02 - Standard: Linear Functions Name: Key

Algebra 1 Final Exam Review

Slope Intercept Form

Objective: *I CAN . . . Write an equation in slope intercept form and graph the line using slope intercept form.*

Slope – Intercept Form: *Any linear equation of the form y = mx + b.*

Write the equations in slope intercept form. Then identify the slope and the y-intercept.

1. $2x - 3y = 6$

$-2x \quad\quad -2x$

$\frac{-3y}{-3} = \frac{-2x+6}{-3}$

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

Slope: $2/3$

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

2. $-4x + 7y = -14$

$+4x \quad\quad +4x$

$\frac{7y}{7} = \frac{4x-14}{7}$

$\boxed{y = \frac{4}{7}x - 2}$

Slope: $4/7$

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

3. $6y + 2 = 3x$

$-2 \quad\quad -2$

$\frac{6y}{6} = \frac{3x-2}{6}$

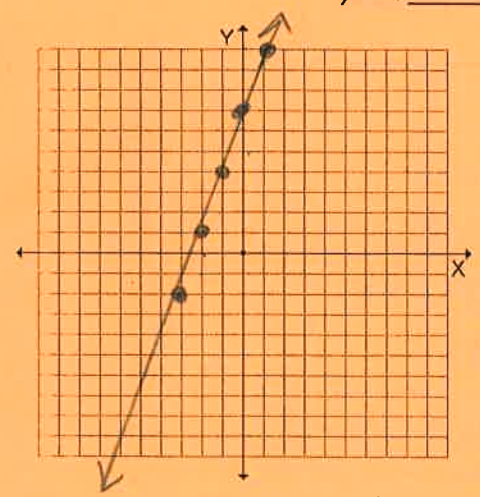
$\boxed{y = \frac{1}{2}x - \frac{1}{3}}$

Slope: $1/2$

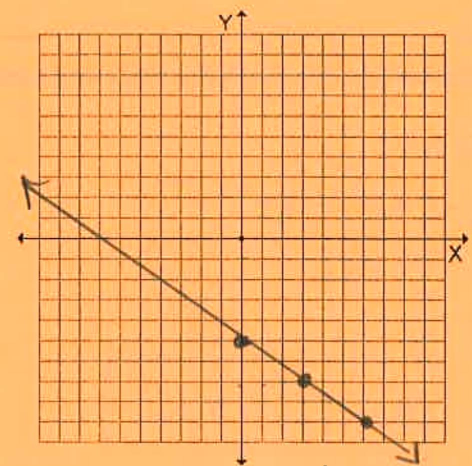
y-int: $(0,-1/3)$

Identify the slope and y-intercept of the equation, then graph the line.

4. $y = 3x + 7$ *Slope:* 3 *y-int:* $(0,7)$

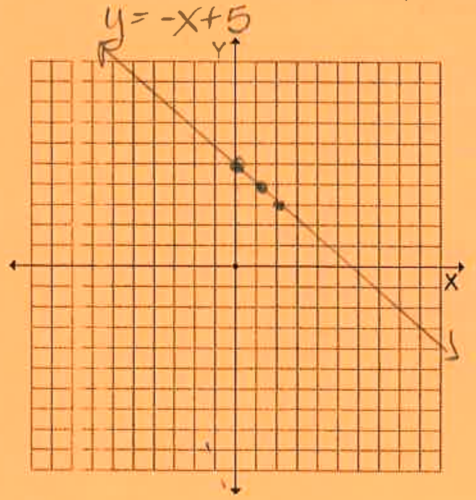


5. $y = -\frac{2}{3}x - 5$ *Slope:* $-2/3$ *y-int:* $(0,-5)$



6. $x + y = 5$ *Slope:* -1 *y-int:* $(0,5)$

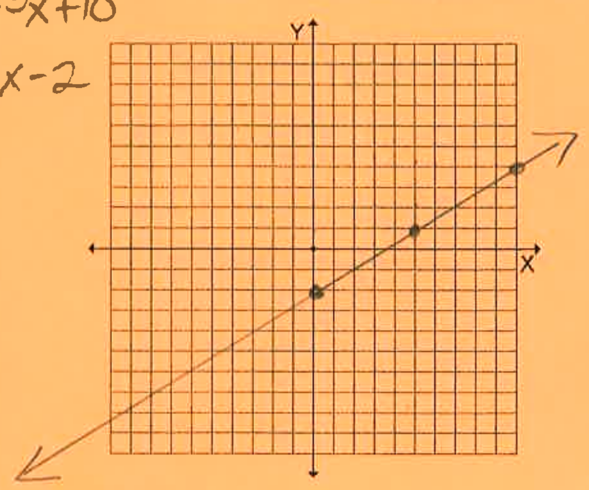
$y = -x + 5$



7. $3x - 5y = 10$ *Slope:* $3/5$ *y-int:* $(0,-2)$

$-5y = -3x + 10$

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



Given a Point and Slope

OBJECTIVE: I CAN . . . Write an equation in slope intercept form given the slope and a point on the line.

Write the equation of the line in slope-intercept form given the information below.

1. Slope: $\frac{3}{4}$; y-Intercept: (0, -4)

$\boxed{y = 3/4x - 4}$

2. m = 4 and b: (0, -3)

$\boxed{y = 4x - 3}$

3. Write an equation of a line with an x-coefficient of -3 and a y-intercept of 7.

$\boxed{y = 3x + 7}$

4. Write an equation with a slope of 2 and a constant of -5.

$\boxed{y = 2x - 5}$

Writing an equation given the SLOPE and a POINT:

1. Write **y = mx + b**
2. Substitute in the slope (**m**) and the point (**x, y**)
3. Solve for the y-intercept (**b**)
4. Substitute only the slope (**m**) and the y-intercept (**b**) into slope-int form: **y = mx +b**

Write an equation of a line given the slope and a point:

5. (2,2), m = -5

$2 = -5(2) + b$
$2 = -10 + b$
$12 = b$
$\boxed{y = -5x + 12}$

6. (8,1), m = 3

$1 = 3(8) + b$
$1 = 24 + b$
$-23 = b$
$\boxed{y = 3x - 23}$

7. (-3,7), m = 1/3

$7 = 1/3(-3) + b$
$7 = -1 + b$
$8 = b$
$\boxed{y = 1/3x + 8}$

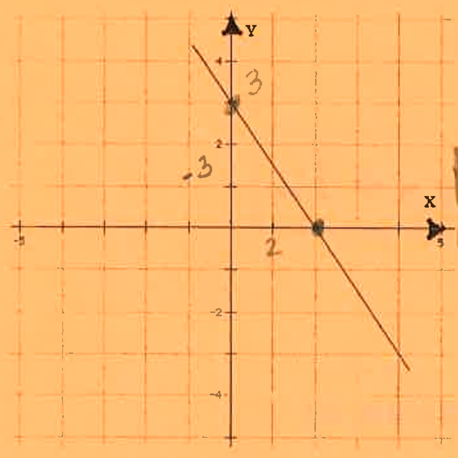
8. (10,4), m = -½

$4 = -1/2(10) + b$
$4 = -5 + b$
$9 = b$
$\boxed{y = -1/2x + 9}$

Writing an equation from a GRAPH given the y-intercept:

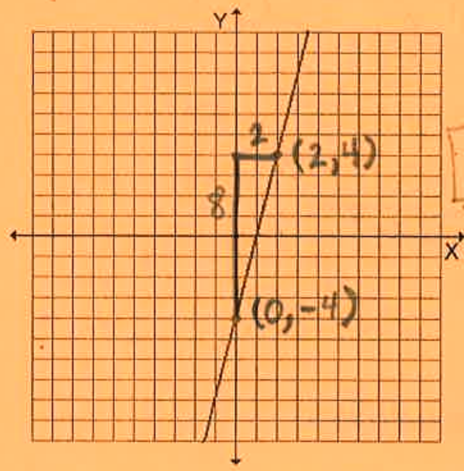
1. **y-intercept (b) :** Where does the line cross the y-axis?
2. **Slope (m) : Use** $m = \dfrac{rise}{run}$
3. Substitute only **(*m*)** and **(*b*)** into slope-intercept form: **y = mx + b**

9.



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

10.



$y = 4x - 4$

Writing an Equation Given 2 Points

OBJECTIVE: I CAN . . . Write an equation in slope intercept form given two points on the line.

Steps to writing the equation given TWO POINTS: (x_1, y_1) *and* (x_2, y_2)

1. Find the slope: $m = \dfrac{y_1 - y_2}{x_1 - x_2}$
2. Substitute the slope (*m*) and one point **(x, y)** into slope-intercept form: **y = mx + b**
3. Solve for the y-intercept **(b)**
4. Substitute only the slope (**m**) and the y-intercept (**b**) into slope-intercept form: **y = mx + b**

Write the equation of the line given the two points.

1. (-5, 7) and (2, -7)

$\frac{\Delta y}{\Delta x}$ $\frac{7 - -7}{-5 - 2} = \frac{14}{-7} = -2$ m

$7 = -2(-5) + b$

$7 = 10 + b$

$-3 = b$

$\boxed{y = -2x - 3}$

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

$\frac{\Delta y}{\Delta x}$ $\frac{0 - 6}{2 - -2} = \frac{-6}{4} = -\frac{3}{2}$ m

$0 = -\frac{3}{2}(2) + b$

$0 = -3 + b$

$3 = b$

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

3. (2, -3) and (-3, 7)

$\frac{\Delta y}{\Delta x}$ $\frac{-3-7}{2--3} = \frac{-10}{5} = -2$ m

$-3 = -2(2) + b$

$-3 = -4 + b$

$1 = b$

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

4. (1, 1) and (7, 4)

$\frac{\Delta y}{\Delta x}$ $\frac{1-4}{1-7} = \frac{-3}{-6} = \frac{1}{2}$

$1 = \frac{1}{2}(1) + b$

$1 = \frac{1}{2} + b$

$\frac{1}{2} = b$

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

5. (-10, 4) and (2,4)

$\frac{\Delta y}{\Delta x}$ $\frac{4-4}{-10-2} = \frac{\emptyset}{-12} = \emptyset$

$4 = \emptyset(-10) + b$

$4 = \emptyset + b$

$4 = b$

$\boxed{y = 4}$

5. (-8, 9) and (4, 10)

$\frac{\Delta y}{\Delta x}$ $\frac{9-10}{-8-4} = \frac{-1}{-12} = \frac{1}{12}$

$9 = \frac{1}{12}(-8) + b$

$9 = -\frac{2}{3} + b$

$9\frac{2}{3} = b$

$\boxed{y = \frac{1}{12}x + 9\frac{2}{3}}$

Determining Linear Relationships:

OBJECTIVE: I CAN . . . Determine whether or not enough information is provided in order to create a linear model.

1. Does the following table demonstrate a linear relationship? If it is linear, explain how you know and write the rule for the table. If it's not linear, explain how you know and provide an example of a table that does show a linear relationship.

x	-2	-1	2	3
y	-7	-4	5	8

+1 +3 +1

+3 +9 +3

yes it is linear because every time the x increases by 1 the y adds 3.

$8 = 3(3) + b$

$8 = 9 + b$

$-1 = b$

$\boxed{y = 3x - 1}$

2. Determine which of the following sequences represent an arithmetic sequence. If the sequence is arithmetic, write a model to represent t(n).

0 1 2 3

a. 8 3, -2, -7, ...

-5 -5

Arithmetic

$t(n) = -5n + 8$

b. 35, 70, 140, ...

x2 x2

Geometric

$t(n) = 17.5(2^n)$

0 1 2 3

48 c. 18, -12, -42, ...

-30 -30

Arithmetic

$t(n) = -30n + 48$

3. Determine whether or not the information provided is enough to determine one line, and then either find the equation of the line OR explain what you would need in order to find one specific equation.

a. Line A goes through the point (2,5).

Need another point or the slope.

b. Line B goes through the points (-3,-2) and (3,10).

$\frac{\Delta y}{\Delta x} = \frac{-2-10}{-3-3} = \frac{-12}{-6} = 2$

$10 = 3(2)+b$

$10 = 6+b$

$4 = b$

$\boxed{y=2x+4}$

c. Line C has slope of -3 and goes through the origin.

$\boxed{y=-3x}$

d. Line F grows by 4.

Need a point the line goes through.

Linear Word Problems

OBJECTIVE: I CAN ... Define variables, determine a linear model, describe all components of the model and what they mean, and then use the model to predict values.

1. A company finds that it can produce 10 solar heaters for $7500 while the production of 20 heaters costs $13,900.

a. If cost is a linear function of the number of heaters produced, find an equation that models the sales for this company. (10, 7500) (20, 13900)

$\frac{7500-13900}{10-20} = \frac{-6400}{-10} = 640$

$7500 = 640(10)+b$

$7500 = 6400+b$

$1100 = b$

$\boxed{y=640x+1100}$

b. In a full sentence or two, explain what the slope and y-intercept values represent in the context of the problem.

As you increases Sales of heaters by 1, the production cost increases by $640.
At zero heaters sold, the cost is $1,100

2. A small college had 2546 students in 1994 and 2702 students in 1996.

a. Find the rate of change for this situation and describe what it means in the context of the situation.

$\frac{2546-2702}{1994-1996} = \frac{-156}{-2} = 78$ Every 1 year the college increases its student enrollment by 78 students.

b. If student population models linear growth over time, how many students will the college have in 2003?

$2546 = 78(1994)+b$

$2546 = 155532+b$

$-152986 = b$

$y = 78x - 152,986$

$y = 78(2003) - 152986$

$y = 3248$

$\boxed{3,248 \text{ Students}}$

3. Speedy printing charges $23 for 200 deluxe business cards and $35 for 500 deluxe business cards. Assume that the cost is a linear function of the number of cards printed.

a. Create a table of values for which x is the number of business cards (increase by 100 each time) and y is the cost of the business cards.

	X	0	100	200	300	400	500
$	y	15	19	23	27	31	35

+4

b. What is the value of the y-intercept in this table and what does it represent?

$b = 15$

it cost $15 for zero cards

c. Write the linear equation for the cost per number of cards printed.

$y = \frac{4}{100}x + 15$

d. Using the function from part (c), determine the cost for printing 700 cards.

$y = \frac{4}{100}(700) + 15$

$y = \$43$

4. A 100-gallon tank was initially full of water and is now being drained at a rate of 5 gallons per minute.

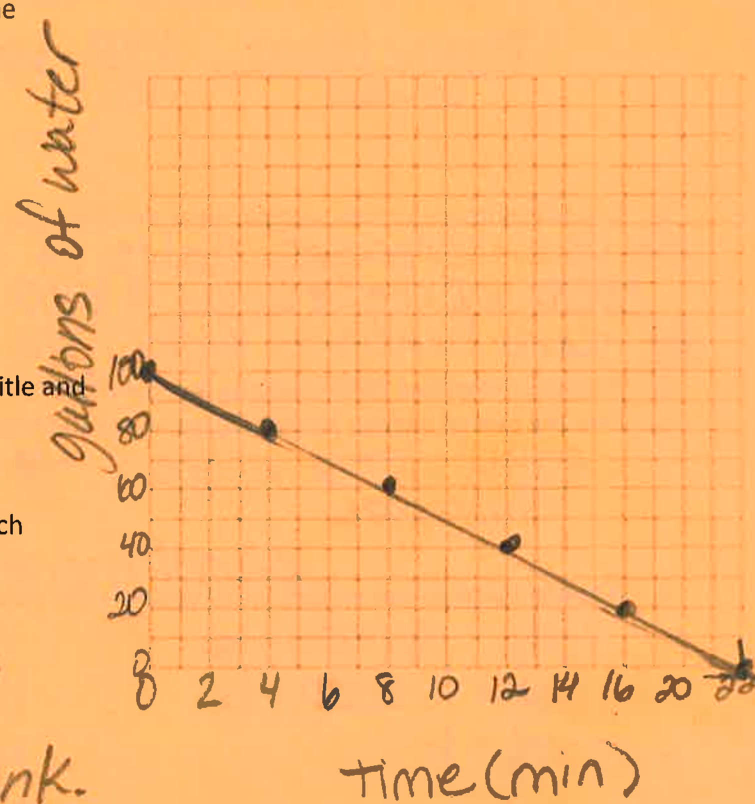
e. Write an equation for a linear function that models the number of gallons in the tank after x minutes.

$y = -5x + 100$

f. How much water is in the tank after 4 minutes?

80gallons

g. Graph the equation on the graph below, providing a title and labeling each axis (you will draw in the x- and y-axis).



h. Identify the x- and y-intercepts and interpret what each represents in the context of the problem.

y-int. at zero amount of time, there was 100 gallons

x-int. at 22 min. there was no more water in the tank.