11 - Working with Linear Relations

December 3, 2018 10:52 AM

II) Working with Linear Relations

Part 1: Graphing a Line from an Equation

Recall the THREE ways we have to graph a line from an equation:

1. Table of Values
2. Slope - Intercept Form: $y = mx + b$ (m = slope, b = y-int.) — ONLY work for linear
3. x and y intercepts ⇒ y = 0, x = 0

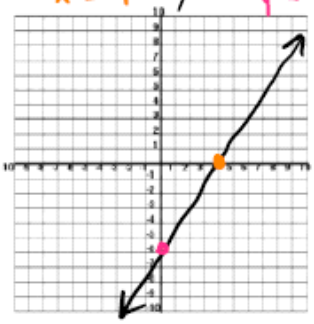
Example 1: Graph the lines represented by the equation. Use any method you wish.

a) $3x - 2y = 12$

x and y intercepts.

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

y-INT (x=0): $-2y = 12$, $y = -6$

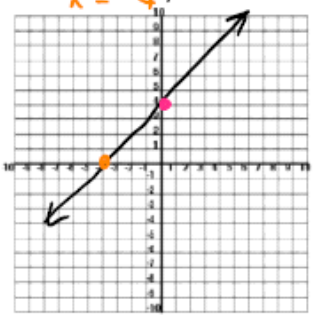


b) $y - x = 4$

x and y intercepts.

x-INT (y=0): $-x = 4$, $x = -4$

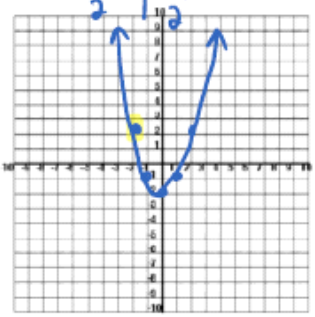
y-INT (x=0): $y = 4$



c) $y = x^2 - 2$ — NOT LINEAR

x	y
(-2)	2
(-1)	-1
0	-2
1	-1
2	2

$y = (-2)^2 - 2 = 4 - 2 = 2$



Part 2: Describing Equations

Example 2: Represent the following in either equations or words.

Remember:

DOMAIN = X

RANGE = Y

a) Represent the following statement with an equation:

Each element of the range is 4 less than triple the domain.

$y = 3x - 4$

b) *T or F*: Each element in the range is 2 more than one-fifth of the domain is represented by the following equation:

$5y - x = 10$

$y = \frac{1}{5}x + 2$ ×5

$5y = 1x + 10$

$-1x \quad -1x$

$5y - 1x = 10$

T

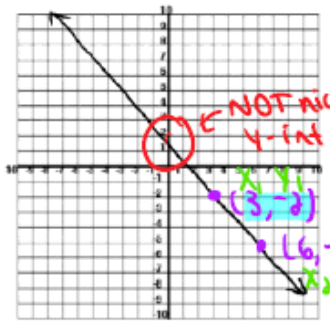
c) Describe the following, in words, as a function:

$2x - 2y = 20$

each element in the domain times two minus each element in the range times two is 20

Part 3: Writing the Equation of a Line from a Graph

Example 3: Write the equation of the following line in slope-intercept form.



$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-5-(-2)}{6-3} = \frac{-3}{3} = -1$

Here's How You Do It:

1. Pick out two points on the line
2. Find the slope
3. Plug the **slope** and **ONE point** into slope-point form *OR* plug the **slope** and the **y-intercept** (if it's a nice point) into slope-intercept
4. Transform your equation into the form asked.

$y - y_1 = m(x - x_1)$

$y - (-2) = -1(x - 3)$

$y + 2 = -1(x - 3)$

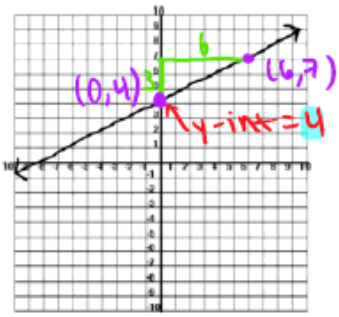
$y + 2 = -1x + 3$

$-2 \quad -2$

$y = -1x + 1$

Example 4: Write the equations of the following lines in general form.

a)



$m = \frac{\text{rise}}{\text{run}} = \frac{3}{6} = \frac{1}{2}$

$y = mx + b$

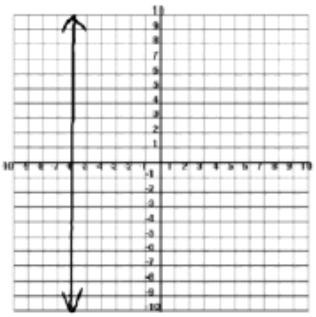
$(y = \frac{1}{2}x + 4)\times 2$

$2y = 1x + 8$

$-2y \quad -2y$

$0 = 1x - 2y + 8$

b)



m = undefined

x always is −6

$x = -6$

$+6 \quad +6$

$x + 6 = 0$

Homework

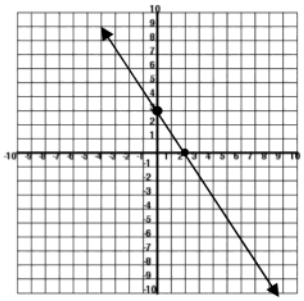
assignment # 11
pages #40-43 questions #166-188

Working With Linear Equations:

- Be able to convert equations between general form and slope-intercept form.
- Be able to graph equations given to you in either form.
- Be able to make comparisons based on parallel and perpendicular lines.

Eg.1. Graph the line $3x + 2y - 6 = 0$.

Your Options:
1) use intercepts 2)make a table of values 3)convert to slope-intercept form



I chose **option 1** because this equation allows for easy calculations to find both intercepts.

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

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

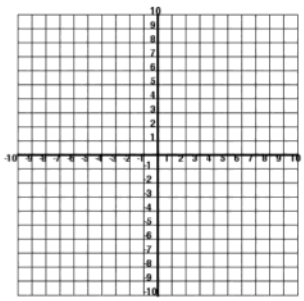
Plot the two points & draw the line through them.

My second choice would have been option 3, conversion to slope-intercept form.
$3x + 2y - 6 = 0$ $2y = -3x + 6$ $y = \frac{-3}{2}x + 3$

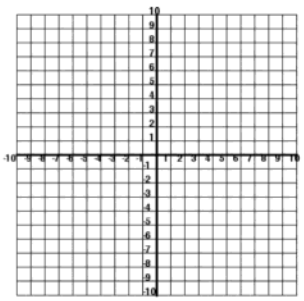
Plot the *y*-intercept then use the slope to plot another point, draw a line through the two points.

Graph the lines represented by each of the following equations. Use any method.

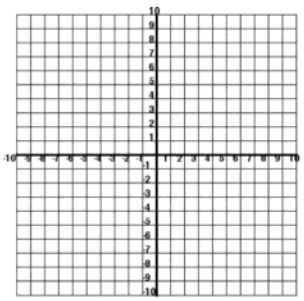
166. $3x + 2y + 6 = 0$



167. $5x + 2y - 10 = 0$

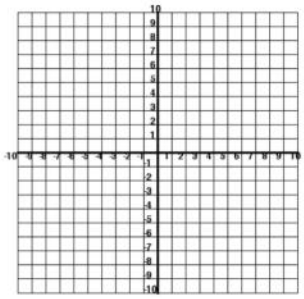


168. $x - y = 10$



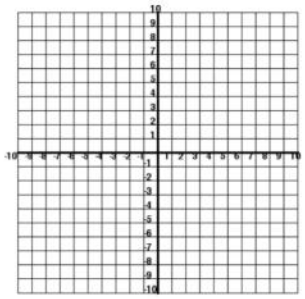
Graph the lines represented by each of the following equations. Use any method.

169. $3x + 2y - 4 = 0$



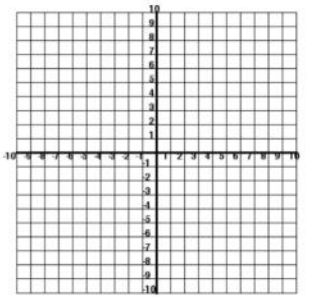
170. Explain your strategy:

171. $x - 4y = 0$



Explain your strategy:

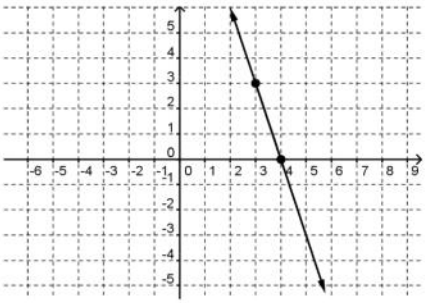
172. $2(x - 3) = y - 3$



Explain your strategy:

Match the following graphs to their corresponding equations. Choose the best match.

173.



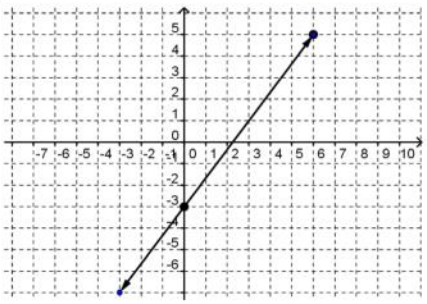
a) $x - 3y + 3 = 0$

b) $3x - y - 12 = 0$

c) $3x + y - 12 = 0$

d) None of the above

174.



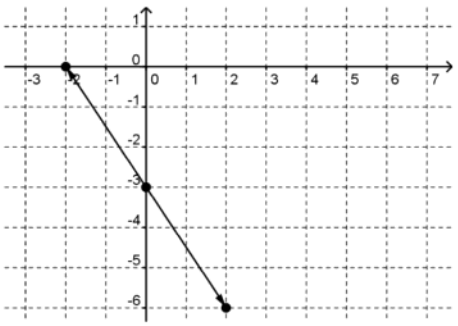
a) $4x - 3y + 9 = 0$

b) $3x - 4y + 9 = 0$

c) $3x + 4y - 9 = 0$

d) None of the above

175. Which equation on the right represents the graph below?



a) $2x - 3y + 6 = 0$

b) $3x - 2y + 6 = 0$

c) $3x + 2y + 6 = 0$

d) None of the above

176. Which of the following equations represents the word statement "each element of the range is equal to one less than double an element in the domain."

a. $2x - y - 1 = 0$
b. $x - 2y = -1$
c. $2x + y + 1 = 0$

177. Which of the following equations represents the word statement "each element of the range is equal to two more than one third an element in the domain."

a. $3x - y = 6$
b. $x - 3y = -6$
c. $x + 3y + 6 = 0$

178. Which of the following equations represents the word statement "triple each element of the range is equal to one less than double an element in the domain."

a. $2x - 3y = -1$
b. $2x - 3y = 1$
c. $2x + 3y = 1$

179. Write a "word statement" to describe the following equation.

$y = 3x - 2$

180. Write a "word statement" to describe the following equation.

$2x + 4y - 8 = 0$

181. Write a "word statement" to describe the following equation.

$3x - 5y = 20$

182. Which of the following equations represent the same line as $y = 3x - 2$?

Circle all that apply.

a. $3x = y + 2$
b. $3x - y - 2 = 0$
c. $y - 3x = -2$
d. none

183. Which of the following equations represent the same line as $5x - 2y + 10 = 0$?

Circle all that apply.

e. $y = \frac{5}{2}x + 5$
f. $\frac{2}{5}(x - 4) = y - 15$
g. $x = \frac{2}{5}y - 2$
h. none

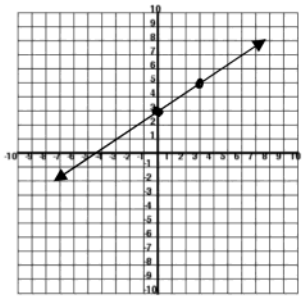
184. Which of the following equations represent the same line as $y - 4 = 2(x + 1)$?

Circle all that apply.

i. $2x - y + 6 = 0$
j. $y = 2x + 6$
k. $2x + y = 6$
l. none

Find the slope and *y*-intercept, write the equation in slope-intercept form, then in general form.

185.

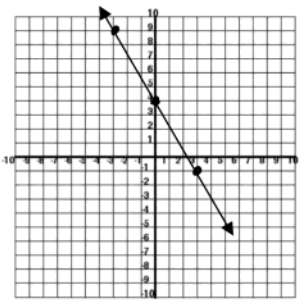


*m*_____ *b*_____

slope-intercept form_____

general form_____

186.

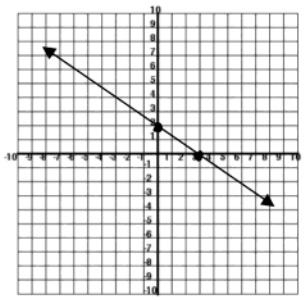


*m*_____ *b*_____

slope-intercept form_____

general form_____

187.

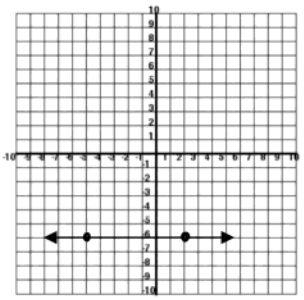


*m*_____ *b*_____

slope-intercept form_____

general form_____

188.



*m*_____ *b*_____

slope-intercept form_____

general form_____