

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:

- sketch a trigonometric function when the amplitude is changed. ($a \neq 1$)
- sketch a trigonometric function when the period is changed. ($\neq 360^\circ$)

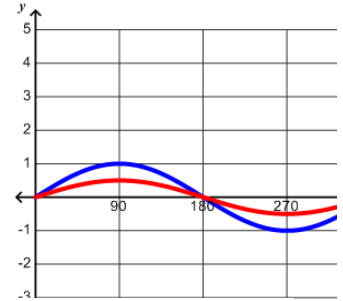
4.5.1 Investigating $y = a \sin x$ and $y = \sin kx$

Date: Apr. 12/16

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

```
NORMAL SCI ENG
FLOAT 0 1 2 3 4 5 6 7 8 9
RADIAN DEGREE
FUNC PAR POL SEQ
CONNECTED DOT
SEQUENTIAL SIMUL
REAL a+bi Fc^*0i
FULL HORIZ G-T
SETCLOCK 03/05/09 8:20PM
```

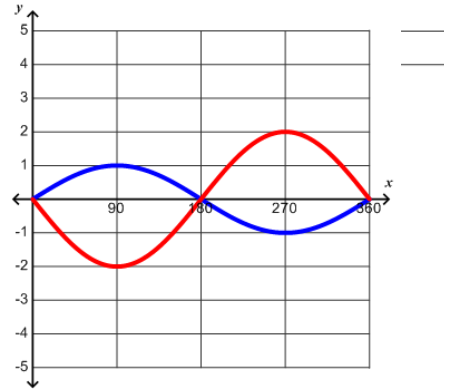
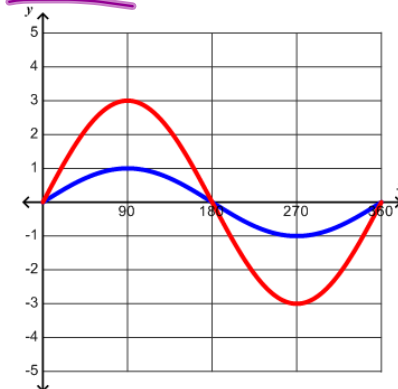
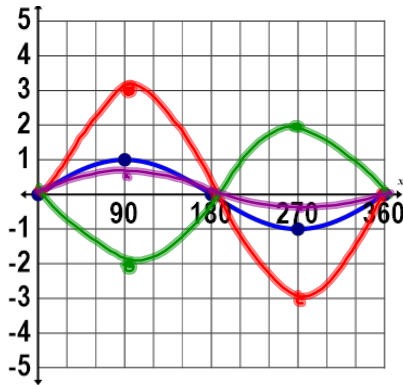
```
WINDOW
Xmin=0
Xmax=720
Xscl=90
Ymin=-5
Ymax=5
Yscl=1
Xres=1
```



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

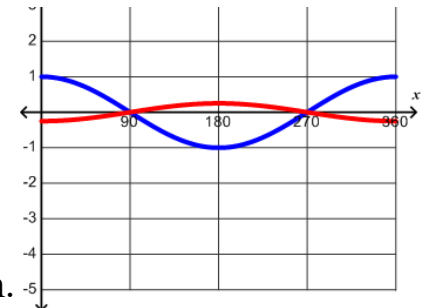
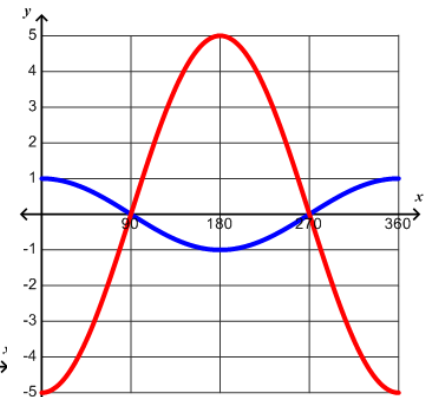
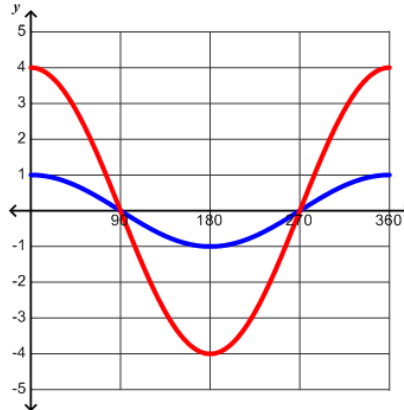
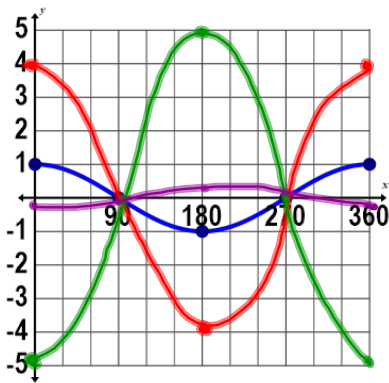
1. The graph of $y = \sin x$ is shown below.

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 $y = \cos x$

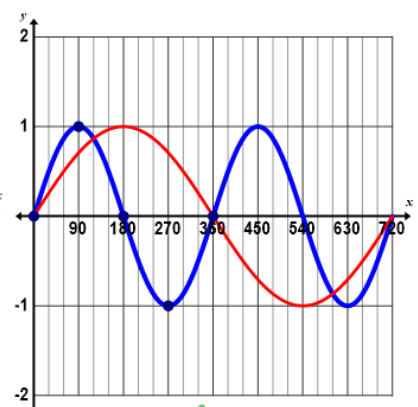
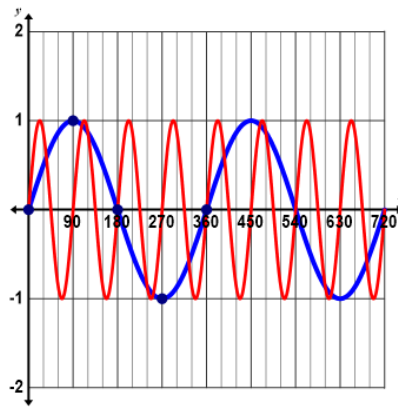
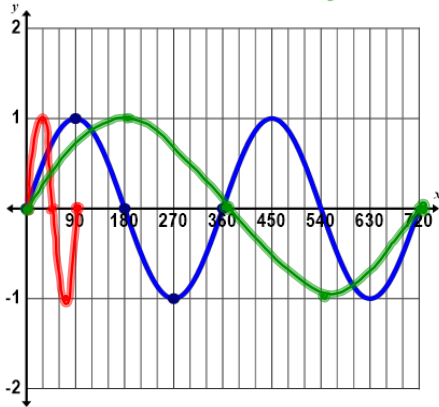
1. The graph of $y = \sin x$ is shown below.

period = $\frac{360^\circ}{k}$

period = $\frac{360}{4} = 90^\circ$

period = $\frac{360}{\frac{1}{5}} = 720$

Sketch $y = \sin(4x)$, and $y = \sin(0.5x)$ on the same grid (below left).

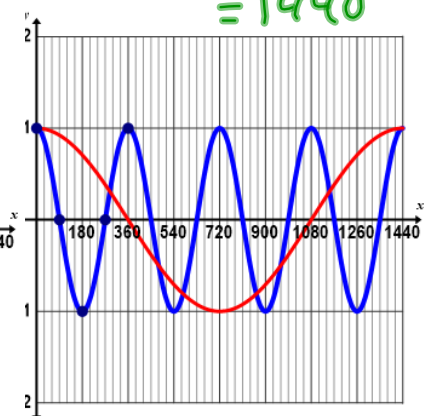
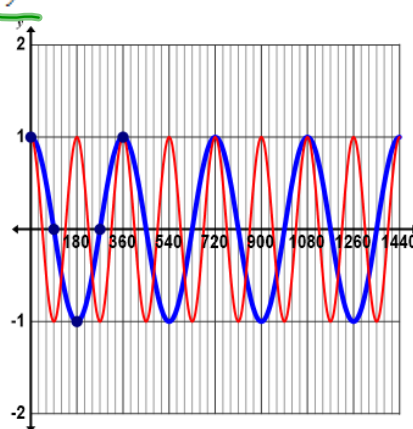
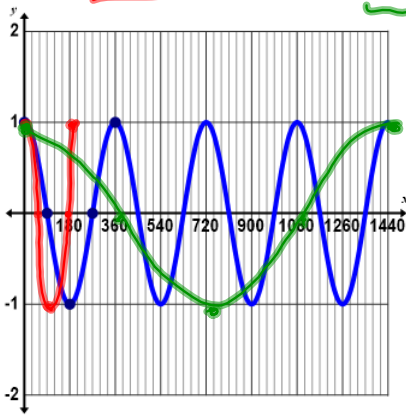


2. The graph of $y = \cos x$ is shown below.

period = $\frac{360}{2} = 180^\circ$

if $k = \frac{1}{4}$
period = $\frac{360}{\frac{1}{4}} = 1440^\circ$

Sketch $y = \cos(2x)$, and $y = \cos(\frac{1}{4}x)$ on the same grid



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 $\frac{360^\circ}{|k|}$, but has no effect on the amplitude, maximum and minimum values, domain and range.