{\pi}{2}\right)$

making them sinusoidal graphs

Graph:  $y = -3\cos\frac{\pi}{2}x$   $-4 \leq x \leq 4$

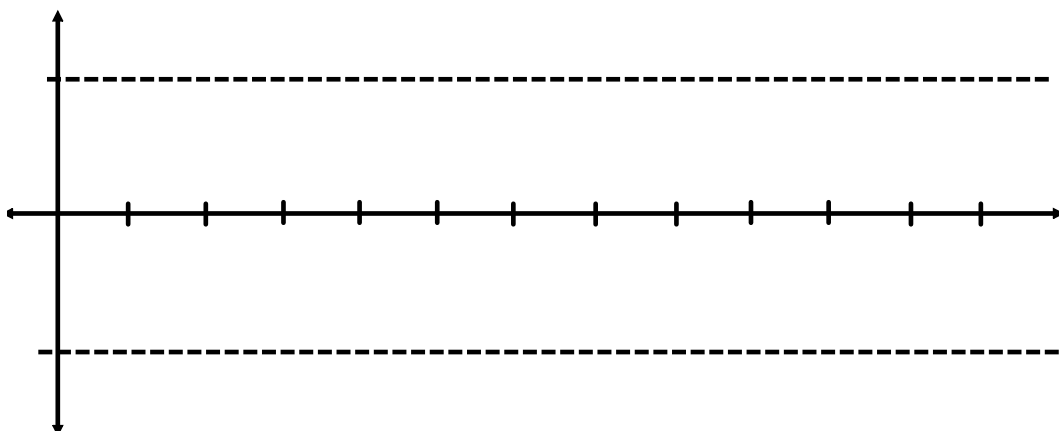


Graph:  $y = \frac{1}{2}\cos(4x + \pi)$

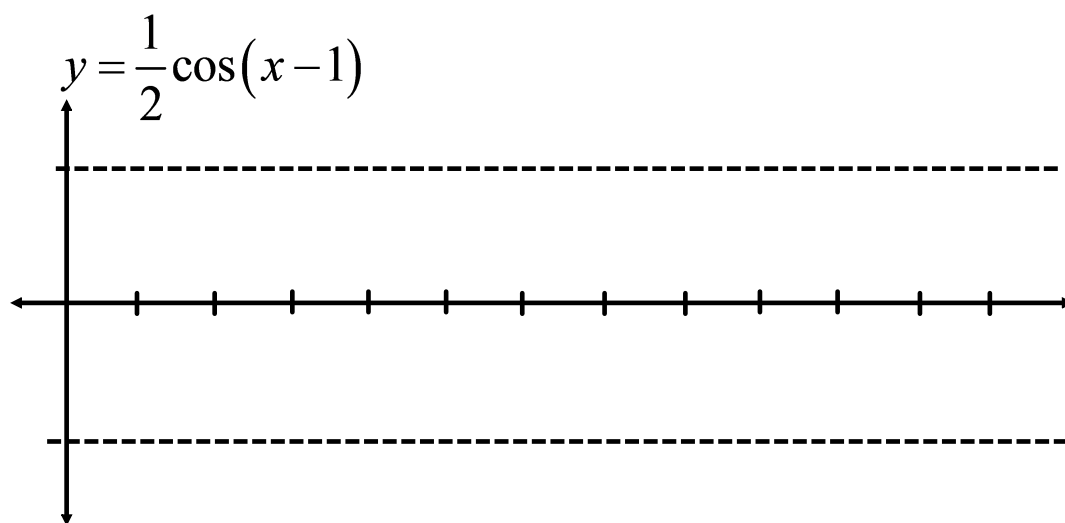
Amp:

Period:

PS:



Graph one period of the function



The depth of water at a boat dock varies with the tides. The depth is 5ft at low tide and 13ft at high tide. On a certain day, low tide occurs at 4AM and high tide at 10AM. If  $y$  is the depth of the water and  $x$  is the hours after midnight, use a sine function to model the water's depth.

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

Suggested Work: Chapter 4.5 pg.493

#'s 3,7,13,23,29,45,47,57,69

check out biorhythm charts....