3-7 Equations of Lines in the Coordinate Plane

Vocabulary

Review

Write T for *true* or F for *false*.

_____ **1.** An *ordered pair* describes the location of a point in a coordinate grid.

_____ **2.** An *ordered pair* can be written as (x-coordinate, y-coordinate) or (y-coordinate, x-coordinate).

_____ **3.** The *ordered pair* for the origin is (0, 0).

Vocabulary Builder

slope (noun, verb) **slohp**

Definition: The **slope** of a line m between two points (x_1, y_1) and (x_2, y_2) on a coordinate plane is the ratio of the vertical change (rise) to the horizontal change (run). $m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$

$\text{Slope} = \frac{\text{rise}}{\text{run}}$

Use Your Vocabulary

Complete each statement with the appropriate word from the list. Use each word only once.

slope sloping sloped

4. The _?_ of the hill made it difficult for bike riding. _____

5. The driveway _?_ down to the garage. _____

6. The _?_ lawn led to the river. _____

Draw a line from each word in Column A to its corresponding part of speech in Column B.

Column A	Column B
7. linear	ADJECTIVE
8. line	NOUN

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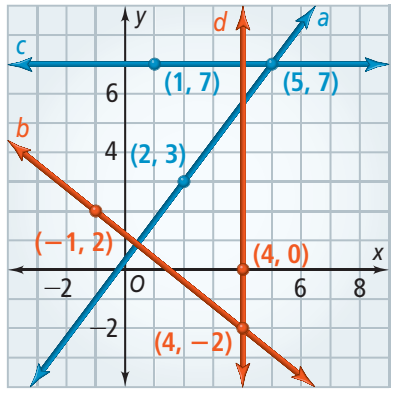
Problem 1 Finding Slopes of Lines

Got It? **Use the graph at the right. What is the slope of line *a*?**



9. Complete the table below to find the slope of line *a*.

Think	Write
I know the slope is the ratio $\frac{\text{change in } y\text{-coordinates}}{\text{change in } x\text{-coordinates}}$.	$m = \frac{y_2 - y_1}{x_2 - x_1}$
Two points on line *a* are (2, 3) and (5, 7).	$= \frac{\square - \square}{\square - \square}$
Now I can simplify.	$= \square$

take note

Key Concept Forms of Linear Equations

Definition

The **slope-intercept form** of an equation of a nonvertical line is $y = mx + b$, where m is the slope and b is the y-intercept.

The **point-slope form** of an equation of a nonvertical line is $y - y_1 = m(x - x_1)$, where m is the slope and (x_1, y_1) is a point on the line.

Symbols

$y = mx + b$
(slope, y-intercept)

$y - y_1 = m(x - x_1)$
(y-coordinate, slope, x-coordinate)

Problem 2 Graphing Lines

Got It? **Graph $y = 3x - 4$.**

10. In what form is the given equation written?

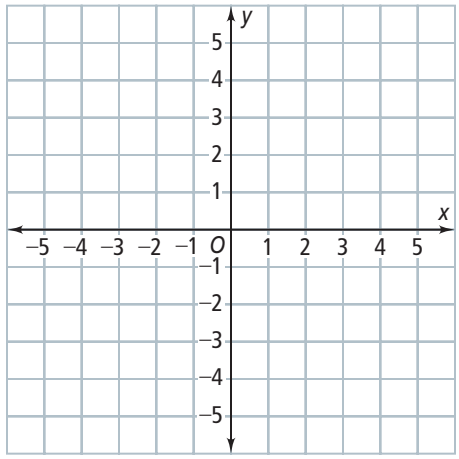
_____

11. Written as a fraction, the slope is ____.

12. One point on the graph is (____, −4).

13. From that point, move ____ unit(s) *up* and ____ unit (s) *to the right*.

14. Graph $y = 3x - 4$ on the coordinate plane.



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Problem 3 Writing Equations of Lines

Got It? What is an equation of the line with slope $-\frac{1}{2}$ and y-intercept 2?

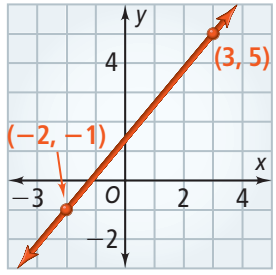
15. Complete the problem-solving model below.

Know	Need	Plan
slope m = ☐ y-intercept = ☐	Write an equation of a line.	Use ☐, the slope-intercept form of a linear equation.

16. Now write the equation.

Problem 4 Using Two Points to Write an Equation

Got It? You can use the two points given on the line at the right to show that the slope of the line is $\frac{6}{5}$. So one equation of the line is $y - 5 = \frac{6}{5}(x - 3)$. What is an equation of the line if you use $(-2, -1)$ instead of $(3, 5)$ in the point-slope form of the equation?



17. The equation is found below. Write a justification for each step.

$y - y_1 = m(x - x_1)$	Write in ☐
$y - (-1) = \frac{6}{5}(x - (-2))$	☐
$y + 1 = \frac{6}{5}(x + 2)$	☐

Got It? Use the two equations for the line shown above. Rewrite the equations in slope-intercept form and compare them. What can you conclude?

18. Write each equation in slope-intercept form.

$y - 5 = \frac{6}{5}(x - 3)$

$y + 1 = \frac{6}{5}(x + 2)$

19. Underline the correct word(s) to complete each sentence.

The equations are different / the same.

Choosing $(-2, -1)$ gives a different / the same equation as choosing $(3, 5)$.

The equations $y - 5 = \frac{6}{5}(x - 3)$ and $y + 1 = \frac{6}{5}(x + 2)$ are / are not equivalent.

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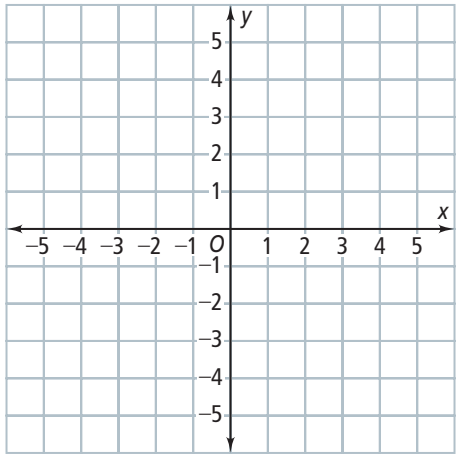
Problem 5 Writing Equations of Horizontal and Vertical Lines

Got It? **What are the equations for the horizontal and vertical lines through $(4, -3)$?**



Write T for *true* or F for *false*.

____ **20.** Every point on a horizontal line through $(4, -3)$ has y-coordinate of -3.

____ **21.** The equation of a vertical line through $(4, -3)$ is $y = -3$.

____ **22.** The equation of a vertical line through $(4, -3)$ is $x = 4$.

23. Graph the horizontal and vertical lines through $(4, -3)$ on the coordinate plane at the right.

Lesson Check • Do you UNDERSTAND?

Error Analysis **A classmate found the slope of the line passing through $(8, -2)$ and $(8, 10)$ as shown at the right. Describe your classmate's error. Then find the correct slope of the line passing through the given points.**

$$m = \frac{8 - 8}{10 - (-2)}$$
$$m = \frac{0}{12}$$
$$m = 0$$

24. What is your classmate's error?

_____

25. Find the slope, m.

26. The run is $8 - 8 =$ ____, so the slope is _____.

Math Success

Check off the vocabulary words that you understand.

☐ slope ☐ slope-intercept form ☐ point-slope form

Rate how well you can write and graph *linear equations*.

Need to review 0 2 4 6 8 10 Now I get it!

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