

Unit 11: Linear Equations

Section 11.1: General Form: $ax + by = c$

Section 11.2: Applications – General Form

Section 11.3: Point-Slope Form: $y - y_1 = m(x - x_1)$

KEY TERMS AND CONCEPTS	
Look for the following terms and concepts as you work through the Media Lesson. In the space below, explain the meaning of each of these concepts and terms <i>in your own words</i> . Provide examples that are not identical to those in the Media Lesson.	
General (Standard) Form	
Finding the intercepts of a linear equation given in general form.	
Finding the slope of a linear equation given in general form.	
Converting from general form to slope-intercept form.	

Write a linear equation in general form given an application problem.	
How to Graph a Linear Equation given in General Form	
Point-Slope Form of a linear equation	
Converting from point-slope form to slope-intercept form.	
How to Graph a Linear Equation given in Point-Slope Form	
Write a linear equation in Point-Slope form.	

Unit 11: Media Lesson

Section 11.1: General Form: $ax + by = c$

Slope-Intercept Form of a Linear Equation	General (Standard) Form of a Linear Equation
$y = mx + b$ <p>$x = \text{input}, y = \text{output}$ $m = \text{slope}$ $b = \text{vertical intercept } (0, b)$</p>	$ax + by = c$ <p>$x = \text{input}, y = \text{output}$ $a, b, \text{ and } c \text{ are constants}$</p>

 **Example 1:** Consider the linear equation $3x - 5y = 30$

a. Write this equation in slope-intercept form.

b. Identify the slope.

Determining Intercepts:

To find the **vertical intercept**, set $x = 0$ and solve for y .

To find the **horizontal intercept**, set $y = 0$ and solve for x .

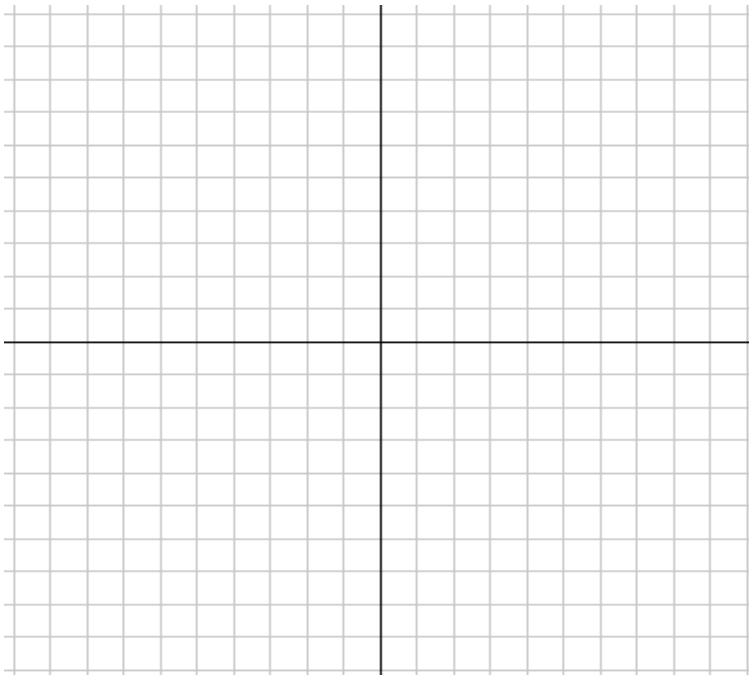
c. Determine the vertical intercept.

d. Determine the horizontal intercept.



Example 2: Draw an **accurate** graph of the linear equation $3x + 2y = 16$.

Slope-Intercept Form:




Slope: _____

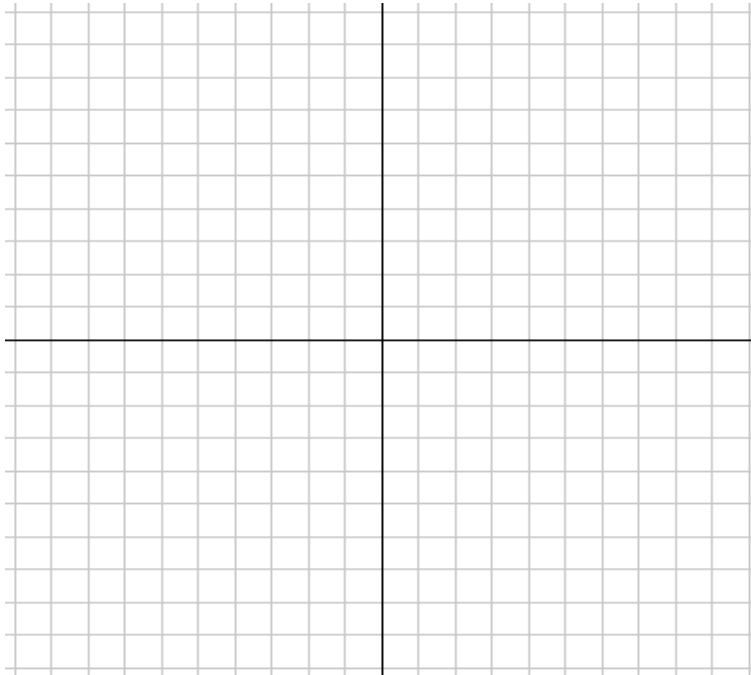
Vertical Intercept: _____

Horizontal Intercept: _____

Additional points on the line:

Section 11.1 – YOU TRY

 Draw an **accurate** graph of the linear equation $4x - y = 7$



Slope-Intercept Form:

Slope: _____

Vertical Intercept: _____

Horizontal Intercept: _____

Additional points on the line:



Example 3: Ivan invested money into two mutual funds. Fund A earned 6% interest during the first year, while Fund B earned 8% interest. At the end of the year, he receives a total of \$774 in interest.

- a. Write a linear equation in general form to represent this situation. Clearly indicate what each variable represents.

- b. If Ivan invested \$8500 in Fund A, how much did he invest in Fund B?




Example 4: Kim invested money into two mutual funds. Fund A earned 6% profit during the first year, while Fund B suffered a 3.5% loss. At the end of the year, she receives a total of \$177 in profit.

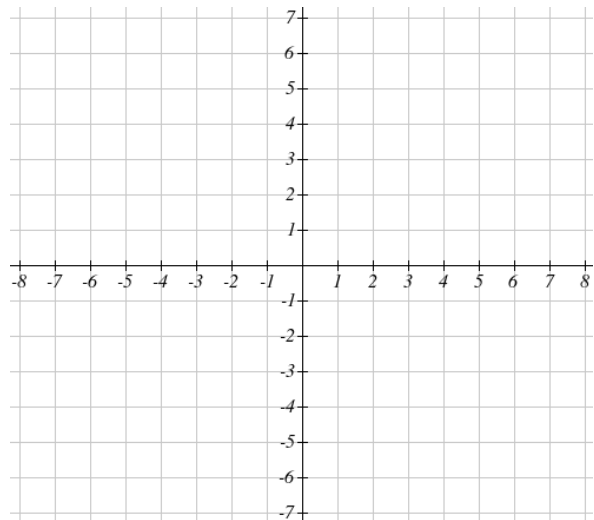
- a. Write a linear equation in general form to represent this situation. Clearly indicate what each variable represents.


- b. If Kim invested \$3650 in Fund A, how much did she invest in Fund B?

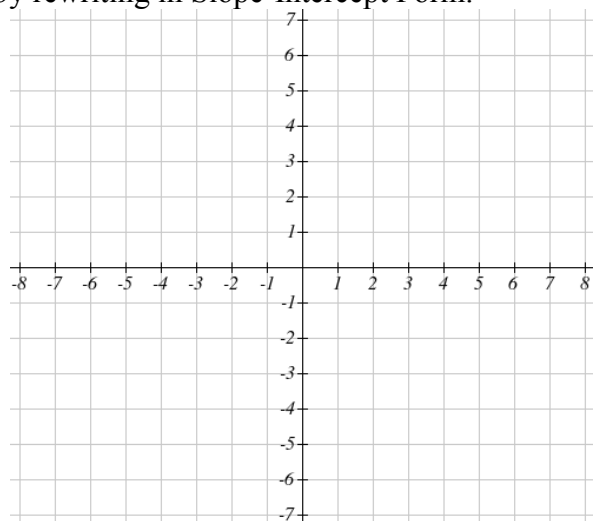
Section 11.3: Point-Slope Form of a Line


Slope-Intercept Form of a Linear Equation	Point-Slope Form of a Linear Equation
$y = mx + b$ <p>$x = \text{input}, y = \text{output}$ $m = \text{slope}$ $b = \text{vertical intercept } (0, b)$</p>	$y - y_1 = m(x - x_1)$ <p>$x = \text{input}, y = \text{output}$ $m = \text{slope}$ (x_1, y_1) is a point on the line.</p>

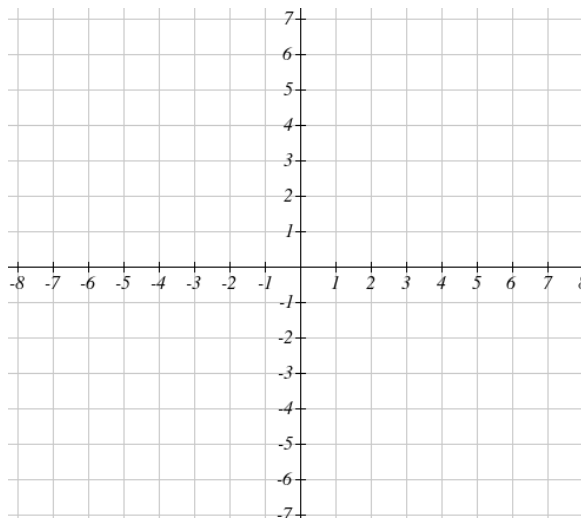
 **Example 1:** Graph the line $y - 3 = -2(x + 4)$.




 **Example 2:** Graph the line $y - 3 = -2(x + 4)$ by rewriting in Slope-Intercept Form.



 **Example 3:** Graph the line $y + 3 = \frac{1}{2}(x - 1)$.




 **Example 4:** Find the equation of the line with slope = $\frac{1}{2}$ and passing through the point (6, -3).

Point-Slope Form

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

Slope-Intercept Form

$$y = mx + b$$

 **Example 5:** Find the equation of the line containing the points (-1, 4) and (3, 5).

Point-Slope Form

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

Slope-Intercept Form

$$y = mx + b$$

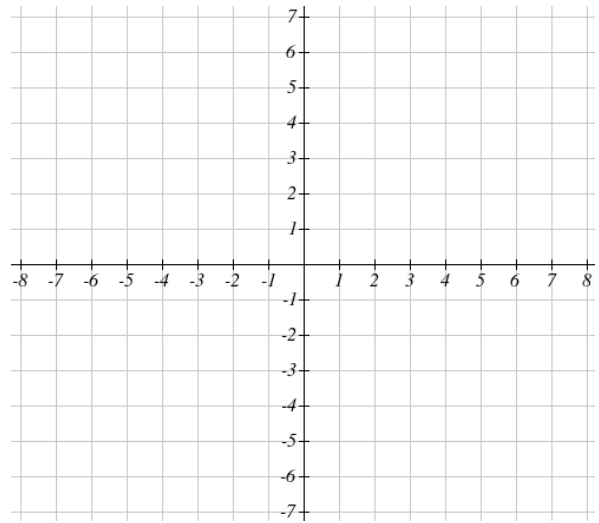
Section 11.3 – YOU TRY



Complete the problems below. Show as much work as possible, as shown in the examples.

- a. Draw an *accurate* graph of the line.

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



- b. Rewrite the linear equation $y + 7 = -3(x - 5)$ in Slope-Intercept Form, $y = mx + b$.

- c. Find the equation of the line containing the points $(-2, 4)$ and $(8, -1)$.

Point-Slope Form

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

Slope-Intercept Form

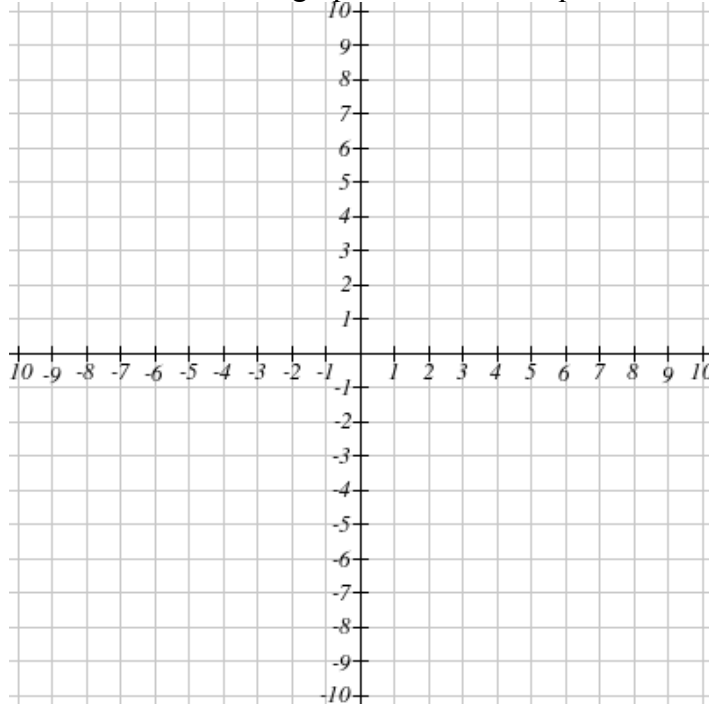
$$y = mx + b$$

Unit 11: Practice Problems

Skills Practice

- Which of the ordered pairs below satisfy the equation $x - y = 5$?
(-2, 3) (6, 1) (0, -5) (-3, -8)
- Which of the ordered pairs below satisfy the equation $2x + 3y = 6$?
(0, 3) (6, -2) (3, 0) (-3, 4)
- Which of the ordered pairs below satisfy the equation $y - 5 = 2(x + 1)$?
(5, -1) (1, -5) (-5, 1) (-1, 5)
- Which of the ordered pairs below satisfy the equation $y + 8 = -\frac{3}{2}(x - 4)$?
(8, -4) (0, -2) (-8, 4) (0, 8)
- Write the equation $x - y = 5$ in Slope-Intercept Form.
- Write the equation $2x + 3y = 6$ in Slope-Intercept Form.

7. Draw an **accurate** graph of the linear equation $2x + 4y = 12$.



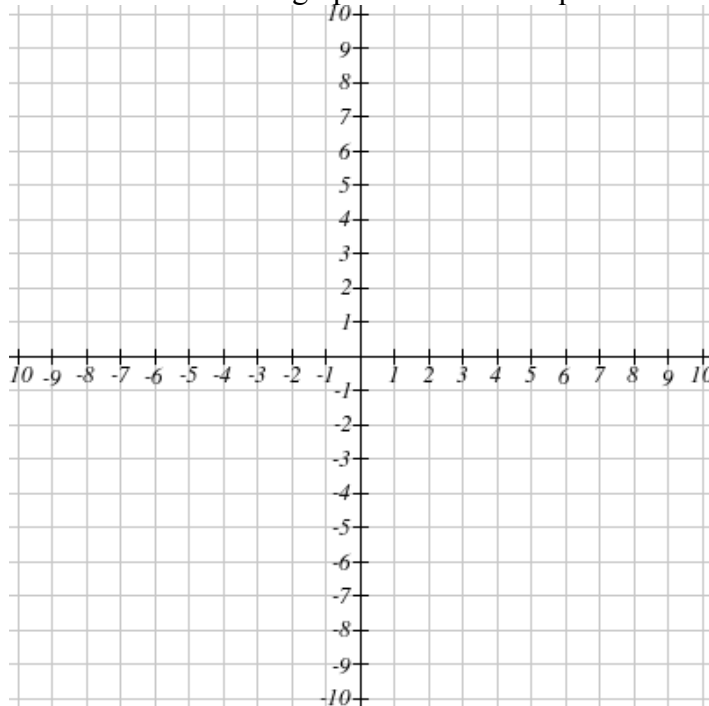
Slope-Intercept Form: _____

Slope: _____

Vertical Intercept: _____

Horizontal Intercept: _____

8. Draw an **accurate** graph of the linear equation $3x - 2y = 10$.



Slope-Intercept Form: _____

Slope: _____

Vertical Intercept: _____

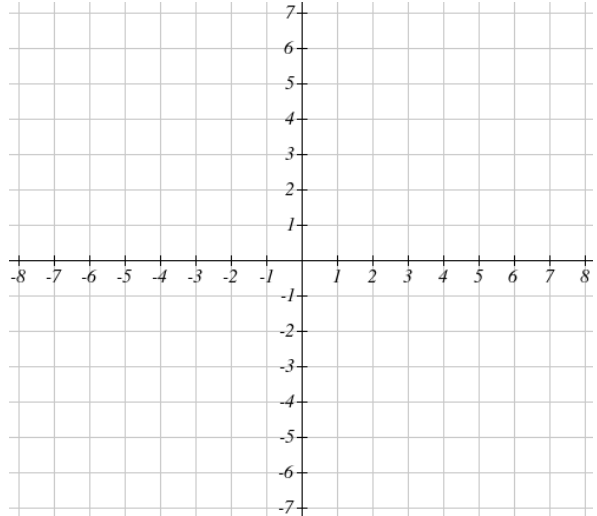
Horizontal Intercept: _____

9. Draw an **accurate** graph for each of the following by identifying the slope and one point on the line.

a. $y + 1 = 2(x - 5)$

Slope: _____

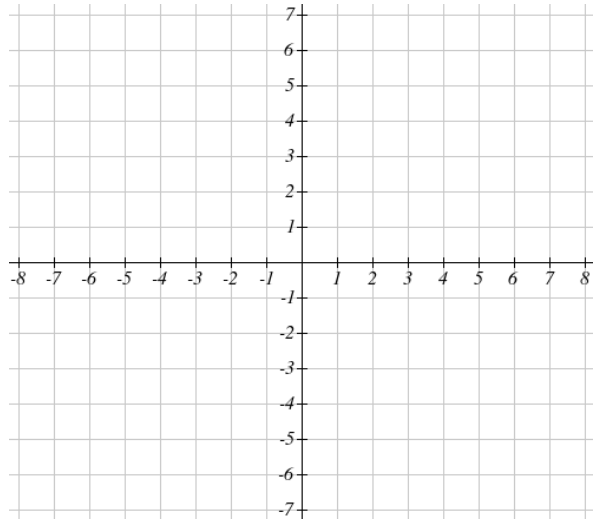
Point: _____



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

Slope: _____

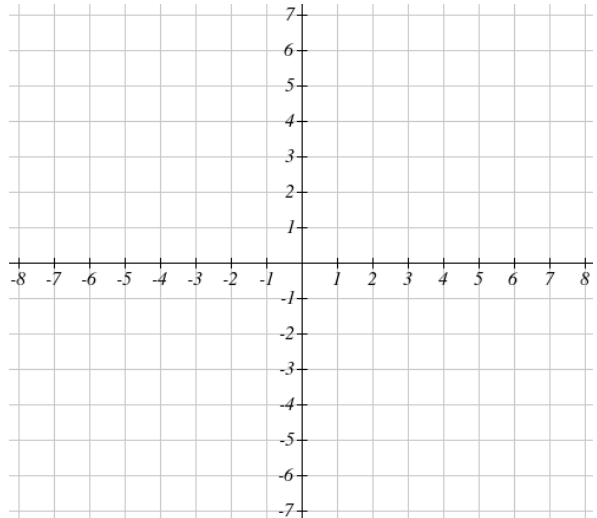
Point: _____



c. $y + 4 = -\frac{2}{5}(x - 2)$

Slope: _____

Point: _____

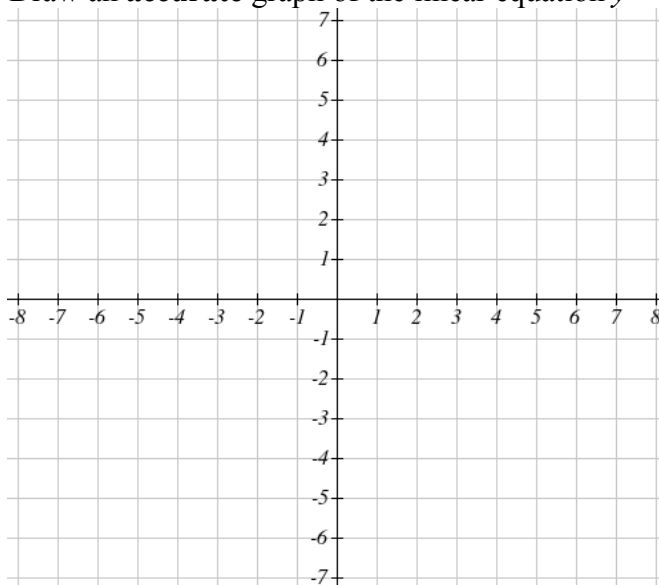


10. Rewrite the linear equation $y + 1 = 2(x - 5)$ in Slope-Intercept Form, $y = mx + b$.

11. Rewrite the linear equation $y - 2 = -3(x + 1)$ in Slope-Intercept Form, $y = mx + b$.

12. Rewrite the linear equation $y + 4 = -\frac{2}{5}(x - 2)$ in Slope-Intercept Form, $y = mx + b$.

13. Draw an **accurate** graph of the linear equation $y + 5 = 2(x + 1)$.



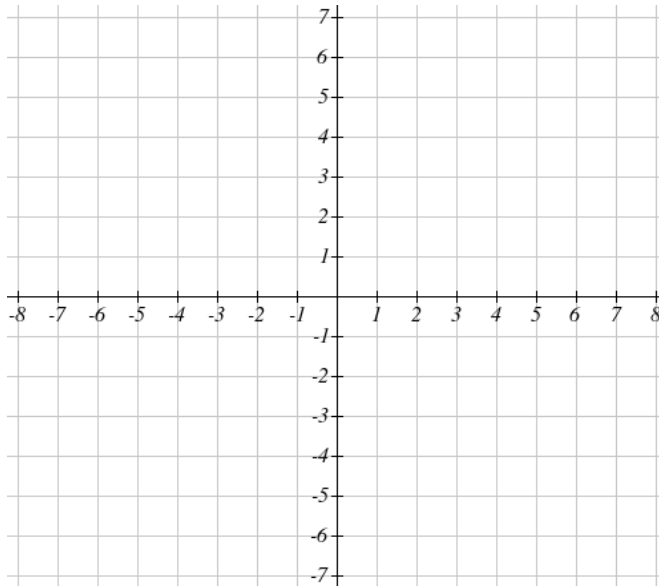
Slope-Intercept Form: _____

Slope: _____

Vertical Intercept: _____

Horizontal Intercept: _____

14. Draw an **accurate** graph of the linear equation $y + 2 = -\frac{1}{2}(x - 3)$.



Slope-Intercept Form: _____

Slope: _____

Vertical Intercept: _____

Horizontal Intercept: _____

15. Find the equation of the line with slope = -4 and passing through the point (8, -10).

Point-Slope Form

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

Slope-Intercept Form

$$y = mx + b$$

16. Find the equation of the line with slope = $\frac{4}{5}$ and passing through the point (-2, 5).

Point-Slope Form

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

Slope-Intercept Form

$$y = mx + b$$

17. Find the equation of the line containing the points (2, 3) and (9, -4).

Point-Slope Form

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

Slope-Intercept Form

$$y = mx + b$$

18. Find the equation of the line containing the points (-5, 2) and (4, -1).

Point-Slope Form

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

Slope-Intercept Form

$$y = mx + b$$

Applications

19. At a concession stand, three hot dogs and five sodas cost \$18.50.
- a. Let h represent the price of each hot dog, and s represent the price of each soda. Write a linear equation in general form to represent this situation.

 - b. If hot dogs cost \$3.25 each, how much is each soda?
20. The Science Museum charges \$14 for adult admission and \$11 for each child. The museum bill for a school field trip was \$896.
- a. Write a linear equation in general form to represent this situation. Clearly indicate what each variable represents.

 - b. Nine adults attended the field trip. How many children were there?
21. Jamaal invested money into two mutual funds. Fund A earned 6% interest during the first year, while Fund B earned 2.5% interest. At the end of the year, he receives a total of \$390 in interest. Write a linear equation in general form to represent this situation. Clearly indicate what each variable represents.
22. Marisol invested money into two mutual funds. Fund A earned 4% profit during the first year, while Fund B suffered a 2% loss. At the end of the year, she receives a total of \$710 in profit. Write a linear equation in general form to represent this situation. Clearly indicate what each variable represents.
23. Jake has a pocket full of dimes and quarters. The total value of his change is \$4.00. Write a linear equation in general form to represent this situation. Clearly indicate what each variable represents.

24. Bill begins a 50 mile bicycle ride. Unfortunately, his bicycle chain breaks, and he is forced to walk the rest of the way. Bill walks at a rate of 4 miles per hour, and rides his bike at a rate of 18 miles per hour.
- Let b represent the amount of time Bill spent bicycling before the chain broke, and w represent the amount of time Bill spent walking. Write a linear equation in general form to represent this situation. (Hint: Distance = rate \cdot time)
 - Bill had been riding his bike for two hours when the chain broke. Use the equation in part a to determine the amount of time he spent walking.

Extension

25. **Refer to your course syllabus**

- The Final Exam for this class is worth _____ % of your course grade.
- Let x represent the score you make on the Final Exam (as a percent), and y represent your grade in the class (as a percent) just prior to taking the Final Exam. Write a linear *inequality* in general form to represent this situation, assuming that you want your final course grade to be:

A: At least 90%

B: At least 80%

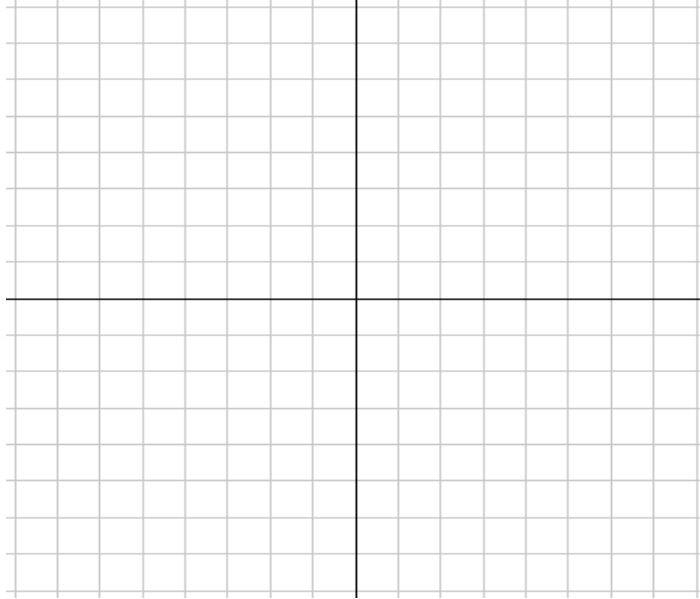
C: At least 70%

Hint: If your Final Exam is worth 30% of your course grade, then everything else would be worth $100\% - 30\% = 70\%$ of your course grade.

- Suppose you have a 77% in the class just before taking the final exam. What score do you need to make on the Final Exam to earn an A, B, or C in the class? Assume that your instructor *does not* round up!

Unit 11: Review

1. Draw an **accurate** graph of the linear equation $2x + 3y = 6$. Determine the slope and intercepts of this linear equation and rewrite this equation in Slope-Intercept Form.



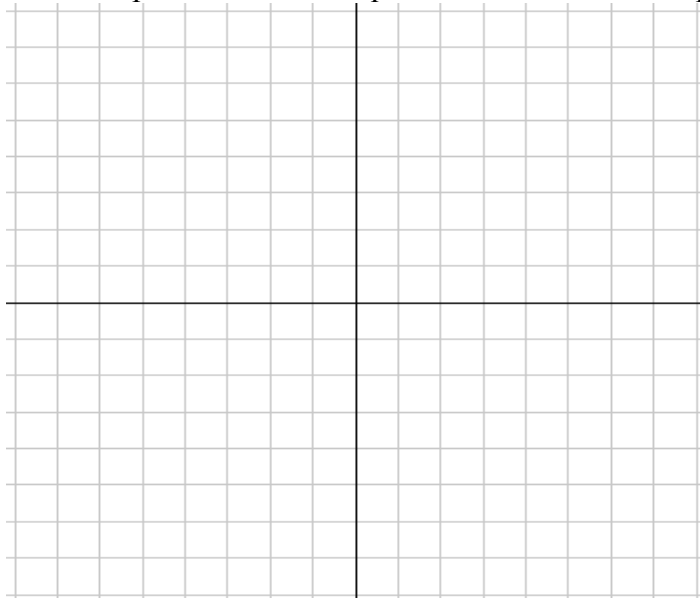
Slope-Intercept Form: _____

Slope: _____

Vertical Intercept: _____

Horizontal Intercept: _____

2. Draw and **accurate** graph of the linear equation $y + 1 = \frac{1}{2}(x - 6)$. Determine the slope and intercepts of this linear equation and rewrite this equation in Slope-Intercept Form.



Slope-Intercept Form: _____

Slope: _____

Vertical Intercept: _____

Horizontal Intercept: _____

3. Find the equation of the line containing the points (2, -5) and (-1, 4).

Point-Slope Form

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

Slope-Intercept Form

$$y = mx + b$$

4. Rashid invested money into two mutual funds. Fund A earned 4% interest during the first year, while Fund B earned 1.5% interest. At the end of the year, he receives a total of \$117 in interest.
- a. Write a linear equation in general form to represent this situation. Clearly indicate what each variable represents.
- b. If Rashid invested \$3,000 in Fund B, how much did he invest in Fund A?
