LESSON 4.2 – THE EQUATION OF A LINE

OVERVIEW

Here's what you'll learn in this lesson:

Finding the Equation I

a. Finding the equation of a line given a point on the line and the slope of the line

b. The point-slope form of the equation of a line

c. Finding the equation of a line given two points on the line

Finding the Equation II

a. The slope-intercept form of the equation of a line

b. Finding the equation of a horizontal line

c. Finding the equation of a vertical line

Suppose a chemistry student needs to measure the temperatures of a chemical reaction at different times during an experiment and record her results. Or, suppose that a family wants to figure out the amount of time it will take them to drive from their home to the Grand Canyon.

To help them better understand the relationships between time and temperature or between time and distance, these people might plot their data as points on an *xy*-plane. When graphed, such data may describe a line.

In this lesson you will learn how to find the equation of a line when you are given a point and the slope of a line, or when you are given two points on a line. You will also learn how to find the equations of vertical and horizontal lines.

EXPLAIN

FINDING THE EQUATION I

Summary

There are many ways to write the equation of a line; depending on the information you have, one form of the equation may be easier to write than another.

Point-Slope Form for the Equation of a Line

When you are given a point on a line and the slope of the line, you can use this information to write the equation of the line in point-slope form.

To find the point-slope form for the equation of the line through (x_1, y_1) with slope m:

1. Pick a general point on the line. Call it (x, y).
2. Substitute the slope and both points into the definition of slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$
3. Simplify the equation by multiplying both sides by the denominator, $(x - x_1)$.
4. Rewrite the equation as $(y - y_1) = m(x - x_1)$.

After you substitute both points into the definition of slope, you get the equation $m = \frac{y - y_1}{x - x_1}$.

Notice that it's easy to see the point and the slope when the equation is in point-slope form.

For example, to find the equation of the line through the point (2, 3) with slope 4:

1. Pick a general point on the line, (x, y).
2. Substitute the slope $m = 4$, the point (x, y), and the point (2, 3) into the definition of slope. $\frac{y-3}{x-2} = 4$
3. Multiply both sides by $(x - 2)$. $(x-2) \cdot \frac{y-3}{x-2} = (x-2) \cdot 4$
4. Rewrite the equation. $y - 3 = 4(x - 2)$

In general, the equation of a line in point-slope form is:

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

where (x_1, y_1) is a point on the line and m is the slope of the line.

You can also find the equation of a line in point-slope form if you only know the coordinates of two points that lie on the line. To do this:

1. Find the slope of the line by substituting the two points into the definition of slope.
2. Use either of the points and the slope of the line to write the equation in point-slope form.

If you can't remember the point-slope form for the equation of a line, use two points you know to figure out the slope. Then substitute the slope and the coordinates of one of the points into the definition of slope and simplify.

You can substitute either point into the point-slope form for the equation of a line. Later you will see that both equations are equivalent.

For example, to find the point-slope form for the equation of the line that passes through the points (5, 2) and (4, –3):

1. Find the slope of the line. $m = \frac{-3-2}{4-5} = \frac{-5}{-1} = 5$

2. Use either of the known points, say (4, –3), and the slope $m = 5$ to write the equation in point-slope form. $y-(-3) = 5(x-4)$ $y+3 = 5(x-4)$

Standard Form for the Equation of a Line

Another common form for the equation of a line is standard form. The equation of a line in standard form is:

$$Ax + By = C$$

where A and B are not both 0.

All forms for the equation of a line are equivalent, so no matter how you initially write an equation, you can rewrite it in any form you choose.

To change a linear equation from point-slope form to standard form:

1. Distribute to remove parentheses.
2. Move all of the x- and y-terms to the left side of the equation.
3. Move all of the constant terms to the right side of the equation.
4. If necessary, rearrange the terms on the left so the equation is in the form $Ax + By = C$.

For example, to rewrite the equation of the line $y - 1 = -3(x - 4)$ in standard form:

1. Distribute the –3. $y - 1 = -3x + 12$
2. Add $3x$. $y - 1 + 3x = 12$
3. Add 1. $y + 3x = 13$
4. Switch the x- and y-terms. $3x + y = 13$

The equation of the line $y - 1 = -3(x - 4)$ in standard form is $3x + y = 13$.

Converting to Standard Form

When you write the equation of a line in point-slope form, the equation looks different depending on the point you substitute into the equation. But no matter which point you choose, when you rewrite the equation in standard form you will always get the same result.

For example, remember how to find the point-slope form of the equation of the line that passes through the points (5, 2) and (4, –3):

1. Find the slope of the line. $m = \frac{-3-2}{4-5} = 5$

2. Use one of the points, say (4, –3), and the slope $m = 5$ to write the equation in point-slope form. $y - (-3) = 5(x - 4)$ $y + 3 = 5(x - 4)$
3. Now try substituting the point (5, 2) instead of (4, –3). $y - 2 = 5(x - 5)$

Although $y - (-3) = 5(x - 4)$ and $y - 2 = 5(x - 5)$ may look like two different equations, you can show they are the same by putting them both in standard form:

$y - (-3) = 5(x - 4)$	$y - 2 = 5(x - 5)$
$y + 3 = 5x - 20$	$y - 2 = 5x - 25$
$-5x + y + 3 = -20$	$-5x + y - 2 = -25$
$-5x + y = -23$	$-5x + y = -23$

When writing an equation of a line in point-slope form, it doesn't matter which point on the line you choose to substitute into the equation.

Sample Problems

1. Find the equation of the line that passes through the point (7, –4) with slope $m = 3$. Write your answer in point-slope form.

   ☑ a. Substitute $m = 3$ and the point (7, –4) into the point-slope form for the equation of a line. $y - (-4) = 3(x - 7)$

   ☐ b. Simplify the equation. $\_\_\_\_ = 3(x - 7)$

2. Find the equation of the line that passes through the points (4, 1) and (6, 5). Write your answer in point-slope form.

   ☐ a. Find the slope of the line passing through the points (4, 1) and (6, 5). $m = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{5 - \_\_\_}{\_\_\_ - \_\_\_}$ $= \_\_\_$

   ☐ b. Substitute the slope and one of the points into the point-slope form for the equation of a line. $y - \_\_\_ = \_\_\_(x - \_\_\_)$

3. Rewrite the equation of the line below in standard form.
   $y - 4 = 5(x + 2)$

   ☑ a. Distribute to remove parentheses. $y - 4 = 5(x + 2)$ $y - 4 = 5x + 10$

   ☐ b. Move the x-term to the left side of the equation. $\_\_\_ + y - 4 = 10$

   ☐ c. Move the constant term to the right side of the equation. $\_\_\_ + y = \_\_\_$

Answers to Sample Problems

b. $y + 4$

a. $\frac{-1}{6 - 4}$

$\frac{4}{2}$

b. *1, 2, 4 or 5, 2, 6*

b. $-5x$

c. $-5x$, *14*

FINDING THE EQUATION II

Summary

Slope-Intercept Form for the Equation of a Line

You may have noticed that the slope-intercept form for the equation of a line is just a special case of the point-slope form, where the point you're given is the y-intercept of the line, (0, b).

$$y - b = m(x - 0)$$
$$y - b = mx - 0$$
$$y = mx + b$$

The slope-intercept form for the equation of a line is:

$$y = mx + b$$

where m is the slope of the line and (0, b) is the y-intercept.

To find the slope-intercept form for the equation of a line when you are given the slope and the y-intercept:

1. Start with the equation $y = mx + b$.
2. Substitute the slope for m.
3. Substitute the y-coordinate of the y-intercept for b.

If you can't remember the slope-intercept form for the equation of a line, just substitute the point and slope into the point-slope form and simplify.

For example, to find the slope-intercept form for the equation of the line with y-intercept (0, 3) and slope $m = -2$:

1. Start with the equation $y = mx + b$.	$y = mx + b$
2. Substitute -2 for m.	$y = -2x + b$
3. Substitute 3 for b.	$y = -2x + 3$

When the equation of a line is in slope-intercept form, it's easy to see the slope and the y-intercept.

So, the equation of the line with y-intercept (0, 3) and slope -2, in slope-intercept form, is $y = -2x + 3$.

You can find the slope-intercept form for the equation of a line even when the point you are given is not the y-intercept. When this is the case:

1. Start with the equation $y = mx + b$.
2. Substitute the slope for m.
3. For the given point, substitute the value of its x-coordinate for x and the value of its y-coordinate for y.
4. Solve for b.
5. Substitute m and the value you found for b back into the original equation.

For example, to find the slope-intercept form for the equation of the line that passes through the point (3, 5) and has slope $m = \frac{2}{3}$:

1. Start with the equation $y = mx + b$.	$y = mx + b$
2. Substitute $\frac{2}{3}$ for m.	$y = \frac{2}{3}x + b$

3. Substitute 3 for x and 5 for y. $5 = \frac{2}{3} \cdot 3 + b$

4. Solve for b. $5 = 2 + b$

$3 = b$

5. Substitute 3 for b and $\frac{2}{3}$ for m in the original equation. $y = \frac{2}{3}x + 3$

The equation $y = \frac{2}{3}x + 3$ is in slope-intercept form.

Horizontal Lines

The equation of a horizontal line is:

$$y = b$$

where (0, b) is the y-intercept of the line.

To find the equation of the horizontal line through a given point, say (a, b),

1. Find the y-coordinate of any point on the line.
2. Write the equation of the line as $y = b$, where b is the y-coordinate found in step 1.

For example, to find the equation of the horizontal line through the point (3, –2):

1. Find the y-coordinate of any point on the line. –2
2. Set y equal to that value. $y = -2$

Vertical Lines

Since the slope of a vertical line is undefined, you can't write the equation of a vertical line in slope-intercept form or point-slope form.

The equation of a vertical line is:

$$x = a$$

where (a, 0) is the x-intercept of the line.

To find the equation of the vertical line through a given point, say (a, b):

1. Find the x-coordinate of any point on the line.
2. Write the equation of the line as $x = a$, where a is the x-coordinate found in step 1.

For example, to find the equation of the vertical line through the point (3, –2):

1. Find the x-coordinate of any point on the line. 3
2. Set x equal to that value. $x = 3$

Remember that the slope of a horizontal line is 0. You can find its equation by substituting a point on the line and the slope m = 0 into the point-slope form for the equation of a line.

Earlier you wrote the equation of a horizontal line as y = k, where k is a constant. Now that you know that k is the y-coordinate of the y-intercept of the line, write the equation as y = b.

Why does finding the y-coordinate of any point on a horizontal line let you write the equation of the line? Since the y-coordinate of all of the points is the same, all you have to do is find one y-coordinate.

Why is the slope of a vertical line undefined? Since any two points on the line have the same x-coordinate, plugging those points into the formula for slope, $m = \frac{y_2 - y_1}{x_2 - x_1}$, gives 0 in the denominator. But division by 0 is undefined.

Earlier you wrote the equation of a vertical line as x = k, where k is a constant. Now that you know that k is the x-coordinate of the x-intercept of the line, write the equation as x = a.

You can think of the equation of a line as a way to name the line. Since all of the points on a vertical line have the same x-coordinate, a good way to name the line is by setting x equal to that x-coordinate.

Answers to Sample Problems

b. $\frac{1}{2}$, *5*

b. 3

c. –2, 3, 4

d. –14

e. 3x + (–14) or 3x – 14

a. –3x, 8 (in either order)
$-\frac{3}{2}x$, *4 (in either order)*

b. $-\frac{3}{2}$
(0, 4)

a. 4

b. y = 4

c. –5

d. x = –5

Sample Problems

1. Find the equation of the line in slope-intercept form that passes through the point (0, 5) with slope $m = \frac{1}{2}$.

   ☑ a. Write the slope-intercept form for the equation of a line. $y = mx + b$

   ☐ b. Substitute 5 for b and $\frac{1}{2}$ for m. $y = \_\_\_x + \_\_\_$

2. Find the equation of the line in slope-intercept form that passes through the point (4, –2) with slope $m = 3$.

   ☑ a. Write the slope-intercept form for the equation of a line. $y = mx + b$

   ☐ b. Substitute 3 for m. $y = \_\_\_x + b$

   ☐ c. Substitute for x and y. $\_\_\_ = (\_\_\_)(\_\_\_) + b$

   ☐ d. Solve for b. $b = \_\_\_$

   ☐ e. Substitute the values for b and m back into the original equation. $y = \_\_\_\_\_$

3. Find the slope and the y-intercept of the line $3x + 2y = 8$.

   ☐ a. Rewrite the equation in slope-intercept form. $2y = \_\_\_ + \_\_\_$
   $y = \_\_\_ + \_\_\_$

   ☐ b. Identify the slope and the y-intercept. slope = _____
   y-intercept = (___, ___)

4. Find the equation of the horizontal line and the equation of the vertical line that pass through the point (–5, 4).

   ☐ a. Find the y-coordinate of any point on the line. y-coordinate = _____

   ☐ b. Write the equation of the line as $y = b$. _____

   ☐ c. Find the x-coordinate of any point on the line. x-coordinate = _____

   ☐ d. Write the equation of the line as $x = a$. _____

EXPLORE

Sample Problems

On the computer, you used the Grapher to analyze different forms of linear equations and their graphs. Below are some additional exploration problems.

1. Graph the line that passes through the point (0, 2) and has slope 1. Find the *x*-intercept of the line.

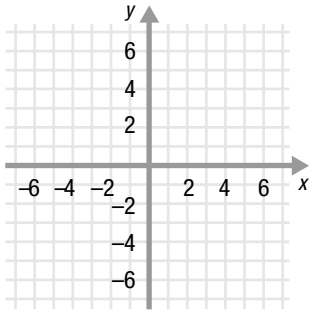
   ☑ a. Write the equation of the line in slope-intercept form.

   $y = mx + b$
   $y = 1x + 2$
   $y = x + 2$

   ☐ b. Find the coordinates of two points that lie on the line.

x	y
0	2
3	___

   ☐ c. Graph the line using the points you found in (b).



   ☐ d. Substitute 0 for y in the equation $y = x + 2$ to find the *x*-intercept.

   ___ = x + ___
   ___ = x

   ☐ e. Write the coordinates of the *x*-intercept. (___, ___)

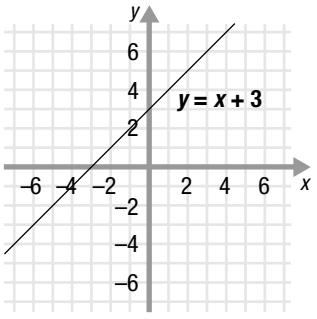
2. Graph each of the equations below on the same set of axes. Then write several sentences to describe the effect that the change in the slope has on the graphs.

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

   ☑ a. Graph the line $y = x + 3$.

   ☐ b. Graph the line $y = \frac{1}{2}x + 3$.

   ☐ c. Graph the line $y = \frac{1}{3}x + 3$.



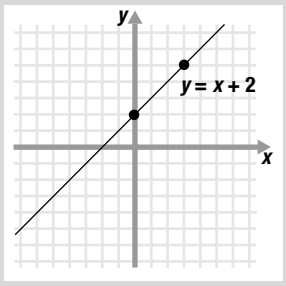
   ☐ d. Describe the effect that changing the slope has on these lines.

   _____
   _____
   _____

Answers to Sample Problems

b. 5

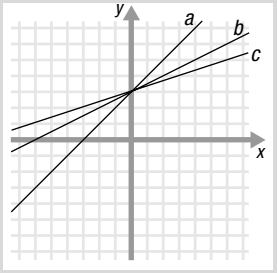
c.



d. 0, 2
–2

e. (–2, 0)

b, c.



d. The smaller m gets, the flatter the lines get.

HOMEWORK

Homework Problems

Circle the homework problems assigned to you by the computer, then complete them below.

Explain

Finding the Equation I

1. Find the equation of the line that passes through the point (4, 1) and has slope 2. Write your answer in point-slope form.
2. Find the equation of the line that passes through the points (2, 3) and (4, 7). Write your answer in point-slope form.
3. Rewrite the equation of the line below in standard form.

   $y - 2 = -3(x - 7)$
4. Find the equation of the line that passes through the point (2, 9) and has slope 4. Write your answer in point-slope form.
5. Find the equation of the line that passes through the points (6, 3) and (5, 0). Write your answer in point-slope form.
6. Rewrite the equation of the line below in standard form.

   $y + 7 = 2(x - 4)$
7. Find the equation of the line that passes through the point (8, 4) and has slope –1. Write your answer in point-slope form.
8. Find the equation of the line that passes through the points (3, 1) and (5, –2). Write your answer in standard form.
9. Alberto is rafting on a river that flows at a constant rate. After 1 hour he had gone 6 miles. Write the equation of the line that shows how fast Alberto is traveling, then use your equation to find out when he will have gone 27 miles. Let $x =$ the length of time Alberto has been rafting; let $y =$ the number of miles he has traveled.
10. Jenne set her cruise control and is driving at a constant rate. After 2 hours she has driven 128 miles. Write the equation of the line that shows how fast Jenne is driving, then use your equation to find out after how many hours she will have driven 288 miles. Let $x =$ the length of time Jenne has been driving; let $y =$ the distance she has gone.
11. Find the equation of the line that passes through the point (0, –7) and has slope $-\frac{2}{5}$. Write your answer in point-slope form and in standard form.
12. Find the equation of the line that passes through the points (3, –6) and (–4, –2). Write your answer in point-slope form and in standard form.

Finding the Equation II

13. Find the slope and the y-intercept of the line $y = 2x + 5$.
14. Find the equation of the line that passes through the point (0, 2) and has slope 3. Write your answer in slope-intercept form.
15. Find the equation of the vertical line that passes through the point (4, 3).
16. Find the slope and the y-intercept of the line $y = \frac{4}{5}x - 3$.
17. Find the equation of the line that passes through the point (0, –6) and has slope 1. Write your answer in slope-intercept form.
18. Find the equation of the horizontal line that passes through the point (1, –3).
19. Find the slope and the y-intercept of the line $7x - 4y = 2$.
20. Find the equation of the line that passes through the point (–4, 6) and has slope 2. Write your answer in slope-intercept form.

21. Dina planted a six-foot tree in her backyard which she expects to grow at the rate of 4 feet per year. Find the equation of the line that shows how tall the tree will be each year, then use your equation to find out how tall the tree will be 4 years after she plants it. Let $x =$ the number of years since she planted the tree; let $y =$ the height of the tree in feet.

22. A city's diving pool is being drained. If the pool is 14 feet deep and the water level goes down 3 feet every 2 hours, write an equation that shows how fast the water is being drained from the pool. Then use your equation to find out how many hours will pass before the pool is empty. Let $x =$ the number of hours the pool has been draining; let $y =$ the depth of the water in the pool.

23. Find the equation of the line that passes through the point $(-8, 11)$ and has slope $-\frac{7}{4}$. Write your answer in slope-intercept form and in standard form.

24. Find the equation of the line that passes through the point $(-2, 4)$ and has slope $-\frac{5}{3}$. Write your answer in slope-intercept form and in standard form.

Explore

25. Graph each of the equations below. Then write several sentences to describe the effect that changing the slope has on the graphs.

$$y = x + 1 \qquad y = 2x + 1 \qquad y = 3x + 1$$

26. Graph the line that passes through the point $(0, -4)$ and has slope 2. Then find the x-intercept of the line. Write several sentences describing the relationship of the y-intercept and the slope to the x-intercept.

27. On a grid, draw three lines through the point $(-2, 3)$:

    a. one line with slope -1

    b. one line with slope -2

    c. one line with slope -3

    Write several sentences comparing the y-intercepts of the lines.

28. Graph each of the equations below. Then write several sentences to describe the effect that changing the y-intercept has on the graphs.

$$y = 2x + 1 \qquad y = 2x + 5 \qquad y = 2x - 3$$

29. Graph the line that passes through the point $(0, 3)$ with slope $\frac{3}{2}$. Then find the x-intercept of the line. Write several sentences describing the relationship of the y-intercept and the slope to the x-intercept.

30. On a grid, draw three lines with slope 1:

    a. one line through the point $(2, 4)$

    b. one line through the point $(2, 2)$

    c. one line through the point $(2, -3)$

    Write several sentences comparing the distance between each pair of points and the distance between the y-intercepts of each pair of lines.

APPLY

Practice Problems

Here are some additional practice problems for you to try.

Finding the Equation I

1. Find the equation of the line that passes through the point (3, 1) and has slope $m = 2$. Write your answer in point-slope form.
2. Find the equation of the line that passes through the point (5, 2) and has slope $m = 3$. Write your answer in point-slope form.
3. Find the equation of the line that passes through the point (2, 7) and has slope $m = -3$. Write your answer in point-slope form.
4. Find the equation of the line that passes through the point (1, 6) and has slope $m = -2$. Write your answer in point-slope form.
5. Find the equation of the line that passes through the point (4, –2) and has slope $m = \frac{2}{3}$. Write your answer in point-slope form.
6. Find the equation of the line that passes through the point (2, –4) and has slope $m = -\frac{3}{5}$. Write your answer in point-slope form.
7. Find the equation of the line that passes through the point (3, –1) and has slope $m = -\frac{1}{2}$. Write your answer in point-slope form.
8. Find the equation of the line that passes through the point (–3, 1) and has slope $m = -\frac{4}{5}$. Write your answer in point-slope form.
9. Find the equation of the line that passes through the point (–5, 3) and has slope $m = \frac{3}{8}$. Write your answer in point-slope form.
10. Find the equation of the line that passes through the point (–4, 2) and has slope $m = \frac{5}{7}$. Write your answer in point-slope form.
11. Rewrite the equation $y - 2 = 3(x - 5)$ in standard form.
12. Rewrite the equation $y + 7 = 4(x - 2)$ in standard form.
13. Rewrite the equation $y + 3 = 5(x - 4)$ in standard form.
14. Rewrite the equation $y - 6 = -3(x + 4)$ in standard form.
15. Rewrite the equation $y + 2 = -5(x - 1)$ in standard form.
16. Rewrite the equation $y - 7 = -2(x + 4)$ in standard form.
17. Rewrite the equation $y - 4 = \frac{3}{4}(x - 8)$ in standard form.
18. Rewrite the equation $y + 5 = -\frac{4}{7}(x + 7)$ in standard form.
19. Rewrite the equation $y + 8 = -\frac{2}{5}(x + 5)$ in standard form.
20. Find the equation of the line that passes through the points (4, 5) and (2, 11). Write your answer in point-slope form and standard form.
21. Find the equation of the line that passes through the points (–6, 2) and (–3, –4). Write your answer in point-slope form and standard form.
22. Find the equation of the line that passes through the points (3, 2) and (1, 12). Write your answer in point-slope form and standard form.
23. Find the equation of the line that passes through the points (2, 7) and (5, 13). Write your answer in point-slope form and standard form.
24. Find the equation of the line that passes through the points (–1, 5) and (–2, 1). Write your answer in point-slope form and standard form.
25. Find the equation of the line that passes through the points (6, 7) and (3, –2). Write your answer in point-slope form and standard form.

26. Find the equation of the line that passes through the points (8, 2) and (1, 7). Write your answer in point-slope form and standard form.

27. Find the equation of the line that passes through the points (–3, 4) and (5, –2). Write your answer in point-slope form and standard form.

28. Find the equation of the line that passes through the points (–4, 8) and (3, 2). Write your answer in point-slope form and standard form.

Finding the Equation II

29. Find the equation of the line in slope-intercept form that passes through the point (3, 1) and has slope $m = 4$.

30. Find the equation of the line in slope-intercept form that passes through the point (–1, 3) and has slope $m = 5$.

31. Find the equation of the line in slope-intercept form that passes through the point (4, –2) and has slope $m = -2$.

32. Find the equation of the line in slope-intercept form that passes through the point (–4, 8) and has slope $m = 3$

33. Find the equation of the line in slope-intercept form that passes through the point (5, –6) and has slope $m = -1$.

34. Find the equation of the line in slope-intercept form that passes through the point (0, –3) and the point (4, 5).

35. Find the equation of the line in slope-intercept form that passes through the point (–2, 0) and the point (–3, –2).

36. Find the equation of the line in slope-intercept form that passes through the point (4, –3) and the point (6, –2).

37. Find the equation of the line in slope-intercept form that passes through the point (3, –5) and the point (6, –4) .

38. Find the equation of the line in slope-intercept form that passes through the point (5, –3) and the point (2, –1).

39. Find the equation of the line in slope-intercept form that passes through the point $\left(\frac{2}{5}, \frac{3}{5}\right)$ and is parallel to the line $y = 3x + 7$.

40. Find the equation of the line in slope-intercept form that passes through the point $\left(\frac{1}{4}, \frac{3}{4}\right)$ and is parallel to the line $y = -2x - 11$.

41. Find the equation of the line in slope-intercept form that passes through the point $\left(\frac{1}{2}, \frac{3}{2}\right)$ and is parallel to the line $y = 4x - 6$.

42. Find the equation of the line in slope-intercept form that passes through the point (6, –3) and is perpendicular to the line $y = -3x + 10$.

43. Find the equation of the line in slope-intercept form that passes through the point (–2, 7) and is perpendicular to the line $y = \frac{1}{5}x - 16$.

44. Find the equation of the line in slope-intercept form that passes through the point (6, –2) and is perpendicular to the line $y = -2x + 4$.

45. Find the slope and y-intercept of the line $-3x + y = 8$.

46. Find the slope and y-intercept of the line $4x - y = -13$.

47. Find the slope and y-intercept of the line $2x - y = 4$.

48. Find the slope and y-intercept of the line $2x + 5y = 12$.

49. Find the slope and y-intercept of the line $4x - 3y = 6$.

50. Find the slope and y-intercept of the line $3x - 2y = -5$.

51. Find the equation of the vertical line that passes through the point (7, 3).

52. Find the equation of the vertical line that passes through the point (–10, –5).

53. Find the equation of the vertical line that passes through the point (8, –2).

54. Find the equation of the horizontal line that passes through the point (7, 0).

55. Find the equation of the horizontal line that passes through the point (–2, 9).

56. Find the equation of the horizontal line that passes through the point (6, –5).

EVALUATE

Practice Test

Take this practice test to be sure that you are prepared for the final quiz in Evaluate.

1. Find the equation of the line that passes through the point (2, –5) and has slope –2.

2. The equation of a line in point-slope form is $y - 1 = 4(x + 2)$. Find the slope of the line and the coordinates of one point that lies on the line.

3. Find the equation of the line that passes through the point (–5, –3) and has slope $\frac{4}{7}$. Write your answer in standard form.

4. Find the equation of the line that passes through the points (–6, –8) and (–1, 7). Write your answer in standard form.

5. Find the equation of the line that passes through the point (0, 2) and has slope –3. Write your answer in standard form.

6. The equation of a line in slope-intercept form is $y = 2x - 7$. Find the slope of the line and the y-intercept of the line.

7. Find the equation of the horizontal line that passes through the point (0, –6).

8. The point $P(4, -3)$ is plotted in Figure 4.2.1. Plot another point Q so that the slope of the line that passes through the points P and Q is undefined.

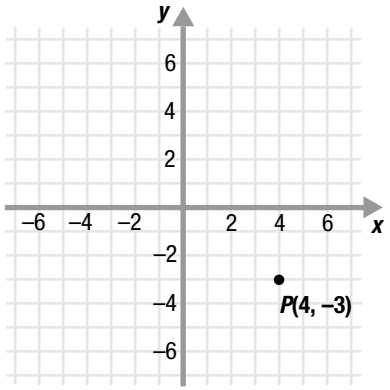


Figure 4.2.1

9. Circle every equation below that represents a line that passes through the point (5, 2).

$y - 5 = \frac{1}{5}(x - 2)$ $\quad$ $y - 2 = 3(x - 5)$

$y + 2 = 4(x + 5)$ $\quad$ $y - 2 = \frac{3}{4}(x - 5)$

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

10. Find the equation of the line that passes through the point (2, –3) and is parallel to the line $y = 3x + 4$. Write your answer in standard form.

11. Use the graphs of the lines A and B in Figure 4.2.2 to decide which of the following statements are true.

    The slope of line A is greater than the slope of line B.

    The slope of line A is less than the slope of line B.

    The y-coordinate of the y-intercept of line A is less than the y-coordinate of the y-intercept of line B.

    The x-coordinate of the x-intercept of line A is less than the x-coordinate of the x-intercept of line B.

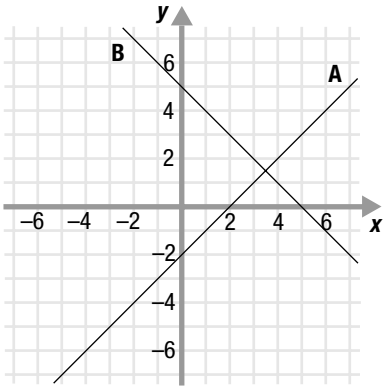


Figure 4.2.2

12. The y-intercepts of two parallel lines are (0, –4) and (0, 3). If the slope of each line is 2, what are the equations of the lines?