**Effects of Changing Parameters**

In this activity, you will learn how the parameters (numbers) *m* and *b* affect a linear function in the form . The form *y* = *mx* + *b* is known as **slope-intercept** form.

**Instructions:**

We will use our graphing calculators to explore linear functions. First, we need a good window. The window controls the range of *x* and *y* values displayed on the graphing calculator. We will use a window where the *x*-axis will go from negative five to five, and the *y*-axis will go from negative five to five. To do this:

1. Turn the calculator **ON**.
2. Press the **WINDOW** button.
3. In the **WINDOW** menu, set **Xmin = -5**, **Xmax** = **5**, **Xscl = 1**, **Ymin = -5, Ymax = 5**, **Yscl = 1**
4. Enter the function:  into the graphing calculator. To do this:
* Press the **Y=** button.
* Enter your equation into ***Y*1=**. For the *x*-variable, the button is the **X,T,Θ,n** button.
1. Graph the function. To do this, press the **GRAPH** button.
2. Sketch the graph of $y=1x+0$.
	1. What is the slope?



* 1. What is the value of *b* in the equation?
	2. What is the *y*-intercept?
1. Graph $y=2x+0$ in the calculator and sketch the graph.
	1. What changed from the graph in question (1)?



* 1. What is the slope?
	2. What is the value of *b* in the equation?
	3. What is the *y*-intercept?
1. Graph $y=\frac{1}{2}x+0$ in the calculator and sketch the graph.
	1. What changed from the graph in question (1)?



* 1. What is the slope?
	2. What is the value of *b* in the equation?
	3. What is the *y*-intercept?
1. If *m* is a positive number, what happens to the graph of a linear function as *m* increases?
2. If *m* is a positive number, what happens to the graph of a linear function when *m* decreases but remains positive?
3. Graph $y=-1x+0$ in the calculator and sketch the graph.
	1. What changed from the graph in question (1)?



* 1. What is the slope?
	2. What is the value of *b* in the equation?
	3. What is the *y*-intercept?
1. Graph $y=-2x+0$ in the calculator and sketch the graph.
	1. What changed from the graph in question (6)?
	2. What is the slope?
	3. What is the value of *b* in the equation?
	4. What is the *y*-intercept?
2. Graph $y=-\frac{1}{2}x+0$ in the calculator and sketch the graph.
	1. What changed from the graph in question (6)?



* 1. What is the slope?
	2. What is the value of *b* in the equation?
	3. What is the *y*-intercept?
1. What happens to the graph of a linear function when *m* is negative?
2. When *m* is negative, describe how you can change *m* to make the line steeper, and how you can change *m* to make the line flatter.
3. What point do all of the lines you have graphed have in common?
4. Does changing *m* have any effect on the *y*-intercept of the graph?
5. Predict what the graph will look like when *m*=0.
6. Test your prediction by graphing a line with *m=*0 on your calculator. Was your prediction correct? If not, what kind of line did you get?
7. In your own words, describe the value of *m*’s overall effect on the graph of a line.
8. Graph $y=1x+0$ in the calculator and sketch the graph.



* 1. What is the slope?
	2. What is the value of *b* in the equation?
	3. What is the *y*-intercept?
1. Graph $y=1x+2$ in the calculator and sketch the graph.
2. What changed from the graph in question (16)?
3. What is the slope?
4. What is the value of *b* in the equation?
5. What is the *y*-intercept?
6. Graph $y=1x+4$ in the calculator and sketch the graph.
7. What changed from the graph in question (16)?



1. What is the slope?
2. What is the value of *b* in the equation?
3. What is the *y*-intercept?
4. Graph $y=1x-2$ in the calculator and sketch the graph.
5. What changed from the graph in question (16)?
6. What is the slope?
7. What is the value of *b* in the equation?
8. What is the *y*-intercept?

20. If *b* has a negative value then the y-intercept is (above, below) the x-axis. Circle one answer.

21. If *b* has a positive value then the y-intercept is (above, below) the x-axis. Circle one answer.

22. What is the y-intercept of the equation?

23. What is the y-intercept of the equation?

24. How does changing *b* in a linear function affect the graph? Be as specific as possible.