

THINK AND DISCUSS

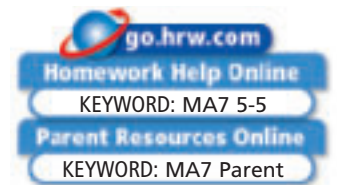
- How do you know that a direct variation is linear?
- Why does the graph of any direct variation pass through $(0, 0)$?
- GET ORGANIZED** Copy and complete the graphic organizer. In each box, describe how you can use the given information to identify a direct variation.



Recognizing a Direct Variation		
From an Equation	From Ordered Pairs	From a Graph

5-5

Exercises



GUIDED PRACTICE

- Vocabulary** If x varies directly with y , then the relationship between the two variables is said to be a ___?___. (*direct variation* or *constant of variation*)

SEE EXAMPLE 1 Tell whether each equation represents a direct variation. If so, identify the constant of variation.

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2. $y = 4x + 9$

3. $2y = -8x$

4. $x + y = 0$

SEE EXAMPLE 2 Tell whether each relationship is a direct variation. Explain.

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5.

x	10	5	2
y	12	7	4

6.

x	3	-1	-4
y	-6	2	8

SEE EXAMPLE 3 7. The value of y varies directly with x , and $y = -3$ when $x = 1$. Find y when $x = -6$.

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8. The value of y varies directly with x , and $y = 6$ when $x = 18$. Find y when $x = 12$.

SEE EXAMPLE 4 9. **Wages** Cameron earns \$5 per hour at her after-school job. The total amount of her paycheck varies directly with the amount of time she works. Write a direct variation equation for the amount of money y that she earns for working x hours. Then graph.

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PRACTICE AND PROBLEM SOLVING

Tell whether each equation represents a direct variation. If so, identify the constant of variation.

10. $y = \frac{1}{6}x$

11. $4y = x$

12. $x = 2y - 12$

Tell whether each relationship is a direct variation. Explain.

13.

x	6	9	17
y	13.2	19.8	37.4

14.

x	-6	3	12
y	4	-2	-8

Independent Practice

For Exercises	See Example
10–12	1
13–14	2
15–16	3
17	4

Extra Practice

Skills Practice p. S13

Application Practice p. S32

15. The value of y varies directly with x , and $y = 8$ when $x = -32$. Find y when $x = 64$.
16. The value of y varies directly with x , and $y = \frac{1}{2}$ when $x = 3$. Find y when $x = 1$.
17. While on his way to school, Norman saw that the cost of gasoline was \$2.50 per gallon. Write a direct variation equation to describe the cost y of x gallons of gas. Then graph.

Tell whether each relationship is a direct variation. Explain your answer.

18. The equation $-15x + 4y = 0$ relates the length of a videotape in inches x to its approximate playing time in seconds y .
19. The equation $y - 2.00x = 2.50$ relates the cost y of a taxicab ride to distance x of the cab ride in miles.

Each ordered pair is a solution of a direct variation. Write the equation of direct variation. Then graph your equation and show that the slope of the line is equal to the constant of variation.

20. (2, 10) 21. (-3, 9) 22. (8, 2) 23. (1.5, 6)
24. (7, 21) 25. (1, 2) 26. (2, -16) 27. $(\frac{1}{7}, 1)$
28. (-2, 9) 29. (9, -2) 30. (4, 6) 31. (3, 4)
32. (5, 1) 33. (1, -6) 34. $(-1, \frac{1}{2})$ 35. (7, 2)

**Astronomy**

The Mars rover *Spirit* landed on Mars in January 2004 and immediately began sending photos of the planet's surface back to Earth.

36. **Astronomy** Weight varies directly with gravity. A Mars lander weighed 767 pounds on Earth but only 291 pounds on Mars. Its accompanying Mars rover weighed 155 pounds on Mars. How much did it weigh on Earth? Round your answer to the nearest pound.
37. **Environment** Mischa bought an energy-efficient washing machine. She will save about 15 gallons of water per wash load.
- Write an equation of direct variation to describe how many gallons of water y Mischa saves for x loads of laundry she washes.
 - Graph your direct variation from part a. Is every point on the graph a solution in this situation? Why or why not?
 - If Mischa does 2 loads of laundry per week, how many gallons of water will she have saved at the end of a year?
38. **Critical Thinking** If you double an x -value in a direct variation, will the corresponding y -value double? Explain.
39. **Write About It** In a direct variation $y = kx$, k is sometimes called the “constant of proportionality.” How are proportions related to direct variations?

MULTI-STEP TEST PREP

40. This problem will prepare you for the Multi-Step Test Prep on page 332.
- Rhea exercised on a treadmill at the gym. When she was finished, the display showed that she had walked at an average speed of 3 miles per hour.
- Write an equation that gives the number of miles y that Rhea would cover in x hours if she walked at this speed.
 - Explain why this is a direct variation and find the value of k . What does this value represent in Rhea's situation?