FM Algebra | Name: Key

Chapter 5 Mid-chapter Review | Date: ______________ Pd: ____

Section 5.1 Equations of Lines Using Slope-Intercept Form

To use Slope-Intercept Form of a line, you must first solve the equation for y.

$$y = mx + b$$

m is the slope of the line and b is the y-coordinate of the y-intercept

For #1-2, identify the slope and the y-intercept.

1. $2x - 3y = 9$

$-3y = -2x + 9$

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

$\boxed{m = \frac{2}{3} \quad y\text{-int: } (0,-3)}$

2. $-8x + 4y = 16$

$4y = 8x + 16$

$y = 2x + 4$

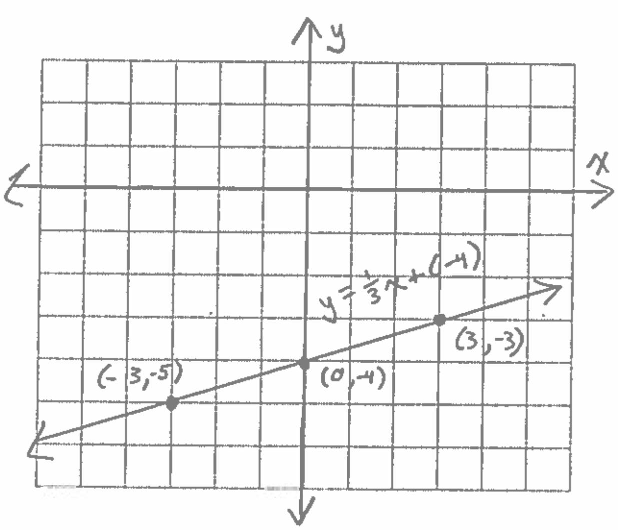
$\boxed{m = 2 \quad y\text{-int: } (0,4)}$

For #3-4 write the equation of the line in slope-intercept form. Then sketch the graph of the line labeling two points and writing the equation on the graph.

3. The slope is $\frac{1}{3}$.

The y-intercept is (0, -4).

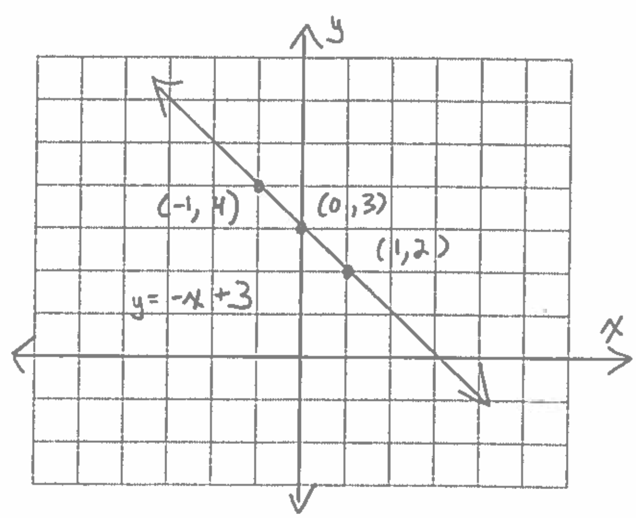
$\boxed{y = \frac{1}{3}x + (-4)}$



4. The slope is -1

The y-intercept is (0, 3).

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



5. The Tri-State car rental agency charges a flat fee of \$25 plus \$0.17 per mile to rent a subcompact car on weekends. Write a linear model for the cost in terms of the number of miles driven. Identify the meaning of the slope and the y-intercept in this problem.

T = # of \$ (Total cost)

m = # of miles driven

(m, T)

$m = \frac{\Delta T}{\Delta m} = \$.17$ per mile

$(0, 25)$ It costs \$25 to rent the car and drive 0 miles.

$\boxed{T = .17m + 25}$ where T is the total cost of renting a car and driving m miles.

Section 5.2 Equations of Lines Given the Slope and a Point

Since you need both the slope and the y-coordinate of the y-intercept to write the equation, substitute the information you are given into $y = mx + b$ and solve for b.

Example: Write the equation of the line that passes through the point (-4, 1) with a slope of 3 in slope-intercept form.

First, find the y-coordinate of the y-intercept.

Substitute 3 for m, -4 for x, and 1 for y.

$$y = mx + b$$
$$1 = 3(-4) + b$$
$$1 = -12 + b$$
$$13 = b$$

Since the slope was given to you as 3 and the y-coordinate of the y-intercept was found to be 13, write the equation of the line.

Solution: $y = 3x + 13$

For #6-7, write the equation of the line that has the given slope and passes through the point in slope-intercept form. Show all work!

6. (-7, 5), $m = -1$

$y = mx + b$

$5 = (-1)(-7) + b$

$5 = 7 + b$

$b = -2$

$\boxed{y = -x + (-2)}$

7. (3, -6), $m = 4$

$y = mx + b$

$-6 = 4(3) + b$

$-6 = 12 + b$

$b = -18$

$\boxed{y = 4x + (-18)}$

For #8-9, write the equation of the line that has the given slope and passes through the point in slope-intercept form. Then sketch the graph of the line labeling two points and writing the equation on the graph.

8. (-1, -1), $m = 1$

$y = mx + b$

$-1 = 1(-1) + b$

$-1 = -1 + b$

$b = 0$ $\boxed{y = x}$

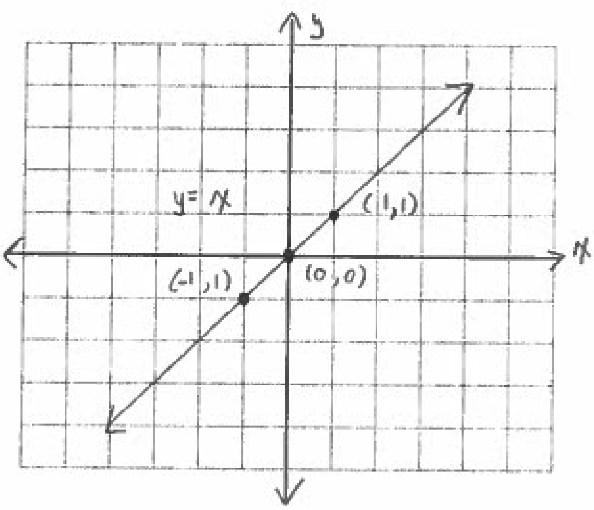
9. (-4, 0), $m = \frac{1}{2}$

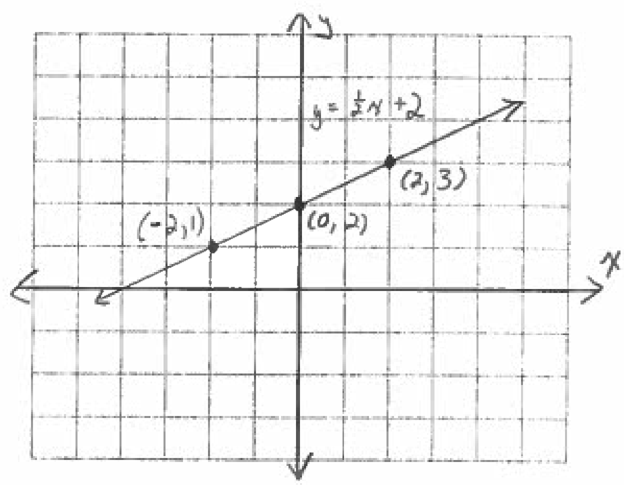
$y = mx + b$

$0 = \frac{1}{2}(-4) + b$

$0 = -2 + b$

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





10. After 10 days of a fitness program, Stan can do 39 push-ups. He has been increasing the number of push-ups he does by 2 per day. Write an equation in slope- intercept form that gives the number of push-ups, *p*, in terms of the number of days, *d*, that Stan should be able to do if he stays on the program. Identify the point and the slope that is given to you in the problem! Show all work!

d = # of days

p = # of push-ups

(d, p)

$m = \frac{\Delta P}{\Delta d}$ = 2 push-ups per day (10, 39)

$y = mx + b$

$39 = 2(10) + b$

$39 = 20 + b$

$b = 19$

P = 2d + 19 where P is the number of push-ups Stan can do d days into his fitness program.

Section 5.3 Equations of Lines Given Two Points

Since you need both the slope and the y-coordinate of the y-intercept to write the equation, first use the two points to find the slope of the line and then substitute into $y = mx + b$ and solve for b.

Example: Write the equation of the line passing through both (-2, 1) and (-4, -3) in slope-intercept form.

First find the slope. $m = \frac{\Delta y}{\Delta x} = \frac{-3-1}{-4-(-2)} = \frac{-4}{-2} = 2$

Now choose one of the two points and solve for b.

Substitute 2 for m, -2 for x, and 1 for y.

$$y = mx + b$$
$$1 = 2(-2) + b$$
$$1 = -4 + b$$
$$5 = b$$

We found that the slope was 2 and the y-coordinate of the y-intercept was 5.

Solution: $y = 2x + 5$

For #11-14, write the slope-intercept form of the equation of the line that passes through the two points. Show all work.

11. (-1, -2) and (2, 1)

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

$m = 1$

② $y = mx + b$

$1 = 1(2) + b$

$1 = 2 + b$

$b = -1$

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

12. (2, 5) and (-1, 5)

① $m = \frac{\Delta y}{\Delta x} = \frac{5-5}{2-(-1)} = \frac{0}{3}$

$m = 0$ horizontal line

$\boxed{y = 5}$

13. (-4, 0) and (-1, -1)

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

$m = -\frac{1}{3}$

② $y = mx + b$

$0 = -\frac{1}{3}(-4) + b$

$0 = \frac{4}{3} + b$

$b = -\frac{4}{3}$

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

14. (1, 2) and (-1, 6)

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

$m = -2$

② $y = mx + b$

$2 = -2(1) + b$

$2 = -2 + b$

$b = 4$

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

15. A newsstand near a lake started carrying the magazine "Fishing Today" in 1995. In 2000, the newsstand sold 325 copies. By 2006, the newsstand sold 535 copies. Assume that the number of copies sold increased at the same rate since the newsstand started carrying the magazine. Write an equation that gives the number of copies sold, *c*, in terms of the number of years, *n*. Let $n = 0$ correspond to 1995. Identify the two points that are given in the problem! Show all work!

n = # of years after 1995
C = # of copies sold
(n, C)

(5, 325) (11, 535)

$m = \frac{\Delta C}{\Delta n} = \frac{535-325}{11-5} = \frac{210}{6} = 35$ copies per year

$y = mx + b$
$325 = 35(5) + b$
$325 = 175 + b$
$b = 150$ [150 copies were sold in 1995]

C = 35n + 150 where C is the # of copies sold n years after 1995.

16. Using the information form #15, how many copies of "Fishing Today" can the newsstand expect to sell in 2008? Show all work and answer in a sentence.

$n = 13$

$C = 35n + 150$
$C = 35(13) + 150$
$C = 455 + 150$
$C = 605$

The newsstand might have sold 605 copies in 2008.

17. Heather's parents gave her some money to open a savings account in 1997. She has been saving the same amount of money every year and depositing it in the savings account. In 2001, she had a balance of $3000. Her balance was $5100 in 2007. Write an equation that gives Heather's savings account balance, *b*, in terms of the number of years, *n*. Let $n = 0$ correspond to 1997. Identify the two points that are given in the problem! Show all work!

B = # of $ (Account balance)
n = # of years since 1997
(n, B)

(4, 3000) (10, 5100)

$m = \frac{\Delta B}{\Delta n} = \frac{5100-3000}{10-4} = \frac{2100}{6} = \$350$ per year

$y = mx + b$
$3000 = 350(4) + b$
$3000 = 1400 + b$
$b = 1600$ [Amount when the account was opened]

B = 350n + 1600 where B is the savings account balance n years after 1997.

18. Using the information from #17, how much should Heather expect to have in her savings account when she graduates college (in 2011)? Show all work and answer in a sentence.

$n = 14$

$B = 350n + 1600$
$B = 350(14) + 1600$
$B = 4900 + 1600$
$B = 6500$

Heather would have had $6500 in her savings account in 2011.