NAME

DATE

Module 16 Solving Rational Equations
Lesson 2 Solving Problems Using Direct
Variation

independent
practice

Does *y* vary directly as *x*? If so, find the constant of variation and write the direct variation function.

1.

x	y
–3	18
5	–30
9	–54

2.

x	y
–3	–2
–9	–6
18	12

3.

x	y
18	24
24	32
48	60

4.

x	y
–3	12
$\frac{1}{2}$	–2
2	–8

5.

x	y
0	0
2	$\frac{1}{3}$
12	–2

6.

x	y
2	14
3	21
5	35

Solve.

7. The variable *y* varies directly as *x*: *y* is 12 when *x* is 4. Find *x* when *y* is 18.

8. The variable *y* varies directly as *x*: *y* is –3 when *x* is 5. Find *y* when *x* is –15.

9. The variable *y* varies directly as *x*: *y* is 10 when *x* is 12. Find *y* when *x* is 9.

10. The variable *y* varies directly as *x*: *y* is –2 when *x* is –4. Find *x* when *y* is 5.

11. The variable *y* varies directly as *x*: *y* is 3.2 when *x* is 4.6. Find *x* when *y* is 1.6.

12. The variable *y* varies directly as *x*: *y* is 3 when *x* is $-\frac{3}{4}$. Find *y* when *x* is 2.

Solve using direct variation.

13. Jin Li earns $44 for eight hours work. How much will she earn for 30 hours work?

14. On a map, the distance from Cesky Krumlov to Karlovy Vary is three inches. One inch represents 50 miles. What is the actual distance between these two Hungarian cities?

15. Richard is taking a trip to Vancouver Canada. He exchanged 15 American dollars for 22.50 Canadian dollars. How many Canadian dollars will he get for 27 American dollars?

16. If Mia receives $72.20 for $1,805.00 in sales, how much must her sales be in order to receive $150 in commission?

17. Colin pays $7.50 for 50 pounds of rabbit feed. How much rabbit feed can he get for $1.50?

18. Merideth's heart beats 63 times in 45 seconds. How many times will her heart beat in one hour?

Journal

1. Does the equation $y = kx$, where $k \neq 0$, represent a direct variation function? Explain.

2. Dwight says that the perimeter of a square varies directly as the length of a side of the square. Is he correct? Explain.

3. How can anyone tell if a line is the graph of a direct variation function?

4. Miguel earns $5.75 an hour mowing lawns. Explain how Miguel can use direct variation to find his pay for the week. What is the constant of variation in this situation?

5. Find the direct variation function whose graph passes through the point (2, 3).

Cumulative Review

Simplify each rational expression. Assume that the domains of the rational expressions contain no value for which any denominator is zero.

1. $\dfrac{3x}{6x + 9}$

2. $\dfrac{4x^2 + 4x - 3}{8x^2 - 2x - 1}$

3. $\dfrac{c^2 + 3c - 28}{c^2 - c - 12}$

4. $\dfrac{m^2 - 9}{(m + 3)^2}$

Solve each rational equation.

5. $\dfrac{1}{x} + \dfrac{2}{3} = \dfrac{3}{x}$

6. $\dfrac{3}{4x} = \dfrac{4}{9}$

7. $\dfrac{5}{3} + \dfrac{4}{2x} = \dfrac{8}{3}$

Calculator Problem

Use a graphing calculator to determine if $y = 3x$ is a direct variation.

1. Press Y=. Enter the function $y = 3x$ into **Y_1**. See Figure 1.
2. Press GRAPH. See Figure 2. (You may want to set your window dimension like those in Figure 3.)
3. The graph of a direct variation function is a non-vertical and non-horizontal line through the origin like the one in Figure 2. Determine the constant of variation.
4. Press 2nd WINDOW. Set values to those of Figure 4.
5. Press 2nd GRAPH. See Figure 5. The x values of the function appear in the first column of the table, and the y values appear in the second column of the table.
6. Press Y= and place the cursor to the right of **Y_2**. Press VARS. Use the right arrow key to select **Y–VARS**. Select **1: Function...** and then, select **1: Y_1**. Press ENTER, ÷, then, ALFA STO→. See Figure 6. This function divides every y value with its corresponding x value. In other words, if there is a constant of variation, $\frac{y}{x}$ is a constant value.
7. Press 2nd GRAPH. See Figure 7. The values in the third column are all 3 except the value corresponding to the coordinate (0, 0). This is because $\frac{0}{0}$ is undefined.
8. Press GRAPH. See Figure 8. The graph now shows a horizontal line at $y = 3$. This is a *graphical representation* of the constant of variation $k = 3$.
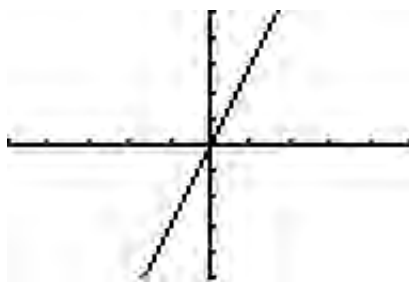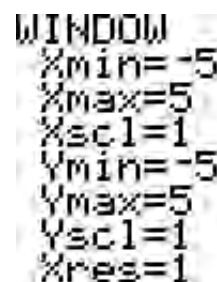

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

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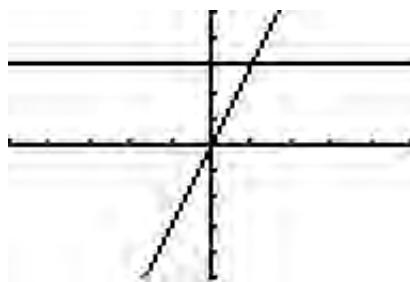
Figure 7

Figure 8

Graph and determine if the following functions are direct variations.

1. $y = \frac{8}{3x}$

2. $y = 2.5x$

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

4. $y = 5x - 2$

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