LESSON 4–3

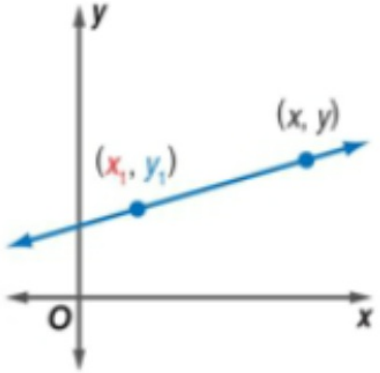
Writing Equations in Point-Slope Form

$$\frac{y - y_1}{x - x_1} = m \frac{(x - x_1)}{x - x_1}$$

KeyConcept Point-Slope Form

Words The linear equation $y - y_1 = m(x - x_1)$ is written in point-slope form, where (x_1, y_1) is a given point on a nonvertical line and m is the slope of the line.

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



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

Check Your Understanding

= Step-by-Step Solutions begin on page R13.

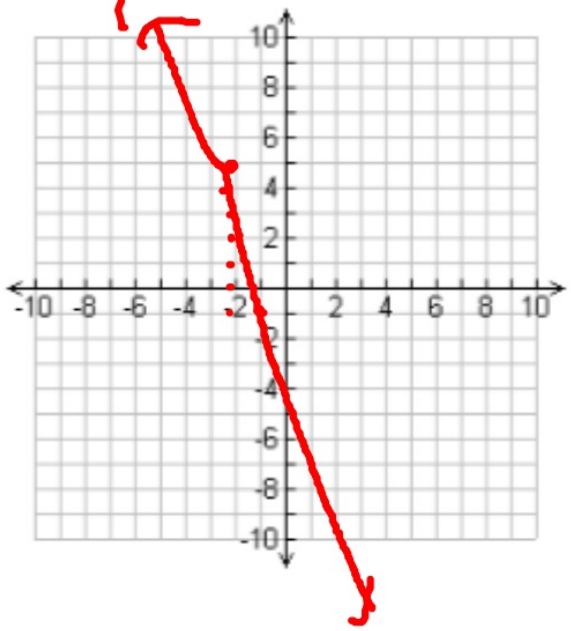
Example 1 Write an equation in point-slope form for the line that passes through the given point with the slope provided. Then graph the equation. **1–3. See Ch. 4 Answer Appendix.**

1. $(-2, 5)$, slope -6
2. $(-2, -8)$, slope $\frac{5}{6}$
3. $(4, 3)$, slope $-\frac{1}{2}$

$x_1 \; y_1$

$y - 5 = -6(x + 2)$

$-6 = \frac{-6}{1}$



Understanding = Step-by-Step So

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$y + 2 = \frac{7}{8}$

$7x - 8y =$

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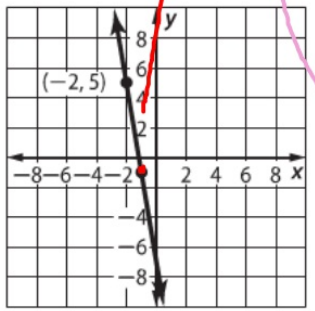
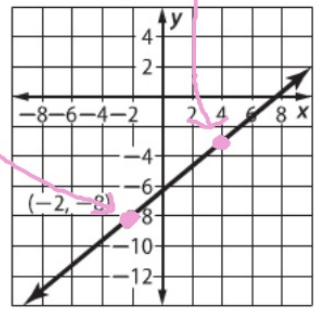
$y - 10 =$

Lesson 4-3

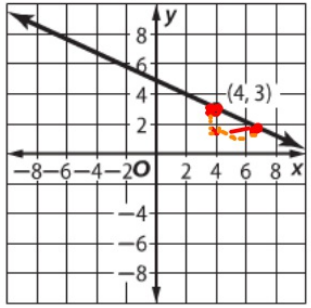
1. $y - 5 = -6(x + 2)$



2. $y + 8 = \frac{5}{6}(x + 2)$



3. $y - 3 = -\frac{1}{2}(x - 4)$



$y - (-8)$

$y + 8$

EXAMPLE 2 Writing an Equation in Standard Form

Write $y = \frac{3}{4}x - 5$ in standard form.

In standard form, the variables are on the left side of the equation. A, B, and C are all integers.

$y = \frac{3}{4}x - 5$	Original equation
$4(y) = 4\left(\frac{3}{4}x - 5\right)$	Multiply each side by 4 to eliminate the fraction.
$4y = 3x - 20$	Distributive Property

EXAMPLE 2 Writing an Equation in Standard Form

$4y - 3x = 3x - 20 - 3x$	Subtract $3x$ from each side.
$-3x + 4y = -20$	Simplify.
$3x - 4y = 20$	Multiply each side by -1.

EXAMPLE 2 Check Your Progress

Write $y - 3 = 2(x + 4)$ in standard form.

A. $-2x + y = 5$

B. $-2x + y = 11$

C. $2x - y = -11$

D. $2x + y = 11$

$y - 3 = 2x + 8$

$+3 \qquad +3$

$y = 2x + 11$

$-2x \qquad -2x$

$-(-2x + y) = -(11)$

$2x - y = -11$

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D. $2x + y = 11$

EXAMPLE 3 Writing an Equation in Slope-Intercept Form

Write $y - 5 = \frac{4}{3}(x - 3)$ in slope-intercept form.

$\frac{4}{3}(3) = 4$

$y - 5 = \frac{4}{3}(x - 3)$	Original equation
$y - 5 = \frac{4}{3}x - 4$	Distributive Property
$y - 5 + 5 = \frac{4}{3}x - 4 + 5$	Add 5 to each side.

EXAMPLE 3 Writing an Equation in Slope-Intercept Form

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

Answer: The slope-intercept form of the equation is $y = \frac{4}{3}x + 1$.

EXAMPLE 3 Check Your Progress

Write $3x + 2y = 6$ in slope-intercept form.

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

B. $y = -3x + 6$

C. $y = -3x + 3$

D. $y = 2x + 3$

EXAMPLE 3 **Check Your Progress**

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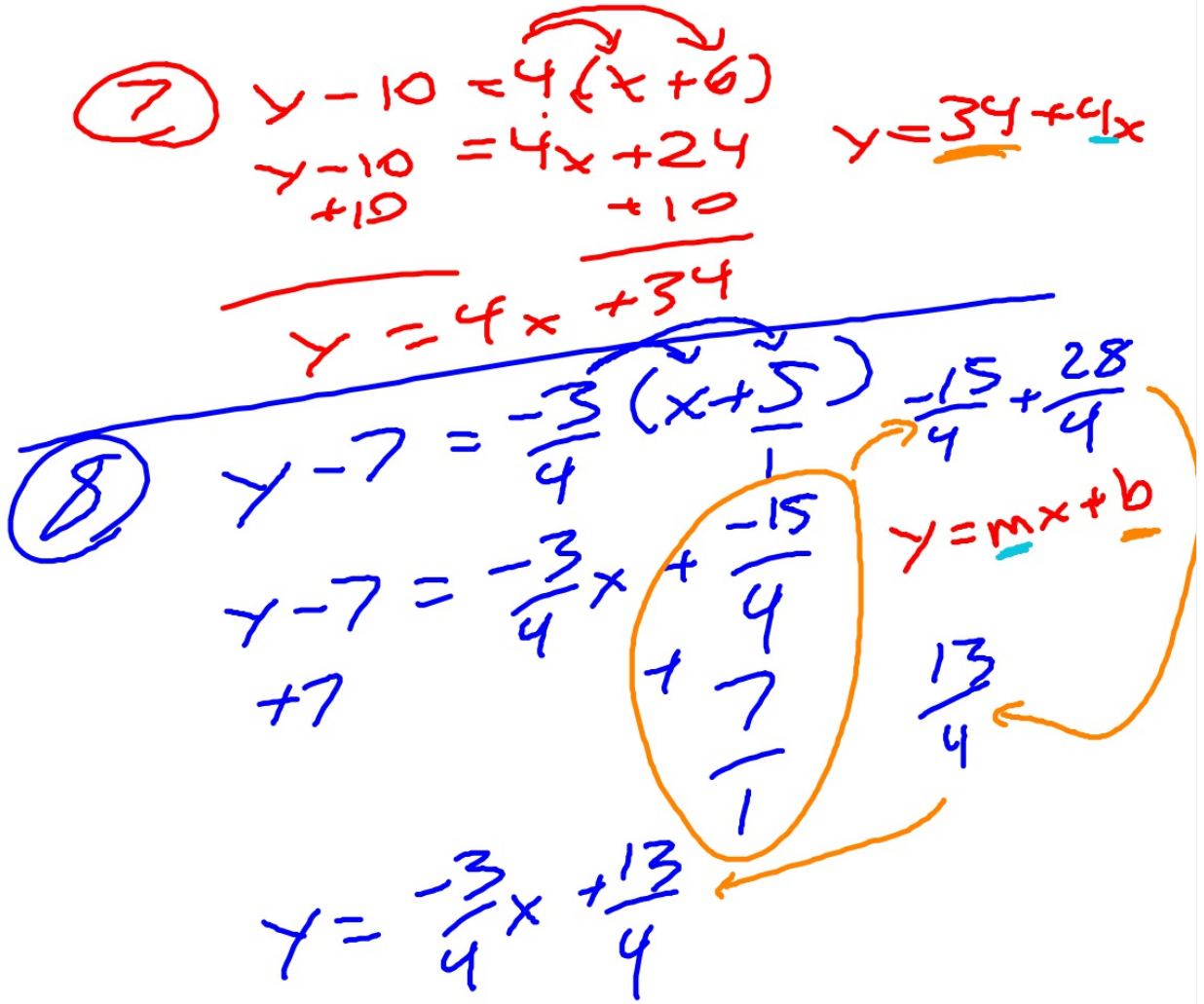
D. $y = 2x + 3$

$7x - 8y = 37$ $5x + y = -22$ $5x - 3y = -24$

Example 3 Write each equation in slope-intercept form.

7. $y - 10 = 4(x + 6)$ **8.** $y - 7 = -\frac{3}{4}(x + 5)$ **9.** $y - 9 = x + 4$ $y = x + 13$



Example 2 Write each equation in standard form.

8. $y = -\frac{3}{4}x + \frac{13}{4}$

4. $y + 2 = \frac{7}{8}(x - 3)$ $7x - 8y = 37$

5. $y + 7 = -5(x + 3)$ $5x + y = -22$

6. $y + 2 = \frac{5}{3}(x + 6)$ $5x - 3y = -24$

Example 3 Write each equation in slope-intercept form.

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9. $y - 9 = x + 4$ $y = x + 13$

(4) $8\left[\frac{7}{8}(x-3)\right]8$

$8y + 16 = 7(x - 3)$

$8y + 16 = 7x - 21$

$-16 \quad -16$

$-7x \quad -7x$

$-7x + 8y = -37$

$-1 \quad -1 \quad -1$

$7x - 8y = 37$

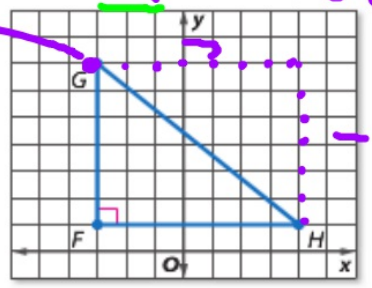
Example 4

10. GEOMETRY Use right triangle FGH.

a. Write an equation in point-slope form for the line containing $\overline{GH}$. $y - 7 = -\frac{6}{7}(x + 3)$

b. Write the standard form of the line containing $\overline{GH}$.

$6x + 7y = 31$



Practice and Problem Solving

Extra Practice is on page R4.

Example 1 **Write an equation in point-slope form for the line that passes through each point with the given slope. Then graph the equation.** 11–18. See margin.

11. $(5, 3), m = 7$

12. $(2, -1), m = -3$

13. $(-6, -3), m = -1$

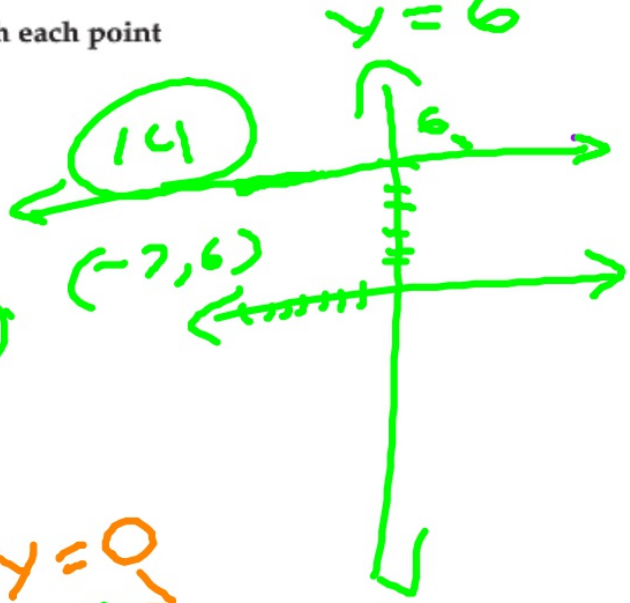
14. $(-7, 6), m = 0$

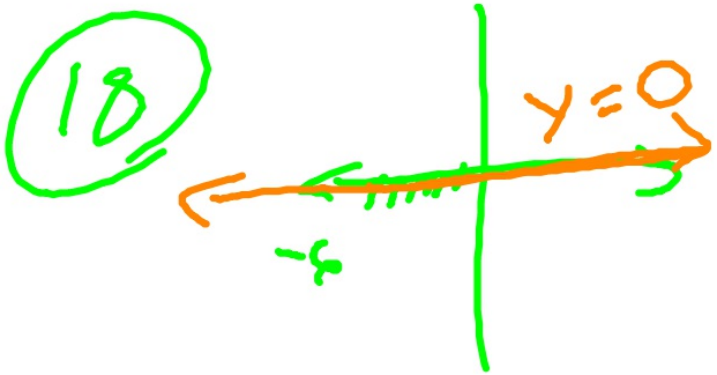
15. $(-2, 11), m = \frac{4}{3}$

16. $(-6, -8), m = -\frac{5}{8}$

17. $(-2, -9), m = -\frac{7}{5}$

18. $(-6, 0)$, horizontal line





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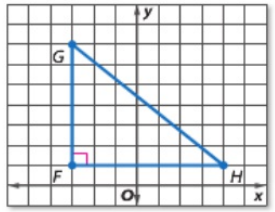

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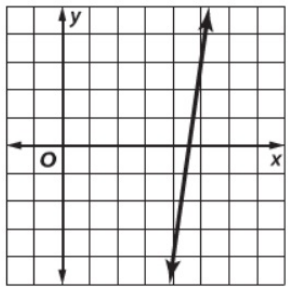

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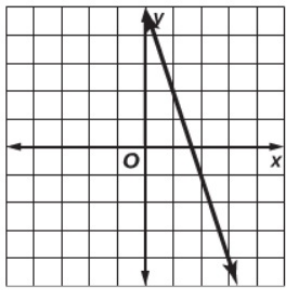

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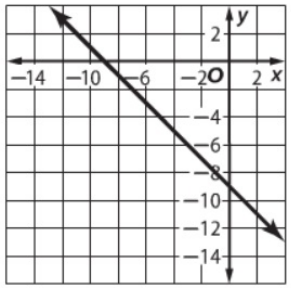

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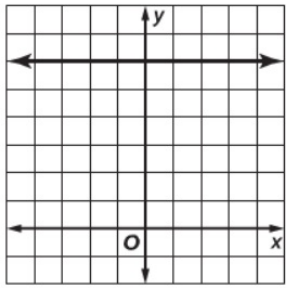

Additional Answers

11–18. See Ch. 4 Answer Appendix for graphs.

11. $y - 3 = 7(x - 5)$

12. $y + 1 = -3(x - 2)$

13. $y + 3 = -1(x + 6)$

14. $y - 6 = 0$

15. $y - 11 = \frac{4}{3}(x + 2)$

16. $y + 8 = -\frac{5}{8}(x + 6)$

17. $y + 9 = -\frac{7}{5}(x + 2)$

18. $y = 0$

Example 2 **Write each equation in standard form.**

19. $y - 10 = 2(x - 8)$ **$2x - y = 6$**

20. $y - 6 = -3(x + 2)$ **$3x + y = 0$**

21. $y - 9 = -6(x + 9)$ **$6x + y = -45$**

22. $y + 4 = \frac{2}{3}(x + 7)$ **$2x - 3y = -2$**

23. $y + 7 = \frac{9}{10}(x + 3)$ **$9x - 10y = 43$**

24. $y + 7 = -\frac{3}{2}(x + 1)$ **$3x + 2y = -17$**

25. $2y + 3 = -\frac{1}{3}(x - 2)$ **$x + 6y = -7$**

26. $4y - 5x = 3(4x - 2y + 1)$ **$17x - 10y = -3$**

Example 3 **Write each equation in slope-intercept form.** $y = mx + b$

27. $y - 6 = -2(x - 7)$ **$y = -2x + 20$**

28. $y - 11 = 3(x + 4)$ **$y = 3x + 23$**

29. $y + 5 = -6(x + 7)$ **$y = -6x - 47$**

30. $y - 1 = \frac{4}{5}(x + 5)$ **$y = \frac{4}{5}x + 5$**

31. $y + 2 = \frac{1}{6}(x - 4)$ **$y = \frac{1}{6}x - \frac{8}{3}$**

32. $y + 6 = -\frac{3}{4}(x + 8)$ **$y = -\frac{3}{4}x - 12$**

33. $y + 3 = -\frac{1}{3}(2x + 6)$ **$y = -\frac{2}{3}x - 5$**

34. $y + 4 = 3(3x + 3)$ **$y = 9x + 5$**

Example 4 **35** **MOVIE RENTALS** The number of copies of a movie rented at a video kiosk decreased at a constant rate of 5 copies per week. The 6th week after the movie was released, 4 copies were rented. How many copies were rented during the second week? **24 copies**

28) $y - 11 = 3(x + 4)$

$y - 11 = 3x + 12$

$+11 \quad +11$

$y = 3x + 23$