PRACTICE & PROBLEM SOLVING

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Practice Tutorial

Additional Exercises Available Online

UNDERSTAND

10. **Use Structure** A line passes through points $A(n, 4)$ and $B(6, 8)$ and is parallel to $y = 2x - 5$. What is the value of n?

11. **Error Analysis** Describe and correct the error the student made when writing the equation of the line that passes through $(-8, 5)$ and is perpendicular to $y = 4x + 2$.

$$y - 5 = \frac{1}{4}(x - (-8))$$

$$y - 5 = \frac{1}{4}x + 2$$

$$y - 5 + 5 = \frac{1}{4}x + 2 + 5$$

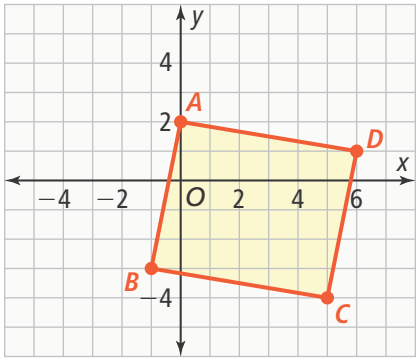
$$y = \frac{1}{4}x + 7$$ ✗

12. **Reason** The graphs of $4x + 12y = 8$ and $y = mx + 5$ are perpendicular. What is the value of m?

13. **Mathematical Connections** Rectangles have four right angles and opposite sides that are parallel.

a. Is the figure shown a rectangle? Explain.

b. If not, how could the points change so it would be a rectangle?



14. **Higher Order Thinking** Explain how you can determine whether the graphs of $5x - 3y = 2$ and $5x - 3y = 8$ are parallel without doing any calculations.

PRACTICE

Write the equation of the line that passes through the given point and is parallel to the given line.

SEE EXAMPLE 1

15. $(5, -4)$; $y = \frac{1}{5}x - 4$

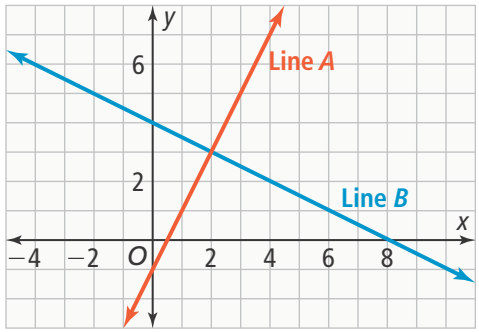
16. $(2, 7)$; $3x - y = 5$

17. $(-3, 2)$; $y = -4$

18. $(6, 4)$; $2x + 3y = 18$

19. Use the slopes of lines A and B to show that they are perpendicular to each other.

SEE EXAMPLE 2



Write the equation of the line that passes through the given point and is perpendicular to the given line. SEE EXAMPLES 3 AND 5

20. $(-6, -3)$; $y = -\frac{2}{5}x$

21. $(0, 3)$; $3x - 4y = -8$

22. $(-2, 5)$; $x = 3$

23. $(4, 3)$; $4x - 5y = 30$

Are the graphs of each pair of equations parallel, perpendicular, or neither? SEE EXAMPLE 4

24. $y = 2x + 1$
$2x - y = 3$

25. $y = \frac{1}{2}$
$y = -3$

26. $x = 4$
$y = 4$

27. $-2x + 5y = -4$
$y = -\frac{5}{2}x + 6$

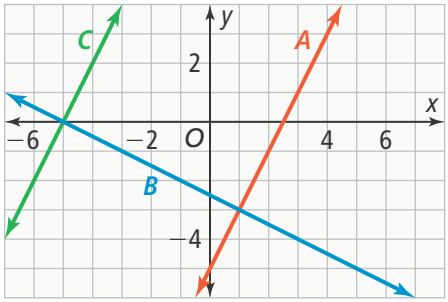
28. Copy and complete the table.

	Equation	Slope of a parallel line	Slope of a perpendicular line
a.	$y = \frac{1}{2}x + 6$		
b.	$x = -4.2$		
c.	$3x + 4y = 3$		
d.	$y = 3$		
e.	$y = x$		

PRACTICE & PROBLEM SOLVING

APPLY

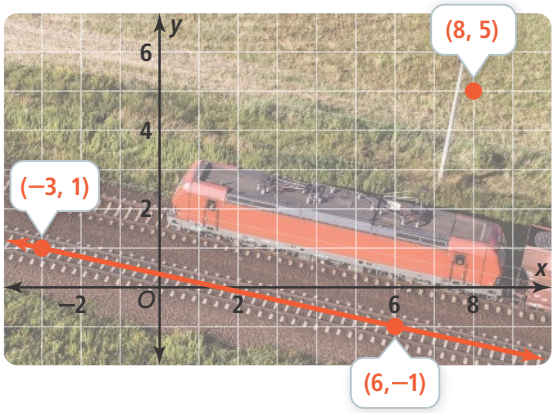
29. Use Structure An artist is drawing up plans for a mural. She wants to include a rectangle in her design.



a. What is an equation of Line *D* that will make the figure a rectangle?

b. Explain how the artist can use algebra to confirm that the figure is a rectangle.

30. Reason A construction crew will build a new railroad track, parallel to one modeled by the line, which passes through the point (8, 5). What equation models the path of the new track?



31. Make Sense and Persevere Elijah and Aubrey have summer jobs. Elijah deposits the same amount of money in his account every week. The equation $y = 125x + 72$ represents his bank balance any given week of the summer. Aubrey also deposits the same amount into her account every week. At the end of the third week she has $398. At the end of the sixth week she has $773.

a. Write an equation to represent Aubrey's bank balance any given week of the summer.

b. Would the graph of the equation for Aubrey's balance be parallel to the graph of Elijah's balance? Explain.

c. What do the parallel graphs mean in terms of the situation?

ASSESSMENT PRACTICE

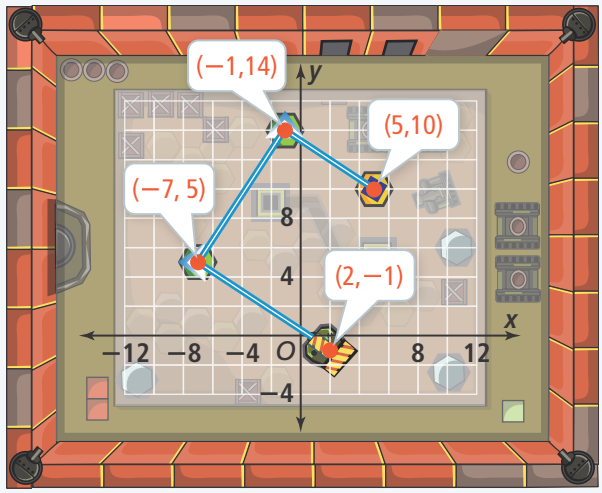
32. Which of the following lines is perpendicular to $y = \frac{1}{4}x - 3$? Select all that apply.

Ⓐ $y = 4x$
Ⓑ $4x - y = -2$
Ⓒ $y = -4x + 6$
Ⓓ $8x - 2y = 3$
Ⓔ $y = 4x + 9$

33. SAT/ACT A line passing through (6, *a*) and (9, −4) is parallel to $2x - 3y = 6$. What is the value of *a*?

Ⓐ −6
Ⓑ −3
Ⓒ −2
Ⓓ 3
Ⓔ 6

34. Performance Task A video game is designed to model the path of a laser. A laser is placed at (2, −1) and is aimed at Mirror 1. Other mirrors are placed as shown. Each mirror is placed so the light will reflect at a 90° angle.



Part A After reflecting off of all three mirrors, where will the light cross the *y*-axis?

Part B Write an equation to model the path of the light between the following:

a. Laser and Mirror 1

b. Mirror 1 and Mirror 2

c. Mirror 2 and Mirror 3

d. Mirror 3 and *y*-axis

Part C Change the placement of the mirrors so that the laser light hits a target in Quadrant IV. Give the coordinates of the mirrors and the equations of lines that the path of the light would follow.