



Lesson Check

Do you know HOW?

- Does the equation $6y = 18x$ represent a direct variation? If it does, what is its constant of variation?
- Suppose y varies directly with x , and $y = 30$ when $x = 3$. What direct variation equation relates x and y ?
- A recipe for 12 corn muffins calls for 1 cup of flour. The number of muffins you can make varies directly with the amount of flour you use. You have $2\frac{1}{2}$ cups of flour. How many muffins can you make?
- Does y vary directly with x ? If it does, what is an equation for the direct variation?

x	y
-2	1
2	-1
4	-2

Do you UNDERSTAND?



- Vocabulary** Determine whether each statement is *always*, *sometimes*, or *never* true.
- The ordered pair $(0, 0)$ is a solution of the direct variation equation $y = kx$.
 - You can write a direct variation in the form $y = k + x$, where $k \neq 0$.
 - The constant of variation for a direct variation represented by $y = kx$ is $\frac{y}{x}$.
- Reasoning** Suppose q varies directly with p . Does this imply that p varies directly with q ? Explain.



Practice and Problem-Solving Exercises

Practice

Determine whether each equation represents a direct variation. If it does, find the constant of variation.

9. $2y = 5x + 1$

10. $8x + 9y = 10$

11. $-12x = 6y$

12. $y + 8 = -x$

13. $-4 + 7x + 4 = 3y$

14. $0.7x - 1.4y = 0$

Suppose y varies directly with x . Write a direct variation equation that relates x and y . Then find the value of y when $x = 12$.

15. $y = -10$ when $x = 2$.

16. $y = 7\frac{1}{2}$ when $x = 3$.

17. $y = 5$ when $x = 2$.

18. $y = 125$ when $x = -5$.

19. $y = 10.4$ when $x = 4$.

20. $y = 9\frac{1}{3}$ when $x = -\frac{1}{2}$.

Graph each direct variation equation.

21. $y = 2x$

22. $y = \frac{1}{3}x$

23. $y = -x$

24. $y = -\frac{1}{2}x$

- Travel Time** The distance d you bike varies directly with the amount of time t you bike. Suppose you bike 13.2 mi in 1.25 h. What is an equation that relates d and t ? What is the graph of the equation?
- Geometry** The perimeter p of a regular hexagon varies directly with the length ℓ of one side of the hexagon. What is an equation that relates p and ℓ ? What is the graph of the equation?

See Problem 1.

See Problem 2.

See Problem 3.

For the data in each table, tell whether y varies directly with x . If it does, write an equation for the direct variation. Check your answer by plotting the points from the table and sketching the line.

See Problem 4.

27.

x	y
-6	9
1	-1.5
8	-12

28.

x	y
3	5.4
7	12.6
12	21.6

29.

x	y
-2	1
3	6
8	11

B Apply

Suppose y varies directly with x . Write a direct variation equation that relates x and y . Then graph the equation.

30. $y = \frac{1}{2}$ when $x = 3$. 31. $y = -5$ when $x = \frac{1}{4}$. 32. $y = \frac{6}{5}$ when $x = -\frac{5}{6}$. 33. $y = 7.2$ when $x = 1.2$.

34. **Think About a Plan** The amount of blood in a person's body varies directly with body weight. A person who weighs 160 lb has about 4.6 qt of blood. About how many quarts of blood are in the body of a 175-lb person?

- How can you find the constant of variation?
- Can you write an equation that relates quarts of blood to weight?
- How can you use the equation to determine the solution?

- STEM** 35. **Electricity** Ohm's Law $V = I \times R$ relates the voltage, current, and resistance of a circuit. V is the voltage measured in volts. I is the current measured in amperes. R is the resistance measured in ohms.
- Find the voltage of a circuit with a current of 24 amperes and a resistance of 2 ohms.
 - Find the resistance of a circuit with a current of 24 amperes and a voltage of 18 volts.

C Reasoning Tell whether the two quantities vary directly. Explain your reasoning.

- the number of ounces of cereal and the number of Calories the cereal contains
- the time it takes to travel a certain distance and the rate at which you travel
- the perimeter of a square and the side length of the square
- the amount of money you have left and the number of items you purchase

C 40. a. Graph the following direct variation equations in the same coordinate plane: $y = x$, $y = 2x$, $y = 3x$, and $y = 4x$.

b. **Look for a Pattern** Describe how the graphs change as the constant of variation increases.

c. Predict how the graph of $y = \frac{1}{2}x$ would appear.

C 41. **Error Analysis** Use the table at the right. A student says that y varies directly with x because as x increases by 1, y also increases by 1. Explain the student's error.

C 42. **Writing** Suppose y varies directly with x . Explain how the value of y changes in each situation.

- The value of x is doubled.
- The value of x is halved.

x	y
0	3
1	4
2	5