

# Jakarta International School

8<sup>th</sup> Grade – AG1

## Practice Test - Green

### Unit 2: Graphing

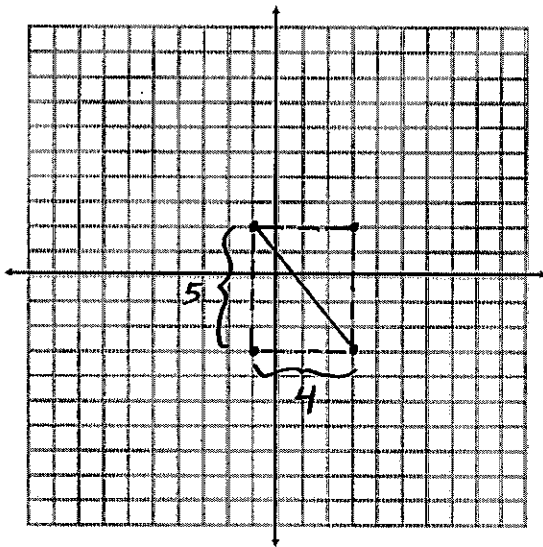
Name: SOLUTIONS

Date: \_\_\_\_\_

Score: 85

**Goal 4: Students convert graphical, symbolic, and numerical representations of data**

1. The points  $(-1,2)$  and  $(3,-3)$  are two vertices of a *right* triangle. If one of the triangle's legs is parallel to the  $x$ -axis, what are the possible coordinates of the third point? Use the following coordinate plane to find your solutions. What is the area of the triangle? (2 pts)



$$\star (3,2) \text{ or } (-1,-3)$$

$$\star A_{\Delta} = \frac{1}{2} b \cdot h$$

$$= \frac{1}{2} \cdot 4 \cdot 5$$

$$= \frac{1}{2} \cdot 20$$

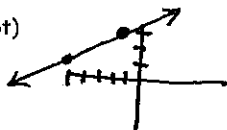
$$= \boxed{10 \text{ square units}}$$

2. What can be determined about the signs of  $x$  and  $y$  if  $(x,y)$  lies...

a) in the second quadrant? (2 pts)  $\boxed{x < 0 \quad y > 0}$

b) below the origin on the  $y$ -axis? (2 pts)  $\boxed{x = 0 \quad y < 0}$

3. The line through the points  $(-5, 1)$  and  $(-1, 3)$  passes through every quadrant except one. Which one? (1 pt)



$\boxed{\text{Quadrant 4}}$

4. The point  $(-3, -5)$  is on the line  $y = 3x - b$ . Find the value of  $b$  (2 pts)

Find the value of  $b$  so that  $(-3, -5)$  is a solution to the equation.

$$-5 = 3 \cdot (-3) - b$$

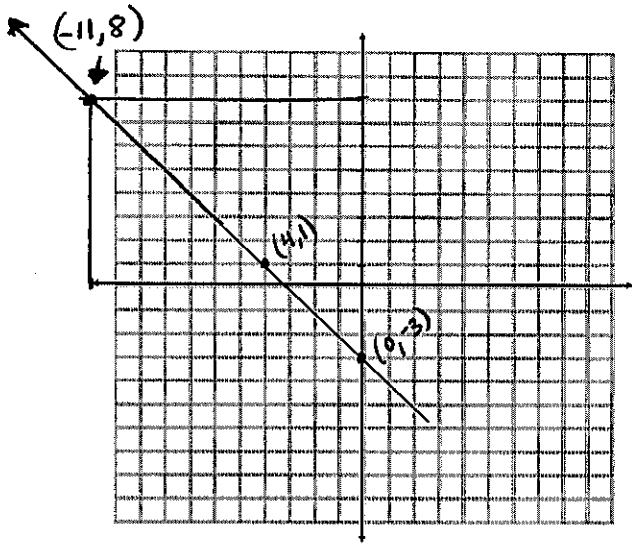
$$-5 = -9 - b$$

$$+9 \quad +9$$

$$4 = -b$$

$$\boxed{b = -4}$$

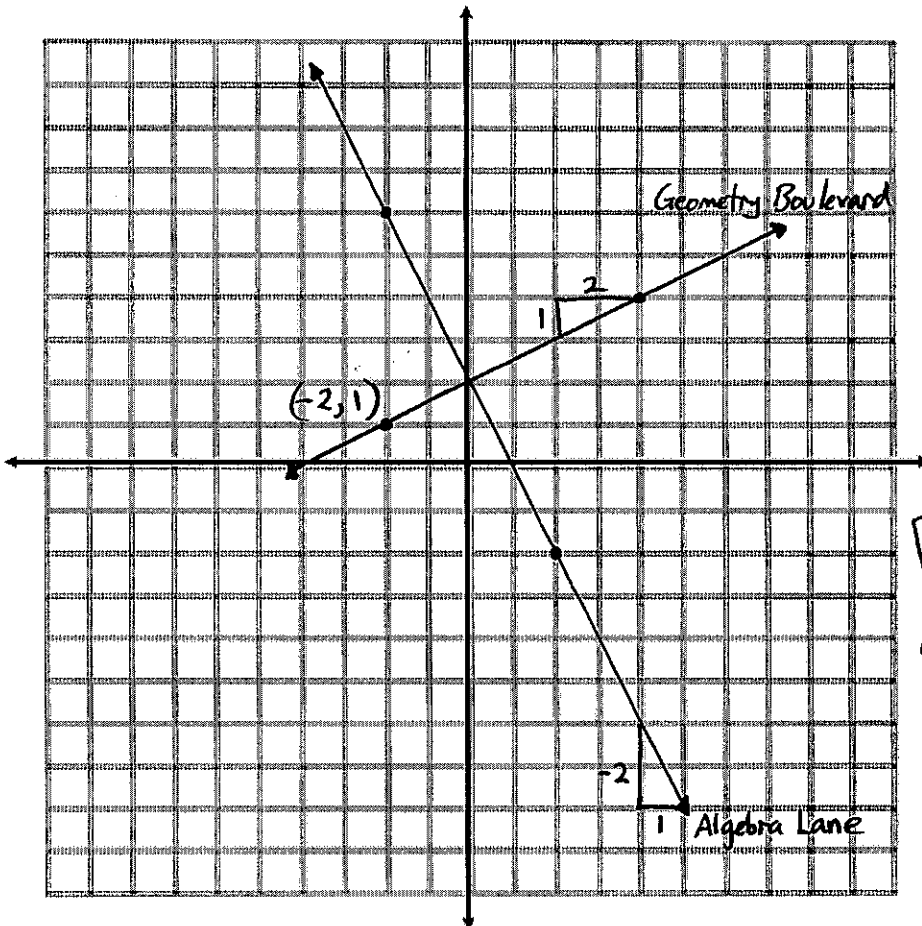
5. The point  $(p, 8)$  lies on the line shown here. What is the value of  $p$ ? (2 pts)



$$p = -11$$

6. If a coordinate plane were placed on top of the map of "Math City", Algebra Lane would go through the points  $(-2, 6)$  and  $(2, -2)$ . Geometry Boulevard runs perpendicular to Algebra Lane and passes through the points  $(4, 4)$  and  $(-2, y)$ . What is the value of  $y$ ? Carefully find this answer using the graph paper provided, a ruler, a protractor, and your understanding of slope. (2 pts)

$$\star \text{ Slope of Algebra Lane} = \frac{-2 - 6}{2 - (-2)} = \frac{-8}{4} = -\frac{2}{1}$$



So, slope of Geometry Blvd must be  $\frac{1}{2}$  if the 2 roads are perpendicular because the product of their slopes must be  $-1$ .

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

From the picture, you see that  $y = 1$ .

Checking with a protractor shows that the lines are perpendicular.

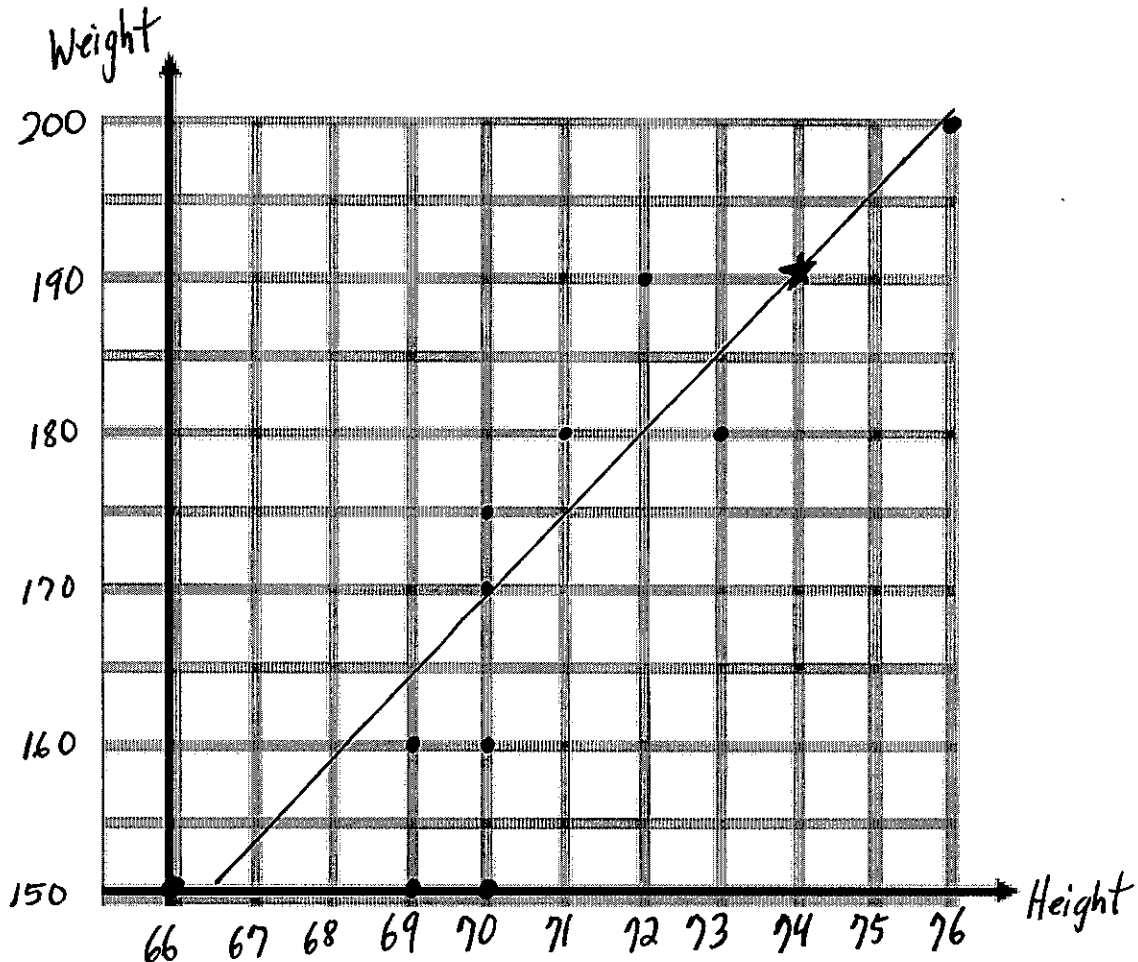
7. You are the student manager of your high school soccer team. You are working on the team's program guide and have recorded the height and weight of the team's eleven players.

Height { minimum is 66, maximum is 76 } This helps make a scale

Height (in.)	72	70	71	70	69	70	69	73	66	70	76
Weight (pounds)	190	170	180	175	160	160	150	180	150	150	200

Weight { minimum = 150, maximum = 200 }

- a. Make a scatter plot of the data. Put height  $h$  on the horizontal axis and weight  $w$  on the vertical axis. (2 pts)



- b. Use a line of best fit to estimate the weight of a player who is 74 inches tall. (2 pts)

About 190 pounds

- c. Describe the relationship between the heights and weights of the team's members? (2 pts)

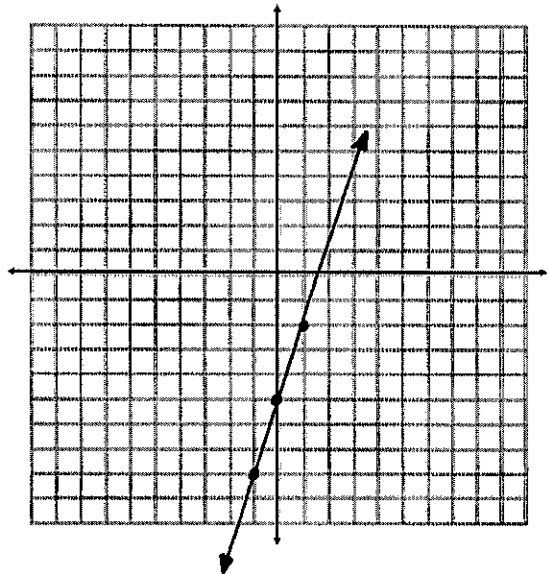
~~Solution in Advanced Red Book Page 204~~

As the heights of the team's players increase, their weights generally increase as well.

8. Rewrite the following equation in function form. Then, use a table of values to graph the function.  $9x - 3y = 15$  (3 pts)

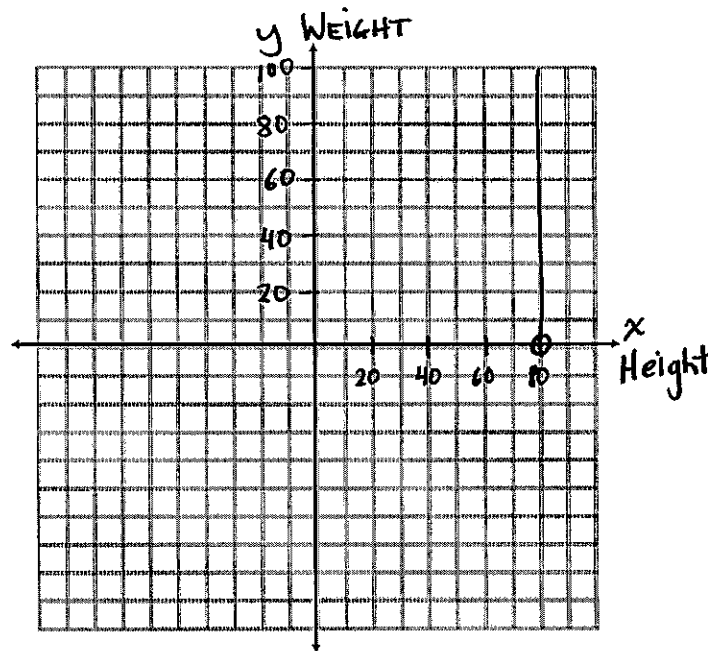
$$\begin{aligned}
 9x - 3y &= 15 \\
 -9x &\quad -9x \\
 \hline
 -3y &= -9x + 15 \\
 -3 &\quad -3 \\
 \hline
 y &= 3x - 5
 \end{aligned}$$

x	y
-1	-8
0	-5
1	-2



9. On the planet of Creon, every creature is exactly the same height (80 cm), but no creature is the same weight, ~~though~~ The heaviest creature is 100 kg.

- a. Graph the relationship between  $x$ , the height of each creature, and  $y$ , each creature's weight. (2 pts)



- b. Write an equation for this graph? (1 pt)  $x = 80$

- c. What is the Domain of this graph? Range? (2 pts)

Domain:  $\{x = 80\}$  RANGE:  $\{0 < y \leq 100\}$

10. Your class is selling shirts and sweaters displaying your school logo to raise money for a field trip. Your class needs to raise \$1800 to cover the cost of the trip. For each shirt sold, \$3 is raised for the trip. For each sweater sold, \$5 is raised for the trip.

- a. Write an equation that represents the number of shirts ( $x$ ) and sweaters ( $y$ ) sold and the amount of money your class needs to raise for the field trip. (2 pts)

$$3x + 5y = 1800$$

- b. Find the x-intercept. What does it represent? (2 pts)

when  $y = 0$

$$3x + 0 = 1800$$

$$\frac{3x}{3} = \frac{1800}{3}$$

$$x = 600$$

If no sweaters are sold, 600 shirts must be sold to raise \$1800.

- c. Find the y-intercept. What does it represent? (2 pts)

when  $x = 0$

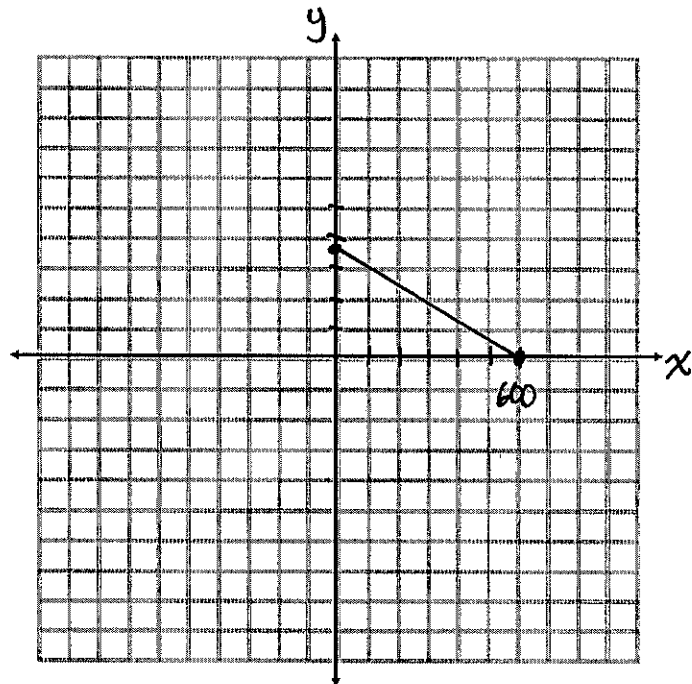
$$0 + 5y = 1800$$

$$\frac{5y}{5} = \frac{1800}{5}$$

$$y = 360$$

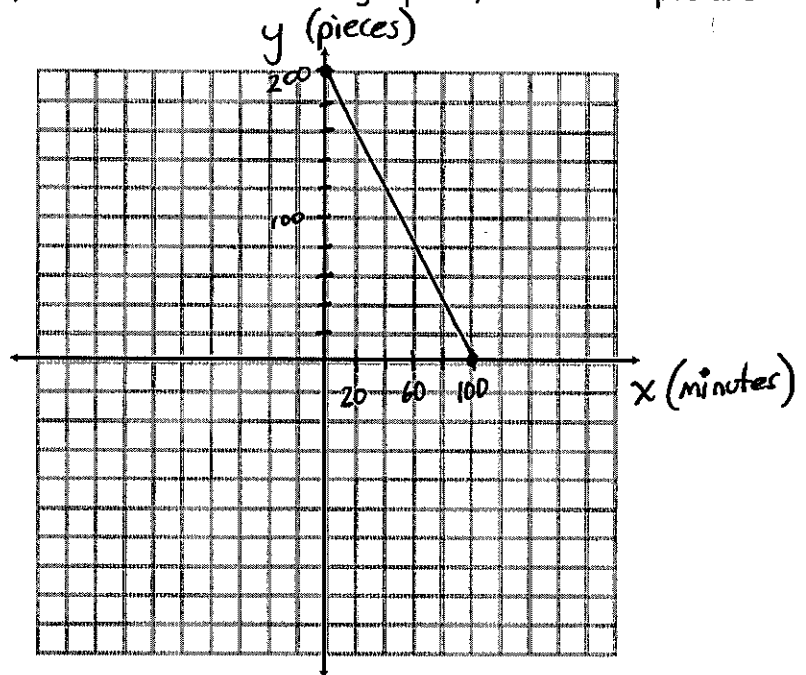
If no shirts are sold, 360 sweaters must be sold to raise \$1800.

- d. Graph the equation. (2 pts)



11. The amount of popcorn left in a container ( $y = \text{pieces}$ ) is related to how long a person has been watching a movie ( $x = \text{minutes}$ ). When the relation is graphed, the intercepts are  $x=100$  and  $y=200$ .

A. Graph this relation (2 pts)



B. Explain the meaning of each intercept. (2 pts)

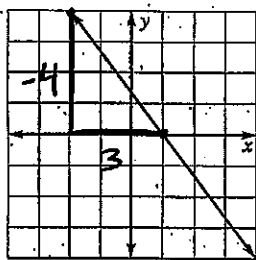
- ★ When zero minutes have passed, all 200 pieces of popcorn remain.
- ★ After 100 minutes have passed, zero pieces of popcorn remain.

C. Write an equation for this graph in slope intercept form (2 pts)

slope =  $m = \frac{-200}{100} = -2$  } slope intercept form is  $y = mx + b$   
 y-intercept =  $b = 200$  } so the equation is  $y = -2x + 200$

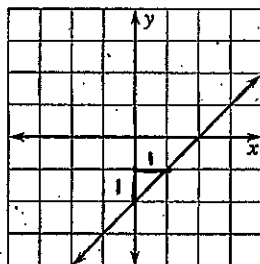
12. What is the slope of each line pictured below? (3 pts total)

a.



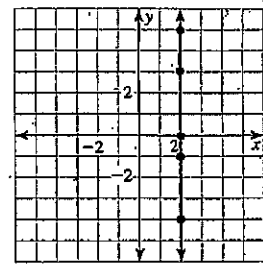
slope =  $\frac{\text{Rise}}{\text{Run}} = \frac{-4}{3}$

b.



$\frac{\text{Rise}}{\text{Run}} = \frac{1}{1} = 1$

c.



slope is UNDEFINED

13. Calculate the slope of the lines passing through the following pairs of points:

$(-10, -7)$  and  $(1, -2)$  (2 pts)

slope =  $\frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - (-7)}{1 - (-10)} = \frac{-2 + 7}{1 + 10} = \frac{5}{11}$

14. Rewrite the following equation in slope intercept form. Then, graph the line. (3 pts)

$$2y + 12 = x \quad (3 \text{ pts})$$

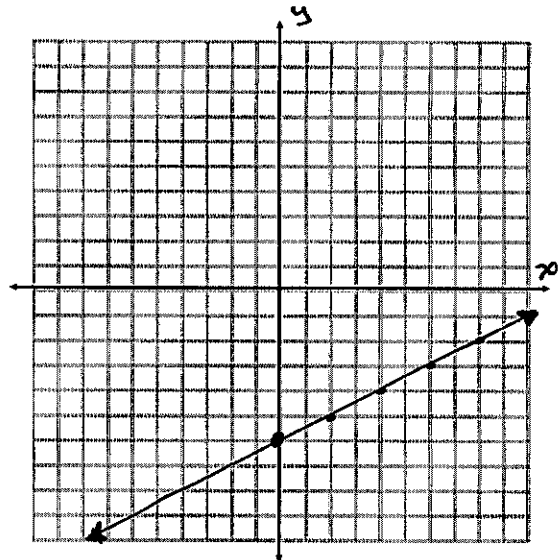
$$2y + 12 = x$$

$$2y + 12 - 12 = x - 12$$

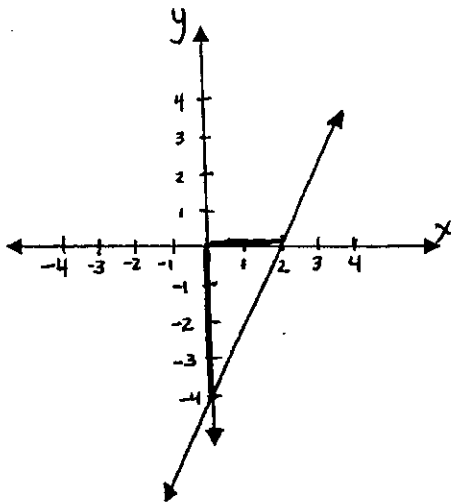
$$\frac{2y}{2} = \frac{x - 12}{2}$$

$$y = \frac{1}{2}x - 6$$

↑ slope =  $\frac{1}{2}$       ↑ y-intercept = -6



15. Write the equation of the line pictured in the following graph. (2 pts)



y-intercept = -4  
slope =  $\frac{4}{2} = 2$

$$y = mx + b$$

$$y = 2x - 4$$

16. The liters,  $L$ , of water used to take a shower vary directly with the number of minutes,  $M$ , in the shower. A 6 minute shower uses 36 liters of water.

a. Write an equation that relates the variables  $L$  and  $M$ . (1 pt)

$$L = k \cdot M$$

$$36 = k \cdot 6$$

$$k = 6$$

so  $L = 6M$

b. If you shower for 15 minutes, how many liters of water will you use? (1 pt)

$$L = 6 \cdot 15 = 90 \text{ liters}$$

17. For each of the following equations,

a.  $y = \frac{1}{2}x + 3$

b.  $y = -\frac{1}{2}x + 2$

c.  $y = 2x + 8$

d.  $y = \frac{1}{2}x - 1$

A. Identify the slope and y-intercept of each equation's graph (8 pts)

		Slope	Y-Intercept
a	$y = \frac{1}{2}x + 3$	$\frac{1}{2}$	3
b	$y = -\frac{1}{2}x + 2$	$-\frac{1}{2}$	2
c	$y = 2x + 8$	2	8
d	$y = \frac{1}{2}x - 1$	$\frac{1}{2}$	-1

B. Graph and label each line on the axes shown. (4 pts)

C. Which 2 equations represent parallel lines? (1 pt)

a and d

$y = \frac{1}{2}x + 3$  AND  $y = \frac{1}{2}x - 1$

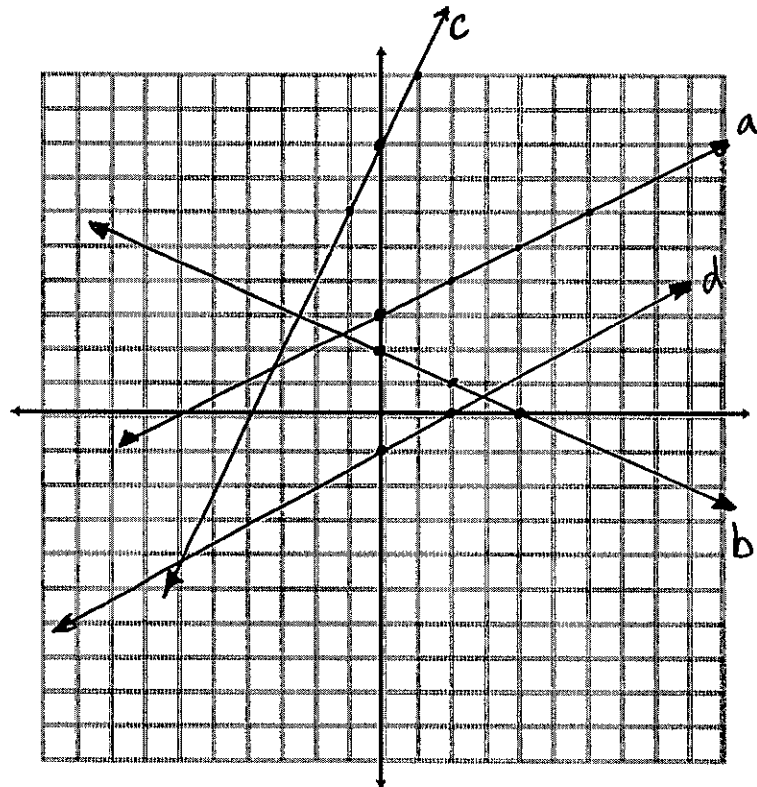
D. Which 2 equations represent perpendicular lines? (1 pt)

b and c

$y = -\frac{1}{2}x + 2$  AND  $y = 2x + 8$

E. How can you tell which lines will be parallel and perpendicular just by looking at the equations? Explain. (2 pts)

2 lines will be parallel if their slopes are equal.  
 In slope intercept form,  $y = mx + b$ ,  $m$  is the slope of a line.  
 Lines a and d both have slope =  $\frac{1}{2}$ , so they are parallel.  
 2 lines will be perpendicular if the product of their slopes = -1.  
 Lines b and c have slopes  $-\frac{1}{2}$  and 2. The product is  $-\frac{1}{2} \cdot 2 = -1$ ,  
 so the lines are perpendicular.





18. Write an equation of the line that is parallel to the given line and passes through the given point. (2 pts)

$$y = -3x + 1 \quad (4, 2)$$

Parallel line will have the same slope,  $m = -3$

→ So the equation will be  $y = 3x + b$   
Find the value of  $b$  by substituting  $(4, 2)$

$$2 = -3 \cdot 4 + b$$

$$2 = -12 + b$$

$$b = 14 \rightarrow \text{so}$$

$$\boxed{y = -3x + 14}$$

19. Write an equation of a line through  $(4, 5)$  that is perpendicular to  $y = \frac{1}{2}x + 3$  (2 pts)

The product of the slopes must be  $-1$ . So, the line must have  $m = -2$  since  $\frac{1}{2} \cdot -2 = -1$ .

$$y = -2x + b$$

$$5 = -2(4) + b$$

$$5 = -8 + b$$

$$b = 13$$

$$\boxed{y = -2x + 13}$$

20. Graph the following equation: (2 pts)

$$y - 3 = \frac{2}{3}(x + 1)$$

①

This equation is in point-slope form

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

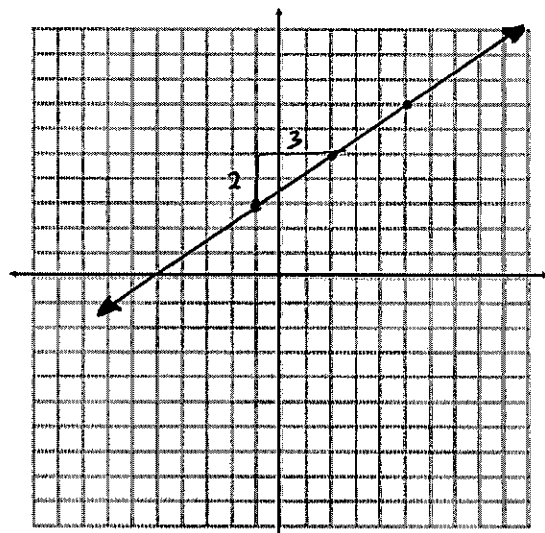
$$\text{so } (x_1, y_1) = (-1, 3) \text{ and } m = \frac{2}{3}$$

② OR you could change to slope-intercept form

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

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

With fractions, this would be tricky to graph.



Point-slope form is easier in this situation.

21. Write an equation in point-slope form of the line that passes through the given point and has the given slope: (2 pts)

$$(-1, -3) \quad m = 4$$

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

$$\boxed{y + 3 = 4(x + 1)}$$

22. In point-slope form, write an equation of the line that passes through the given points:

(3, -12) and (8, 3) (2 pts)

$$\text{slope} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-12)}{8 - 3} = \frac{15}{5} = 3$$

Choose either point:  $y - y_1 = m(x - x_1)$

$$y + 12 = 3(x - 3) \quad \text{OR} \quad y - 3 = 3(x - 8)$$

B. Now, write the equation in slope intercept form. (2 pts)

$$y + 12 = 3(x - 3)$$

$$y + 12 = 3x - 9$$

$$y = 3x - 21$$

$$y - 3 = 3(x - 8)$$

$$y - 3 = 3x - 24$$

$$y = 3x - 21$$

★ Simplified, both equations from part A give the same equation, which we would expect since we're talking about a single line.

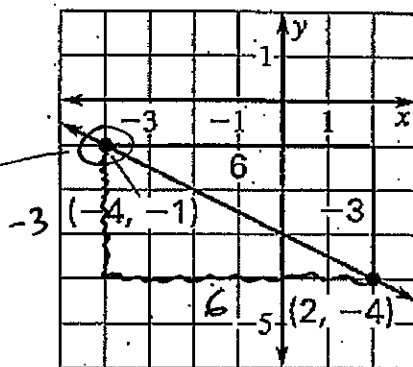
23. Write an equation of the line in point slope form (2 pts)

$$\text{slope} = \frac{\text{Rise}}{\text{Run}} = \frac{-3}{6} = -\frac{1}{2}$$

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

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

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



B. Now, write the equation in slope-intercept form. (2 pts)

$$y + 1 = -\frac{1}{2}x - 2$$

$$y = -\frac{1}{2}x - 3$$

→ check by looking at the graph. The line has a y-intercept of -3 and slope =  $-\frac{1}{2}$ , so I am right! ;)