S
es 651–657

ı to preteach some of the key
ı this chapter. Particularly for
uage Learners (ELL),
ıe vocabulary before the
sson begins gives students a
to understanding the new
ting new words on poster
ng to the words as you say
isplaying the poster for a
e is a useful technique.

xes (p. 304)
lane (p. 304)
(p. 304)
equation (p. 310)
ordered pair

it (p. 334)
ion (p. 313)
4)
s (p. 338)
ar lines (p. 339)
equation (p. 329)
306)

3)
ept equation

m of a linear equation (p. 315)
)4)
e (abscissa) (p. 304)
(p. 314)
)4)
e (ordinate) (p. 304)
(p. 314)

CHAPTER 7

What You'll Learn in Chapter 7

- How to graph linear equations in two variables
- How to write an equation of a line
- How to find an equation of a line that models given data
- How to prove theorems related to slope

Skills & Concepts You Need for Chapter 7

1-1 Evaluate.

1. $3x + y$ for $x = 4$ and $y = 3$

2. $\frac{3m + 1}{2n}$ for $m = 5$ and $n = 2$

1-3 Evaluate each expression.

3. $y^2 + 2$ for $y = 6$ **4.** $m^2 + 7$ for $m = 7$

2-1 Make true sentences using $>$ or $<$.

5. $-3 \square 2$ **6.** $-2 \square -6$ **7.** $0 \square -8$ **8.** $5 \square -2$

3-1 to 3-3 Solve and check.

9. $\frac{5}{2} - y = \frac{1}{3}$ **10.** $w + 8 = -3$ **11.** $-4 + x = 8$

12. $6x = -12$ **13.** $\frac{7}{8}w = -\frac{2}{3}$ **14.** $\frac{2}{3}t = \frac{1}{8}$

15. $5x + 8 = 43$ **16.** $-2x + 9 = -11$ **17.** $-8x + 3x = 25$

3-5 Solve and check.

18. $5x + 6 = -2x - 8$ **19.** $6(x - 6) = 3(x - 4)$

3-7 Solve for the indicated variable.

20. $d = \frac{5k}{s}$, for k **21.** $S = \frac{Mp^2}{mv}$, for v

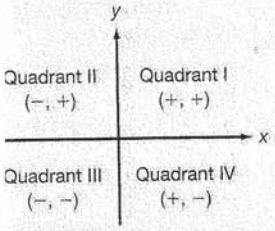
Skills & Concepts You Need for Chapter 7

1. 15
2. 4
3. 38
4. 56
5. $<$
6. $>$
7. $>$
8. $>$
9. $\frac{13}{6}$
10. -11
11. 12
12. -2
13. $-\frac{16}{21}$
14. $\frac{3}{16}$
15. 7
16. 10
17. -5
18. -2
19. 8
20. $k = \frac{ds}{5}$
21. $v = \frac{Mp^2}{mS}$

Teach the Mathematics (continued)

Quadrants

out that the points on the axes are
a quadrant.
ote that the quadrants are
ered in a counterclockwise direction.
ou may want to use the following
am to point out the signs associated
the coordinates in each quadrant.

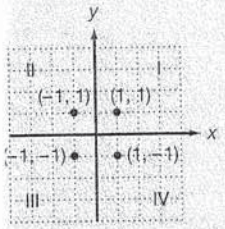


Questions

at is the sign of all *x*-coordinates in
adrant I?
itive
at is the sign of all *y*-coordinates in
adrant II?
itive
which quadrant are both coordinates
gative?
adrant III

lkboard Example

n which quadrant is each point
ocated? (−1, −1), (1, −1), (1, 1),
−1, 1)
II, IV, I, II



Teaching Transparency T3 or T24 for
ning quadrants.

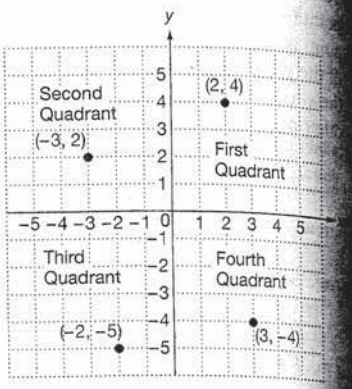
PART 2 Quadrants

Objective: Identify the quadrant associated with a point.

The coordinate plane is divided into four regions called **quadrants,** as shown at the right. The quadrants are numbered counterclockwise starting at the upper right. The graph also shows some points and their coordinates.

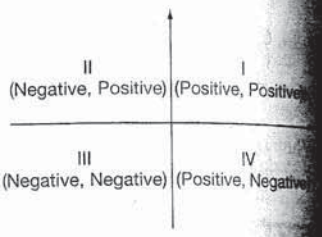
The point (−3, 2) is located in the second quadrant.

The point (3, −4) is located in the fourth quadrant.



The axes are not a part of any quadrant. A point on the *x*- or *y*-axis is not in a quadrant since it is on the boundary between quadrants.

The quadrants are traditionally denoted by Roman numerals.



EXAMPLE 3 In which quadrant is each point located?

(4, −5)	Quadrant IV
(2, 2)	Quadrant I
(−1, −3)	Quadrant III
(−6, 1)	Quadrant II
(−4, 0)	Not in a quadrant

Try This In which quadrant is each point located?

j. (5, 3) **k.** (−6, −4) **l.** (10, −14) **m.** (−13, 4)

PART 3 Finding Coordinates

Objective: Identify the coordinates of a point.

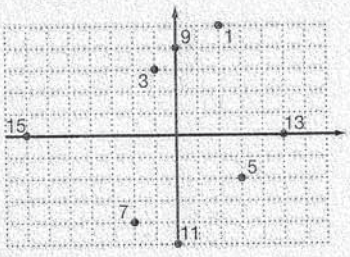
We can count how many units a point is to the left or right of the *y*-axis and the units up or down from the *x*-axis to find the coordinates of the point.

Try This

j. I
k. III
l. IV
m. II
n. (4, 3), (−4, −3), (2, −4), (1, 5), (−2, 0), (0, 3)

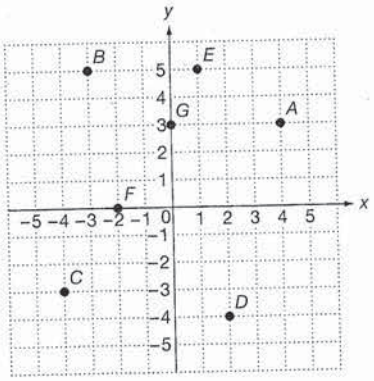
Exercises

1–15 Odd



EXAMPLE 4 Find the coordinates of point B.

Point B is 3 units to the left and 5 units up. Its coordinates are $(-3, 5)$.



Try This

a. Find the coordinates of points A, C, D, E, F, and G in the graph above.

7-1 Exercises

Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

A

Plot these points. Write the ordered pair close to each point.

1. $(2, 5)$	**2.** $(4, 6)$	**3.** $(-1, 3)$	**4.** $(-2, 4)$
5. $(3, -2)$	**6.** $(5, -3)$	**7.** $(-2, -4)$	**8.** $(-5, -7)$
9. $(0, 4)$	**10.** $(0, 6)$	**11.** $(0, -5)$	**12.** $(0, -7)$
13. $(5, 0)$	**14.** $(6, 0)$	**15.** $(-7, 0)$	**16.** $(-8, 0)$

In which quadrant is each point located?

17. $(-5, 3)$	**18.** $(-12, -1)$	**19.** $(100, -1)$	**20.** $(35.6, -2.5)$
21. $(-6, -29)$	**22.** $(-3.6, 10.9)$	**23.** $(3.8, 9.2)$	**24.** $(1895, 1492)$

25. a. In Quadrant II, ___-coordinates are positive and ___-coordinates are negative.

b. In Quadrant IV, x-coordinates are ___ and y-coordinates are ___.

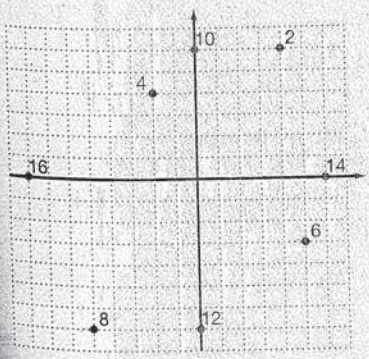
26. ***Critical Thinking*** There are many types of coordinate systems that use ordered pairs. For example, the (city, state) ordered pair in an envelope address helps locate a letter's destination.

a. Name two different (city, state) ordered pairs with the same second coordinate. Tell why the ordered pairs are different.

b. Name two different (city, state) ordered pairs with the same first coordinate. Tell why the ordered pairs are different.

ZIP+4 is a coordinate system used by the United States Postal Service to locate places as small as a post office box. See Exercise 26.

2–16 Even



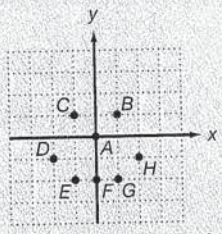
17. II
18. III
19. IV
20. IV
21. III
22. II
23. I
24. I
25. a. y, x
b. Positive, negative
26. a. Sample: Phoenix, Arizona, and Tucson, Arizona, are different communities in the same state.
b. Sample: Concord, Massachusetts, and Concord, California, are communities in different states.

Teach the Mathematics (

3 Finding Coordinates

Chalkboard Example

1. Find the coordinates of the p
A, B, C, D, E, F, G, H.



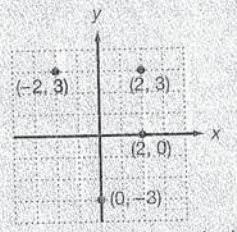
A: (0, 0), *B*: (1, 1), *C*: (−1, 1
D: (−2, −1), *E*: (−1, −2),
F: (0, −2), *G*: (1, −2), *H*: (2,

Use Teaching Transparencies T2 finding coordinates of points.

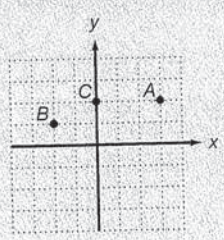
3. PRACTICE/ASSESS

LESSON QUIZ

1. Draw an x-axis and a y-axis paper and plot these points. (2, 3), (−2, 3), (0, −3), (2, 0



2. In which quadrant is the po
IV
3. Find the coordinates of poi



A: (3, 2), *B*: (−2, 1), *C*: (0, 2

Assignment Guide

To provide flexible schedul lesson can be split into par

1 Core 1–16
Extension 32, 36, 37

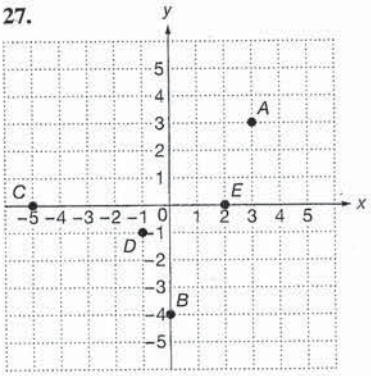
2 Core 17–25
Extension 33

3 Core 27–31
Extension 26, 34, 35

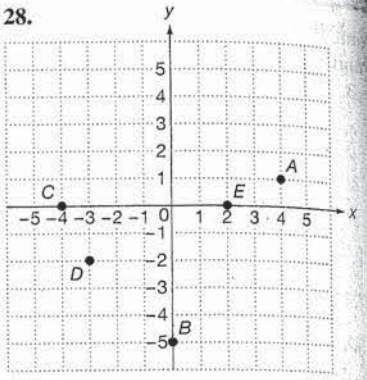
Use Mixed Review to main

Find the coordinates of points A, B, C, D, and E.

27.



28.



B

In Exercises 29–31, find three points that satisfy the following conditions.

29. The absolute values of the x-coordinate and the y-coordinate are equal.

30. The x-coordinate and the y-coordinate are additive inverses of each other.

31. The x-coordinate is the square of the y-coordinate.

32. Graph 12 points where the difference between the x- and y-coordinates of each point is 1.

33. ***Critical Thinking*** Graph the following pairs of points: $(1, -1)$, $(-1, 1)$; $(2, 5)$, $(5, 2)$; $(-3, -4)$, $(-4, -3)$; $(3, -1)$, $(-1, 3)$; and $(1, 4)$, $(4, 1)$. Make a conclusion about the graphs of the points (q, r) and (r, q) from the pattern formed.

Challenge

34. Find three points such that the product of the two coordinates is 2.

35. Find three points such that the sum of the two coordinates is 5.

36. Find the perimeter of a rectangle whose vertices have coordinates $(5, 3)$, $(5, -2)$, $(-3, -2)$, and $(-3, 3)$.

37. Find the area of a triangle whose vertices have coordinates $(0, 9)$, $(0, -4)$, and $(5, -4)$.

Mixed Review

Factor. **38.** $54m^2 - 24n^2$ **39.** $x^3 - 5x^2 + 2x - 10$ *6-2, 6-7*

Simplify. **40.** $(xy - 4yz) + 6yz$ **41.** $(ab - bc) + (3ab - 2bc)$

42. $(xy + 3yz) - (2xy - 5yz)$ **43.** $(mn - pq) - (2pq + 5mn)$ *2-8*

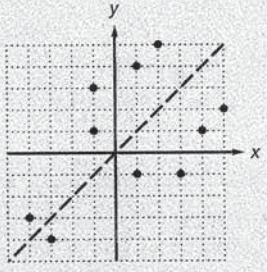
Exercises

27. A (3, 3), B (0, −4), C (−5, 0), D (−1, −1), E (2, 0)
28. A (4, 1), B (0, −5), C (−4, 0), D (−3, −2), E (2, 0)

29–35. Answers may vary. Examples are given.

29. (−3, 3), (−4, 4), (5, 5)
30. (−1, 1), (0, 0), (2, −2)
31. (4, −2), (9, 3), (1, −1)
32. (−2, −3), (0, −1), (2, 1)

33.



(q, r), and (r, q) are symmetrical about the line $y = x$.

34. $(-2, -1)$, $(1, 2)$, $\left(4, \frac{1}{2}\right)$
35. (2, 3), (4, 1), (0, 5)
36. 26
37. 32.5

Mixed Review

38. $6(3m - 2n)(3m + 2n)$
39. $(x^2 + 2)(x - 5)$
40. $xy + 2yz$
41. $4ab - 3bc$
42. $-xy + 8yz$
43. $-4mn - 3pq$

Teach the Mathematics (continued)

2 Graphing Equations

nphasize that it is easy to generate lutions to many equations if we first lve for one variable, say y, in terms of e other, x. Then each time we pick a lue for x, we can calculate a rresponding value for y.

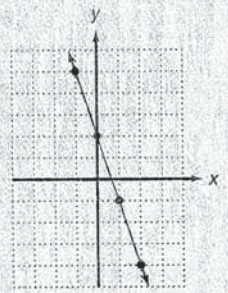
voiding Common Errors

ome students will plot the points but ot connect them. Emphasize that here are infinitely many solutions to quations in two variables and that we ust connect the points to complete e graph.

halkboard Example

1. Graph the equation $6x + 2y = 4$.
   Solve for y.
   $2y = 4 - 6x$
   $y = 2 - 3x$
   Make a table of solutions.

x	y
-1	5
0	2
1	-1
2	-4

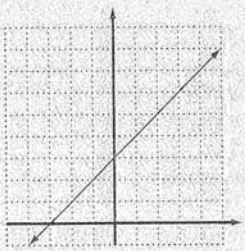


Use Teaching Transparency T25 to present Chalkboard Example 1.

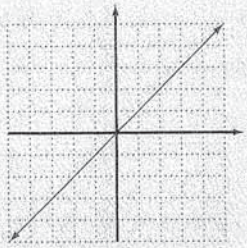
Try This

c. Answers may vary. Sample: (0, 3), (1, 5), (−1, 1), (−2, −1)

d.



e.



We can substitute values for x and find corresponding values for y. We choose any value for x. The easiest is 0.

$y = 3x - 2$
$y = 3 \cdot 0 - 2$ Substituting 0 for x
$y = -2$

The ordered pair $(0, -2)$ is a solution. We choose another number for x.

$y = 3 \cdot 2 - 2$ Substituting 2 for x
$y = 4$

A second solution is $(2, 4)$. Now try -2 for x.

$y = 3(-2) - 2$ Substituting -2 for x
$y = -8$

A third solution is $(-2, -8)$.

We can record the ordered pairs in a table to show the solutions at a glance.

x	y
0	-2
2	4
-2	-8

Try This

c. Find three solutions of $y - 2x = 3$.

PART 2 Graphing Equations

Objective: Graph equations in two variables.

A solution of an equation with two variables is an ordered pair of numbers which can be plotted on a coordinate plane. The **graph** of an equation is a drawing that represents its solution set.

Quick Review

To "graph an equation" means to draw the graph of its solution set.

EXAMPLE 4 Graph the equation $y - x = 1$.

Solve for y and find several solutions by substituting values for x.

$y - x = 1$
$y = 1 + x$

If $x = 0$, $y = 1 + 0 = 1$
If $x = -1$, $y = 1 + -1 = 0$
If $x = -5$, $y = 1 + -5 = -4$
If $x = 1$, $y = 1 + 1 = 2$
If $x = 3$, $y = 1 + 3 = 4$

x	y
0	1
-1	0
-5	-4
1	2
3	4

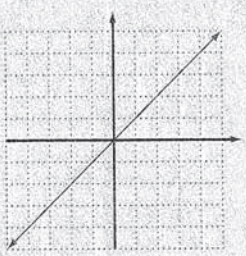
Making a table to record ordered pairs

Exercises

1. Yes
2. Yes
3. No
4. Yes
5. Yes
6. No

7–15. Answers may vary. Check students' work.

16.



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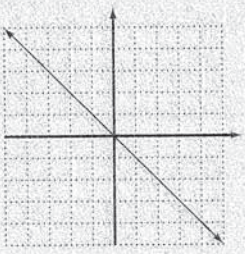

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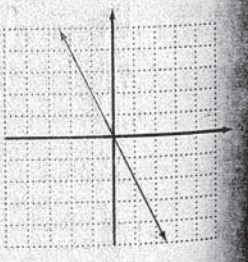
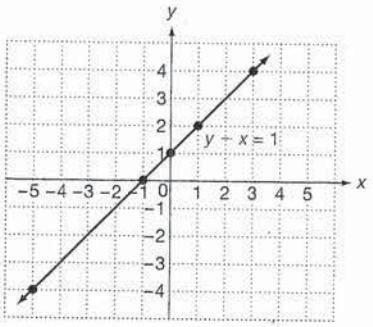


310 Chapter 7 *Graphs and Linear Equations*

Plot the points $(0, 1)$, $(-1, 0)$, $(-5, -4)$, $(1, 2)$ and $(3, 4)$.

The points all lie on a straight line. We can see that if we could plot all solutions, the graph would be a line. Thus we connect the points to draw the line. The arrowheads show that the line continues endlessly.

The line is the graph of the equation $y - x = 1$. Every point on the line is a solution of this equation.



Try This Graph each equation.

d. $y - x = 3$ **e.** $y = x$

7-2 Exercises

Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

A

Determine whether the given point is a solution of the equation.

1. $(2, 5)$, $y = 3x - 1$ **2.** $(1, 7)$, $y = 2x + 5$

3. $(2, -3)$, $3x - y = 3$ **4.** $(-1, 4)$, $2x + y = 2$

5. $(-2, -1)$, $2x + 3y = -7$ **6.** $(0, -4)$, $4x + 2y = 8$

Find three solutions of each equation.

7. $y = 2x + 1$ **8.** $y = 3x + 2$ **9.** $x + y = 6$

10. $x + y = 8$ **11.** $2x + y = 10$ **12.** $3x - y = 11$

13. $4x + 3y = 14$ **14.** $5x + 7y = 19$ **15.** $6x - 5y = 23$

Make a table of solutions and graph each equation.

16. $y = x$ **17.** $y = -x$ **18.** $y = -2x$

19. $y = 2x$ **20.** $y = x + 1$ **21.** $y = x - 1$

22. $y = 2x + 1$ **23.** $y = 3x - 1$ **24.** $y = -3x + 2$

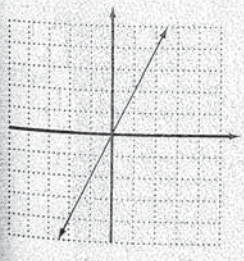
25. $y = -4x + 1$ **26.** $2x + y = 3$ **27.** $5x + y = 7$

B

28. Complete the table for $y = x^2 + 1$. Plot the points on graph paper and draw the graph.

x	0	−1	1	−2	2	−3	3
y							

19.



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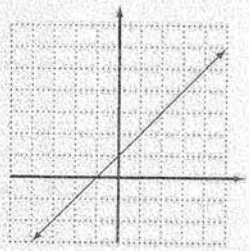

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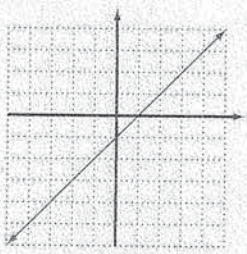

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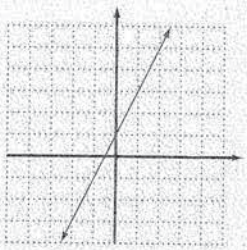
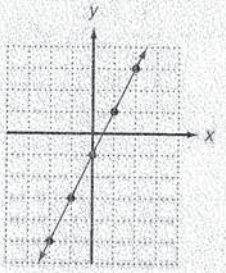


3. PRACTICE/ASSES

LESSON QUIZ

1. Determine whether the p
a solution of the equatior
$4x - 2y = 2$.
$(3, 5)$ is a solution.
2. Graph the equation $y = 2$

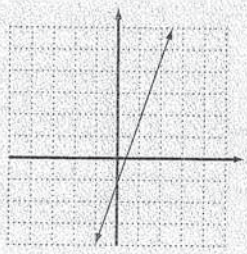


Assignment Guide

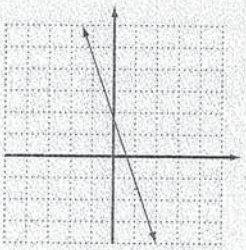
To provide flexible schedul
lesson can be split into par
Core 1–15
Extension 32, 33
Core 16–30
Extension 31

Use Mixed Review to maint

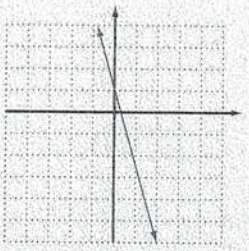
23.



24.



25.



Answers continue on next page

29. Copy and complete the table for $y = |x| + 1$. Plot the points on graph paper and draw the graph.

x	−4	−3	−2	−1	0	1	2	3	4
y									

30. Copy and complete the table for $y = \frac{1}{x}$. Plot the points on graph paper and draw the graph.

x	4	3	2	1	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	0	$-\frac{1}{4}$	$-\frac{1}{3}$	$-\frac{1}{2}$	−1	−2	−3	−4
y																

31. ***Critical Thinking*** Looking at the graphs for Exercises 28–30, which of the equations below would you expect to graph as a straight line?

$y = 3x - 1$ $\quad x^2 + y^2 = 3$ $\quad y = \frac{3}{xy}$ $\quad y = |x - 1|$

Challenge

32. Joan earns \$6 an hour. If she works on Saturdays, she earns \$9 an hour. Joan worked x hours on Friday and y hours on Saturday.

a. Write an expression showing Joan's total earnings for the two days.

b. Suppose Joan earned a total of \$57 on the two days. If x and y are whole numbers, find all of the possibilities for the number of hours she worked each day.

33. Machine X produces 68 rivets per hour, and machine Y produces 76 rivets per hour. Let x represent the number of hours machine X runs, and let y represent the number of hours machine Y runs. Write an equation giving the combined production of machine X and machine Y on a given day as 864. Find a solution to the equation. Explain your solution.

Mixed Review

Simplify. **34.** 4^{-3} **35.** m^0 **36.** $(y^2)^3$ **37.** $8x^4 - (x^4 + 2x) + 3x$ *2-7, 5-1, 5-2*

Solve. **38.** $(2y + 3)(y + 3) = 0$ **39.** $36c^2 = 0$ **40.** $9x^2 = 25$

41. $y^2 + 3y - 18 = 0$ **42.** $5x^2 = 7x$ **43.** $3x^2 + 14x + 9 = 2x$ *6-8*

Factor **44.** $16 - 12c$ **45.** $m^2n^3 + 2mn^2$ **46.** $9a^4 - 9b^4$

47. $x^2 + 6xy + 9y^2$ **48.** $x^2 + 7x - 18$ **49.** $6x^2 - 7x + 2$ *6-1, 6-2, 6-5, 6-6*

Solve for the indicated variable. **50.** $\frac{9}{5}C + 32 = F$ for C

51. $A = P(1 + rt)$ for r **52.** $A = \frac{1}{2}h(b_1 + b_2)$ for b_2 *3-7*

31. Yes No No No

32. a. $6x + 9y$

b. 2 h on Friday and 5 h on Saturday or 5 h on Friday and 3 h on Saturday or 8 h on Friday and 1 h on Saturday

33. $68x + 76y = 864$, let $x = y$, each machine runs for 6 h

Mixed Review

34. $\frac{1}{64}$
35. 1
36. y^6
37. $x(7x^3 + 1)$
38. $-3, -\frac{3}{2}$
39. 0
40. $\frac{5}{3}, \frac{-5}{3}$
41. $-6, 3$
42. $0, \frac{7}{5}$
43. $-1, -3$
44. $4(4 - 3c)$
45. $(mn^2)(mn + 2)$
46. $9(a^2 + b^2)(a + b)(a - b)$
47. $(x + 3y)^2$
48. $(x + 9)(x - 2)$
49. $(3x - 2)(2x - 1)$
50. $C = \frac{5}{9}(F - 32)$
51. $r = \frac{A - P}{Pt}$
52. $b_2 = \frac{2A - hb_1}{h}$

'ICE/ASSESS

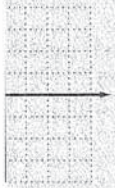
z

= 6

epts are (0, −2) and (1, 0).

ne parallel to the *x*-axis with
ot 1.

ine parallel to the *y*-axis with
ot −2.



ent Guide

le flexible scheduling, this
n be split into parts.
–15, 45–50
ion 56–58
6–33
ion 51
4–42, 52–55
ion 43, 44

d Review to maintain skills.

Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

Practice Multiple Choice

Choose the best answer.

1. Determine whether each of the given points is a solution of the equation.
a. (5, 2), b. (−5, 10), c. (4, 7);
$4x + 5y = 30$

A a. No; b. yes; c. yes
B a. Yes; b. no; c. yes
C a. Yes; b. yes; c. no
D a. No; b. no; c. yes

2. Find the *x*-intercept and the *y*-intercept of the equation.
$6x - 3y = 36$

F $x = -12$ and $y = 6$
G $x = 6$ and $y = 12$
H $x = 12$ and $y = -6$
J $x = 6$ and $y = -12$

1. C; Algebra 7.0
2. J; Algebra 6.0

7-3 Exercises

A

Graph these linear equations using three points.

1. $x + 3y = 6$	**2.** $x + 2y = 8$	**3.** $-x + 2y = 4$
4. $-x + 3y = 9$	**5.** $3x + y = 9$	**6.** $2x + y = 6$
7. $2y - 2 = 6x$	**8.** $3y - 6 = 9x$	**9.** $2x - 5y = 10$
10. $4x + 5y = 20$	**11.** $2x + 6y = 12$	**12.** $2x + 3y = 8$
13. $3x - 4y = 12$	**14.** $y = \frac{1}{2}x + 1$	**15.** $y = \frac{1}{3}x - 1$

Graph using intercepts.

16. $x - 1 = y$	**17.** $x - 3 = y$	**18.** $2x - 1 = y$
19. $3x - 2 = y$	**20.** $4x - 3y = 12$	**21.** $6x - 2y = 18$
22. $7x + 2y = 6$	**23.** $3x + 4y = 5$	**24.** $y = -4 - 4x$
25. $y = -3 - 3x$	**26.** $-3x = 6y - 2$	**27.** $-4x = 8y - 5$
28. $3x - 6y = 12$	**29.** $-5x + y = 3$	**30.** $3x - 4y = -12$
31. $8y + 5x = 24$	**32.** $y = -6 + 2x$	**33.** $3y = 2x - 7$

Graph.

34. $x = -4$	**35.** $x = -3$	**36.** $y = -7$	**37.** $y = -8$
38. $x = 5$	**39.** $x = 7$	**40.** $y = 0$	**41.** $y = -2$

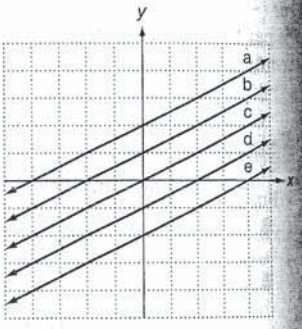
42. Write an equation whose graph is the *y*-axis.

43. Find the coordinates of the point of intersection of the graphs of the equations $x = -3$ and $y = 6$.

44. ***Mathematical Reasoning*** Which equation, $x = -2$ or $x = 3$, has a graph that comes closer to the origin? Explain.

B

Match each equation with its corresponding graph at the right.

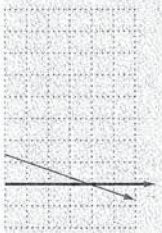


45. $y = \frac{1}{2}x$
46. $y = \frac{1}{2}x + 1$
47. $y = \frac{1}{2}x - 1$
48. $y = \frac{1}{2}x + 2$
49. $y = \frac{1}{2}x - 2$

50. **TEST PREP** Which equation is *not* a standard-form equation for a line graphed above?
A. $2y - x = 0$ **B.** $x - 2y = 0$ **C.** $x - 2y = 2$ **D.** $-x + 2y = 4$

51. ***Critical Thinking*** In Exercises 45–49, what effect does changing the constant in an equation have on the graph of the equation?

2.



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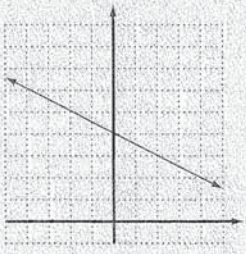

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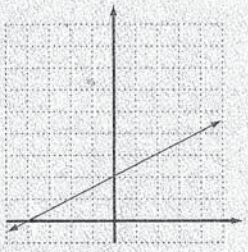
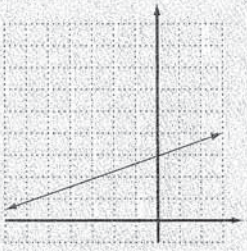


6.



5. See Additional Answers.

p. T658 – T663

Mental Math Write an equation of each line.

52. the line parallel to the x-axis and 5 units below it
53. the line parallel to the y-axis and 13 units to the right of it
54. the line parallel to the x-axis and intersecting the y-axis at (0, 2.8)
55. the line parallel to the y-axis and intersecting the x-axis at $(-3\frac{1}{2}, 0)$

Challenge

56. Plot the points (10, 10), (10, −10), (−10, −10), and (−10, 10). Connect the points to form a square. Then graph the following equations, but draw only the part of each line that is inside the square.

a. $y = x - 7$ **b.** $y = x - 5$ **c.** $y = 5$ **d.** $y = 2x$
e. $y = -x$ **f.** $y = -x + 7$ **g.** $y = -x + 5$ **h.** $2y = x$

57. The part of each line that is inside the square in Exercise 56 is called a line segment. Which of the eight line segments is the longest? Which pairs of line segments have the same length?
58. Is the following statement sometimes, always, or never true? Explain.
If $Ax + By = C$ is in standard form, then $-Ax - By = -C$ is also in standard form.

Mixed Review

Determine whether the following are squares of binomials.

59. $x^2 + 24x + 144$ **60.** $m^2 - 24m - 144$ **61.** $a^2 - 2ac + c^2$ *6-3*

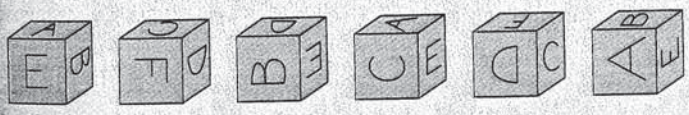
Factor. **62.** $a^2c - ac^2$ **63.** $x^2y^2 - 2xy - 8$ **64.** $a^2 - 3ab - 4b^2$ *6-2, 6-6*

Solve for the indicated variable. **65.** $a = \frac{v^2}{r}$ for r **66.** $K = \frac{1}{2}Iw^2$ for I *3-7*

67. The office assistant types 65 words per minute. At that rate, how long will it take him to type a 2500-word document? *3-9*

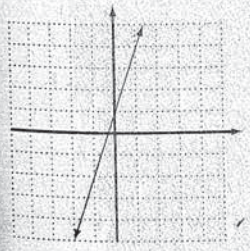
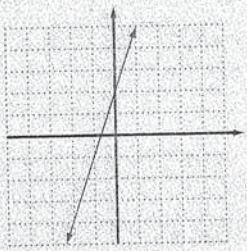
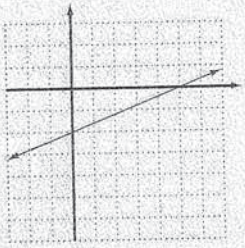
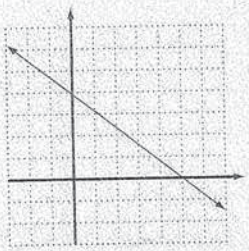
Connections: Reasoning

The 6 diagrams below show different views of the same cube.

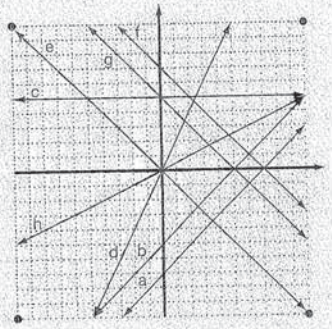


Give the letter that is on the face opposite each face shown below.

1. 
2. 
3. 
4. 

7. 
8. 
9. 
10. 

11–41. See Additional Answers.

42. $x = 0$
43. (−3, 6)
44. The graph of $x = -2$ comes withi units of the origin at (0, −2). The closest that the graph of $x = 3$ co to the origin is 3 units at (0, 3).
45. c
46. b
47. d
48. a
49. e
50. A
51. Changing the constant raises or l the graph.
52. $y = -5$
53. $x = 13$
54. $y = 2.8$
55. $x = -3\frac{1}{2}$
56. 

57. e; b and g, a and f, d and h
58. Always true; the x term, y term, constant term are in the correct positions, $-A$, $-B$, and $-C$ are constants, and $-A$ and $-B$ are n both 0. So $-Ax - By = -C$ is in standard form by definition.

Mixed Review

59. Yes
60. No
61. Yes
62. $ac(a - c)$
63. $(xy + 2)(xy - 4)$
64. $(a - 4b)(a + b)$
65. $r = \frac{v^2}{a}$
66. $I = \frac{2K}{w^2}$
67. About 38.5 minutes

Connections: Reasoning

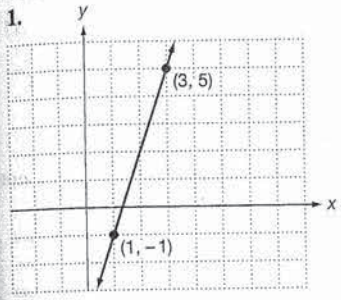
1. D
2. C
3. F
4. B

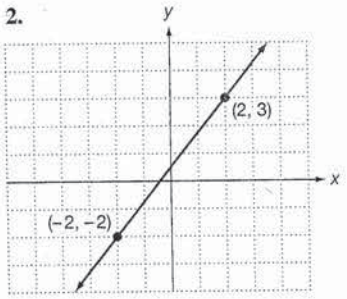
See p. 658–663

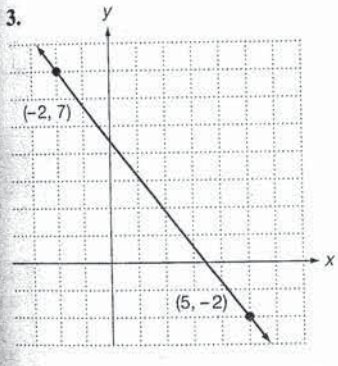
7-4 Exercises

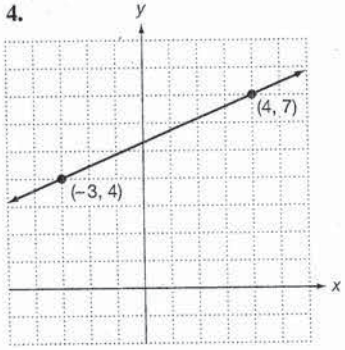
A

Find the slope of each line.

1. 

2. 

3. 

4. 

Graph the lines containing these points and find their slopes.

5. $(-4, 2)$ $(2, -3)$
6. $(4, 1)$ $(-2, -3)$
7. $(-2, 4)$ $(3, 0)$
8. $(3, 2)$ $(-1, 2)$
9. $(0, 5)$ $(-4, -3)$
10. $(1, 6)$ $(-2, -4)$

Find the slopes of the lines containing these points.

11. $(4, 0)$ $(5, 7)$
12. $(3, 0)$ $(6, 2)$
13. $(0, 8)$ $(-3, 10)$
14. $(0, 9)$ $(4, 7)$
15. $(3, -2)$ $(5, -6)$
16. $(-2, 4)$ $(6, -7)$
17. $(0, 0)$ $(-3, -9)$
18. $(0, 0)$ $(-4, -8)$
19. $\left(\frac{3}{4}, \frac{1}{2}\right)$ $\left(\frac{1}{4}, -\frac{1}{2}\right)$
20. $\left(\frac{1}{4}, \frac{1}{8}\right)$ $\left(\frac{1}{2}, \frac{3}{4}\right)$

Find the slope, if it exists, of each of these lines.

21. $x = -8$
22. $x = -4$
23. $y = 2$
24. $y = 17$
25. $x = 9$
26. $x = 6$
27. $y = -9$
28. $y = -4$

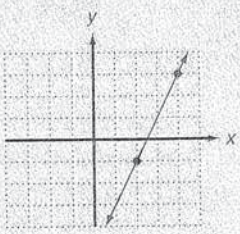
Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

3. PRACTICE/ASSESS

LESSON QUIZ

1. Graph the line containing the p
(4, 3) and (2, −1) and find the



The slope equals 2.

Find the slope, if possible, of the l
containing these points.

2. $(-6, 3)$, $(4, -9)$
$-\frac{6}{5}$
3. $(3, 4)$, $(5, 4)$
0
4. $(5, 7)$, $(5, -3)$
No slope

Assignment Guide

To provide flexible scheduling lesson can be split into parts.

- Core 1–9 odd, 11–20, 29–33
  Extension 36, 38, 39
- Core 2–10 even, 21–28, 34
  Extension 35, 37

Use Mixed Review to maintain

Exercises

1. $m = 3$
2. $m = \frac{5}{4}$
3. $m = -\frac{9}{7}$
4. $m = \frac{3}{7}$
5. $m = -\frac{5}{6}$
6. $m = \frac{2}{3}$
7. $m = -\frac{4}{5}$
8. $m = 0$
9. $m = 2$
10. $m = \frac{10}{3}$
11. 7
12. $\frac{2}{3}$
13. $-\frac{2}{3}$
14. $-\frac{1}{2}$
15. -2
16. $-\frac{11}{8}$
17. 3
18. 2
19. 2
20. $\frac{5}{2}$
21. No slope
22. No slope
23. Zero slope
24. Zero slope
25. No slope
26. No slope
27. Zero slope
28. Zero slope

The vertical rise is 14 ft. The horizontal run is 5 ft. What is the slope of this ladder? (See Exercise 35.)

B

29. A line contains $(4, 3)$ and $(x, 7)$. It has slope 2. Find x.

30. A line contains $(9, y)$ and $(-6, 3)$. It has slope $\frac{2}{3}$. Find y.

31. A line contains $(-4, y)$ and $(2, 4y)$. It has slope 6. Find y.

32. The gradient of a road is its slope expressed as percent. What is the slope of a road with a 7% gradient?

33. Suppose an airplane climbs 11.7 ft for every 30 ft it moves horizontally. Express the slope of the climb as a percent.

34. The vertices of a triangle are $X(-1, 4)$, $Y(2, 2)$, and $Z(2, -2)$. Find the slope of each side of the triangle.

35. ***Critical Thinking*** An extension ladder has a label that says, "Do not place base of ladder less than 5 ft from the vertical surface."

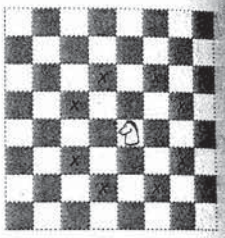
- **a.** What is the greatest slope possible if the ladder can extend to safely reach a height of 12 ft? Of 18 ft? Of 24 ft?
- **b.** Once, when the ladder reached to 20 ft with the base 5 ft from a wall, it slid down and away from the wall until it was flat on the ground. What slope values did the ladder have during its slide?

36. ***Write a Convincing Argument*** Are the points $(-1, 3)$, $(1, 1)$, and $(10, -8)$ on one line? Explain. Hint: Use the definition of slope.

Challenge

37. A line contains points (p, q) and (q, p) where $p \neq q$. Find the slope.

38. In the chessboard drawing, the knight may move to any of the eight squares shown. If the beginning and end squares of any move determine a line, what slopes are possible?



39. ***Error Analysis*** Garth found the slope of the line containing $(-2, 5)$ and $(4, -7)$ to be 2. What error did he make?

Mixed Review

Factor. **40.** $9m^4n^2 - 16$ **41** $a^2b^2 + ab - 2$ **42.** $3x^2 + 2xy - y^2$ *6-2, 6-7*

Determine whether the given point is a solution of the equation.

43. $(0, -2)$, $3x - y = 2$ **44.** $(2, 3)$, $3x - 2y = 2$ *7-2*

Write in standard notation **45.** 2.575×10^{-3} **46.** 1.004×10^{5} *5-4*

Solve. **47.** $y^2 - 7y = 18$ **48.** $m^2 + 3m = 10$ **49.** $a^2 + 4a = -4$ *6-8*

Photo caption: $\frac{14}{5}$

36. Yes. Sample: A line can be determined by a point and a slope. The slope between $(-1, 3)$ and $(1, 1)$ equals -1, and the slope between $(1, 1)$ and $(10, -8)$ also equals -1. Since both lines have slope -1 and contain the point $(1, 1)$, they must be the same line, and all 3 points are on a line.

37. -1

38. $2, \frac{1}{2}, -\frac{1}{2}, -2$

39. In using the slope formula, Garth subtracted the y-coordinates (numerator) and the x-coordinates (denominator) in opposite orders.

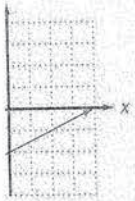
Mixed Review

40. $(3m^2n + 4)(3m^2n - 4)$
41. $(ab + 2)(ab - 1)$
42. $(3x - y)(x + y)$
43. Yes
44. No
45. 0.002575
46. 100,400
47. $-2, 9$
48. $-5, 2$
49. -2

'ICE/ASSESS

z

e the slope and *y*-intercept of
$= 7x + 6$.
is 7.
ercept is 6.
e the slope and *y*-intercept of
$x - 4y = 3$.
is $\frac{7}{4}$.
ercept is $-\frac{3}{4}$.
$= \frac{1}{2}x - 2$ using *y*-intercept
e.



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de flexible scheduling, this
an be split into parts.
1–18, 40
sion 47
19–27, 48–54
sion 55, 56, 58
28–39, 41–46
sion 57

ed Review to maintain skills.

Exercises

1. $-\frac{3}{2}$
2. 4
3. $-\frac{1}{4}$
4. $-\frac{1}{3}$
5. 2
6. 5
7. $\frac{4}{3}$
8. $\frac{3}{4}$
9. $\frac{1}{2}$
10. $\frac{1}{3}$
11. $\frac{1}{2}$
12. $\frac{5}{7}$
13. $\frac{7}{5}$
14. $\frac{3}{2}$
15. $-\frac{2}{3}$
16. $-\frac{8}{5}$
17. $-\frac{6}{9}$ 18. $-\frac{7}{9}$

Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

7-5 Exercises

A

Find the slope of each line by solving for *y*.

1. $3x + 2y = 6$
2. $4x - y = 5$
3. $x + 4y = 8$
4. $x + 3y = 6$
5. $-2x + y = 4$
6. $-5x + y = 5$
7. $4x - 3y = -12$
8. $3x - 4y = -12$
9. $x - 2y = 9$
10. $x - 3y = -2$
11. $-2x + 4y = 8$
12. $-5x + 7y = 2$
13. $-7x + 5y = 16$
14. $-3x + 2y = 9$
15. $-6x - 9y = 13$
16. $-8x - 5y = 18$
17. $8x + 9y = 10$
18. $7x + 4y = 13$

Find the slope and *y*-intercept.

19. $y = -4x - 9$
20. $y = -3x - 5$
21. $2x + 3y = 9$
22. $5x + 4y = 12$
23. $-8x - 7y = 21$
24. $-2x - 9y = 13$
25. $9x = 3y + 5$
26. $4x = 9y + 7$
27. $-6x = 4y + 2$

Graph each line using the *y*-intercept and slope.

28. $y = 2x + 3$
29. $y = -3x + 4$
30. $y = -x + 7$
31. $y = \frac{2}{3}x - 3$
32. $y = \frac{3}{4}x - 3$
33. $y = \frac{1}{2}x + 2$
34. $y + \frac{1}{3}x = 2$
35. $y - \frac{2}{3}x = 0$
36. $y + \frac{3}{5}x = -3$
37. $y - 5x = -4$
38. $y - 7 = -3x$
39. $y + 4 = -2x$

40. **TEST PREP** Which line has greater slope, $-2x + 3y = 6$ or $2x - 3y = 4$?

A. $-2x + 3y = 6$ **B.** $2x - 3y = 4$
C. Slopes are equal. **D.** Cannot tell.

B

Graph each line using the slope and *y*-intercept.

41. $2y - 6x = -8$
42. $4y + 2x = 12$
43. $2x - 5y = 15$
44. $6x + 3y = -12$
45. $8x - 3y = 15$
46. $-2x = -4y + 16$

47. Consider the equation $ky + 2x = 7$. For what value of k will the slope be 1?

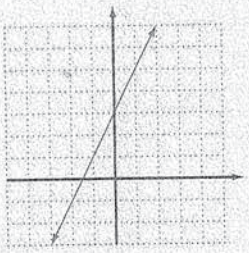
Write an equation for each line given the slope and *y*-intercept. Express the equation in slope-intercept form.

48. $m = 3, b = -2$
49. $m = 8, b = 0$
50. $m = 0, b = -5$
51. $m = -7, b = 4$
52. $m = \frac{1}{2}, b = 1$
53. $m = -6, b = \frac{3}{4}$

54. Write an equation of a line that has the same slope as $y = \frac{2}{3}x + 5$ with a *y*-intercept of -8.

19. $m = -4, b = -9$
20. $m = -3, b = -5$
21. $m = -\frac{2}{3}, b = 3$
22. $m = -\frac{5}{4}, b = 3$
23. $m = -\frac{8}{7}, b = -3$
24. $m = -\frac{2}{9}, b = -\frac{13}{9}$
25. $m = 3, b = -\frac{5}{3}$
26. $m = \frac{4}{9}, b = -\frac{7}{9}$
27. $m = -\frac{3}{2}, b = -\frac{1}{2}$

28.



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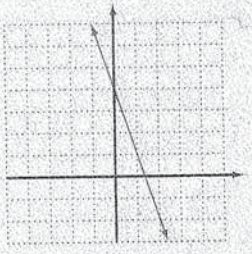

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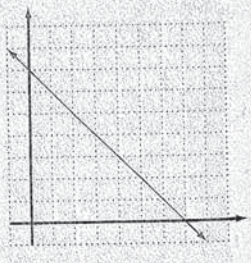


31–39, 41–46. See Additional Answers.
40. C

Find the slope and y-intercept. Do not graph.

55. $3(x + 4) = y - 8x + 3$ **56.** $2y + 4x = 3(y - x) + 8$

57. ***Critical Thinking*** Graph $y = 3|x| + 5$. Your graph should look like an angle. Give the slope of each ray of the angle, and the coordinates of the vertex.

Challenge

58. ***Mathematical Reasoning*** Copy and complete the table.

Standard Form	Slope-Intercept Form	x- and y-Intercepts
$Ax + By = C$, $A \neq 0, B \neq 0$	?	?
?	$y = mx + b$	?
?	?	$(a, 0)$ and $(0, b)$ $a \neq 0, b \neq 0$

Mixed Review

In which quadrant is each point located? **59.** $(1, -5)$ **60.** $(-1, 3)$ **61.** $(2, 3)$ **62.** $(-4, -1)$ **63.** $(2, -6)$ **64.** $(-3, 2)$ *7-1*

Find three solutions of each equation. **65.** $x + 2y = 5$ **66.** $2x - 4y = 0$ **67.** $3x + y = 2$ **68.** $2x - 2y = 4$ *7-2*

Factor. **69.** $25b^2 - 16a^2$ **70.** $a^4 + 4a^3b + 4a^2b^2$ **71.** $mn + 5m + 3n + 15$ **72.** $6x^2 + 14x + 8$ *6-2, 6-7*

Solve. **73.** $12y^2 = 108$ **74.** $a^2 - 3a = 10$ **75.** $x^2 - 25 = 0$ *6-8*

76. The Correction Company makes erasers and packs them in boxes of 144. On Tuesday, the Correction Company produced and packed 31 boxes, with 4 erasers left over. How many erasers were produced that day? *3-11*

Self-Test On the Web

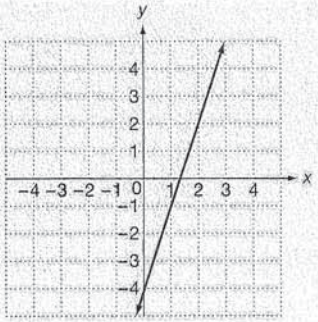
Check your progress. Look for a self-test at the Prentice Hall Web site.
www.phschool.com

Connections: Reasoning

The graph of the equation $y = 3x - 4$ is shown at the right.

Suppose you graphed each of the following equations on the same coordinate axes. How would the graph of each equation be related to the graph at the right?

a. $y = 3x + 6$ **b.** $y = 6x - 4$
c. $2y = 6x - 8$ **d.** $4 = 3x - y$
e. $y = \frac{-x}{3} - 4$ **f.** $-y = -3x + 4$



47. -2
48. $y = 3x - 2$
49. $y = 8x$
50. $y = -5$
51. $y = -7x + 4$
52. $y = \frac{1}{2}x + 1$
53. $y = -6x + \frac{3}{4}$
54. $y = \frac{2}{3}x - 8$
55. $m = 11, b = 9$
56. $m = 7, b = -8$
57. Slopes: -3, 3; vertex (0, 5)

58.

Standard Form	*Slope-Intercept Form*	*x- and y-Intercepts*
$Ax + By = C$, $A \neq 0, B \neq 0$	$y = -\frac{A}{B}x + \frac{C}{B}$	$\frac{C}{A}$ and $\frac{C}{B}$
$-mx + y = b$	$y = mx + b$	$-\frac{b}{m}$ and b
$\frac{b}{a}x + y = b$	$y = -\frac{b}{a}x + b$	a and b $a \neq 0, b \neq 0$

Mixed Review
59. IV
60. II
61. I
62. III
63. IV
64. II
65–68. Answers may vary. Sam given.
65. $(-1, 3)$, $(1, 2)$, $(2, \frac{3}{2})$
66. $(-2, -1)$, $(2, 1)$, $(4, 2)$
67. $(0, 2)$, $(1, -1)$, $(-1, 5)$
68. $(2, 0)$, $(0, -2)$, $(1, -1)$
69. $(5b + 4a)(5b - 4a)$
70. $a^2(a + 2b)^2$
71. $(m + 3)(n + 5)$
72. $2(x + 1)(3x + 4)$
73. -3, 3
74. -2, 5
75. -5, 5
76. 4468 erasers

Connections: Reasoning
a. Same slope, but $b = 6$
b. Same y-intercept, but $m =$
c. Same line
d. Same line
e. Same y-intercept, but $m =$
f. Same line

7-6 Exercises

A

Write an equation for each line with the given point and slope. Express the equation in slope-intercept form.

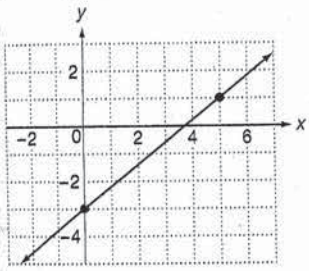
1. $(2, 5), m = 5$
2. $(-3, 0), m = -2$
3. $(2, 4), m = \frac{3}{4}$
4. $\left(\frac{1}{2}, 2\right), m = -1$
5. $(2, -6), m = 1$
6. $(-3, 0), m = -3$
7. $(0, 3), m = -3$
8. $(4, 3), m = \frac{3}{4}$
9. $(-2, 1), m = \frac{1}{2}$
10. $(-3, -5), m = -\frac{3}{5}$
11. $(-6, -2), m = \frac{5}{2}$
12. $\left(-\frac{1}{2}, 0\right), m = 3$

Write an equation for each line that contains the given pair of points.

13. $(-6, 1)$ $(2, 3)$
14. $(12, 16)$ $(1, 5)$
15. $(0, 4)$ $(4, 2)$
16. $(0, 0)$ $(4, 2)$
17. $(3, 2)$ $(1, 5)$
18. $(-4, 1)$ $(-1, 4)$
19. $(5, 0)$ $(0, -2)$
20. $(-2, -2)$ $(1, 3)$
21. $(-2, -4)$ $(2, -1)$
22. $(-3, 5)$ $(-1, -3)$

Write an equation for each line in slope-intercept form.

23.



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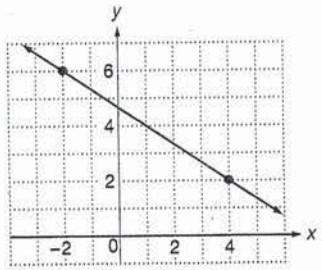

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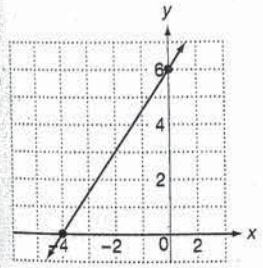

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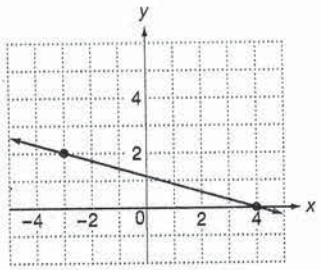


27. *Critical Thinking* When you write an equation for a line containing one or more given points, you can check your work by checking that the coordinates of each given point satisfy the equation. Check your work in this way for the Exercises assigned from 1–26 above.

Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

Practice Multiple Choice

Choose the best answer.

1. Find the equation of a line through point (2, 3) with a slope of $-\frac{5}{7}$.

A $5x + 7y = 11$
B $5x + 7y = 31$
C $5x - 7y = -11$
D $5x - 7y = 31$

2. What part of the statement below is the conclusion?

If $4x + 2y = 9$, then $12x + 6y = 27$.

F (1, 0.5)
G $4x + 2y = 9$
H $16x + 8y = 36$
J $12x + 6y = 27$

1. B; Algebra 7.0
2. J; Algebra 24.2

3. PRACTICE/ASSESS

LESSON QUIZ

1. Write the equation of the line slope 6 and *y*-intercept −5.
   $y = 6x - 5$
2. Write the slope-intercept form line with slope 5, containing th (2, 7).
   $y = 5x - 3$
3. Write the slope-intercept form line containing the points (8, 3) (4, 1).
   $y = \frac{1}{2}x - 1$

Assignment Guide

To provide flexible scheduling, lesson can be split into parts.

- Core 1–31 odd
  Extension 32
- Core 2–26 even, 27, 28, 30
  Extension 33–35

Use Mixed Review to maintain

Exercises

1. $y = 5x - 5$
2. $y = -2x - 6$
3. $y = \frac{3}{4}x + \frac{5}{2}$
4. $y = -x + \frac{5}{2}$
5. $y = x - 8$
6. $y = -3x - 9$
7. $y = -3x + 3$
8. $y = \frac{3}{4}x$
9. $y = \frac{1}{2}x + 2$
10. $y = -\frac{3}{5}x - \frac{34}{5}$
11. $y = \frac{5}{2}x + 13$
12. $y = 3x + \frac{3}{2}$
13. $y = \frac{1}{4}x + \frac{5}{2}$
14. $y = x + 4$
15. $y = -\frac{1}{2}x + 4$
16. $y = \frac{1}{2}x$
17. $y = -\frac{3}{2}x + \frac{13}{2}$
18. $y = x + 5$
19. $y = \frac{2}{5}x - 2$
20. $y = \frac{5}{3}x + \frac{4}{3}$
21. $y = \frac{3}{4}x - \frac{5}{2}$
22. $y = -4x - 7$
23. $y = \frac{4}{5}x - 3$
24. $y = -\frac{2}{3}x + \frac{14}{3}$
25. $y = \frac{3}{2}x + 6$
26. $y = -\frac{2}{7}x + \frac{8}{7}$
27. Check students' work.

B

Write an equation in slope-intercept form of the line described.

28. has the same slope as $3x - y + 4 = 0$ and contains the point $(2, -3)$

29. has the same y-intercept as $x - 3y = 6$ and contains the point $(5, -1)$

30. has the same slope as $3x - 2y = 8$ and the same y-intercept as $2y + 3x = -4$

31. has the same slope as $2x = 3y - 1$ and contains the point $(8, -5)$

32. ***Write a Convincing Argument*** A line contains the points $(12, 8)$ and $(14, 9)$. Explain why the line intercepts the y-axis at the point $(0, 2)$.

Challenge

33. If the endpoints of a line segment are (x_1, y_1) and (x_2, y_2), then the coordinates of the midpoint of the segment are

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Use this formula to find midpoints of segments with these endpoints.

a. $(-4, 3)$ and $(6, -9)$ **b.** $(-4, 0)$ and $(4, 0)$

c. $(-2, 1)$ and $(4, 3)$ **d.** $(-4, 3)$ and $(4, -3)$

34. Consider the triangle with vertices at $(1, 4)$, $(5, 10)$, and $(9, 2)$. Form a second triangle by joining midpoints of the sides of the first triangle. Repeat this process to get a third triangle. How are the slopes of the sides of the third triangle related to the slopes of the sides of the first triangle?

35. Find the y-intercept of the line containing the point $(2, 5)$ and the midpoint of the segment with endpoints $(3, 6)$ and $(10, -2)$.

Quick Review

The sum of two numbers divided by 2 is the *average* of the two numbers.

Mixed Review

Graph each line using the given information.

36. $(-6, 1)$ and $(4, 6)$ are on the line. **37.** $m = 3$ and $(4, -1)$ is on the line.

38. slope $= -2$, y-intercept is 1 *7-5*

39. What number is 68% of 240? **40.** 54 is 12% of what number? *3-10*

Solve. **41.** $x^2 - 49 = 0$ **42.** $a^2 - a = 6$ **43.** $m^2 + 5m = 36$

44. $c(c + 7) = 0$ **45.** $(x - 9)(3x + 5) = 0$ **46.** $81x^2 = 16$ *6-8*

Factor. **47.** $4m^2 - 36m + 80$ **48.** $x^5 + 4x^4 + 4x^3$

49. $9c^3 - 3c^2 - 3c + 1$ **50.** $y^3 - 2y^2 - 8y$ **51.** $x^2y^2 - z^2$ *6-7*

Simplify. **52.** $\frac{4^7}{4^4}$ **53.** $\frac{p^{18}}{p^{16}}$ **54.** $(5^3)^4$ *5-1, 5-2*

55. The United States population in 1950 was 151 million. By 1990 it had increased by 65%. What was the 1990 population? *3-10*

Exercises

8. $y = 3x - 9$

9. $y = 1/5x - 2$

10. $y = 3/2x - 2$

11. $y = 2/3x - 3 1/3$

12. The equation for the line containing the points is $y = 1/2x + 2$, so the line intercepts the y-axis at $(0, 2)$.

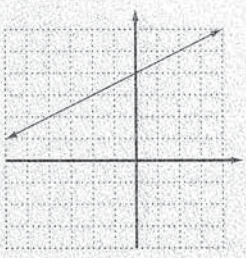
13. a. $(1, -3)$
    b. $(0, 0)$
    c. $(1, 2)$
    d. $(0, 0)$

14. corresponding sides have the same slope.

15. $19/3$

Mixed Review

36.



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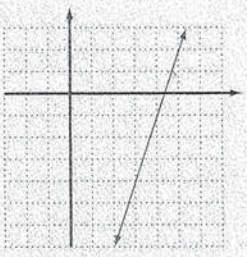

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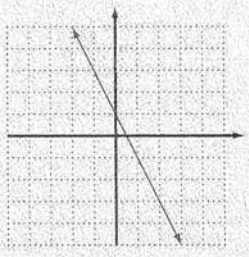


39. 163.2
40. 450
41. $-7, 7$
42. $-2, 3$
43. $-9, 4$
44. $0, -7$
45. $9, -\frac{5}{3}$
46. $\frac{4}{9}, -\frac{4}{9}$
47. $4(m - 4)(m - 5)$
48. $x^3(x + 2)^2$
49. $(3c^2 - 1)(3c - 1)$
50. $y(y - 4)(y + 2)$
51. $(xy - z)(xy + z)$
52. 4^3
53. p^2
54. 5^{12}
55. 249 million

For the year 2000, $a = 20$. We evaluate the equation for $a = 20$.

$$d = -14a + 1744$$
$$d = -14(20) + 1744$$
$$d = -280 + 1744$$
$$d = 1464$$

We can predict that there were about 1464 daily newspapers in the United States in 2000.

Try This

a. A college record in the 100-m dash in 1960 (t) was 10.5 seconds (r). In 1990 the new record was 10.2 seconds. Assume a linear relationship fits these data with ordered pairs (t, r).
(1) Find a linear equation to fit the data points.
(2) Use the linear equation to predict the record in 2000.

b. Graph the ordered pairs (d, c). Draw the line of best fit and find the equation of the line.

Distance (d) in miles	10	15	20	25	30	40	50	60
Cost (c)	10	15	20	22	24	35	42	50

7-7 Exercises

Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

A

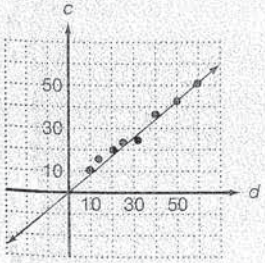
Solve. Assume a linear relationship fits each set of data.

1. A long-distance telephone company advertised the following rates: "5 minutes (m) for just 85¢ (p) and 10 minutes for just $1.10." Use the ordered pairs (m, p).
   a. Find a linear equation for these data points.
   b. Use this linear equation to find the cost of a 20-minute phone call.
2. A temperature of 0°C is the same as 32°F. A temperature of 10°C is the same as 50°F. Use the ordered pairs (C, F).
   a. Find a linear equation for these data points.
   b. Use this linear equation to find the temperature Fahrenheit when the temperature is 30°C.
3. For a ground temperature of 15°C, the air temperature (t) at an altitude of 500 m (h) is 10°C. At 2000 m, the air temperature is −5°C. Use the ordered pairs (h, t).
   a. Find a linear equation for these data points.
   b. Use this linear equation to find the air temperature at 1500 m.

Try This

a. (1) $r = -0.01t + 30.1$
(2) 10.1 s

b. Answers may vary; $c = \frac{5}{6}d$



Exercises

1. a. $p = 0.05m + \$0.60$
   b. $1.60
2. a. $F = \frac{9}{5}C + 32$
   b. 86°F
3. a. $t = -\frac{1}{100}h + 15$
   b. 0°C

3. PRACTICE/ASSESS

LESSON QUIZ

1. A wholesale poster company s posters for $12 and 30 posters The relationship between the r of posters sold and the cost is l Find an equation giving cost (c terms of the number (n) of pos Let the pairs of the relation be form (n, c), where n is the num posters sold and c is the cost of posters in dollars. The pairs (20 and (30, 15) satisfy the relation

   The slope of the line is $\frac{3}{10}$. The slope equation is

   $$c - 12 = \frac{3}{10}(n - 20)$$
   $$c - 12 = \frac{3}{10}n - 6$$
   $$c = \frac{3}{10}n + 6$$

Assignment Guide
Core 1–13
Extension 14, 15

Use Mixed Review to maintain

4. Scores on an achievement test (a) are related linearly to scores on another test (b). Here are two students' scores $a = 500, b = 100$ and $a = 680, b = 127$. Use the ordered pairs (a, b).
   a. Find a linear equation for these data points.
   b. Use this linear equation to predict the score on the b test for a student with a score of 700 on the a test.
5. A school record in a certain race in 1970 (t) was 3.8 minutes (r). In 1990 the school record was 3.65 minutes. Use the ordered pairs (t, r).
   a. Find a linear equation for these data points.
   b. Use this linear equation to predict the school's record in 2000.
6. The total length (l) of a certain species of snake is related linearly to the tail length (t) of this snake. Here are the measurements for two snakes of this species. Snake 1: $l = 150$ mm and $t = 19$ mm; Snake 2: $l = 300$ mm and $t = 40$ mm. Use the ordered pairs (l, t).
   a. Find a linear equation for these data points.
   b. Use this linear equation to estimate the tail length of a snake with a total length of 200 mm.
   c. Use this linear equation to estimate the tail length of a snake with a total length of 350 mm.
7. Graph the ordered pairs (d, y). Draw the line of best fit and find an equation of the line.

Diameter of tree trunk in inches (d)	4	10	40	35	25	35	20
Age (y)	1	5	20	15	10	15	20

8. Graph the ordered pairs (m, c). Draw the line of best fit and find an equation of the line.

Miles (m)	2	3	5	10	20
Cost of a taxi (c)	\$4.00	\$5.25	\$8.50	\$16.25	\$31.00

9. A motel owners' association compared the prices of motel rooms in and near a small city. Each ordered pair represents the distance (d) in miles a motel is from the center of the city and the cost (c) of a motel room for one person. Graph the ordered pairs (d, c). Draw the line of best fit and find an equation of the line.

Distance (d) in miles	1	2	2	3	3	4	5	5	6
Cost (c)	\$80	\$75	\$55	\$60	\$45	\$55	\$40	\$50	\$35

Exercises

4. a. $b = \frac{3}{20}a + 25$
   b. 130
5. a. $r = 0.0075t + 18.575$
   b. 3.575 min
6. a. $t = \frac{7}{60}L - 2$
   b. 26 mm
   c. 47 mm

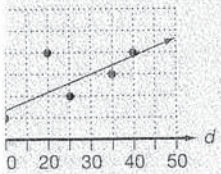
$a + 25$

$0.0075t + 18.575$

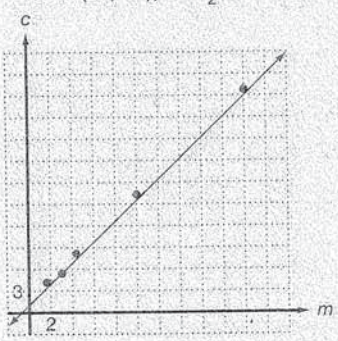
min

$l - 2$

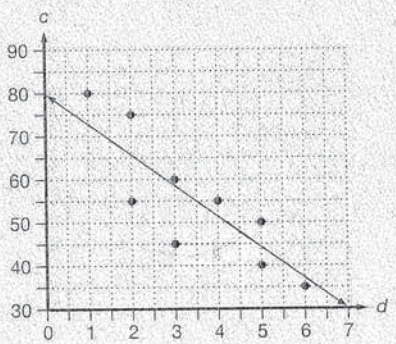
may vary; using (10, 5) and $y = \frac{1}{2}d$.



8. Answers may vary; using (2, 4) and (20, 31), $c = \frac{3}{2}m + 1$.



9. Answers may vary; using (3, 60) and (6, 35), $c = -\frac{25}{3}d + 85$.



10. Below are some world records for the fastest speed attained on land, in miles per hour. The speed (s) is linearly related to the year. Graph the ordered pairs (y, s). Draw the line of best fit and find an equation of the line. Use the equation to predict the record for the year 2000.

Speed	39	105	132	204	301	394	537
Year	1898	1904	1910	1927	1935	1947	1964

B

11. Solve, assuming a linear equation fits the situation. The value of a computer is \$3500. After 2 years, the value of this computer is \$2200. Find the value of the computer after 5 years.

12. Solve, assuming a linear equation fits the situation. The value of a new car is \$14,000. Two years later, its value is \$9000. What will be the value of this car after 5 years?

13. ***Write a Convincing Argument*** At the age of 8 years, a saguaro cactus is 7 ft tall. After 20 years, the cactus is 10 ft tall. Predict the height of the saguaro after 200 years. Assume a linear equation fits the situation to justify your prediction.

Use your work from Exercise 13 to estimate the age of a saguaro cactus that is 30 ft tall.

Challenge

14. An elevator has a capacity of 500 kg. Suppose an average child weighs 34 kg and an average adult weighs 75 kg. Find the combinations of adults and children that would exceed the weight limit of this elevator by no more than 50 kg.

15. The formula below gives an approximate value for the stopping distance (d), in feet, of a car traveling at speed (s), in miles per hour.

$$d = s + \frac{s^2}{20}$$

Find 6 ordered pairs that satisfy this relationship. Graph these ordered pairs. Is the relationship linear?

Mixed Review

Find the slope of each line. **16.** $2y - 6x = 5$ **17.** $4x + y = 7$ *7-5*

Multiply. **18.** $(x^3 - 2)(x^2 + 2)$ **19.** $3y^3(y^2 - 2y)$ **20.** $(a^2 - 2a)^2$ *5-9*

Factor. **21.** $50y^4 - 72y^2$ **22.** $16 - 9m^2$ **23.** $ab + 3a - 6b - 18$ *6-2, 6-7*

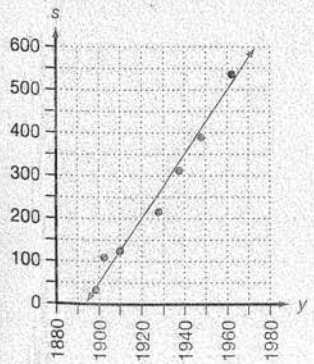
Write an equation and solve.

24. One less than the square of a number is 143.

25. The product of two consecutive integers is 110.

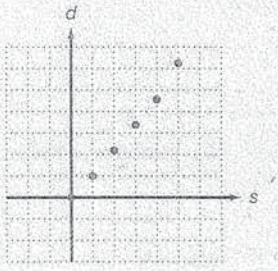
26. Three times the difference of the square of a number and 1 is 72. *6-9*

10. Answers may vary. Using the points (1898, 39) and (1910, 132), $s = \frac{93}{12}y - \frac{176046}{12}$.
Using this equation, when $y = 2000$, $s = \frac{9954}{12} = 829.5$.



11. \$250
12. \$1500
13. 55 ft
Photo caption: 100 years
14. As (children, adult) ordered pairs: (16, 0), (15, 0), (13, 1), (11, 2), (9, 3), (7, 4), (6, 4), (5, 5), (4, 5), (2, 6), (0, 7)

15. (0, 0), $(1, \frac{21}{20})$, $(2, \frac{11}{5})$, $(3, \frac{69}{20})$, $(4, \frac{24}{5})$, $(5, \frac{25}{4})$; No



Mixed Review

16. $m = 3$
17. $m = -4$
18. $x^5 + 2x^3 - 2x^2 - 4$
19. $3y^5 - 6y^4$
20. $a^4 - 4a^3 + 4a^2$
21. $2y^2(5y + 6)(5y - 6)$
22. $(4 + 3m)(4 - 3m)$
23. $(a - 6)(b + 3)$
24. $n^2 - 1 = 143$; $-12, 12$
25. $n(n + 1) = 110$; 10, 11 or
26. $3(n^2 - 1) = 72$; $-5, 5$

Try This Write an equation for the line containing the given point and perpendicular to the given line.

e. $(0, 0)$; $y = 2x + 4$ **f.** $(-1, -3)$; $x + 2y = 8$

Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

7-8 Exercises

A

Determine whether the graphs of the equations are parallel lines.

1. $x + 4 = y$
$y - x = -3$

2. $3x - 4 = y$
$y - 3x = 8$

3. $y + 3 = 6x$
$-6x - y = 2$

4. $y = -4x + 2$
$-5 = -2y + 8x$

5. $y = 2x + 7$
$5y + 10x = 20$

6. $y = -7x - 5$
$2y = -7x - 10$

7. $3x - y = -9$
$2y - 6x = -2$

8. $y - 6 = -6x$
$-2x + y = 5$

9. $-3x + y = 4$
$3x - y = -6$

10. $-4 = y + 2x$
$6x + 3y = 4$

11. $8x - 4y = 16$
$5y - 10x = 3$

12. $-4x = 3y + 5$
$8x + 6y = -1$

Determine whether the graphs of the equations are perpendicular lines.

13. $y = -4x + 3$
$4y + x = -1$

14. $y = -\frac{2}{3}x + 4$
$3x + 2y = 1$

15. $x + y = 6$
$4y - 4x = 12$

16. $2x - 5y = -3$
$5x + 2y = 6$

17. $y = -x + 8$
$x - y = -1$

18. $2x + 6y = -3$
$12y = 4x + 20$

19. $6x + y = -4$
$6x - y = 4$

20. $4y = x + 5$
$9y + 3x = 2$

21. $6y - x = -12$
$\frac{1}{6}x + y = 3$

22. $\frac{2}{3}x + y = 6$
$8y - 12x - 12 = 0$

23. $\frac{2}{5}x - \frac{1}{10}y = 20$
$5x + 10y = -5$

24. $\frac{1}{2}x + \frac{3}{4}y = 6$
$-\frac{3}{2}x + y = 4$

25. $\frac{3}{8}x - \frac{y}{2} = 1$
$\frac{4}{3}x - y + 1 = 0$

26. **TEST PREP** Are the graphs of $3x + 4y = 4$ and $4y = 3x + 4$ parallel, perpendicular, or neither?

A. parallel **B.** perpendicular **C.** neither **D.** Cannot tell.

B

Write an equation for the line containing the given point and perpendicular to the given line.

27. $(0, 6)$; $y - 3x = 4$

28. $(-2, 4)$; $y = 2x - 3$

29. $(0, 2)$; $3y - x = 0$

30. $(1, 0)$; $2x + y = -4$

Try This

e. $y = -\frac{1}{2}x$
f. $y = 2x - 1$

Exercises

1. Yes
2. Yes
3. No
4. No
5. No
6. No
7. Yes
8. No
9. Yes
10. Yes
11. Yes
12. Yes
13. No
14. No
15. Yes
16. Yes
17. Yes
18. No
19. No
20. No
21. No
22. Yes
23. No
24. Yes
25. No
26. C
27. $y = -\frac{1}{3}x + 6$
28. $y = -\frac{1}{2}x + 3$
29. $y = -3x + 2$
30. $y = \frac{1}{2}x - \frac{1}{2}$

31.–34. Write an equation for the line containing the given point and parallel to the given line in each of Exercises 27–30.

35. a. Write an equation for the line containing $(4, -1)$ and perpendicular to the line $x - 2y = 6$.

b. ***Write a Convincing Argument*** Can you write an equation for a line containing $(4, -1)$ and parallel to the line $x - 2y = 6$? Explain.

36. ***Critical Thinking*** Write an equation of a line parallel to $ax + by = c$ and an equation of a line perpendicular to $ax + by = c$.

Challenge

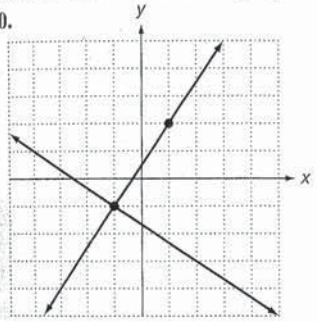
37. Graph the line $y = 4x + 2$. Give the equations of three other lines that together with the line $y = 4x + 2$ would form a rectangle. Graph your rectangle.

38. Find the value of k so that the graphs of $4y = kx - 6$ and $5x + 20y = 12$ are parallel.

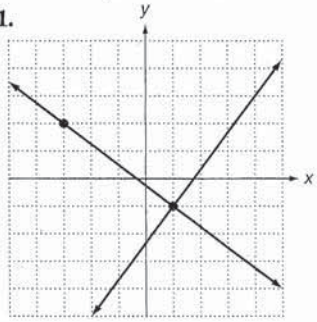
39. Using the same equations as in Exercise 38, find the value of k so that the graphs are perpendicular.

Assume the two lines are perpendicular. Find an equation for each line.

40.



41.



Mixed Review

Find the slope and y-intercept of each line. **42.** $y = 3x + 5$

43. $2x + 4y = 5$ **44.** $6x = 2y + 3$ **45.** $6x = 3y - 2$

46. $5y - 3x = 15$ **47.** $2x = 3y + 4$ **48.** $3x + 4y = 8$ *7-5*

Write an equation in slope-intercept form for each line with the given slope and point. **49.** $(1, 3), m = -2$ **50.** $(-1, 4), m = 9$ *7-6*

Factor. **51.** $9a^2 - 49b^2$ **52.** $5x^2 + 70x + 245$

53. $2m^3 + 3m^2 - 18m - 27$ **54.** $3x^2 - 3x - 90$ *6-2, 6-5, 6-7*

Simplify. **55.** $(3t^3)^2$ **56.** $(4ab^2c)(3abc^3)$ **57.** $(2x^2yz)(3x^3yz^2)$

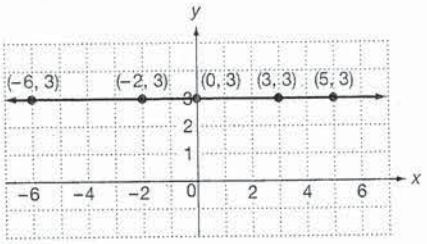
58. $(y + 11)(y - 11) + 121$ **59.** $(2x + y)(3x + 3y)$ *5-2, 5-9*

31. $y = 3x + 6$
32. $y = 2x + 8$
33. $y = \frac{1}{3}x + 2$
34. $y = -2x + 2$
35. a. $y = -2x + 7$
    b. No; the line $x - 2y = 6$ contains $(4, -1)$.
36. $ax + by = d$; $-bx + ay = c$
37. Answers may vary.
38. -1
39. 16
40. $2y - 3x = 1$
    $3y + 2x = -5$
41. $4y + 3x = -1$
    $3y - 4x = -7$

Mixed Review

42. $m = 3, b = 5$
43. $m = -\frac{1}{2}, b = \frac{5}{4}$
44. $m = 3, b = -\frac{3}{2}$
45. $m = 2, b = \frac{2}{3}$
46. $m = \frac{3}{5}, b = 3$
47. $m = \frac{2}{3}, b = -\frac{4}{3}$
48. $m = -\frac{3}{4}, b = 2$
49. $y = -2x + 5$
50. $y = 9x + 13$
51. $(3a - 7b)(3a + 7b)$
52. $5(x + 7)^2$
53. $(2m + 3)(m + 3)(m - 3)$
54. $3(x - 6)(x + 5)$
55. $9t^6$
56. $12a^2b^3c^4$
57. $6x^5y^2z^3$
58. y^2
59. $6x^2 + 9xy + 3y^2$

In Lesson 7-4, we stated that a horizontal line has slope 0. Before we begin to write the proof, we think about horizontal lines. On any horizontal line, all points have the same y-coordinate. This is the key to the proof. We want to show that for a horizontal line, slope = 0



Prove: For a horizontal line, slope = 0

Consider any horizontal line. Suppose that (x_1, y_1) and (x_2, y_2) are any two points on the line. Then,

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

Since the y-coordinates are the same,

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0}{x_2 - x_1} = 0$$

Try This

b. Prove that a vertical line has no slope. (Hint: Think about the coordinates of the points on a vertical line and division by 0.)

7-9 Exercises

Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

A

1. Prove the point-slope equation property of Lesson 7-6. (Hint: Show that any point (x_2, y_2) on the line described must satisfy the equation, and that any point satisfying the equation must be on the line described.)
2. Prove that if a line has slope m and y-intercept b, then an equation of the line is $y = mx + b$. (Hint: Use the point-slope equation theorem.)

Mixed Review

Identify the degree of each term and the degree of the polynomial.

3. $c^2 - 25$ **4.** $3a^4b^2 + 21b^4 - 11a$ **5.** $a^3b^2c - 4c^3$ *5-5*

Give the additive inverse. **6.** $ax^2 + bx + c$ **7.** $35 - 8c$ **8.** $y - 9$ *2-3, 5-8*

Find three factorizations for each monomial. **9.** $3a^3$ **10.** $15a^2b$ *6-1*

Find three solutions of the equation. **11.** $4y - x = 1$ *7-2*

Factor. **12.** $4a^2b + 2a$ **13.** $4y^2 - 9$ **14.** $10c^2 + 28c - 6$ *6-1, 6-2, 6-5*

3. PRACTICE/AS

LESSON QUIZ

1. Prove that the slope
$Ax + By = C, B \neq 0,$
Solve for y.
$By = -Ax + C$
$y = -\frac{A}{B}x + \frac{C}{B}$
This is the slope-inter
the line, so $m = -\frac{A}{B}$,

Assignment Guide
Core 1, 2

Use Mixed Review to

Exercises

1. First, show that a point (x_2, y_2) on a nonvertical line with slope m and containing (x_1, y_1) must satisfy the equation $y - y_1 = m(x - x_1)$. By the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$. Multiplying each side of the equation by $x_2 - x_1$ (Mult. prop.), we have $m(x_2 - x_1) = y_2 - y_1$, or $y_2 - y_1 = m(x_2 - x_1)$. Thus, the point (x_2, y_2) satisfies the equation $y - y_1 = m(x - x_1)$.

Next, show that a point that satisfies the equation $y - y_1 = m(x - x_1)$ lies on a nonvertical line with slope m and containing (x_1, y_1). Suppose (x_2, y_2) is such a point. Then, $y_2 - y_1 = m(x_2 - x_1)$. If $x_2 = x_1$, then $y_2 - y_1 = m(x_2 - x_1) = 0$, so $y_2 = y_1$. This means that (x_1, y_1) and (x_2, y_2) are one and the same point, a point that does indeed lie on the desired line. Now suppose $x_2 \neq x_1$. Then $x_2 - x_1 \neq 0$, so multiply both sides of the equation by $\frac{1}{x_2 - x_1}$ to get $\frac{y_2 - y_1}{x_2 - x_1} = m$. Thus, the line through (x_1, y_1) and (x_2, y_2) is nonvertical with slope m. (x_2, y_2) lies on this line and the proof is complete.

2. 1. Line with slope m and point $(0, b)$, Hypothesis;
   2. $y - y_1 = m(x - x_1)$, Point-slope equation;
   3. $y - b = m(x - 0)$, Substitution;
   4. $y = mx + b$, Addition prop.

Mixed Review

3. 2, 0; 2
4. 6, 4, 1; 6
5. 6, 3; 6
6. $-ax^2 - bx - c$
7. $-35 + 8c$
8. $-y + 9$
9. $3(a^3)$, $(3a)(a^2)$, $(3$
10. Answers may vary. $(3)(5a)(ab)$, $(5a^2)($
11. Answers may vary. $(-4, -\frac{3}{4})$, $(3, 1)$, $(4,$
12. $2a(2ab + 1)$
13. $(2y + 3)(2y - 3)$
14. $2(c + 3)(5c - 1)$

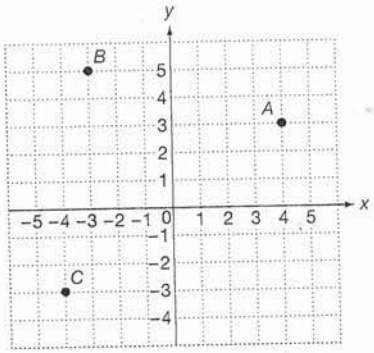
7 Chapter Wrap Up

7-1

On a plane, each point is the graph of an ordered pair. The numbers in the ordered pair are called **coordinates.** The first number in the pair, the ***x*-coordinate,** tells the distance right or left from the *y*-axis. The second number, the ***y*-coordinate,** tells the distance up or down from the *x*-axis.

Plot these points on graph paper.

1. $(2, 5)$
2. $(0, -3)$
3. $(-4, -2)$
4. $(5, 0)$
5. $(4, -3)$
6. $(-4, 3)$



In which **quadrant** is each point located?

7. $(3, -8)$
8. $(-20, -14)$
9. $(4.9, 1.3)$
10. $(-1, 12)$

Find the coordinates of each point.

11. *A*
12. *B*
13. *C*

7-2

An ordered pair of numbers is a solution of an equation if the numbers make the equation true when the numbers are substituted for the variables.

Determine whether the given point is a solution of $3x + y = 4$.

14. $(0, 4)$
15. $(1, -1)$

Make a table of solutions and draw a **graph** of each equation.

16. $2x - y = 1$
17. $y - 5 = 2x$

7-3

An equation whose graph is a straight line is called a **linear equation.** Its **standard form** is $Ax + By = C$ (A and B not both 0). To graph a linear equation, plot two points (ordered pairs) and draw the line that contains the two points. Use a third point to check. The ***x*-intercept** of a line is the *x*-coordinate of the point where the line crosses the *x*-axis. To find the *x*-intercept, let $y = 0$ and solve for x. The ***y*-intercept** of a line is the *y*-coordinate of the point where the line crosses the *y*-axis. To find the *y*-intercept, let $x = 0$ and solve for y.

Graph using intercepts.

18. $2x - 7y = 14$
19. $3x - 2y = -6$

Graph.

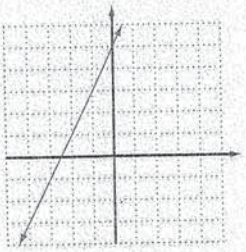
20. $y = -4$
21. $x = 7$

Key Terms

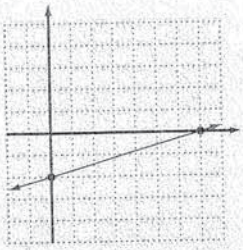
coordinate axes (p. 304)
coordinate plane (p. 304)
coordinates (p. 304)
graph of an equation (p. 310)
graph of an ordered pair (p. 304)
line of best fit (p. 334)
linear equation (p. 313)
origin (p. 304)
parallel lines (p. 338)
perpendicular lines (p. 339)
point-slope equation (p. 329)
quadrant (p. 306)
rise (p. 318)
run (p. 318)
slope (p. 318)
slope-intercept equation (p. 324)
standard form of a linear equation (p. 315)
x-axis (p. 304)
x-coordinate (abscissa) (p. 304)
x-intercept (p. 314)
y-axis (p. 304)
y-coordinate (ordinate) (p. 304)
y-intercept (p. 314)

17.

x	*y*
0	5
1	7
2	9



18.



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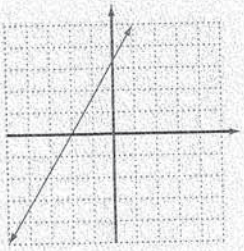

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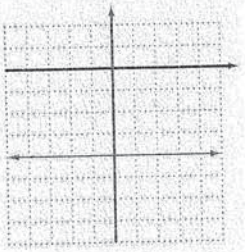

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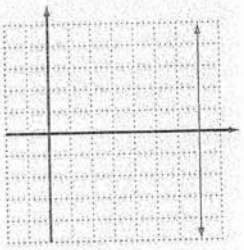
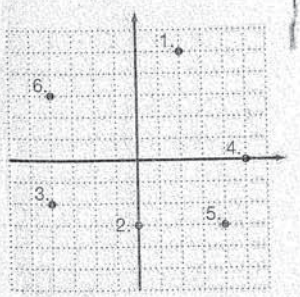


Chapter 7 Wrap Up

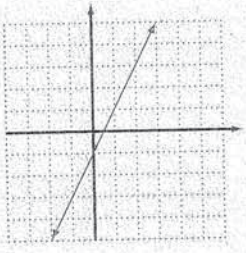
1–6.



7. IV
8. III
9. I
10. II
11. (4, 3)
12. (−3, 5)
13. (−4, −3)
14. Yes
15. No

16.

x	*y*
0	−1
1	1
2	3



Internet Activity On the Web

Look for extension problems for this chapter at the Prentice Hall Web site.
www.phschool.com

7-4

The **slope** of a line is a ratio that describes which way the line slants and how steep it is.

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

A horizontal line has a slope of 0 and a vertical line has no slope.

Find the slopes, if they exist, of the lines containing these points.

22. (6, 8) (−2, −4)
23. (5, 1) (−1, 1)
24. (−3, 0) (−3, 5)
25. (3, 4) (5, −8)

7-5

To find the slope and the y-intercept of a line from its equation, solve the equation for y to get the form $y = mx + b$. This is called the **slope-intercept equation.** The coefficient of the x-term, m, is the slope, and b is the y-intercept.

Find the slope of each line by solving for y.

26. $3x - 2y = -6$
27. $5x + 3y = 4$

Find the slope and y-intercept of each line.

28. $3x - 5y = 4$
29. $2x = 6y + 12$

Graph each line using the y-intercept and slope.

30. $y = -x + 5$
31. $y = \frac{3}{5}x - 2$
32. $y - \frac{3}{4}x = 0$

7-6

If you know the slope, m, and the y-intercept, b, of a line, you can use the slope-intercept equation for the line, $y = mx + b$, to find the equation of the line. If you know the slope, m, and a point on the line, (x_1, y_1), you can use the **point-slope equation,** $y - y_1 = m(x - x_1)$, to find an equation of the line. If you know two points on the line, first find the slope and then use the point-slope equation.

Write an equation for the line with each given slope and y-intercept.

33. $m = 3$, y-intercept $= -4$
34. $m = 5$, y-intercept $= 0$

Write an equation for the line with each given point and slope.

35. $(1, 2), m = 3$
36. $(0, 4), m = -2$
37. $(-2, 4), m = -\frac{1}{2}$

Write an equation for the line that contains each given pair of points.

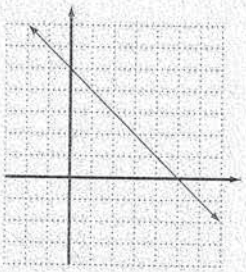
38. (5, 7) (−1, 1)
39. (2, 0) (−4, −3)

chapter 7 warm up

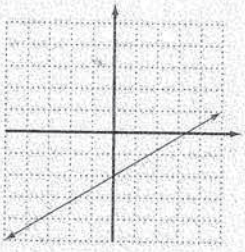
22. 3/2
23. 0
24. NO SLOPE
25. -6
26. 3/2
27. -5/3
28. 3/5, -4/5
29. 1/3, -2

Wrap Up

30.



31.



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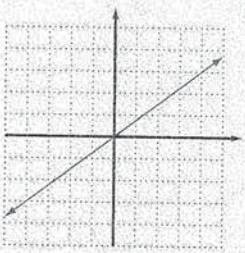
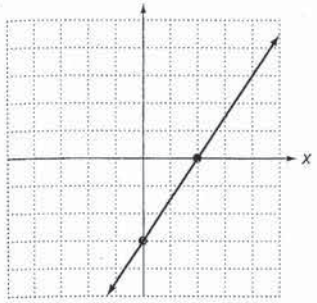


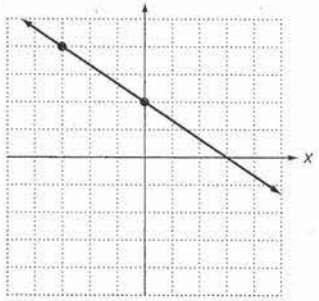
33. $y = 3x - 4$
34. $y = 5x$
35. $y = 3x - 1$
36. $y = -2x + 4$
37. $y = -\frac{1}{2}x + 3$
38. $y = x + 2$
39. $y = \frac{1}{2}x - 1$

Write an equation for each line in slope-intercept form.

40.



41.



7-7

In real-world situations, the relationship between two variables can sometimes be expressed as a particular linear equation whose graph is the **line of best fit.** You can then use the linear equation to solve problems involving a prediction between two variables.

Solve.
A temperature of 59°F equals 15°C. A temperature of 68°F equals 20°C.

42. Find the linear equation with ordered pairs (F, C) for these data points.

43. Use this linear equation to find the Celsius temperature when it is 77°F.

7-8

Two nonvertical lines are **parallel** if they have the same slope and different y-intercepts. Two lines are **perpendicular** if the product of their slopes is -1.

Determine whether the graphs of the equations are parallel.

44. $y - 5 = -2x$
$y + 2x = -3$

45. $y = 3x - 4$
$y + 3x = 2$

Determine whether the graphs of the equations are perpendicular.

46. $y = \frac{2}{3}x$
$2y = -3x + 8$

47. $6y = -x + 18$
$y = -6x - 4$

Determine whether the graphs of the equations are parallel, perpendicular, or neither.

48. $4x + y = 6$
$4x + y = 8$

49. $2x + y = 10$
$y = \frac{1}{2}x - 4$

50. $x + 4y = 8$
$x = -4y - 10$

51. $3x - y = 6$
$3x + y = 8$

40. $y = \frac{3}{2}x - 3$
41. $y = -\frac{2}{3}x + 2$
42. $C = \frac{5}{9}F - \frac{160}{9} = \frac{5}{9}(F - 32)$
43. 25°C
44. Yes
45. No
46. Yes
47. No
48. Parallel
49. Perpendicular
50. Parallel
51. Neither

7 Chapter Assessment

Use graph paper to plot these points.

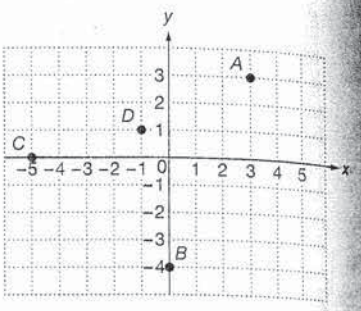
1. $(-5, 3)$ **2.** $(0, -4)$

In which quadrant is each point located?

3. $(-1, -4)$ **4.** $(-1, 8)$

Find the coordinates of each point.

5. A **6.** B **7.** C **8.** D



Determine whether the given point is a solution of $2x + 3y = 12$.

9. $(2, 3)$ **10.** $(3, 2)$

11. Make a table of solutions and graph $3x + y = 10$.

12. Use intercepts to graph $2x - 3y = -6$.

Graph.

13. $x = 8$ **14.** $y = -2$

Find the slopes, if they exist, of the lines containing these points.

15. $(9, 2)$ $(-3, -5)$ **16.** $(4, 7)$ $(4, -1)$

Use the equation $-4x + 3y = -6$.

17. Find the slope and y-intercept. **18.** Graph the equation.

Write an equation for the line containing the given point and having the given slope.

19. $(3, 5)$ $m = 1$ **20.** $(-2, 0)$ $m = -3$

Write an equation for the line containing the two given points.

21. $(1, 1)$ $(2, -2)$ **22.** $(4, -1)$ $(-4, -3)$

When an electronics company produces 1000 chips, it makes a profit of \$10 per unit. When it produces 5000 chips, the company makes a profit of \$30 per unit. Assume that a linear relationship fits these data.

23. Find the linear equation that fits these data.

24. Use the linear equation to predict the profit per unit if the company produced 10,000 chips.

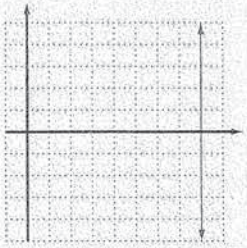
Determine whether the lines are parallel, perpendicular, or neither.

25. $2x + y = 8$
$2x + y = 4$

26. $2x + 5y = 2$
$y = 2x + 4$

27. $x + 2y = 8$
$-2x + y = 8$

13.



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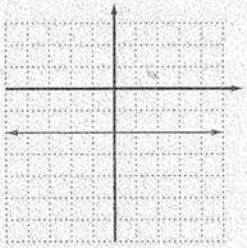

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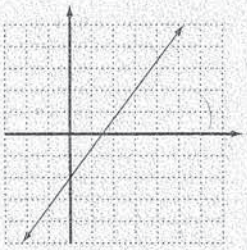


19. $y = x + 2$
20. $y = -3x - 6$
21. $y = -3x + 4$
22. $y = \frac{1}{4}x - 2$
23. $p = \frac{1}{200}n + 5$
24. 55
25. Parallel
26. Neither
27. Perpendicular

15. $\frac{7}{12}$
16. No slope
17. $\frac{4}{3}$, -2

1–7 Cumulative Review

1-1 Evaluate.

1. $y + 6 + y$ for $y = 8$
2. $\frac{x}{18}$ for $x = 24$

1-2

3. Use a commutative property to write three equivalent expressions for $4x + 3y$.

Simplify

4. $\frac{16}{48}$
5. $\frac{q}{12pq}$
6. $\frac{51s}{3st}$

1-3, 1-4 Evaluate.

7. $x^2 - 5$ for $x = 3$
8. $(4y)^3$ for $y = 3$
9. $(y - 1)^2$ for $y = 6$

1-5 Use the distributive property to write an equivalent expression.

10. $3(2x + y)$
11. $4(3x + 4y + z)$

Collect like terms.

12. $7a + 7b + a + 7c$
13. $6x^2 + 2y + 2z + 3x^2$

1-6 Write as an algebraic expression.

14. 7 less than twice y
15. the difference of x and three times y
16. Let s be Shawn's age 5 years ago. Write an expression for Shawn's age now.

1-7 State whether each sentence is true, false, or open.

17. **a.** $15x + 325 = 90$ **b.** $9 \cdot 8 - 5 = 27$ **c.** $12x - 5x = 7$

Solve for the given replacement set.

18. $x + 2.7 = 8.5$ $\{5.4, 5.8, 6.2\}$
19. $112t = 4256$ $\{35, 37\}$

1-9 Evaluate.

20. $D = rt$ for $r = 55$ mi/h and $t = 270$ min
21. $F = \frac{9}{5}C + 32$ for $C = 15°$

Chapters 1–7 Cumulative Review

1. 22
2. $\frac{4}{3}$
3. Answers may vary. Sample: $4x + y \cdot 3$, $x \cdot 4 + 3y$, $3y + 4x$
4. $\frac{1}{3}$
5. $\frac{1}{12p}$
6. $\frac{17}{t}$
7. 4
8. 1728
9. 25
10. $6x + 3y$
11. $12x + 16y + 4z$
12. $8a + 7b + 7c$
13. $9x^2 + 2y + 2z$
14. $2y - 7$
15. $x - 3y$
16. $s + 5$
17. a. Open
    b. False
    c. Open
18. {5.8}
19. No solution
20. 247.5 mi
21. 59°F

2-1 Use $>$, $<$, or $=$ to write a true sentence.

22. $-10 \square -14$ **23.** $-3.1 \square -3.15$ **24.** $0.01 \square 0.1$

25. $-\frac{2}{3} \square -\frac{3}{4}$ **26.** $\frac{7}{8} \square \frac{8}{9}$ **27.** $\frac{-4}{10} \square \frac{5}{7}$

Find the absolute value.

28. $|-18|$ **29.** $|25|$

2-3, 2-4 Add or subtract.

30. $-\frac{1}{2} + \frac{3}{8} + (-6) + \frac{3}{4}$ **31.** $-2.6 + (-7.5) + 2.6 + (-7.5)$

32. $-6.1 - (-3.1) + 7.9 - 3.1 + 1.8$ **33.** $-\frac{5}{9} - \frac{2}{18}$

2-5 Multiply.

34. $\left(-\frac{2}{3}\right)\left(\frac{18}{15}\right)$ **35.** $\frac{3}{5}\left(-\frac{3}{5}\right)\left(-\frac{25}{9}\right)$ **36.** $-2(-7)(-3)$

2-6 Divide.

37. $-\frac{4}{3} \div \frac{-2}{9}$ **38.** $-6.262 \div 1.01$ **39.** $-\frac{72}{108} \div -\frac{2}{3}$

2-7 Factor.

40. $121x - 55$ **41.** $-6 - 2x - 12y$

2-8 Simplify.

42. $-8x - (9 - 4x)$ **43.** $-2(y + 3) - 3y$

2-10 Name the following properties.

44. $a + (-a) = 0$ **45.** $a(b + c) = ab + ac$

3-1 to 3-3 Solve.

46. $x - \frac{3}{8} = \frac{1}{2}$ **47.** $-3.2 = y - 5.8$ **48.** $-\frac{2}{3} = x - \frac{8}{12}$

49. $-4x = -18$ **50.** $-\frac{x}{3} = -16$ **51.** $-\frac{5}{6} = x - \frac{1}{3}$

52. $6y + 3 = -15$ **53.** $3(x - 2) = 24$ **54.** $-2(x - 4) = 10$

3-4, 3-11 Write an equation and solve.

55. Twelve computer disks cost \$9. How much does one disk cost?

56. The number of girls in the band is one more than twice the number of boys. There are 19 students in the band. How many are boys?

Chapters 1–7 Cumulative Review

22. $>$
23. $>$
24. $<$
25. $>$
26. $<$
27. $<$
28. 18
29. 25
30. $-\frac{43}{8}$
31. -15
32. 3.6
33. $-\frac{2}{3}$
34. $-\frac{4}{5}$
35. 1
36. -42
37. 6
38. -6.2
39. 1
40. $11(11x - 5)$
41. $-2(3 + x + 6y)$ or $2(-3 - x - 6y)$
42. $-4x - 9$
43. $-5y - 6$
44. Additive inverse property
45. Distributive property
46. $\frac{7}{8}$
47. 2.6
48. 0
49. $\frac{9}{2}$
50. 48
51. $-\frac{1}{2}$
52. -3
53. 10
54. -1
55. $12d = 9$; \$0.75
56. $b + 2b + 1 = 19$; 6 boys

3-5, 3-6 Solve.

57. $9(t + 2) = 5(t - 3)$

58. $4 + 3x - 2 = 5x + 8 - x$

59. $\frac{5}{3} + \frac{2}{3}x = \frac{13}{12} + \frac{5}{4}x + \frac{3}{4}$

60. $\frac{1}{3}x - \frac{2}{9} = \frac{2}{3} + \frac{4}{9}x$

3-7 Solve.

61. $C = 2\pi r$ for r

3-8 Solve.

62. $4|x| = 28$

63. $|x| - 16 = 45$

3-9 Solve these proportions.

64. $\frac{24}{x} = \frac{8}{3}$

65. $\frac{12}{15} = \frac{t}{35}$

3-10 Translate to an equation and solve.

66. What is the interest on \$300 at 6% for one year?

67. A football quarterback completes 21 passes out of a total of 35. What percent are completed?

4-1 Determine whether the given number is a solution of the inequality $x \geq -5$.

68. **a.** -2 **b.** 0 **c.** -8

4-2 to 4-5 Solve and graph the solution.

69. $4y + 4 - 2y \leq 12$

70. $4x + 3 - 3x > 2$

71. $-2y > 3$

72. $6 - 5y > 8 - 4y$

73. The sum of three consecutive odd integers is less than 100. Find the set of the largest of three such numbers.

5-1, 5-2 Simplify.

74. $x^8 \cdot x^2$

75. $\frac{z^4}{z^7}$

76. $(4y^3)^2$

77. $(3x^2y)^3$

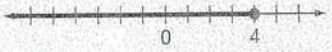
5-3 Multiply.

78. $(-2x)(4x^3)$

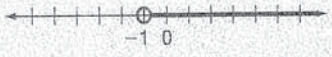
79. $(3b^2c^3)(-4bc^4)(-2b^2)$

57. $\frac{-33}{4}$
58. -6
59. $-\frac{2}{7}$
60. -8
61. $r = \frac{C}{2\pi}$
62. 7, -7
63. 61, -61
64. 9
65. 28
66. \$18
67. 60%
68. (a) Yes
    (b) Yes
    (c) No

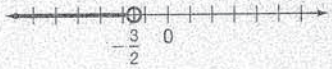
69. $y \leq 4$



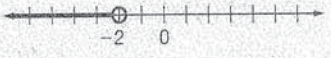
70. $x > -1$



71. $y < -\frac{3}{2}$



72. $y < -2$



73. 31, 33, 35
74. x^{10}
75. $\frac{1}{z^3}$
76. $16y^6$
77. $27x^6y^3$
78. $-8x^4$
79. $24b^5c^7$

Divide.

80. $\frac{-25n^6}{-5n^3}$ **81.** $\frac{-48m^6n^8}{8m^4n^8}$ **82.** $\frac{36a^4b^7}{-3a^6b^2}$ **83.** $\frac{4p^2r^4}{12p^5r^9}$

5-4 Write in scientific notation.

84. 248,000 **85.** 0.0000375

5-5, 5-6 Collect like terms and arrange in descending order for x.

86. $-3x^2 + 4x - 5x^3 - 6x^2 + 2 - 3x$

87. $2x^3 - 7 + 3x^2 - 6x^3 - 4x^2 + 5$

Evaluate.

88. $x^2 - 6x + 8$ for $x = 4$

5-7 Add.

89. $(3x^4 + 2x^3 - 6x^2) + (-2x^4 - 3x^2 - 7)$

90. $(a^4b^2 - 3a^2b + 4b^3) + (5a^4b^2 + 6a^2b - 9b^3)$

5-8 Subtract.

91. $(-8y^2 - y + 2) - (-y^3 - 6y^2 + y - 5)$

92. $(14v^3u + 4u^2 - 3v^2) - (8v^3u - 6u^2 + 5v^2)$

5-9 to 5-11 Multiply.

93. $4x^3(2x^2 - x + 7)$

94. $(2x - 5)(3x + 4)$

95. $(xy - 7y^2)(xy + 7y^2)$

96. $3m(-m^7 + 4m^2n + 3n^3)$

97. $(2a - 5b)^2$

98. $(4x - 5y)(x + 6y)$

99. $(1 - 3x^2)(2 - 4x^2)$

100. $(2x^5 + 3)(3x^2 - 6)$

101. $(2x^3 + 1)(2x^3 - 1)$

102. $(8x + 3)^2$

103. $(6x - 5)^2$

104. $(4x^3 - x + 1)(x - 1)$

6-1 to 6-7 Factor.

105. $x^2 - 4x$

106. $6x^5 - 36x^3 + 9x^2$

107. $12x - 4x^2 - 48x^4$

108. $9x^2 - 1$

109. $2x^2 - 8$

110. $16x^4 - 81$

111. $x^2 - 14x + 49$

112. $16x^2 + 40x + 25$

113. $x^2 - 8xy + 16y^2$

114. $c^2 - 7cd + 6d^2$

115. $18x^2 - 48x + 32$

116. $x^2 - 10x + 24$

117. $x^2 - 2x - 35$

118. $x^3 - 4x^2 - 21x$

119. $8x^2 + 10x + 3$

120. $3x^2 + 10x - 8$

Chapters 1–7 Cumulative Review

80. $5n^3$
81. $-6m^2$
82. $-\frac{12b^5}{a^2}$
83. $\frac{1}{3p^3r^5}$
84. 2.48×10^5
85. 3.75×10^{-5}
86. $-5x^3 - 9x^2 + x + 2$
87. $-4x^3 - x^2 - 2$
88. 0
89. $x^4 + 2x^3 - 9x^2 - 7$
90. $6a^4b^2 + 3a^2b - 5b^3$
91. $y^3 - 2y^2 - 2y + 7$
92. $6v^3u + 10u^2 - 8v^2$
93. $8x^5 - 4x^4 + 28x^3$
94. $6x^2 - 7x - 20$
95. $x^2y^2 - 49y^4$
96. $-3m^8 + 12m^3n + 9mn^3$
97. $4a^2 - 20ab + 25b^2$
98. $4x^2 + 19xy - 30y^2$
99. $2 - 10x^2 + 12x^4$
100. $6x^7 - 12x^5 - 9x^2 - 18$
101. $4x^6 - 1$
102. $64x^2 + 48x + 9$
103. $36x^2 - 60x + 25$
104. $4x^4 - 4x^3 - x^2 + 2x - 1$
105. $x(x - 4)$
106. $3x^2(2x^3 - 12x + 3)$
107. $4x(3 - x - 12x^3)$
108. $(3x + 1)(3x - 1)$
109. $2(x - 2)(x + 2)$
110. $(4x^2 + 9)(2x + 3)(2x - 3)$
111. $(x - 7)^2$
112. $(4x + 5)^2$
113. $(x - 4y)^2$
114. $(c - 6d)(c - d)$
115. $2(3x - 4)^2$
116. $(x - 6)(x - 4)$
117. $(x - 7)(x + 5)$
118. $x(x - 7)(x + 3)$
119. $(2x + 1)(4x + 3)$
120. $(3x - 2)(x + 4)$

Factor.

121. $6x^2 - 28x + 16$

122. $x^3 + x^2 + 2x + 2$

123. $x^4 + 2x^3 - 3x - 6$

124. $3 - 12x^6$

125. $x^2 + 5x + xy + 5y$

126. $am + an - bm - bn$

6-8 Solve for x.

127. $x^2 + 4x - 12 = 0$

128. $2x^2 + 7x - 4 = 0$

6-9 Solve.

129. The product of two consecutive even integers is 224. Find the integers.

7-1 In which quadrant is each point located?

130. $(4, 3)$

131. $(-2, 7)$

132. $(4, -9)$

7-2 Graph the equations. Make a table of solutions.

133. $3x - y = 2$

134. $y - 4 = 3x$

7-3 Graph the equations. Use intercepts.

135. $3y = x + 6$

136. $2x = 3y + 9$

7-4 Find the slopes of the lines containing these points.

137. $(0, -3)$ and $(4, 0)$

138. $(2, 2)$ and $(-1, 8)$

7-5 Find the slope and y-intercept of each line.

139. $2y = -4x + 8$

140. $4x = 9y - 7$

7-6 Write an equation for each line.

141. $m = -1$, y-intercept $= 3$

142. $m = 5$, passes through $(5, 2)$

143. $m = \frac{2}{3}$, passes through $(2, 5)$

144. contains points $(6, 4)$ and $(-2, 0)$

7-8 Determine whether the graphs of the equations are parallel or perpendicular lines.

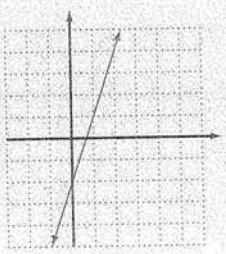
145. $y = -\frac{1}{2}x - \frac{1}{2}$, $-2y = x + 6$

146. $6x + y = -4$, $6y = x + 8$

121. $2(3x - 2)(x - 4)$
122. $(x^2 + 2)(x + 1)$
123. $(x^3 - 3)(x + 2)$
124. $3(1 + 2x^3)(1 - 2x^3)$
125. $(x + 5)(x + y)$
126. $(m + n)(a - b)$
127. $2, -6$
128. $\frac{1}{2}, -4$
129. 14, 16 or $-16, -14$
130. I
131. II
132. IV

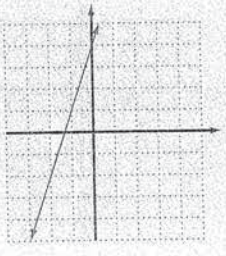
133.

x	y
-1	-5
0	-2
1	1

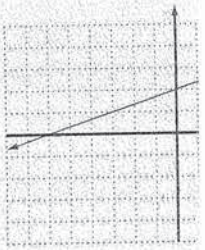


134.

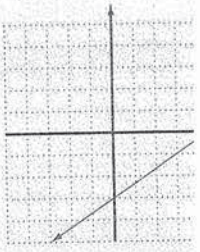
x	y
-2	-2
-1	1
0	4



135.



136.



137. $\frac{3}{4}$
138. -2
139. $m = -2$, $b = 4$
140. $m = \frac{4}{9}$, $b = \frac{7}{9}$
141. $y = -x + 3$
142. $y = 5x - 23$
143. $y = \frac{2}{3}x + \frac{11}{3}$
144. $y = \frac{1}{2}x + 1$
145. Parallel
146. Perpendicular