Name _____ Date _____

LESSON 3.6

Study Guide

For use with the lesson "Model Direct Variation"

GOAL **Write and graph direct variation equations.**

Vocabulary

Two variables x and y show **direct variation,** provided $y = ax$ and $a \neq 0$.

The nonzero number a is called the **constant of variation,** and y is said to *vary directly* with x.

EXAMPLE 1 ## Identify direct variation equations

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

a. $6x - 3y = 12$ **b.** $-5x + 2y = 0$

Solution

To tell whether the equation represents direct variation, try to rewrite the equation in the form $y = ax$.

a. $6x - 3y = 12$ Write original equation.

$-3y = -6x + 12$ Subtract $6x$ from each side.

$y = 2x - 4$ Divide each side by -3.

Because the equation $6x - 3y = 12$ cannot be rewritten in the form $y = ax$, it does not represent direct variation.

b. $-5x + 2y = 0$ Write original equation.

$2y = 5x$ Add $5x$ to each side.

$y = \frac{5}{2}x$ Simplify.

Because the equation $-5x + 2y = 0$ can be rewritten in the form $y = ax$, it represents direct variation. The constant of variation is $\frac{5}{2}$.

Exercises for Example 1

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

1. $3x + 5y = 0$ **2.** $x + 2y = 1$ **3.** $7x - 9y = 0$

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LESSON 3.6

Study Guide *continued*

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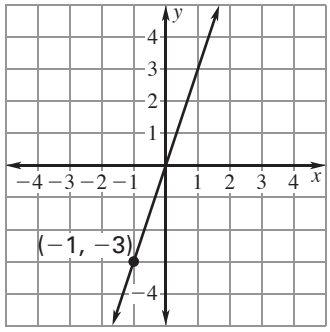
EXAMPLE 2 Write and use a direct variation equation

The graph of a direct variation equation is shown.



a. Write the direct variation equation.

b. Find the value of y when $x = 12$.

Solution

a. Because y varies directly with x, the equation has the form $y = ax$. Use the fact that $y = -3$ when $x = -1$ to find a.

$y = ax$	Write direct variation equation.
$-3 = a(-1)$	Substitute.
$3 = a$	Solve for a.

A direct variation equation that relates x and y is $y = 3x$.

b. When $x = 12$, $y = 3(12) = 36$. The value of y when $x = 12$ is 36.

EXAMPLE 3 Use a direct variation model

The table shows the cost *C* of purchasing tickets for a rock concert.

a. Explain why C varies directly with t.

b. Write a direct variation equation that relates t and C.

Number of tickets, *t*	Cost, *C*
2	$36
3	$54
5	$90

Solution

a. To explain why C varies directly with t, compare the ratios $\frac{C}{t}$ for all data pairs (t, C): $\frac{36}{2} = \frac{54}{3} = \frac{90}{5} = 18$. Because the ratios all equal 18, C varies directly with t.

b. A direct variation equation is $C = 18t$.

Exercises for Examples 2 and 3

4. The graph of a direct variation equation passes through the point $(5, -2)$. Write a direct variation equation and find the value of y when $x = 20$.

5. **What if?** In Example 3, suppose the ticket distributor charges $5.50 for each transaction, no matter how many tickets are purchased, and $18 per ticket. Is it reasonable to use a direct variation model for this situation? *Explain*.