EXAMPLE 1 Write an Equation Given the Slope and a Point

Write an equation of a line that passes through (2, –3) with a slope of $\frac{1}{2}$.

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Write an equation of a line that passes through (2, –3) with a slope of $\frac{1}{2}$.

Step 1 Find the y-intercept by replacing m with $\frac{1}{2}$ and (x, y) with $(2, -3)$ in the slope-intercept form and solving for b.

LESSON 4–2 Writing Equations in Slope-Intercept Form

EXAMPLE 1 **Write an Equation Given the Slope and a Point**

$y = mx + b$	Slope-intercept form
$-3 = \frac{1}{2}(2) + b$	Replace m with $\frac{1}{2}$, y with -3, and x with 2.
$-3 = 1 + b$	Multiply.
$-3 - 1 = 1 + b - 1$	Subtract 1 from each side.
$-4 = b$	Simplify.

EXAMPLE 1 Write an Equation Given the Slope and a Point

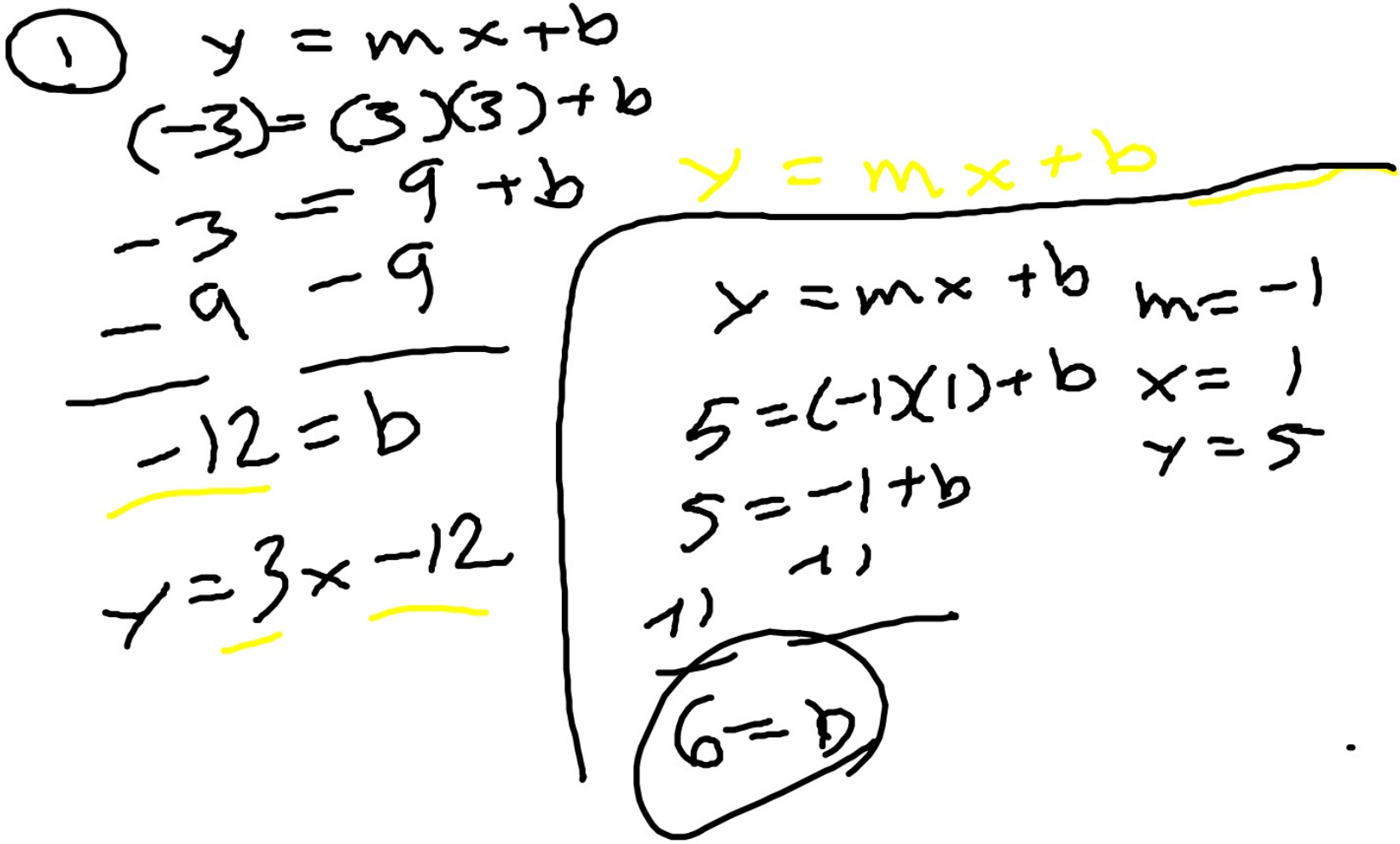
Step 2 Write the slope-intercept form using $m = \frac{1}{2}$ and $b = -4$.

$y = mx + b$ Slope-intercept form

$y = \frac{1}{2}x - 4$ Replace m with $\frac{1}{2}$ and b with -4.

Write an equation of the line that passes through the given point and has the given slope.

1. (3, −3), slope 3 $y = 3x - 12$
2. (2, 4), slope 2 $y = 2x$
3. (1, 5), slope −1 $y = -x + 6$
4. (−4, 6), slope −2 $y = -2x - 2$



Example 2 Write an equation of the line that passes through each pair of points.

5. (4, −3), (2, 3) $y = -3x + 9$ 6. (−7, −3), (−3, 5) $y = 2x + 11$

7. (−1, 3), (0, 8) $y = 5x + 8$ 8. (−2, 6), (0, 0) $y = -3x$

5

Find "m":

$$\frac{3-(-3)}{2-4} = \frac{6}{-2} = -3$$

m

$y = mx + b$

$-3 = (-3)(4) + b$

$-3 = -12 + b$

$+12 \quad +12$

$9 = b$

$y = mx + b$

$y = -3x + 9$

Examples 3, 4 **9. WHITEWATER RAFTING** Ten people from a local youth group went to Black Hills Whitewater Rafting Tour Company for a one-day rafting trip. The group paid $425.

a. Write an equation in slope-intercept form to find the total cost C for p people. $C = 35p + 75$

b. How much would it cost for 15 people? $600

m = 35, given a point (10, 425)

Example 1 **Write an equation of the line that passes through the given point and has the given slope.**

10. (3, 1), slope 2 $y = 2x - 5$

11 (−1, 4), slope −1 $y = -x + 3$

12. (1, 0), slope 1 $y = x - 1$

13. (7, 1), slope 8 $y = 8x - 55$

14. (2, 5), slope −2 $y = -2x + 9$

15. (2, 6), slope 2 $y = 2x + 2$

Example 2 **Write an equation of the line that passes through each pair of points.**

16. (9, −2), (4, 3) $y = -x + 7$

17. (−2, 5), (5, −2) $y = -x + 3$

18. (−5, 3), (0, −7) $y = -2x - 7$

19. (3, 5), (2, −2) $y = 7x - 16$

20. (−1, −3), (−2, 3) $y = -6x - 9$

21. (−2, −4), (2, 4) $y = 2x$

Examples 3, 4 **22.** CCSS **MODELING** Greg is driving a remote control car at a constant speed. He starts the timer when the car is 5 feet away. After 2 seconds the car is 35 feet away.

a. Write a linear equation to find the distance d of the car from Greg. $d = 15t + 5$

b. Estimate the distance the car has traveled after 10 seconds. 155 ft

23. **ZOOS** Refer to the beginning of the lesson.

a. Write a linear equation to find the attendance (in millions) y after x years. Let x be the number of years since 2000. $y = 0.2x + 0.4$

b. Estimate the zoo's attendance in 2020. 4.4 million

24. **BOOKS** In 1904, a dictionary cost 30¢. Since then the cost of a dictionary has risen an average of 6¢ per year.

a. Write a linear equation to find the cost C of a dictionary y years after 1904. $C = 30 + 6y$

b. If this trend continues, what will the cost of a dictionary be in 2020? $7.26

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

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

Write an equation of the line that passes through the given point and has the given slope.

1. (3, −3), slope 3 $y = 3x - 12$
2. (2, 4), slope 2 $y = 2x$
3. (1, 5), slope −1 $y = -x + 6$
4. (−4, 6), slope −2 $y = -2x - 2$

Write an equation of the line that passes through each pair of points.

5. (4, −3), (2, 3) $y = -3x + 9$
6. (−7, −3), (−3, 5) $y = 2x + 11$
7. (−1, 3), (0, 8) $y = 5x + 8$
8. (−2, 6), (0, 0) $y = -3x$

4 9. **WHITEWATER RAFTING** Ten people from a local youth group went to Black Hills Whitewater Rafting Tour Company for a one-day rafting trip. The group paid $425.

a. Write an equation in slope-intercept form to find the total cost C for p people. $C = 35p + 75$

b. How much would it cost for 15 people? $600

EXAMPLE 1 Check Your Progress

x y

Write an equation of a line that passes through (1, 4) and has a slope of –3.

m

A. $y = -3x + 4$

B. $y = -3x + 1$

C. $y = -3x + 13$

D. $y = -3x + 7$

$y = mx + b$

$4 = (-3)(1) + b$

$4 = -3 + b$

$+3 \quad +3$

$7 = b$

$y = mx + b$

$y = -3x + 7$

EXAMPLE 1 Check Your Progress

Write an equation of a line that passes through (1, 4) and has a slope of –3.

A. $y = -3x + 4$

B. $y = -3x + 1$

C. $y = -3x + 13$

D. $y = -3x + 7$

EXAMPLE 2 Write an Equation Given Two Points

A. Write the equation of the line that passes through (–3, –4) and (–2, –8).

Step 1 Find the slope of the line containing the points.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$ Slope formula

$$m = \frac{-8 - (-4)}{-2 - (-3)}$$ Let $(x_1, y_1) = (-3, -4)$ and $(x_2, y_2) = (-2, -8)$.

$$m = \frac{-4}{1} \text{ or } -4$$ Simplify.

EXAMPLE 2 Write an Equation Given Two Points

Step 2 Use the slope and one of the two points to find the *y*-intercept. In this case, we chose (–3, –4).

$y = mx + b$	Slope-intercept form
$-4 = -4(-3) + b$	Replace m with –4, x with –3, and y with –4.
$-4 = 12 + b$	Multiply.
$-4 - 12 = 12 + b - 12$	Subtract 12 from each side.
$-16 = b$	Simplify.

EXAMPLE 2 Write an Equation Given Two Points

Step 3 Write the slope-intercept form using $m = -4$ and $b = -16$.

$y = mx + b$	Slope-intercept form
$y = -4x - 16$	Replace m with -4 and b with -16.

EXAMPLE 2 Write an Equation Given Two Points

B. Write the equation of the line that passes through (6, –2) and (3, 4).

Step 1 Find the slope of the line containing the points.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$ Slope formula

$$= \frac{4 - (-2)}{3 - 6}$$ Let $(x_1, y_1) = (6, -2)$ and $(x_2, y_2) = (3, 4)$.

$$= \frac{6}{-3} \text{ or } -2$$ Simplify.

EXAMPLE 2 Write an Equation Given Two Points

$y = -2x + 10$

Step 2 Use the slope and either of the two points to find the *y*-intercept.

$y = mx + b$	Slope-intercept form
$4 = -2(3) + b$	Replace m with –2, x with 3, and y with 4.
$4 = -6 + b$	Simplify.
$4 + 6 = -6 + b + 6$	Add 6 to both sides.
$10 = b$	Simplify.

EXAMPLE 2 Check Your Progress

A. The table of ordered pairs shows the coordinates of two points on the graph of a line. Which equation describes the line?

x	y
−1	3
2	6

A. $y = -x + 4$

B. $y = x + 4$

C. $y = x - 4$

D. $y = -x - 4$

EXAMPLE 2 Check Your Progress

A. The table of ordered pairs shows the coordinates of two points on the graph of a line. Which equation describes the line?

x	y
−1	3
2	6

A. $y = -x + 4$

B. $y = x + 4$

C. $y = x - 4$

D. $y = -x - 4$

Real-World Example 3 Use Slope-Intercept Form

ECONOMY During one year, Malik's cost for self-serve regular gasoline was $3.20 on the first of June and $3.42 on the first of July. Write a linear equation to predict Malik's cost of gasoline the first of any month during the year, using 1 to represent January.

Understand You know the cost in June is $3.20. You know the cost in July is $3.42.

Plan Let x represent the month. Let y represent the cost. Write an equation of the line that passes through (6, 3.20) and (7, 3.42).

Real-World Example 3 Use Slope-Intercept Form

Solve Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$ Slope formula

$$m = \frac{3.42 - 3.20}{7 - 6}$$ Let $(x_1, y_1) = (6, 3.20)$ and $(x_2, y_2) = (7, 3.42)$.

$$m = 0.22$$ Simplify.

Real-World Example 3 Use Slope-Intercept Form

Choose (6, 3.40) and find the *y*-intercept of the line.

$y = mx + b$	Slope-intercept form
$3.20 = 0.22(6) + b$	Replace m with 0.22, x with 6, and y with 3.20.
$1.88 = b$	Simplify.

Write the slope-intercept form using $m = 0.22$ and $b = 1.88$.

$y = mx + b$	Slope-intercept form
$y = 0.22x + 1.88$	Replace m with 0.22 and b with 1.88.

Tools Help

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$y = -3x$

Check Your Understanding

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

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x y
(−2, 6)
(0, 0)

Guide's FEE

8

$x_1 y_1 \; x_2 y_2$

$m = \frac{0-6}{0-(-2)} = \frac{-6}{2} = -3$

$m = -3$

$y = mx + b$

$6 = (-3)(-2) + b$

$6 = 6 + b$

$-6 \quad -6$

$b = 0$

b. How much would it cost for 15 people? $600

Practice and Problem Solving

Extra Practice is on page R4.

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