

## Follow That Graph

### Teacher Demonstration Notes

Use the following equations to demonstrate to the students how to use the graphing calculators. Be sure to discuss the effects of the parameter changes with the students after they have graphed each equation.

The general equation of a parabola is  $y = a(x + b)^2 + c$ .

Graph  $y = x^2$ . This is our basic parabola function.

Now let's take a look at what happens when we change the value of the parameter **a**.

Graph  $y = 4x^2$

Graph  $y = \frac{1}{4} x^2$

Graph  $y = -2x^2$

What can we conclude about the effect of parameter **a** on the graph of the parabola?

Now let's take a look at what happens when we change the value of the parameter **c**.

Graph  $y = x^2 + 4$

Graph  $y = x^2 + .5$

Graph  $y = x^2 - 3$

What can we conclude about the effect of parameter **c** on the graph of the parabola?

Now let's take a look at what happens when we change the value of the parameter **b**.

Graph  $y = (x + 4)^2$

Graph  $y = (x + \frac{1}{2})^2$

Graph  $y = (x - 2)^2$

What can we conclude about the effect of parameter **b** on the graph of the parabola?

# Follow That Graph

## Graphing Trig Functions

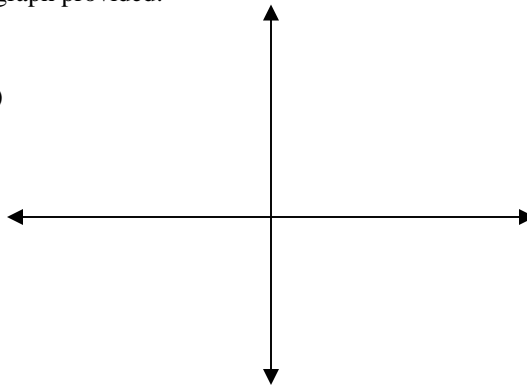
Name \_\_\_\_\_

Today, you are going to investigate the graphs of the trig functions and effects a simple little parameter change can have on the graph. To begin with, you will graph what we will call the basic trig function. You will then experiment with changing the values of different variables (parameters). Write down each equation before you graph. Be sure you include some fractional values as well as integer values. Be sure to sketch the graph of each change in colored pencil on the graph provided.

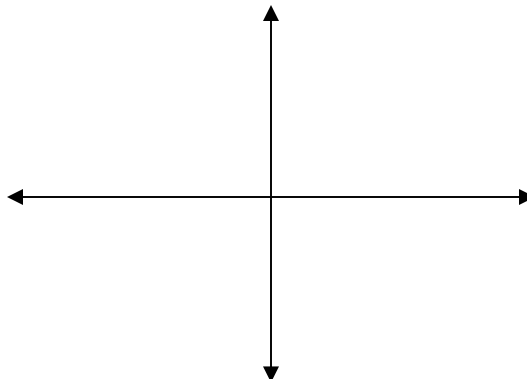
Let's begin with the sine function. In general, we have  $y = c + a \sin b(x+d)$

### Graph $y = \sin x$ .

This is the basic sine curve. As you change each parameter, note how the new graph is different from the basic curve.



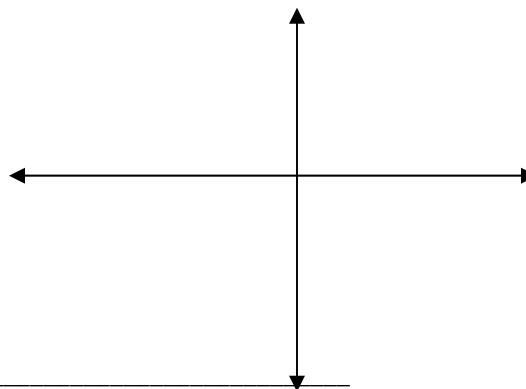
Now let's take a look at  $y = a \sin x$ . Choose three different values for  $a$  and graph the equations. Record your graphs in different colored pencils on the graph provided.



Describe the effect of changing parameter  $a$ . \_\_\_\_\_  
\_\_\_\_\_

What happens if  $a$  is a negative number? \_\_\_\_\_

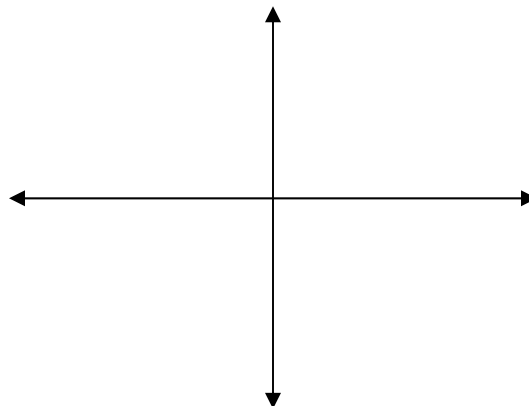
Now let's take a look at  $y = c + \sin x$ . Choose three different values for  $c$  and graph the equations. Record your graphs in different colored pencils on the graph provided.



Describe the effect of changing parameter  $c$ . \_\_\_\_\_  
\_\_\_\_\_

What happens if  $c$  is a negative number? \_\_\_\_\_

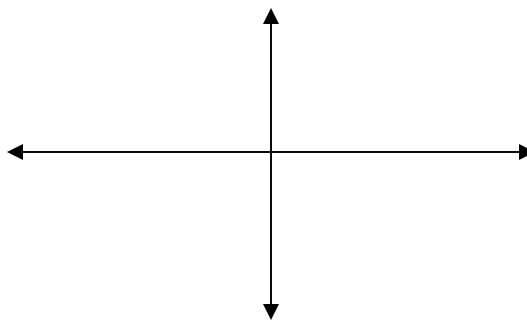
Now let's take a look at  $y = \sin bx$ . Choose three different values for  $b$  and graph the equations. Record your graphs in different colored pencils on the graph provided.



Describe the effect of changing parameter  $b$ . \_\_\_\_\_  
\_\_\_\_\_

What happens if  $b$  is a negative number? \_\_\_\_\_

Now let's take a look at  $y = \sin(x + d)$  where  $d$  is a multiple of  $\pi$ . Choose three different values of  $d$  and graph the equations. Record your graphs in different colored pencils on the graph provided.



Describe the effect of changing parameter  $d$ . \_\_\_\_\_  
\_\_\_\_\_

What happens if  $d$  is a negative number? \_\_\_\_\_

With a graphing calculator repeat the above process using the cosine function, tangent function, secant function, cosecant function and cotangent function. After doing so, generalize what you have learned about the effects of changes on each parameter in the space below.

**Follow That Graph**  
Graphing Trig Functions

Name \_\_\_\_\_

Find the amplitude of each of the following.

\_\_\_\_\_ 1.  $y = 3 + 2 \sin(x - \pi)$

\_\_\_\_\_ 2.  $y = -1/2 - 5 \cos(2x + 4\pi)$

Find the period of each of the following.

\_\_\_\_\_ 3.  $y = 3 \tan 2x$

\_\_\_\_\_ 4.  $y = 1/2 - \sin(3x + 2\pi)$

\_\_\_\_\_ 5.  $y = 2 + 3 \sec(x - \pi)$

Find the vertical shift of each of the following.

\_\_\_\_\_ 6.  $y = 2 + \csc(1/4 x + 7)$

\_\_\_\_\_ 7.  $y = \cot(x) - 6$

\_\_\_\_\_ 8.  $y = 3/4 - 4 \sin 3(x - \pi)$

Find the phase shift of each of the following.

\_\_\_\_\_ 9.  $y = 2 + 4 \sin 8(x - \pi)$

\_\_\_\_\_ 10.  $y = -1/2 - 3 \tan(2x + 3\pi)$

\_\_\_\_\_ 11.  $y = \cos(4x - 6\pi)$

Discuss the graph of each function below. Be sure to mention period, amplitude, vertical shift or phase shift as appropriate. Sketch the graph of the function. Do not use a graphing calculator.

\_\_\_\_\_ 12.  $y = 3 + 2 \sin(x - \pi)$

\_\_\_\_\_ 13.  $y = -1 + 1/2 \sec(2x + \pi/2)$