Name ______________________ Date ____________ Class ____________

LESSON **12-5**

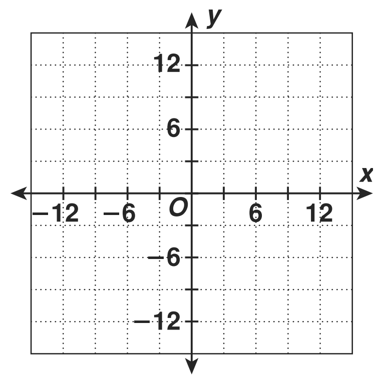
Practice B

Direct Variation

Make a graph to determine whether the data sets show direct variation.

1.

x	y
6	9
4	6
0	0
−2	−3
−8	−12



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2. Write the equation of direct variation for Exercise 1.

____

Find each equation of direct variation, given that *y* varies with *x*.

3. y is 32 when x is 4

____

4. y is −10 when x is −20

____

5. y is 63 when x is −7

____

6. y is 40 when x is 50

____

7. y is 87.5 when x is 25

____

8. y is 90 when x is 270

____

9. The table shows the length and width of various U.S. flags. Determine whether there is direct variation between the two data sets. If so, find the equation of direct variation.

Length (ft)	2.85	5.7	7.6	9.88	11.4
Width (ft)	1.5	3	4	5.2	6

____

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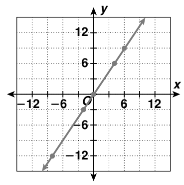
LESSON **12-5**

Practice B
Direct Variation

Make a graph to determine whether the data sets show direct variation.

1.

x	y
6	9
4	6
0	0
−2	−3
−8	−12



The data sets show direct variation.

2. Write the equation of direct variation for Exercise 1.

$y = 1.5x$ or $y = \frac{3}{2}x$

Find each equation of direct variation, given that y varies with x.

3. y is 32 when x is 4

$y = 8x$

4. y is −10 when x is −20

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

5. y is 63 when x is −7

$y = -9x$

6. y is 40 when x is 50

$y = \frac{4}{5}x$

7. y is 87.5 when x is 25

$y = 3.5x$

8. y is 90 when x is 270

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

9. The table shows the length and width of various U.S. flags. Determine whether there is direct variation between the two data sets. If so, find the equation of direct variation.

Length (ft)	2.85	5.7	7.6	9.88	11.4
Width (ft)	1.5	3	4	5.2	6

There is direct variation between the lengths and widths of the flags.

$y = 1.9x$, where y is the length, x is the width, and 1.9 is the constant of proportionality

LESSON **12-5**

Practice C
Direct Variation

Find each equation of direct variation, given that y varies directly with x.

1. y is 189 when x is 45

$y = 4.2x$

2. y is 456 when x is 3800

$y = 0.12x$

3. y is 763 when x is 981

$y = \frac{7}{9}x$

4. y is $171\frac{3}{4}$ when x is 916

$y = \frac{3}{16}x$

Tell whether each equation represents direct variation between x and y.

5. $y = \frac{9}{10}x$ — yes

6. $y = xy - 8$ — no

7. $-5x - y = 0$ — yes

8. $y = \frac{24}{x}$ — no

9. $\frac{y}{x} = 8.25$ — yes

10. $x - y = -10$ — no

11. $x = y$ — yes

12. $\frac{1}{3}y = x$ — yes

13. The following table shows the distance on a map in inches x and the actual distance between two cities in miles, y. Determine whether there is direct variation between the two data sets. If so, find the equation of direct variation.

x	$456\frac{1}{4}$	$3\frac{1}{2}$	4	5	$7\frac{1}{4}$	8	$9\frac{1}{8}$	11
y	75	175	200	350	$362\frac{1}{2}$	400	$456\frac{1}{4}$	550

There is no direct variation.

14. A person's weight on Earth varies directly with a person's estimated weight on Venus. If a person weighs 110 pounds on Earth, he or she would weigh an estimated 99.7 pounds on Venus. If a person weighs 125 pounds on Earth, what would be his or her estimated weight to the nearest tenth of a pound on Venus?

113.3 pounds

LESSON **12-5**

Reteach
Direct Variation

Two data sets have **direct variation** if they are related by a constant ratio, the **constant of proportionality.** A graph of the data sets is linear and passes through (0, 0).

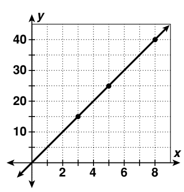
$y = kx$ **equation of direct variation,** where k is the constant ratio

To determine whether two data sets have direct variation, you can compare ratios. You can also graph the data sets on a coordinate grid.

x	3	5	8
y	15	25	40

$\frac{y}{x} = \frac{15}{3} = \frac{25}{5} = \frac{40}{8} = \frac{5}{1}$ ← constant ratio

$k = 5 \rightarrow y = 5x$



The graph of the data sets is linear and passes through (0, 0).

So, the data sets show direct variation.

Determine whether the data sets show direct variation. If there is a constant ratio, identify it and write the equation of direct variation. Plot the points and tell whether the graph is linear.

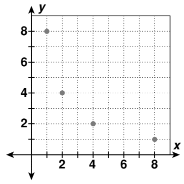
1.

x	1	2	4	8
y	8	4	2	1

constant ratio? no

If yes, equation. ________

Is the graph linear? no



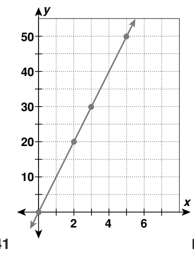
2.

x	0	2	3	5
y	0	20	30	50

constant ratio? yes, 10

If yes, equation. $y = 10x$

Is the graph linear? yes



LESSON **12-5**

Challenge
Different Paths, Same Result

Problems of direct variation can be solved with two methods.
If r varies directly with h, and $r = 13.5$ when $h = 3$, find r when $h = 7$.

Method 1: Find the constant of variation.

$\frac{r}{h} = k$

$\frac{13.5}{3} = k$ Use a pair of known values.

$4.5 = k$ constant of variation

$r = 4.5h$ equation of variation

$r = 4.5(7) = 31.5$

So, when $h = 7$, $r = 31.5$.

Method 2: Write a proportion.

$\frac{r_1}{h_1} = \frac{r_2}{h_2}$

$\frac{13.5}{3} = \frac{r_2}{7}$ Use all known values.

$3r_2 = 13.5(7)$ Cross multiply.

$\frac{3r_2}{3} = \frac{94.5}{3}$

$r_2 = 31.5$

Use both methods to solve each problem.

1. y varies directly as x. If $y = 16$ when $x = 5$, find y when $x = 9$.

$\frac{y}{x} = k$

$\frac{16}{5} = k$

$3.2 = k$

$y = 3.2x$

$y = 3.2(9) = 28.8$

$\frac{y_1}{x_1} = \frac{y_2}{x_2}$

$\frac{16}{5} = \frac{y_2}{9}$

$5y_2 = 16(9)$

$\frac{y_2}{5} = \frac{144}{5}$

$y_2 = 28.8$

So, when $x = 9$, $y =$ 28.8.

2. A varies directly as s^2. If $A = 75$ when $s = 5$, find A when $s = 7$.

$\frac{A}{s^2} = k$

$\frac{75}{5^2} = k$; $k = 3$

$A = 3s^2$

$A = 3(7^2) = 147$

$\frac{A_1}{(s_1)^2} = \frac{A_2}{(s_2)^2}$

$\frac{75}{5^2} = \frac{A_2}{7^2}$; $25A_2 = 75(49)$

$\frac{25A_2}{25} = \frac{3675}{25}$

$A_2 = 147$

So, when $s = 7$, A = 147