

# Unit 4 Study Guide

Writing Equations of Lines

## Part I: Writing Equations in Slope-Intercept, Point-Slope & Standard Form

1. Given the points: (3, -7) and (-2, 8).  
 a. Write an equation in **point-slope form** of the line that passes through the given points.

$$m = \frac{8 - (-7)}{-2 - 3} = \frac{15}{-5} = -3$$

$$\boxed{\begin{array}{l} y + 7 = -3(x - 3) \\ \text{OR} \\ y - 8 = -3(x + 2) \end{array}}$$

- b. Rewrite the equation in **slope-intercept form**:      c. Now, rewrite the equation in **standard form**:

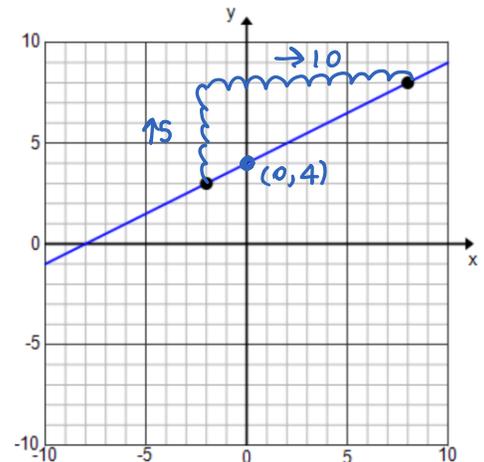
$$\begin{array}{r} y - 8 = -3x - 6 \\ +8 \qquad +8 \\ \hline \boxed{y = -3x + 2} \end{array}$$

$$\begin{array}{r} y = -3x + 2 \\ +3x \quad +3x \\ \hline \boxed{3x + y = 2} \end{array}$$

2. Write the equation of the graph to the right:

- a. In **slope-intercept form**:  $m = \frac{5}{10} = \frac{1}{2}$

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



- b. Now re-arrange into **standard form**. (*A, B, and C must be integers*)

$$\begin{array}{l} 2[y = \frac{1}{2}x + 4] \\ 2y = x + 8 \\ -x \quad -x \\ \hline \boxed{-x + 2y = 8} \end{array}$$

3. Rewrite the equation of the line  $y - 2 = \frac{2}{5}(x - 5)$  in **standard form**. (*A, B, and C must be integers*)

$$\begin{array}{l} 5y - 10 = 2(x - 5) \\ 5y - 10 = 2x - 10 \\ -2x \quad +10 \quad -2x \quad +10 \\ \hline \boxed{-2x + 5y = 0} \end{array}$$

4. Write the equation of the line that passes through the points (3, 5) and (-4, 9) in **standard form**. (*A, B, and C must be integers*)

$$m = \frac{9 - 5}{-4 - 3} = \frac{4}{-7}$$

$$\begin{array}{l} 7[y - 5 = -\frac{4}{7}(x - 3)] \\ 7y - 35 = -4(x - 3) \\ 7y - 35 = -4x + 12 \\ +4x \quad +35 \quad +4x \quad +35 \\ \hline \boxed{4x + 7y = 47} \end{array}$$

## Part II: Parallel & Perpendicular Lines

5. Write the equation of the line that is perpendicular to  $y = -\frac{1}{4}x - 2$  and passes through the point (4, 3) in **slope-intercept form**.

$$y - 3 = 4(x - 4)$$

$$y - 3 = 4x - 16$$

$$\begin{array}{r} y - 3 \\ + 3 \end{array} = \begin{array}{r} 4x - 16 \\ + 3 \end{array}$$


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$$y = 4x - 13$$

$$m = -\frac{1}{4} \Rightarrow m = 4$$

6. Write an equation of a line that is parallel to  $2x - 3y = 6$  with a y-intercept of -4 in **point-slope form**.

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

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

$$y + 4 = \frac{2}{3}(x - 0)$$

you

$$m = \frac{2}{3}, \text{ pt. @ } (0, -4)$$

7. Which of the lines below is parallel to  $4x - 2y = 7$ ?

a)  $-2x + 4y = 3$

$$\frac{4y}{4} = \frac{2x + 3}{4}$$

$$y = \frac{1}{2}x + \frac{3}{4}$$

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

b)  $2y = 4x + 7$

$$y = 2x + \frac{7}{2}$$

$$m = 2$$

c)  $y = 4x + 2$

$$m = 4$$

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

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

$$m = 2$$

## Part III: Applications

8. The leaves on your tree are falling a rate of 7 leaves per minute. You start with 50 leaves on your tree. (Hint: You are LOSING leaves...)

- a. Define your variables.

$$\uparrow$$

$$m = -7$$

$$\uparrow$$

$$b = 50$$

$x = \#$  of minutes

$y = \#$  of leaves

- b. Write an equation in **SLOPE-INTERCEPT form** that represents this situation.

$$y = -7x + 50$$

- c. When will there be no leaves left on the tree?

$$0 = -7x + 50$$

$$-50 = -7x$$

$$50/7 = x$$

$\sim 7.14$  minutes

- d. How many leaves are left on the tree after 4.5 minutes?

9. While on vacation you start keeping track of how far your family has traveled and how long it has taken. After 3 hrs you are 180 miles from home. After 7 hrs you are 420 hours from home.  $(3, 180)$   $(7, 420)$

- a. Define your variables.

$$x = \text{hours}$$

$$y = \text{miles from home}$$

- b. Write an equation in **POINT-SLOPE form** that represents this situation:

$$m = \frac{420 - 180}{7 - 3} = \frac{240}{4} = 60$$

$$y - 180 = 60(x - 3) \text{ OR } y - 420 = 60(x - 7)$$

- c. Convert your equation to **SLOPE-INTERCEPT form**:

$$\begin{array}{r} y - 180 = 60x - 180 \\ +180 \qquad \qquad +180 \\ \hline y = 60x + 0 \end{array}$$

- d. Explain the meaning of the y-intercept.

you are starting your trip at home

- e. Explain the meaning of the slope.

you are travelling 60 miles every 1 hour

- f. How many hours from home are you when you are 550 miles away?

$$550 = 60x$$

$$x = \boxed{9.16 \text{ hours}}$$

10. Mike has a total of \$35.00 in his wallet consisting of \$5 bills and \$1 bills.

- a. Define your variables.

$$x = \# \text{ of } \$5 \text{ bills}$$

$$y = \# \text{ of } \$1 \text{ bills}$$

- b. Write an equation in **STANDARD form** does he have?

$$5x + y = 35$$

- c. If he has four \$5 bills, how many singles that represents the situations:

$$\begin{array}{r} 5(4) + y = 35 \\ 20 + y = 35 \\ y = \boxed{15 - \$1 \text{ bills}} \end{array}$$

#### Part IV: Correlation and Line of Best Fit

(#11-13) Based on each scenario described below:

- Define the independent and dependent variables
- Describe the correlation
- Write a sentence describing the correlation in the context of the problem

11. The number of minutes spent in class and the number of copies handed out to each student.

- $x = \# \text{ of min}$   
 $y = \# \text{ of copies}$
- positive  $\Rightarrow \uparrow \text{min}, \uparrow \text{copies}$
- more copies are handed out as time goes up

12. Your energy level and the number of cups of coffee you drink.

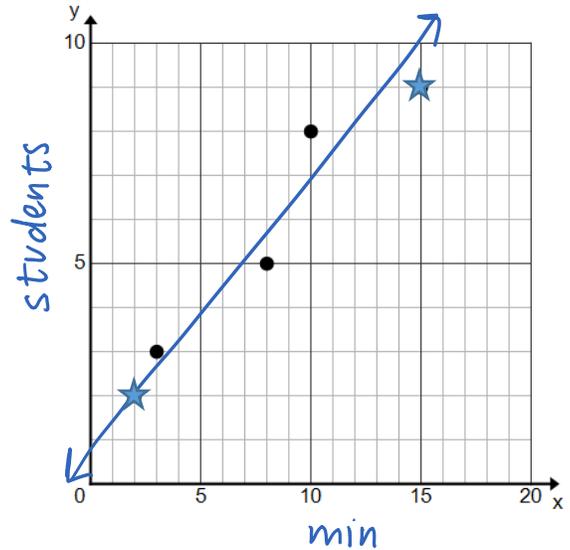
- $x = \# \text{ of cups}$   
 $y = \text{energy level}$
- positive  $\Rightarrow \uparrow \text{cups}, \uparrow \text{energy}$
- the more cups you drink, your energy level  $\uparrow$

13. The amount you eat and your hunger level.

- $x = \text{amount you eat}$   
 $y = \text{hunger level}$
- negative  $\Rightarrow \uparrow \text{eat}, \downarrow \text{hunger}$
- the more you eat, the less hungry you are

14. The data below represents the number of minutes spent in class and the number of students who ask to leave the room.

- a. What type of correlation is this? *positive*
- b. What are the independent and dependent variables?  
*x = # of min y = # of students*
- c. Label the axes and draw a line of best fit.
- d. Using the two points marked with stars on the graph to the right, write an equation of the line of best fit in slope-intercept form. *(2, 2) (15, 9)*



$$m = \frac{9-2}{15-2} = \frac{7}{13}$$

$$13 \left[ y - 2 = \frac{7}{13}(x - 2) \right]$$

$$13y - 26 = 7(x - 2)$$

$$13y - 26 = 7x - 14$$

$$\begin{array}{r} 13y - 26 = 7x - 14 \\ +26 \qquad \qquad +26 \\ \hline 13y = 7x + 12 \end{array} \Rightarrow y = \frac{7}{13}x + \frac{12}{13}$$

e. Use your calculator to calculate the line of best fit. Record it here.

$$y = .55x + 1.18$$

For problems f-i use your equation from part e.

f. What is the meaning of your y-intercept?

*1.18 students have asked to leave class before it started*

g. What does the slope represent?

*every 1 minute, ~.55 students ask to leave the room*

h. How many students will leave the room 12 minutes into the class period?

$$y = .55(12) + 1.18$$

$$\boxed{7.78 \text{ students}}$$

i. How many minutes are spent in the class period if 7 students have left?

$$7 = .55x + 1.18$$

$$x = \boxed{10.58 \text{ min}}$$