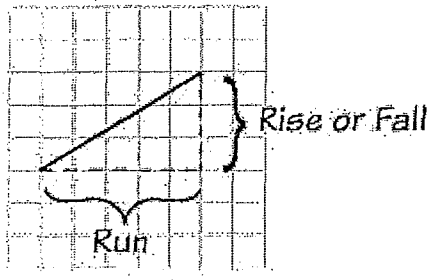
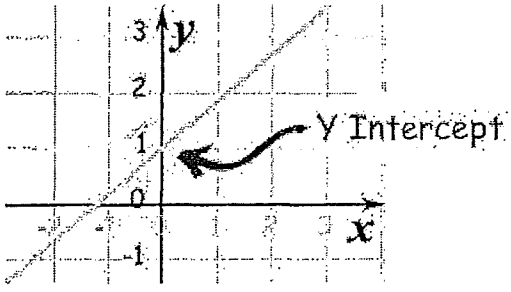
Lesson 5.6 - Summarizing "m" and "b" Finding the equation of a line

When working with linear relations (real-life word problems with units), we say:
initial value and **rate of change**

When working with analytic geometry (graphs and equations without context), we say:
y-intercept and **slope**



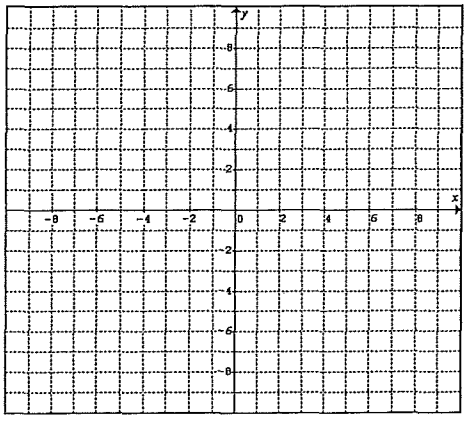
$slope = m = \frac{rise}{run}$ and



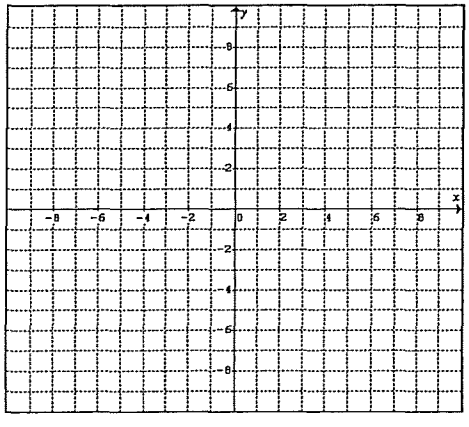
y-intercept is a point where a relation crosses the y-axis.

1. The slope and y – intercept are given. In each case write the equation of the line and graph the line.

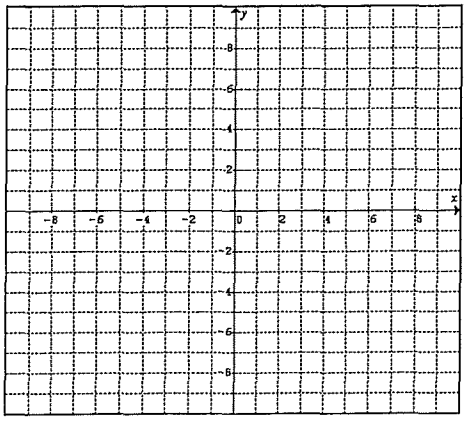
a) m = $\frac{3}{4}$, b = -5



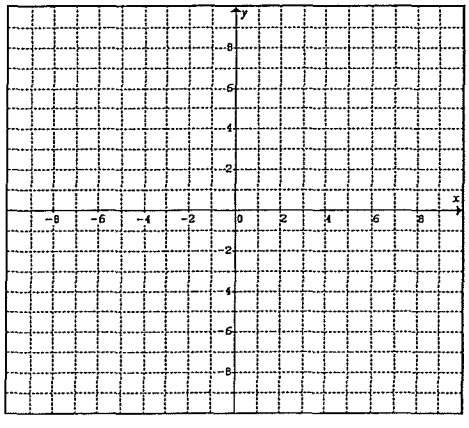
b) m = -3, b = 0



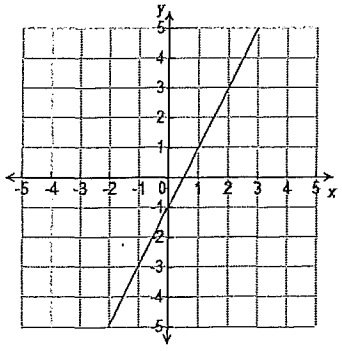
c) m = $\frac{1}{2}$, b = 5

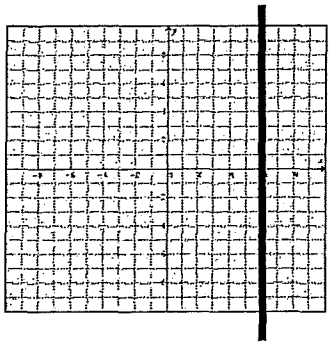


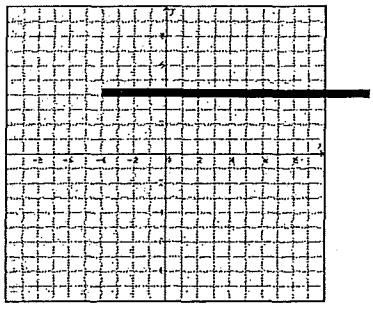
d) m = 0, b = 6



2. What are the slope and y-intercept of this line? Use these values to write the equation of the line.







Slope Y-Intercept Form

Generally, the slope y-intercept form is:

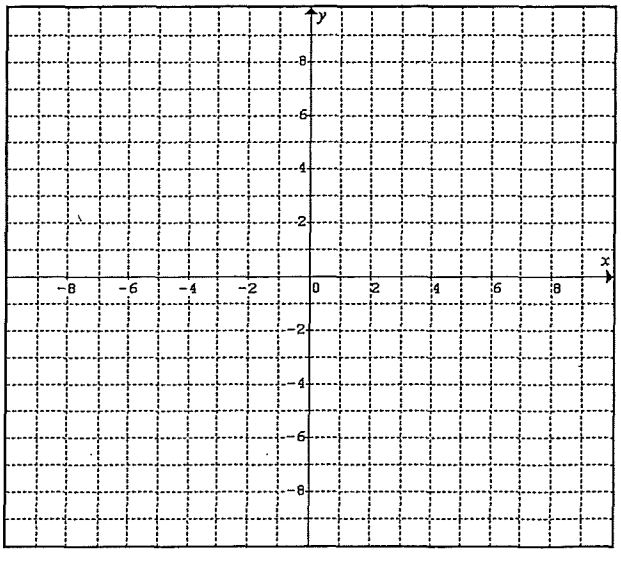
$$y = \boldsymbol{mx} + \boldsymbol{b}$$

Graphing from Slope Y-Intercept Form

We can graph easily from the slope y-intercept form.

Example: Graph the line $y = \frac{3}{2}x - 5$

STEPS: 1) Determine the y-intercept from the equation and plot this point on the grid.



2) Use the slope to "rise" and "run" to other points on the line. (go in both directions, fill the grid from end to end).

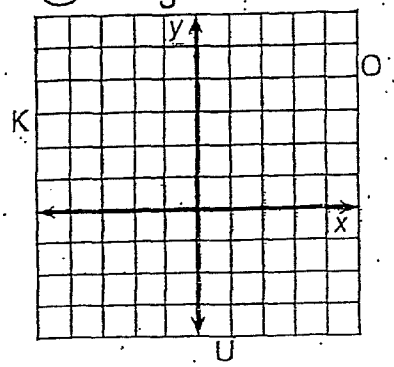
3) Using a ruler, line up your points and graph a line that passes through all of your points (don't forget to put arrows on each end)

5-6

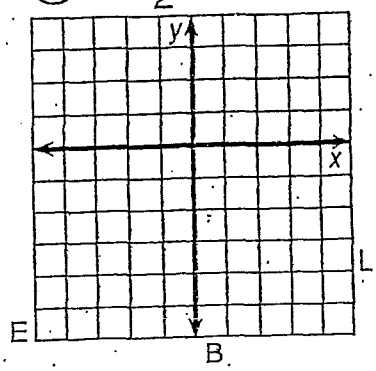
Whom Should You See at the Bank If You Need To Borrow Money?

Use the slope and y-intercept to graph each equation below. The graph, if extended, will cross a letter. Print this letter in each box that contains the number of that exercise.

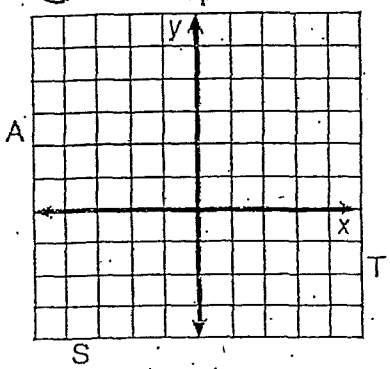
① $y = \frac{2}{3}x + 1$



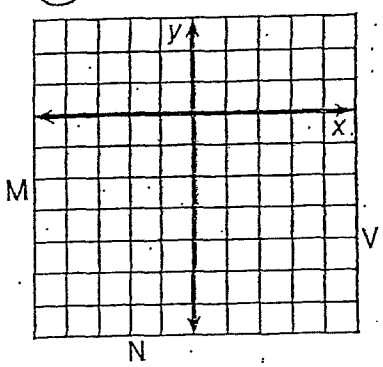
② $y = \frac{1}{2}x - 3$



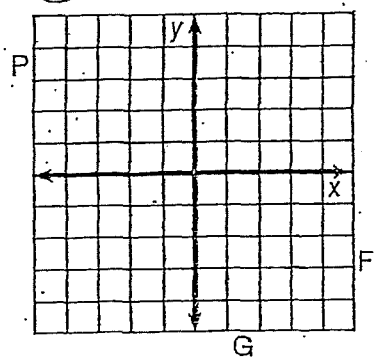
③ $y = -\frac{3}{4}x + 2$



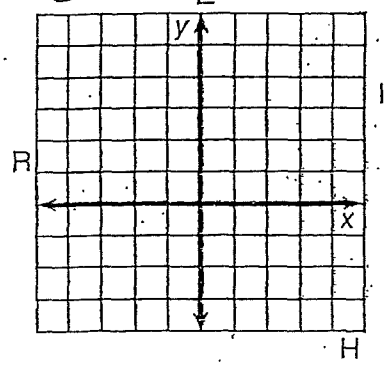
④ $y = 2x - 4$



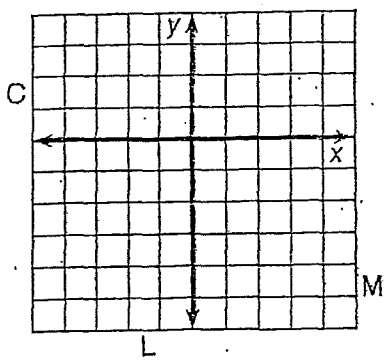
⑤ $y = -3x - 1$



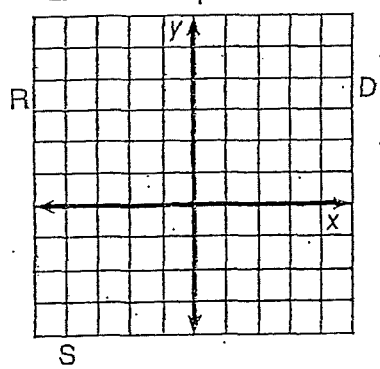
⑥ $y = -\frac{3}{2}x + 3$



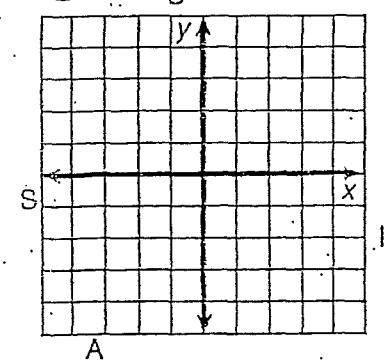
⑦ $y = 4x - 2$



⑧ $y = -\frac{1}{4}x + 2$



⑨ $y = \frac{5}{3}x$



3	6	2	7	1	9	4	9	8	8	9	4	5	2	8

Learning About *m* and *b*

Date:

Each of the equations that were graphed are in the form: $y = mx + b$

4. Fill in the values of **m** and **b** in column #1 and #2.
5. Look at the graphs of each line and fill in columns #3 and #4.

The ***x-intercept*** is defined as the place where a line crosses the *x*-axis.
The ***y-intercept*** is defined as the place where a line crosses the *y*-axis.

6. Find the slope of each of the lines which you have plotted using the $\frac{rise}{run}$ method. It may be helpful to actually sketch a *rise* and a *run* onto your graphs for each of the lines. Record the slopes in column #5.

			COLUMN # :				
			1	2	3	4	5
		RELATION	m	b	*x* - intercept	*y* - intercept	slope
Graph #1	a	$y = 2x + 4$					
	b	$y = 2x + 2$					
	c	$y = 2x$					
	d	$y = 2x - 4$					
Graph #2	a	$y = -2x + 4$					
	b	$y = -2x + 1$					
	c	$y = -2x - 1$					
	d	$y = -2x - 5$					
Graph #3	a	$y = 4x - 2$					
	b	$y = 2x - 2$					
	c	$y = x - 2$					
	d	$y = \frac{1}{2}x - 2$					
Graph #4	a	$y = -\frac{1}{2}x + 3$					
	b	$y = -x + 3$					
	c	$y = -2x + 3$					
	d	$y = -4x + 3$					

Learning About *m* and *b*

Date:

7. Which column of the Table of Results is identical to column #1? _____

   What conclusions can you make from this observation about the meaning of **m** ?

   _____

8. Which column of the Table of Results is identical to column #2? _____

   What conclusions can you make from this observation about the meaning of **b** ?

   _____

9. Fill in the chart.

	Equation	m	b	Slope	y-intercept
a	$y=2x+4$				
b	$y=7x-2$				
c	$y=-3x-1$				
d	$y=x-3$				
e	$y=-x+8$				
f	$y=4x$				
g	$y=4$				
h	$y=-x$				
i	$y=-1$				
j	$y=x$				