FM Algebra

Name: Key

Chapter 4 Review

Date: ____________ Pd: ____

Section 4.1 Graphing Linear Equations in One Variable

Example: Write the equations of the horizontal line and the vertical line that pass through the point (2, 1).

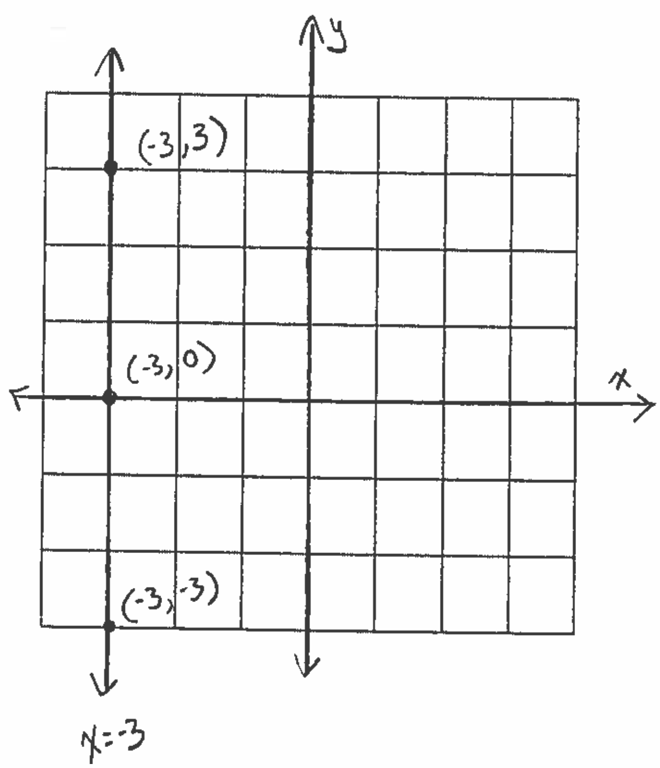
The x-coordinate of (2, 1) is 2. Because all of the points on the vertical line with (2, 1) will also have an x-coordinate of 2, the equation of the vertical line is $x=2$. The y-coordinate of (2, 1) is 1. Because all of the points on the horizontal line with (2, 1) will also have a y-coordinate of 1, the equation of the horizontal line is $y=1$.

Answer: The horizontal line is $y=1$ and the vertical line is $x=2$.

Example: Sketch the graph of the line $x=-3$ labeling three points.

The line $x=-3$ is the set of all points that have x-coordinates of -3. Pick three such points. Examples could be (-3, 3), (-3, 0), and (-3, -3). When connected, these three points will form a vertical line.

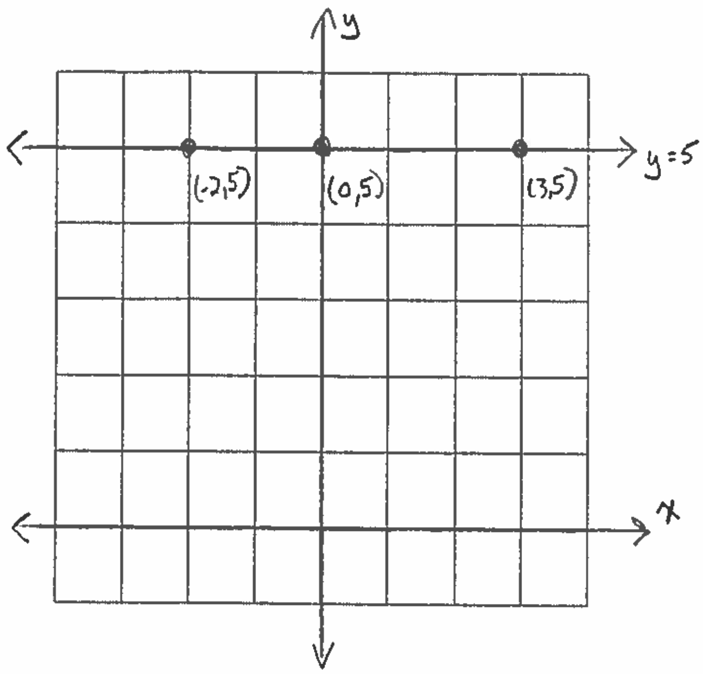
Answer:



Example: Sketch the graph of the line $y = 5$ labeling three points.

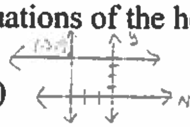
The line $y = 5$ is the set of all points that have y-coordinates of 5. Pick three such points. Examples could be (-2, 5), (0, 5), and (3, 5). When connected, these three points will form a horizontal line.

Answer:



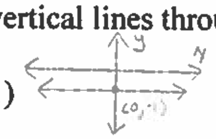
Practice

Write the equations of the horizontal and vertical lines through the given point.

1. (-3, 4) 

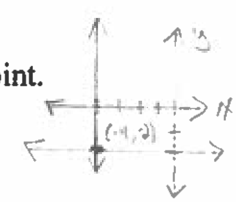
Horizontal Line: y = 4

Vertical Line: x = -3

2. (0, -1) 

Horizontal Line: y = -1

Vertical Line: x = 0

3. (-4, -2) 

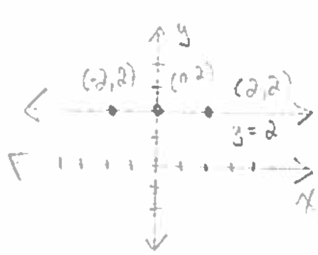
Horizontal Line: y = -2

Vertical Line: x = -4

Use a ruler and sketch the graph of the following lines labeling three points each.

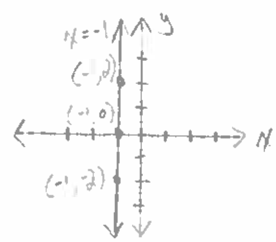
4. $y = 2$

Domain x	Range $y = 2$	Solution (x, y)
-2	2	(-2, 2)
0	2	(0, 2)
2	2	(2, 2)



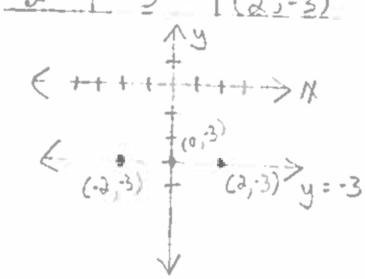
5. $x = -1$

Domain $x = -1$	Range y	Solution (x, y)
-1	-2	(-1, -2)
-1	0	(-1, 0)
-1	2	(-1, 2)



6. $y = -3$

Domain x	Range $y = -3$	Solution (x, y)
-2	-3	(-2, -3)
0	-3	(0, -3)
2	-3	(2, -3)



Section 4.2 Graphing Linear Equations in Two Variables Using a Table

Procedure:
1. Solve the equation for y.
2. Make a table of three x-values.
3. Plot and label.

Example: Graph the equation $6x - 2y = 4$.

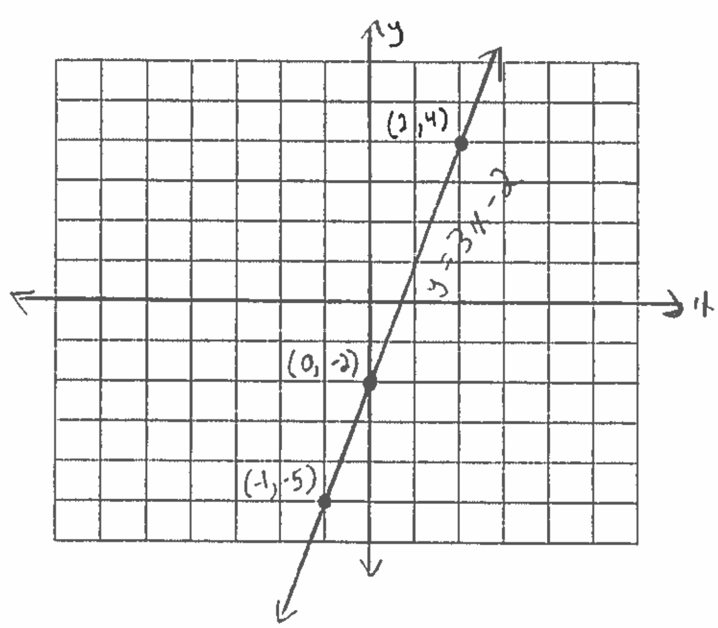
Solution:
1. Solve for the equation for y.

$$6x - 2y = 4$$
$$-2y = -6x + 4$$
$$y = 3x - 2$$

2. Make a table of three x-values. (Pick values around the origin.)

Domain	Range	Solution
x	$y = 3x - 2$	(x, y)
-1	$y = 3(-1) - 2$ $y = -3 - 2$ $y = -5$	(-1, -5)
0	$y = 3(0) - 2$ $y = 0 - 2$ $y = -2$	(0, -2)
2	$y = 3(2) - 2$ $y = 6 - 2$ $y = 4$	(2, 4)

3. Plot and label.

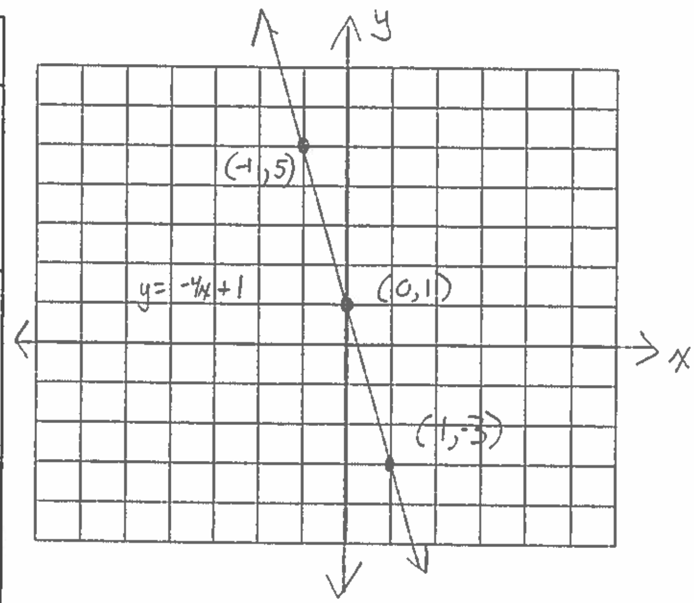


Practice for 4.2 Use a table of values to graph each equation. Follow the three steps.

1. $4x + y = 1$

$y = -4x + 1$

Domain x	Range $y = -4x + 1$	Solution (x, y)
-1	$y = -4(-1) + 1$ $y = 4 + 1$ $y = 5$	$(-1, 5)$
0	$y = -4(0) + 1$ $y = 0 + 1$ $y = 1$	$(0, 1)$
1	$y = -4(1) + 1$ $y = -4 + 1$ $y = -3$	$(1, -3)$

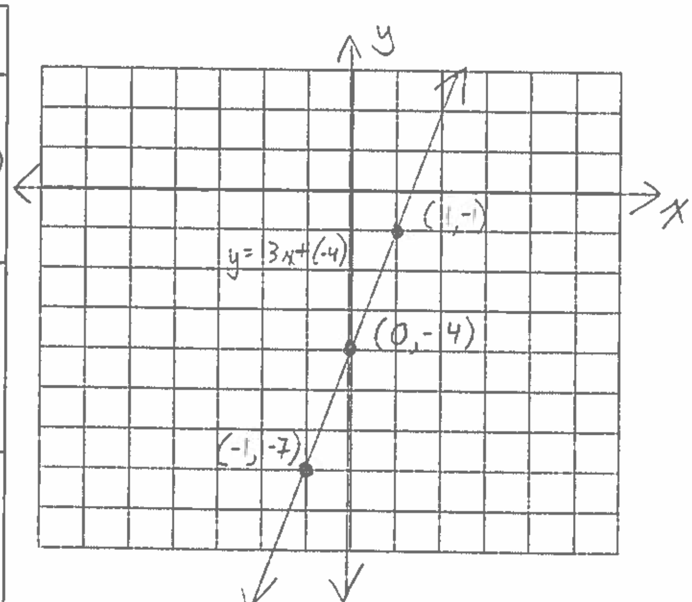


2. $9x - 3y = 12$

$-3y = -9x + 12$

$y = 3x + (-4)$

Domain x	Range $y = 3x + (-4)$	Solution (x, y)
-1	$y = 3(-1) + (-4)$ $y = -3 + (-4)$ $y = -7$	$(-1, -7)$
0	$y = 3(0) + (-4)$ $y = 0 + (-4)$ $y = -4$	$(0, -4)$
1	$y = 3(1) + (-4)$ $y = 3 + (-4)$ $y = -1$	$(1, -1)$

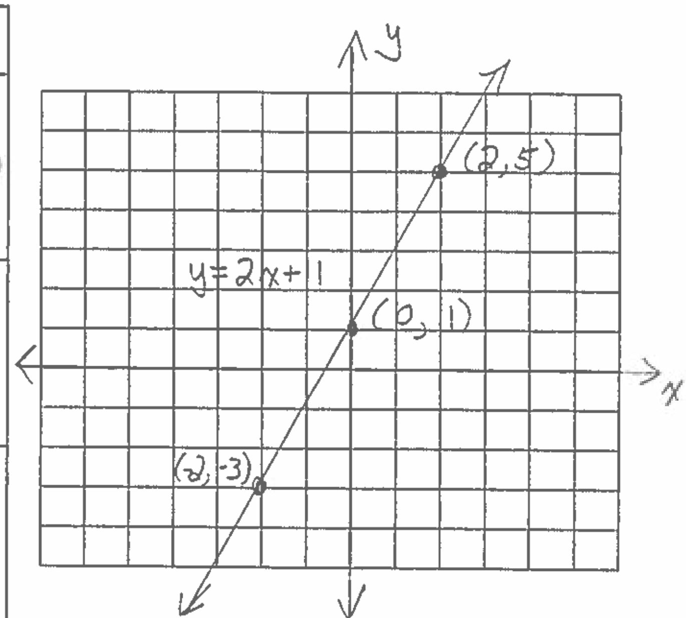


3. $-4x+2y=2$

$2y=4x+2$

$y=2x+1$

Domain x	Range $y = 2x+1$	Solution (x, y)
-2	$y=2(-2)+1$ $y=-4+1$ $y=-3$	$(-2,-3)$
0	$y=2(0)+1$ $y=0+1$ $y=1$	$(0,1)$
2	$y=2(2)+1$ $y=4+1$ $y=5$	$(2,5)$

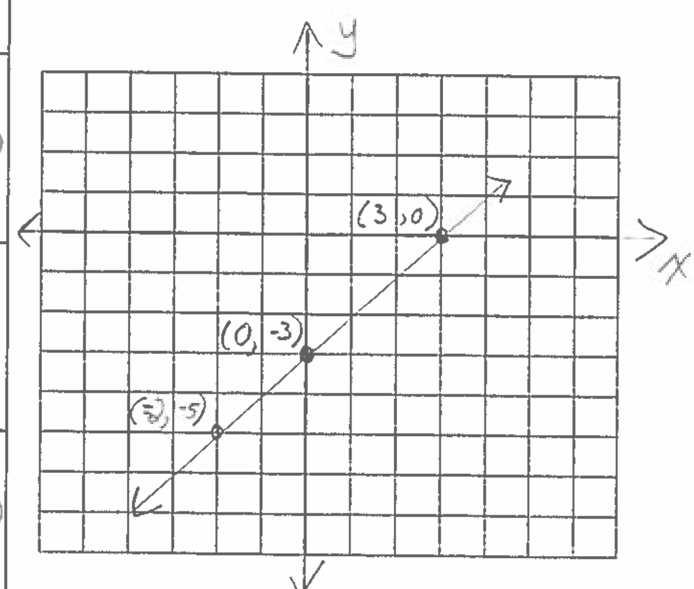


4. $5x-5y=15$

$-5y=-5x+15$

$y=x+(-3)$

Domain x	Range $y = x+(-3)$	Solution (x, y)
-2	$y=-2+(-3)$ $y=-5$	$(-2,-5)$
0	$y=0+(-3)$ $y=-3$	$(0,-3)$
3	$y=3+(-3)$ $y=0$	$(3,0)$



Section 4.3 Using Intercepts to Sketch the Graph of a Linear Equation

Example: Sketch the graph of $2x+3y=6$ using intercepts.

The x-intercept is the point where the line crosses the x-axis. Every point on the x-axis has a y-coordinate of 0. Substitute $y=0$ into the original equation to find the x-intercept.

$2x+3(0)=6$

$2x=6$ The x-intercept is (3, 0).

$x=3$

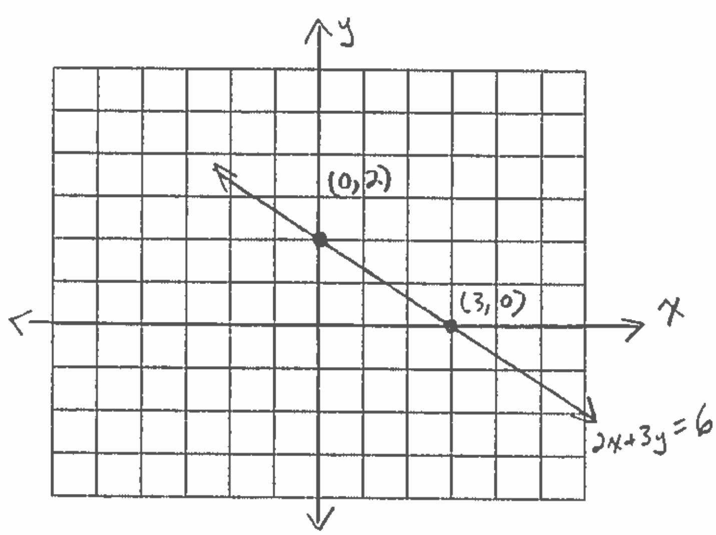
The y-intercept is the point where the line crosses the y-axis. Every point on the y-axis has an x-coordinate of 0. Substitute $x=0$ into the original equation to find the y-intercept.

$2(0)+3y=6$

$3y=6$ The y-intercept is (0, 2).

$y=2$

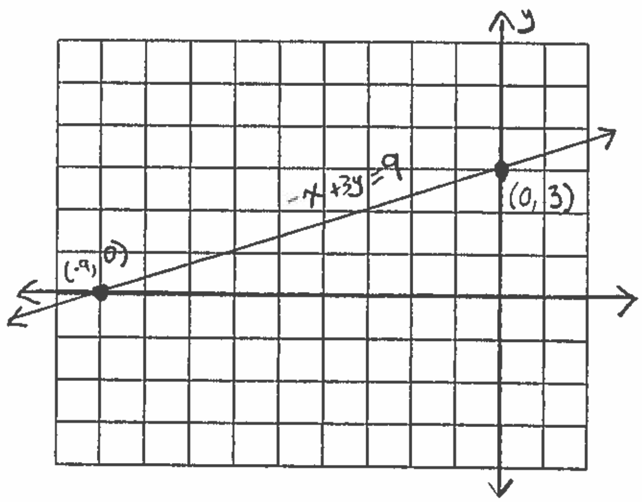
Plot and label.



Example: Sketch the graph of $-x+3y=9$ using intercepts.

$-x+3(0)=9$	$-(0)+3y=9$
$-x=9$	$3y=9$
$x=-9$	$y=3$

The x-intercept is (-9, 0) and the y-intercept is (0, 3)



Practice for 4.3 Use intercepts to sketch the graphs of each linear equation.

1. $-2x+3y=-6$

x-int: $y=0$ y-int: $x=0$

$-2x=-6$ $3y=-6$

$x=3$ $y=-2$

$(3,0)$ $(0,-2)$

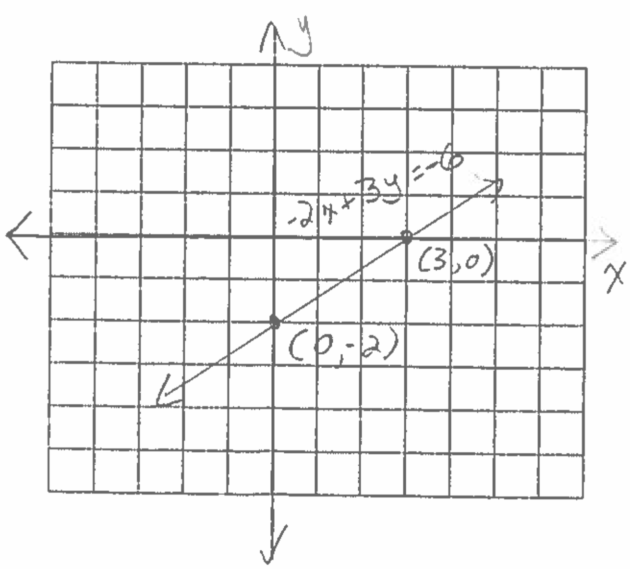
2. $2x+y=-4$

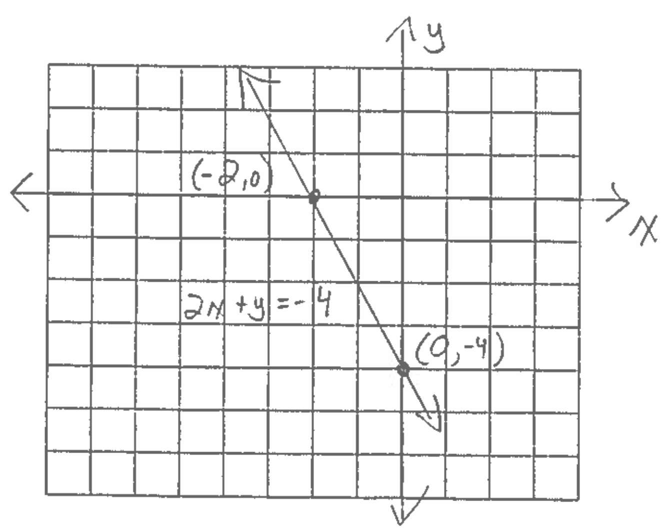
x-int: $y=0$ y-int: $x=0$

$2x=-4$ $y=-4$

$x=-2$ $(0,-4)$

$(-2,0)$

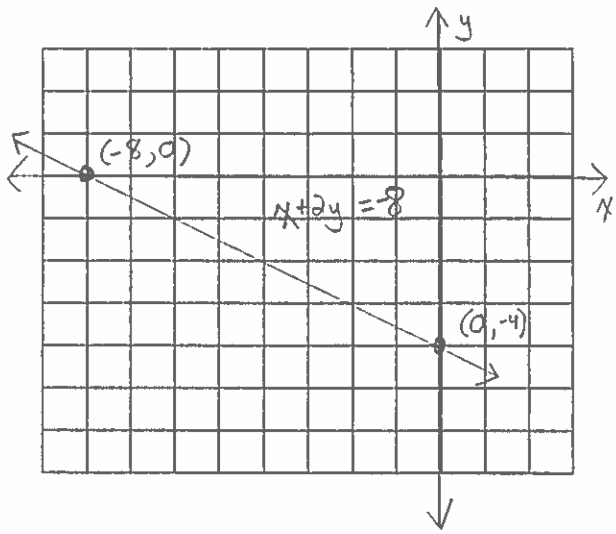




3. $x+2y=-8$

x-int: $y=0$
$x=-8$
$(-8,0)$

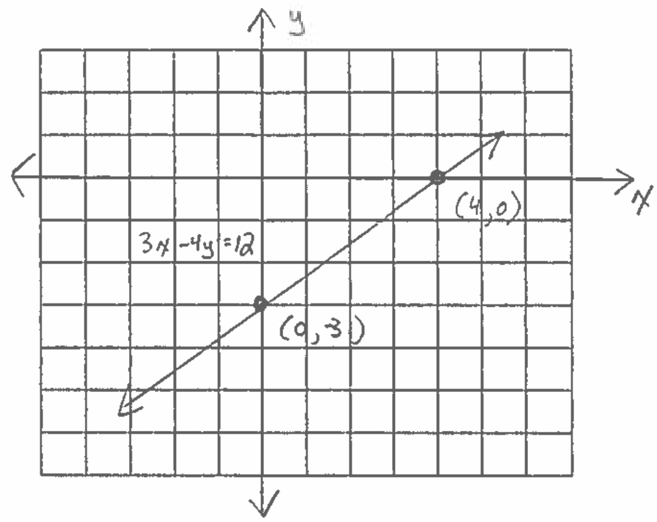
y-int: $x=0$
$2y=-8$
$y=-4$
$(0,-4)$



4. $3x-4y=12$

x-int: $y=0$
$3x=12$
$x=4$
$(4,0)$

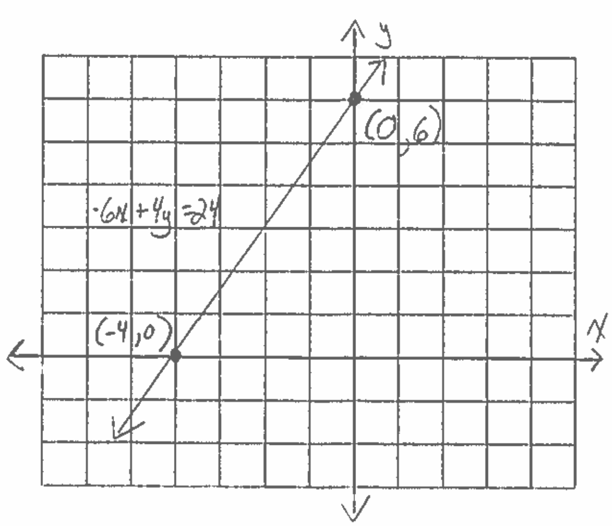
y-int: $x=0$
$-4y=12$
$y=-3$
$(0,-3)$



5. $-6x+4y=24$

x-int: $y=0$
$-6x=24$
$x=-4$
$(-4,0)$

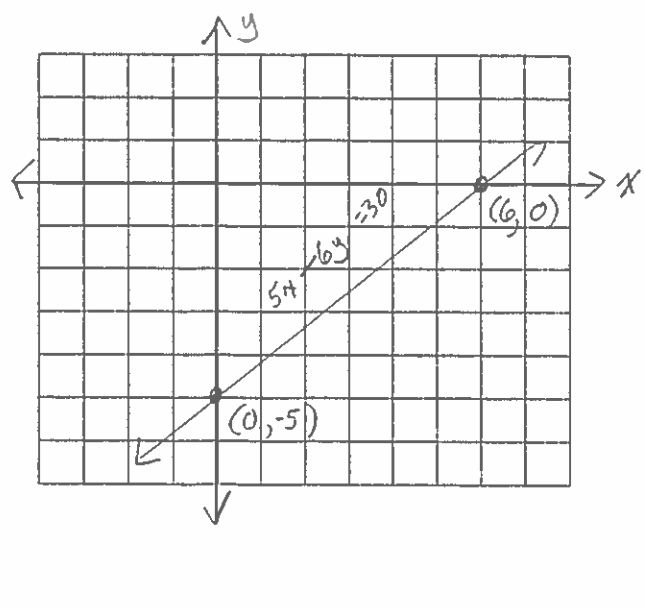
y-int: $x=0$
$4y=24$
$y=6$
$(0,6)$



6. $5x-6y=30$

x-int: $y=0$
$5x=30$
$x=6$
$(6,0)$

y-int: $x=0$
$-6y=30$
$y=-5$
$(0,-5)$



Section 4.4 Finding the Slope of a Line Using Two Points

Ideas: A line with positive slope rises from left to right. (Increasing Line)
A line with negative slope falls from left to right. (Decreasing Line)
A line with a zero slope does not change left to right. (Horizontal)
A line with an undefined slope does not go left to right. (Vertical)

Formula: The slope of the line between two points can be calculated using the following formula.

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Example: Find the slope of the line passing through the points (2, 1) and (4, 5). Describe the line as increasing, decreasing, horizontal, or vertical.

Solution: Let (2,1) be point 1 and (4, 5) be point 2.

$$m = \frac{\Delta y}{\Delta x} = \frac{5-1}{4-2} = \frac{4}{2} = 2$$

$m = 2$ The line is increasing.

Example: Find the slope of the line passing through the points (3, 3) and (3, -1). Describe the line as increasing, decreasing, horizontal, or vertical.

Solution: Let (3, 3) be point 1 and (3, -1) be point 2.

$$m = \frac{\Delta y}{\Delta x} = \frac{-1-3}{3-3} = \frac{-4}{0}$$

Slope is undefined. The line is vertical.

Example: Find the slope of the line passing through the points (2, -4) and (5, -4). Describe the line as increasing, decreasing, horizontal, or vertical.

Solution: Let (2, -4) be point 1 and (5, -4) be point 2.

$$m = \frac{\Delta y}{\Delta x} = \frac{-4-(-4)}{5-2} = \frac{0}{3} = 0$$

$m = 0$ The line is horizontal.

Practice for 4.4

A. Find the slope of the line passing through the given points.

B. Describe the line as increasing, decreasing, horizontal, or vertical.

1. (2, 3) and (4, 5)

I II

$m = \frac{\Delta y}{\Delta x} = \frac{5-3}{4-2} = \frac{2}{2}$

$\boxed{m=1}$ $\boxed{\text{Inc. Line}}$

2. (-2, 5) and (2, -3)

I II

$m = \frac{\Delta y}{\Delta x} = \frac{-3-5}{2-(-2)}$

$m = \frac{-8}{4}$

$\boxed{m=-2}$ $\boxed{\text{Dec. Line}}$

3. (3, 4) and (4, 4)

I II

$m = \frac{\Delta y}{\Delta x} = \frac{4-4}{4-3}$

$m = \frac{0}{1}$

$\boxed{m=0}$ $\boxed{\text{Horizontal Line}}$

4. (-7, 10) and (3, 0)

I II

$m = \frac{\Delta y}{\Delta x} = \frac{0-10}{3-(-7)}$

$m = \frac{-10}{10}$

$\boxed{m=-1}$ $\boxed{\text{Dec. Line}}$

5. (0, 4) and (0, -4)

I II

$m = \frac{\Delta y}{\Delta x} = \frac{-4-4}{0-0}$

$m = \frac{-8}{0}$

$\boxed{m \text{ is undefined}}$ $\boxed{\text{Vertical Line}}$

6. (2, -5) and (0, -4)

I II

$m = \frac{\Delta y}{\Delta x} = \frac{-4-(-5)}{0-2}$

$m = \frac{1}{-2}$

$\boxed{m=-\frac{1}{2}}$ $\boxed{\text{Dec. Line}}$

7. (9, 10) and (-5, 38)

I II

$m = \frac{\Delta y}{\Delta x} = \frac{38-10}{-5-9}$

$m = \frac{28}{-14}$

$\boxed{m=-2}$ $\boxed{\text{Dec. Line}}$

8. (-3, -2) and (3, -2)

I II

$m = \frac{\Delta y}{\Delta x} = \frac{-2-(-2)}{3-(-3)}$

$m = \frac{0}{6}$

$\boxed{m=0}$ $\boxed{\text{Horizontal Line}}$

Section 4.5 Graphing Using Slope-Intercept Form

Ideas:

1. Write y as a function of x. $y = mx + b$

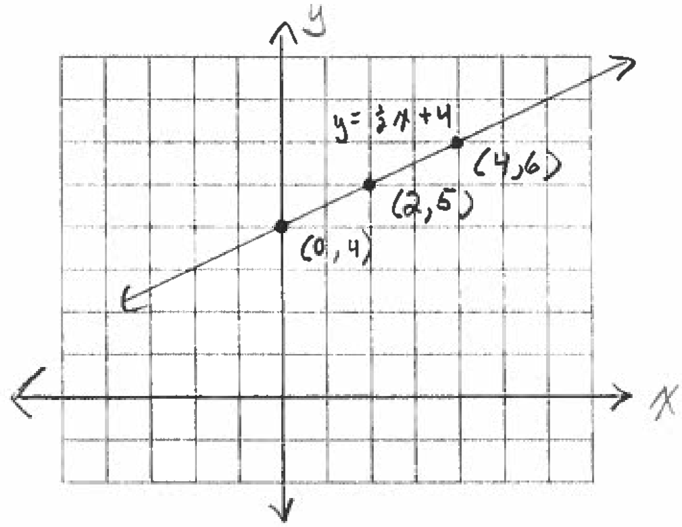
m is the slope of the line. b is the y-coordinate of the y-intercept. $(0, b)$

2. Plot the y-intercept and use the slope to get 2 other points.
3. Completely label your graph.

Example: Graph $-x + 2y = 8$.

$2y = x + 8$

$y = \frac{1}{2}x + 4$ The slope is ½ and the y-intercept is (0, 4).



Practice for 4.5. Graph each equation using the slope and y-intercept.

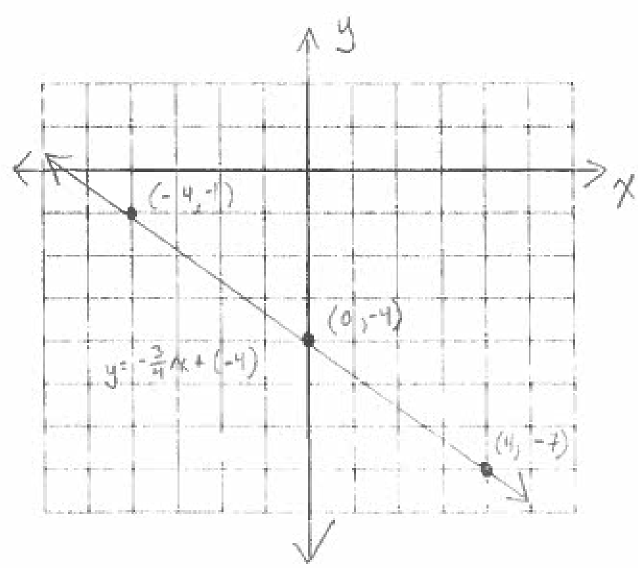
1. $3x + 4y = -16$

$4y = -3x + (-16)$

$y = \frac{-3}{4}x + (-4)$

$m = -\frac{3}{4} = \frac{\Delta y}{\Delta x} = \frac{-3}{4} = \frac{3}{-4}$

y-int: $(0, -4)$



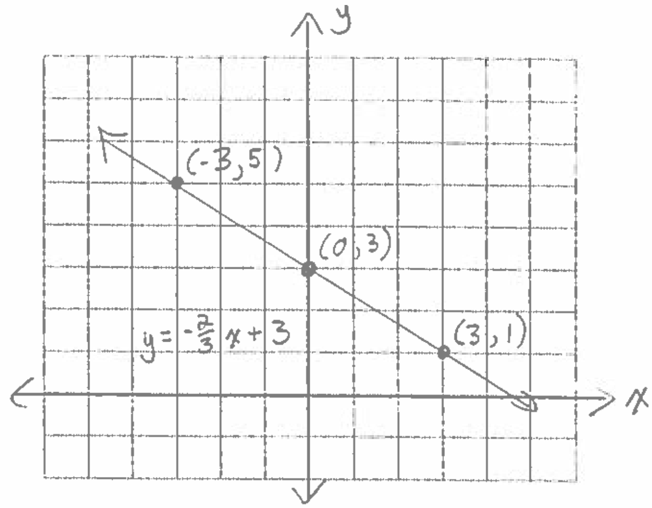
2. $2x+3y=9$

$3y=-2x+9$

$y=-\frac{2}{3}x+3$

$m=-\frac{2}{3}=\frac{\Delta y}{\Delta x}=\frac{-2}{3}=\frac{2}{-3}$

y-int: $(0,3)$



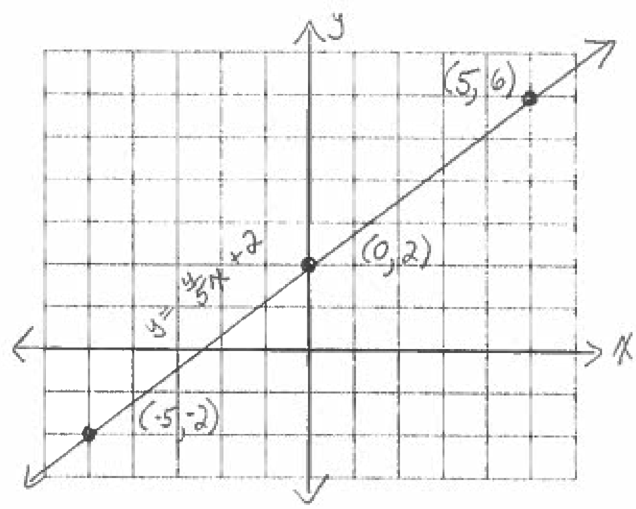
3. $4x-5y=-10$

$-5y=-4x+(-10)$

$y=\frac{4}{5}x+2$

$m=\frac{4}{5}=\frac{\Delta y}{\Delta x}=\frac{-4}{-5}$

y-int: $(0,2)$



4. $-6x-2y=4$

$-2y=6x+4$

$y=-3x+(-2)$

$m=-3=\frac{\Delta y}{\Delta x}=\frac{-3}{1}=\frac{3}{-1}$

y-int: $(0,-2)$