Before we begin, are there any questions from last day's work? 4.4.3

(Today's quiz is NOT based on this material)

Today's Learning Goal(s):

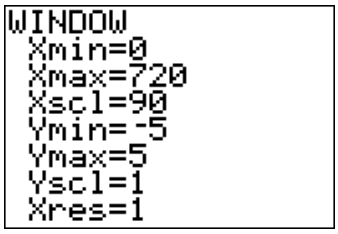
By the end of the class, I will be able to:

a) sketch a trigonometric function when the amplitude is changed. $(a \neq 1)$
b) sketch a trigonometric function when the period is changed. $(\neq 360°)$

4.5.1 Investigating $y = a\sin x$ and $y = \sin kx$

Date: Apr. 11/18

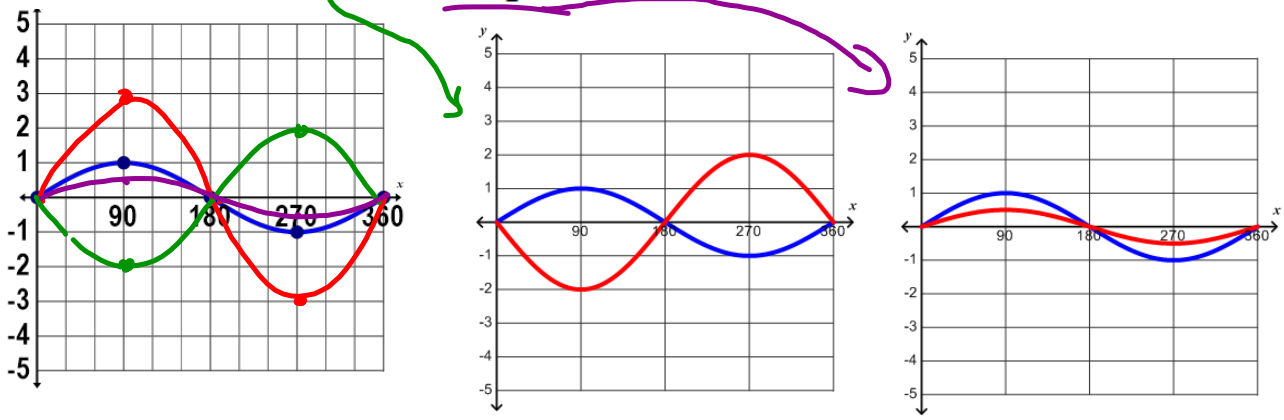
Using the TI-84, press the MODE button and set the third line to DEGREE, then set the WINDOW



A. Comparing $y = a\sin x$ to $y = \sin x$, and $y = a\cos x$ to $y = \cos x$

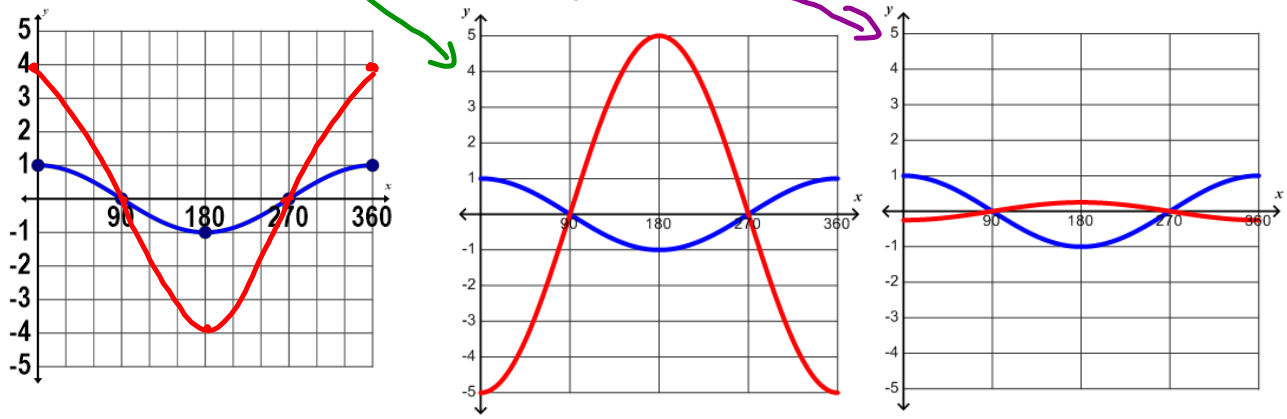
1. The graph of $y = \sin x$ is shown below.

Sketch $y = 3\sin x$, $y = -2\sin x$, and $y = \frac{1}{2}\sin x$ on the same grid (below left).



2. The graph of y = cos *x* is shown below.

Sketch $y = 4\cos x$, $y = -5\cos x$, and $y = \frac{-1}{4}\cos x$ on the same grid



3. Experiment with different values of *a*.
   Describe the effects of *a* on a trigonometric function.

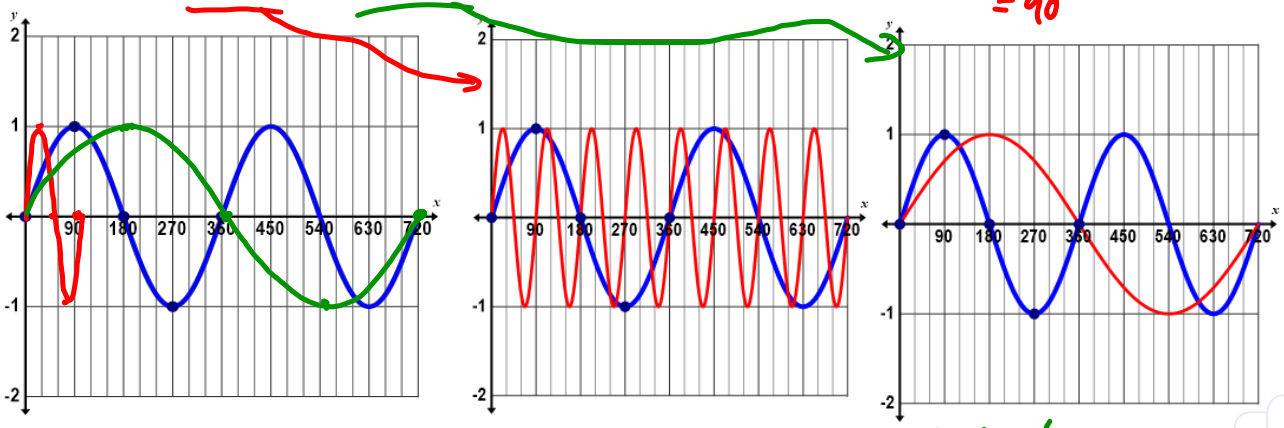
- *a* can vertically stretch or compress a trig function. (see summary for specifics)
- *a* can reflect a trig function in the *x*-axis. (if *a* is negative)

B. Comparing $y = \sin kx$ to $y = \sin x$, and $y = \cos kx$ to $y = \cos x$

1. The graph of $y = \sin x$ is shown below.
   Sketch $y = \sin(4x)$, and $y = \sin(0.5x)$ on the same grid (below left).

period = $\frac{360°}{k}$

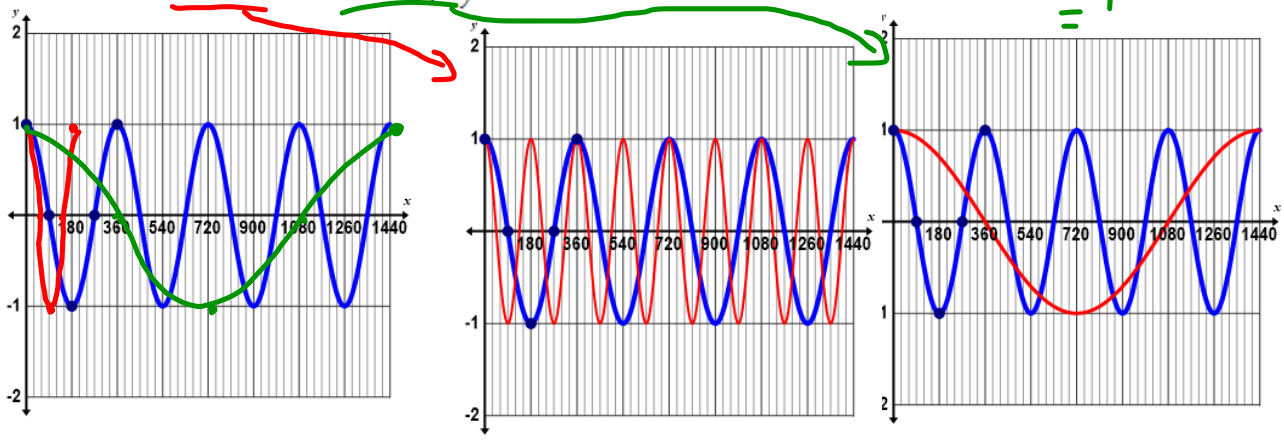
period = $\frac{360}{4}$ = 90°



2. The graph of y = cos x is shown below.
   Sketch $y = \cos(2x)$, and $y = \cos\left(\frac{1}{4}x\right)$ on the same grid

period = $\frac{360}{2}$ = 180°

if $k = \frac{1}{4}$ period = $\frac{360}{\frac{1}{4}}$ =



3. Experiment with different values of k.
   Describe the effects of k on a trigonometric function.

☞ k can horizontally stretch or compress a trig function. (changes the period)

Summary

If $y = a\sin x$, the value a has the following effect on the function $y = \sin x$.
When $a > 0$, the function is stretched vertically by the factor a.
When $0 < a < 1$, the function is compressed vertically by the factor a.
When a is negative, the function is reflected in the x-axis.
Changing the value of a affects the maximum and minimum values, amplitude, and range of the function, but has no effect on the period, or domain.

Changing the value of k results in a horizontal stretch or compression and affects the period, changing it to $\frac{360°}{|k|}$, but has no effect on the amplitude, maximum and minimum values , domain and range.