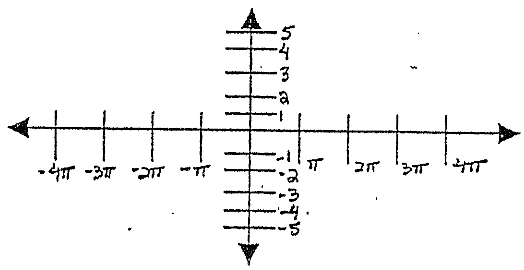
Name__________________________________Date________________________Block______

Section 3.2: Graphs of the Trig Functions on the TI-83

We are going to look at the graph of $y = \sin(x)$ and see how we can change that graph using addition, subtraction, multiplication and division.

When we graph the trig functions, we usually use steps of 1 on the y-axis and steps of π on the x-axis. Keeping this in mind, please set your window to the following settings. Your window, then, will look like this:

Xmin = -4π
Xmax = 4π
Xscl = π
Ymin = -5
Ymax = 5
Xres = 1



To graph the following, make sure your calculator is in **radian** mode!

The Amplitude

1) Graph the equations: $y = \sin(x)$ and $y = 2\sin(x)$

2) What relationship do you notice between the two graphs? ☆ sin x goes up to 1 and down to -1
☆ Same x-ints ☆ Same periods
☆ 2sin x goes up to 2 and down to -2

3) Graph the equation $y = 5\sin(x)$ on the same axes as the graphs from #1. How does this relate? ☆ Goes up to 5 and down to -5
☆ Same x-int and periods

4) Describe the impact that multiplying $\sin(x)$ by an integer has on the graph.
☆ Vertical stretch

The Opposite

5) Graph the equations: $y = \sin(x)$ and $y = -\sin(x)$

6) What relationship do you notice between these two graphs?
☆ Same x-ints ☆ Same periods
☆ reflect over x-axis

7) Graph the equations: $y = 4\sin(x)$ $y = -4\sin(x)$

8) What relationship do you notice between these two graphs?
☆ reflect over x-axis
☆ Same x-ints ☆ Same periods

9) In general, what does putting a negative in front on the equation do to the graph?
☆ reflect over x-axis

Trig $y = A\sin Bx + K$ $y = A\cos Bx + K$

Section 3.2 – Graphing $y = k + A\sin Bx$ and $y = k + A\cos Bx$

K: vertical shift

+ up

- down

$|A|$: amplitude

how far above and below horizontal axis.

-A: reflected or flipped over horizontal axis

Period: $\dfrac{2\pi}{B}$ (no time unless linked to application)

$B > 1$: horizontal shrink → period less than 2π

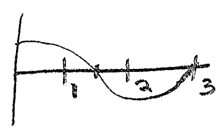
$0 < B < 1$: horizontal stretch → period greater than 2π

Period (P): time it takes to complete one cycle

Frequency (f): # of cycles per unit of time

$$P = \frac{1}{f} \qquad P = \frac{2\pi}{B} \qquad f = \frac{1}{P} \qquad f = \frac{B}{2\pi}$$

Ex: P = 3 sec/cycle

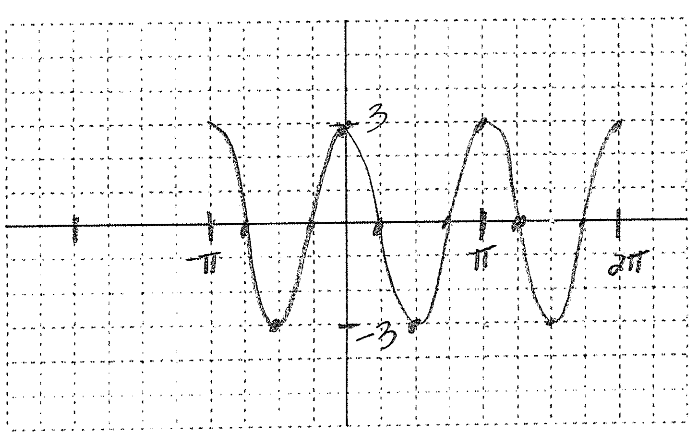


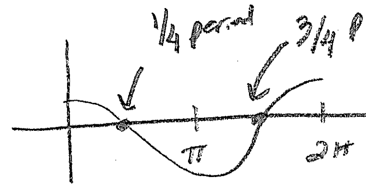
Ex: f = 1/3 cycle/sec

1) State the amplitude and period for $y = 3\cos 2x$, and graph the equation for $-\pi \le x \le 2\pi$

Amplitude: 3

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



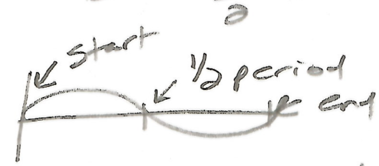


x-ints at 1/4 and 3/4 period

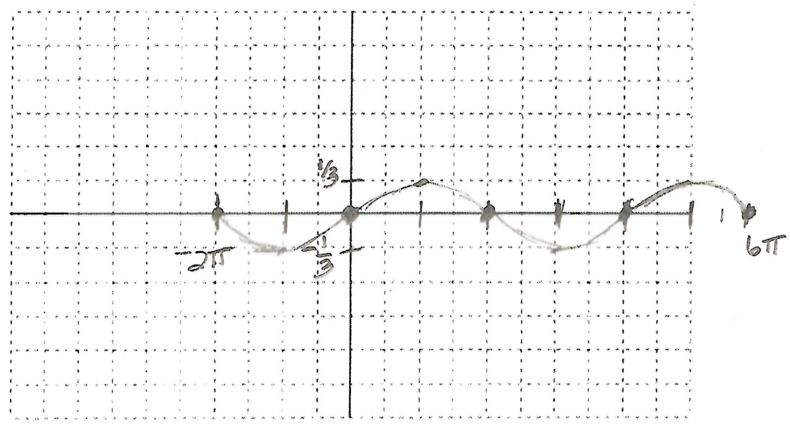
Trig 3-2 p.3

2) State the amplitude and period for $y = \frac{1}{3}\sin(x/2)$, and graph the equation for

$-2\pi \le x \le 6\pi$ Amplitude: $\frac{1}{3}$ Period: $\frac{2\pi}{B} = \frac{2\pi}{\frac{1}{2}} = 4\pi$

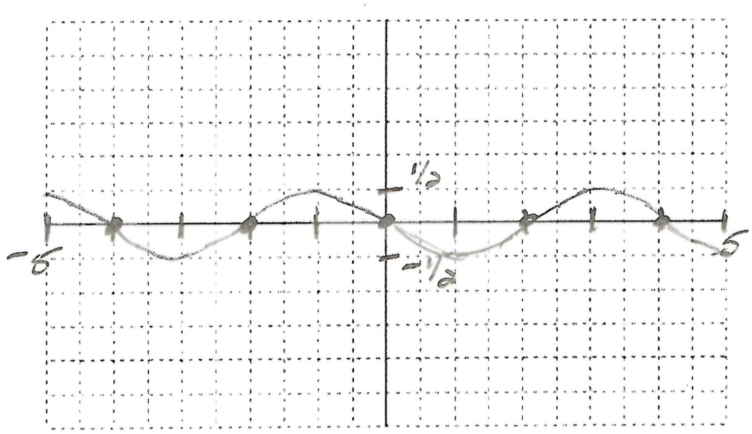


★ x-ints at start, middle + end of period



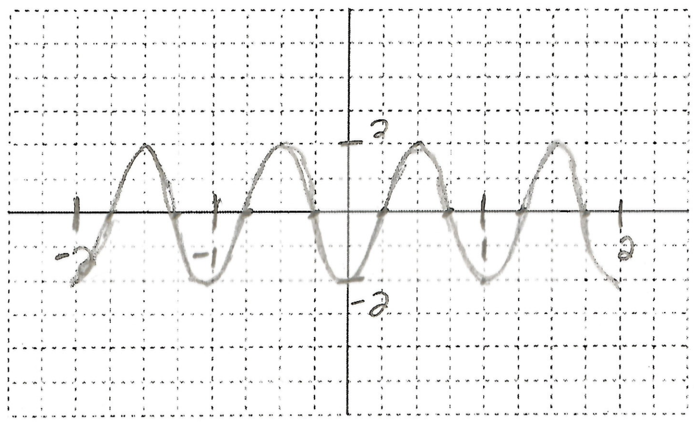
3) State the amplitude and period for $y = -\frac{1}{2}\sin\left(\frac{\pi x}{2}\right)$, and graph the equation for

$-5 \le x \le 5$ Amplitude: $\frac{1}{2}$ ★ FLIP Period: $\frac{2\pi}{B} = \frac{2\pi}{\frac{\pi}{2}} \cdot \frac{2}{\pi} = 4$



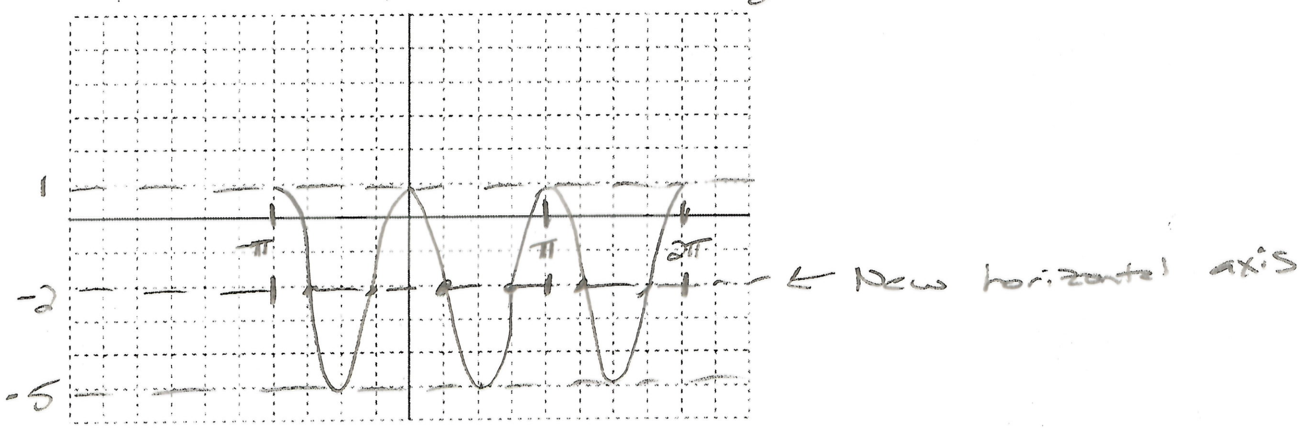
4) State the amplitude and period for $y = -2\cos 2\pi x$, and graph the equation for $-2 \le x \le 2$

Amplitude: 2 ★FLIP Period: $\frac{2\pi}{B} = \frac{2\pi}{2\pi} = 1$



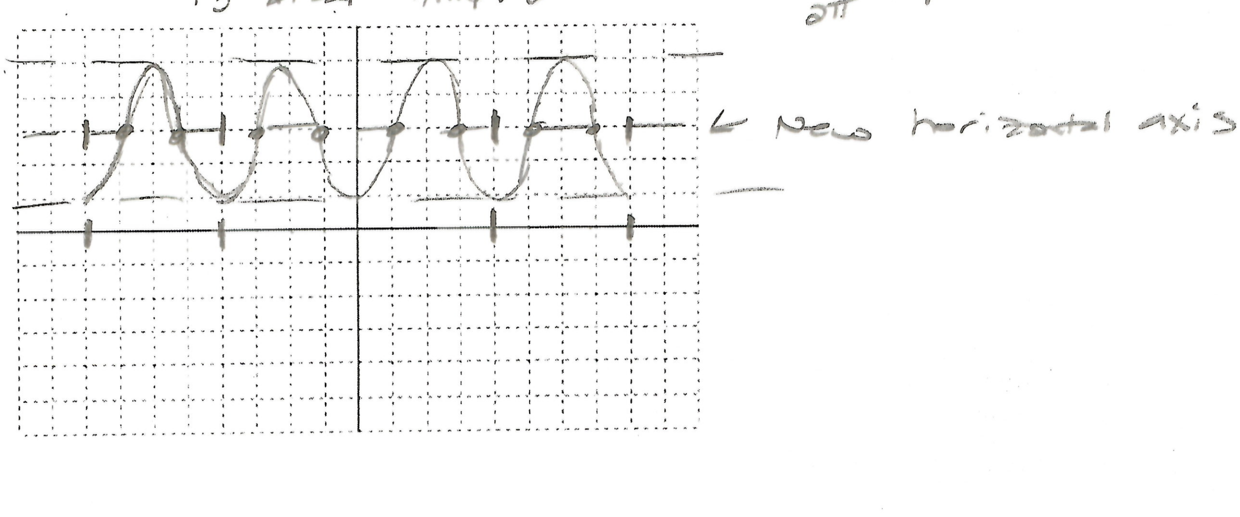
5) Graph $y = -2 + 3\cos 2x$, $-\pi \le x \le 2\pi$

↓2 Amp: 3 Period: $\frac{2\pi}{2} = \pi$



6) Graph $y = 3 - 2\cos 2\pi x$, $-2 \le x \le 2$

↑3 ★FLIP Amp: 2 Period: $\frac{2\pi}{2\pi} = 1$



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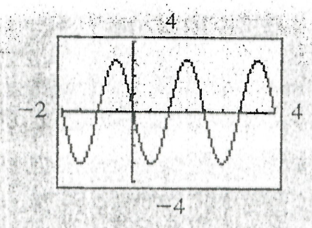
EXPLORE/DISCUSS 2

Find an equation of the form $y = A \sin Bx$ that produces the graph shown in the following graphing calculator display:



Is it possible for an equation of the form $y = A \cos Bx$ to produce the same graph? Explain. → Would need to translate horizontally.

Amp = 3 * FLIP

Period $B(2) = \left(\frac{2\pi}{B}\right)B$

$\frac{2B}{2} = \frac{2\pi}{2}$ $B = \pi$

$\boxed{y = -3\sin(\pi x)}$

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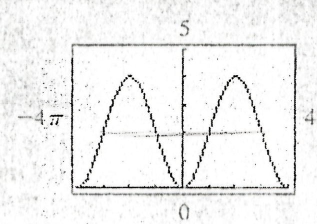
EXPLORE/DISCUSS 3

Find an equation of the form $y = k + A \cos Bx$ that produces the graph shown in the following graphing calculator display:



Is it possible for an equation of the form $y = k + A \sin Bx$ to produce the same graph? Explain. → Would need to translate horizontally.

Amp = 2 K = 2
* FLIP

Period $= B(4\pi) = \left(\frac{2\pi}{B}\right)B$

$\frac{4\pi B}{4\pi} = \frac{2\pi}{4\pi}$

$B = \frac{1}{2}$

$\boxed{y = 2 - 2\cos(\tfrac{1}{2}x)}$