Name ______________________ Date ______________

LESSON 6.1

Study Guide

For use with pages 315–319

CA Standards AF 4.2

GOAL Find solutions of equations in two variables.

VOCABULARY

A **solution of an equation in two variables** is an ordered pair whose coordinates make the equation true.

EXAMPLE 1 Checking Solutions

Tell whether $(-3, 3)$ is a solution of $x + 7y = 18$.

$x + 7y \stackrel{?}{=} 18$	Write original equation.
$-3 + 7(3) \stackrel{?}{=} 18$	Substitute -3 for x and 3 for y.
$-3 + 21 \stackrel{?}{=} 18$	Simplify.
$18 = 18$ ✓	Solution checks.

Answer: The ordered pair $(-3, 3)$ is a solution of $x + 7y = 18$. When you substitute -3 for x and 3 for y, the result is a true equation.

Exercises for Example 1

Tell whether the ordered pair is a solution of the equation.

1. $2x + y = 7; (-3, 1)$

2. $x - 3y = 13; (-1, -4)$

3. $x + 5y = 18; (-2, 4)$

4. $24x + y = 25; (-3, 13)$

EXAMPLE 2 Making a Table of Solutions

It takes Janice about 1 hour to read 30 pages of a book. She started reading a 420-page book today. The number of pages she has left to read can be modeled by the equation $P = 420 - 30h$, where P is the number of pages she has left to read and h is the number of hours she has already spent reading. Make a table that shows some possible numbers of pages left to read.

Solution

STEP 1 Substitute several values of h into the equation and solve for P.

h-value	Substitute for h.	Solve for P.	Solution
$h = 1$	$P = 420 - 30(1)$	$P = 390$	(1, 390)
$h = 2$	$P = 420 - 30(2)$	$P = 360$	(2, 360)
$h = 3$	$P = 420 - 30(3)$	$P = 330$	(3, 330)
$h = 4$	$P = 420 - 30(4)$	$P = 300$	(4, 300)

STEP 2 Make a table of the solutions. Show the number of pages P for h hours.

Hours spent reading, h	1	2	3	4
Pages left to read, P	390	360	330	300

Name ______________________________ Date ______________

LESSON 6.1

Study Guide *continued*

For use with pages 315–319

Lesson 6.1

Exercise for Example 2

5. A bowling alley charges \$3 for shoe rental and \$5 for each game. The total cost can be modeled by the equation $C = 3 + 5g$, where C is the total cost in dollars and g is the number of games bowled. Make a table of solutions for this equation.

EXAMPLE 3 Finding Solutions of an Equation

Solve the equation $5x + y = 12$ for y. The list four solutions.

Solution

STEP 1 Solve the equation for y.

$5x + y = 12$ Write original equation.

$y = 12 - 5x$ Subtract $5x$ from each side.

STEP 2 Choose several values to substitute for x. Then solve for y.

x-value	Substitute for x.	Evaluate.	Solution (x, y)
$x = -1$	$y = 12 - 5(-1)$	$y = 17$	$(-1, 17)$
$x = 0$	$y = 12 - 5(0)$	$y = 12$	$(0, 12)$
$x = 1$	$y = 12 - 5(1)$	$y = 7$	$(1, 7)$
$x = 2$	$y = 12 - 5(2)$	$y = 2$	$(2, 2)$

Answer: Four solutions are $(-1, 17)$, $(0, 12)$, $(1, 7)$, and $(2, 2)$.

Exercises for Example 3

Solve the equation for *y*.

6. $9x + y = 22$

7. $26x + 2y = 28$

List four solutions of the equation.

8. $y = 5x + 2$

9. $y = -4x + 10$

10. $5y = -5x - 55$

11. $18x - 3y = 6$

Name ______________________________ Date ______________

LESSON 6.3

Study Guide

For use with pages 327–332

CA Standards AF 3.3

GOAL **Use x- and y-intercepts to graph linear equations.**

VOCABULARY

An **x-intercept** of a graph is the x-coordinate of a point where the graph intersects the x-axis. A **y-intercept** of a graph is the y-coordinate of a point where the graph intercepts the y-axis.

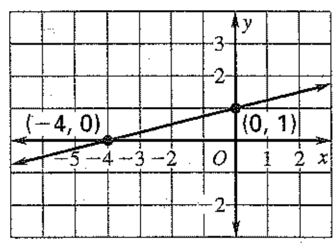
Finding Intercepts

To find the x-intercept of a line, substitute 0 for y into the equation of the line and solve for x.

To find the y-intercept of a line, substitute 0 for x into the equation of the line and solve for y.

EXAMPLE 1 Using Intercepts to Graph a Line

Graph the line with an x-intercept of -4 and a y-intercept of 1.



Solution

The x-intercept is -4, so plot the point $(-4, 0)$. The y-intercept is 1, so plot the point $(0, 1)$. Draw a line through the two points.

EXAMPLE 2 Writing an Equation in Two Variables

A discount bookstore sells paperbacks for \$4 each and hardcovers for \$9 each. You have \$36 to spend at the store. Write an equation in two variables that models the situation.

Solution

STEP 1 Use a verbal model to represent the situation.

Total cost of Paperbacks	+	Total cost of Hardcovers	=	Total Amount to Spend

STEP 2 Represent the total cost of paperbacks as the product of the price of one paperback and the number of paperbacks purchased x: \$4x.

STEP 3 Represent the total cost of hardcovers as the product of the price of one hardcover and the number of hardcovers purchased y: \$9y.

STEP 4 Write the equation. The total amount to spend, \$36, is equal to the sum of the total cost of paperbacks and the total cost of hardcovers:

$$\$4x + \$9y = \$36 \quad \text{or} \quad 4x + 9y = 36$$

Answer: The equation $4x + 9y = 36$ models the situation described.

Lesson 6.3

Name ______________________________ Date ______________

LESSON 6.3

Study Guide *continued*

For use with pages 327-332

EXAMPLE 3 Using and Interpreting Intercepts

In Example 2, the equation $4x + 9y = 36$ models the money spent on paperbacks and hardcovers at a discount bookstore. Graph the equation. What do the intercepts represent?

Solution

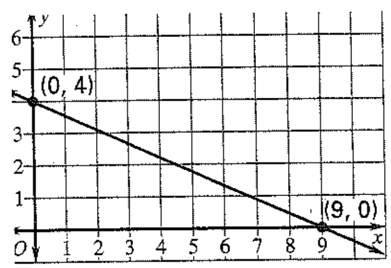
STEP 1 Find the x-intercept.

$$4x + 9y = 36$$
$$4x + 9(0) = 36$$
$$4x = 36$$
$$x = 9$$

STEP 2 Find the y-intercept.

$$4x + 9y = 36$$
$$4(0) + 9y = 36$$
$$9y = 36$$
$$y = 4$$

STEP 3 Graph the equation. The x-intercept is 9 and the y-intercept is 4. So the points (9, 0) and (0, 4) are on the graph. Plot these points and draw a line segment joining them.



Answer: The x-intercept represents the number of paperbacks that can be purchased if no hardcovers are purchased. The y-intercept represents the number of hardcovers that can be purchased if no paperbacks are purchased.

Exercises for Examples 1, 2, and 3

Graph the line with the given intercepts.

1. x-intercept: 2; y-intercept: 4
2. x-intercept: -1; y-intercept: 3
3. x-intercept: 3; y-intercept: -6
4. x-intercept: -2; y-intercept: -5
5. Sharon wants to withdraw \$60 from her bank account as five-dollar bills and ten-dollar bills. Write and graph an equation to represent this, where x is the number of five-dollar bills and y is the number of ten-dollar bills. What do the intercepts of the graph represent?

Lesson 6.3

Name ______________________ Date ______________

LESSON 6.4

Study Guide

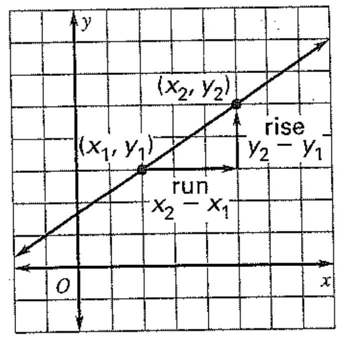
For use with pages 333–339

CA Standards AF 3.3

GOAL **Find and interpret slopes of lines.**

VOCABULARY

The **slope** of a nonvertical line is the ratio of its vertical change, the **rise**, to its horizontal change, the **run**.



Slope of a Line
The slope m of a nonvertical line passing through the points (x_1, y_1) and (x_2, y_2) is $m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$. The slope of a line is the same no matter which two points you choose to use in the formula.

Summary of Slope
A line with *positive* slope rises from left to right.

A line with *negative* slope falls from left to right.

A line with *zero* slope is horizontal.

A line with *undefined* slope is vertical.

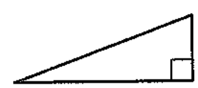
In real-world problems, slope is often used to describe a constant rate of change or an **average rate of change.**

EXAMPLE 1 Finding Slope

A skateboard ramp is 24 inches tall and 66 inches long. What is the slope of the ramp?

Solution

The diagram shows the rise and the run of the skateboard ramp.



$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\overset{4}{\cancel{24\text{ in.}}}}{\underset{11}{\cancel{66\text{ in.}}}} = \frac{4}{11}$$

Answer: The skateboard ramp has a slope of $\frac{4}{11}$.

Exercise for Example 1

1. A road rises 2 feet vertically for every 18 feet it runs horizontally. What is the slope of the road?

Lesson 6.4

Name ____________________ Date ____________

LESSON 6.4

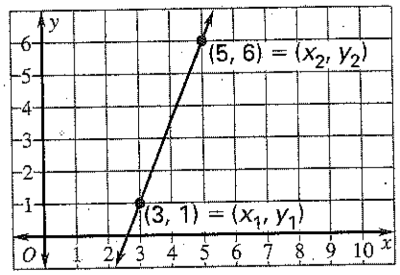
Study Guide *continued*

For use with pages 333–339

EXAMPLE 2 Positive and Negative Slope

Find the slope of the line.

a.

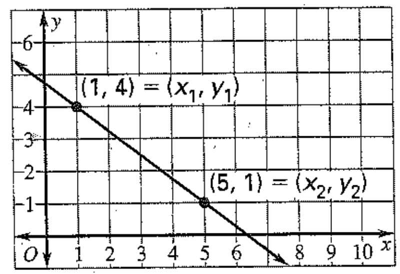


$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{6 - 1}{5 - 3} = \frac{5}{2}.$$

Answer: The slope is $\frac{5}{2}$.

b.



$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{1 - 4}{5 - 1} = \frac{-3}{4}, \text{ or } -\frac{3}{4}$$

Answer: The slope is $-\frac{3}{4}$.

Exercises for Example 2

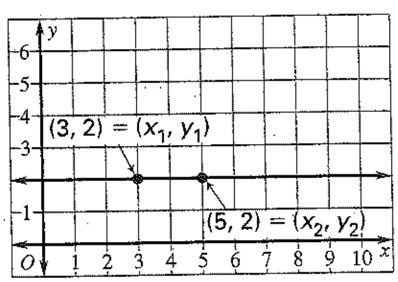
Find the slope of the line passing through the points.

2. (0, 0), (6, 2) **3.** (2, 3), (7, 0) **4.** (1, 1), (6, 4)

EXAMPLE 3 Zero and Undefined Slope

Find the slope of the line.

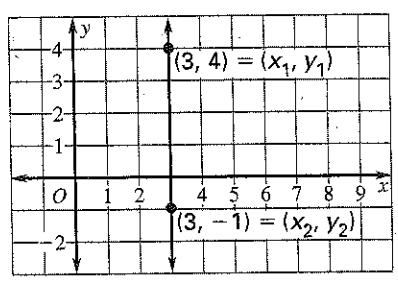
a.



$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 2}{5 - 3} = 0$$

Answer: The slope is 0.

b.



$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 4}{3 - 3} = \frac{-5}{0}$$

Answer: The slope is undefined.

Exercises for Example 3

Find the slope of the line passing through the points.

5. (4, −3), (4, 0) **6.** (0, 2), (5, 2) **7.** (3, −1), (3, −4)