

Answers for 5.1

For use with pages 286–289

5.1 Skill Practice

1. slope
2. You can substitute the slope for m and the y -intercept for b to get the equation of the line.
3. $y = 2x + 9$ 4. $y = x + 5$
5. $y = -3x$ 6. $y = -7x + 1$
7. $y = \frac{2}{3}x - 9$ 8. $y = \frac{3}{4}x - 6$
9. A
10. $y = x - 4$ 11. $y = -\frac{1}{2}x$
12. $y = -3x + 4$
13. $y = \frac{2}{3}x - 8$
14. $y = -x - 3$ 15. $y = -2x - 2$
16. The given slope and y -intercept were interchanged in the slope-intercept form of the equation; $y = 2x + 7$.
17. The slope should be $\frac{0 - 4}{5 - 0}$,
 $y = -\frac{4}{5}x + 4$.
18. $y = \frac{1}{3}x + 2$ 19. $y = 4x + 4$
20. $y = -\frac{1}{4}x + 3$
21. $y = -\frac{4}{3}x$
22. $y = x - 4$ 23. $y = 2x - 2$
24. $y = -3x - 8$
25. $y = -x - 5$
26. $y = -4$
27. $y = -0.0625x + 4$
28. $y = -\frac{8}{3}x + 5$
29. $y = -4x - 24$
30. $y = x + 2$ 31. $y = -2x + 7$
32. $y = -\frac{1}{4}x - 2$
33. $y = -\frac{4}{5}x - 1$
34. $y = -5x - 4$
35. $y = \frac{2}{3}x + 3$
36. $y = -2x + 21$
37. $y = -3x + 9$
38. $y = 2x + 0.6$
39. $y = x - 3$
40. *Sample answer:* A health club offers an aerobics membership that charges \$9 plus \$4 per class.
41. $y = -2x + 1$
42. $y = \frac{1}{2}x$
43. No; the slope of the line is undefined, the equation is $x = 3$, which is not in slope-intercept form.

Answers for 5.1 *continued*
For use with pages 286–289

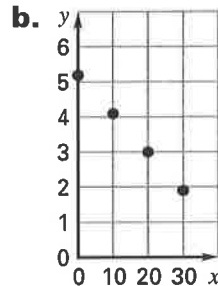
- 44.** Find the slope by substituting the values: $\frac{b + m - b}{1 - 0} = m$. The y -intercept is when $x = 0$, so the y -intercept is b . If you substitute $(-1, b - m)$ into the equation $y = mx + b$, you get $b - m = -m + b$ which is a true statement.

5.1 Problem Solving

- 45. a.** $C = 44m + 48$
b. \$312
- 46.** $C = 3.99e + 1.49$; \$33.41
- 47.** $C = 3h + 30$; \$42
- 48. a.** $a = 0.0037e + 3$
b. dependent variable: a , independent variable: e
c. Substitute 2 for e to get approximately 3.

49. a.

x (years since 1970)	y (km^2)
0	5.2
10	4.1
20	3.0
30	1.9



The area of the glaciers changed -1.1 square kilometers between every 10 year interval.

- c.** $y = -0.11x + 5.2$; -0.11 km^2
- 50. a.** 81 million gal
b. $y = 130,000,000h$
c. $0 \leq h \leq 3$; water is only released for 3 hours after 10 A.M.
- 51. a.** $t = 0.7d + 2$ **b.** 16 min
- 52. a.** $d = \frac{7}{1000}e + 400$
b. $d \text{ ft} = \frac{7}{1000} \cdot e \text{ ft} + 400 \text{ ft}$
c. 424.5 ft

5.1 Mixed Review

- 53.** -5 **54.** 20 **55.** -5
56. 4 **57.** 14 **58.** -0.5
59. -2 **60.** 1 **61.** $\frac{1}{2}$
62. $-\frac{1}{4}$ **63.** $\frac{5}{2}$ **64.** $\frac{1}{9}$

Answers for 5.2

For use with pages 296–299

5.2 Skill Practice

1. y -intercept
2. It is the point where x is 0.
3. $y = 3x - 2$ 4. $y = 2x - 9$
5. $y = -5x - 13$
6. $y = -2x + 5$
7. $y = -\frac{3}{4}x + 2$ 8. $y = \frac{1}{2}x - \frac{19}{2}$
9. -3 was substituted for x instead of y and 6 was substituted for y instead of x , $-3 = -2(6) + b$, $-3 = -12 + b$, $9 = b$.
10. 18 should have been substituted for m , not b , $81 = (18)2 + b$, $81 = 36 + b$, $b = \$45$.
11. $y = 3x + 1$ 12. $y = 7x - 19$
13. $y = -\frac{2}{5}x - 1$
14. $y = 2x + 12$
15. $y = -\frac{3}{4}x + \frac{35}{8}$
16. $y = -\frac{1}{2}x - \frac{7}{4}$
17. $y = 4x - 15$ 18. $y = \frac{2}{5}x + \frac{4}{5}$
19. $y = -\frac{1}{2}x + \frac{1}{2}$
20. $y = -\frac{7}{6}x + \frac{11}{6}$
21. $y = \frac{1}{3}x - \frac{4}{3}$ 22. $y = -3x - 7$
23. $y = -2x + 11$
24. $y = -x - 4$
25. $y = -\frac{1}{2}x + 8$
26. $y = \frac{3}{4}x - 5$
27. $y = x - 2$ 28. $y = -3x - 6$
29. D
30. $y = -\frac{1}{4}x + 5$
31. $y = -\frac{2}{3}x + 6$
32. $y = -\frac{1}{2}x + 3$
33. $y = 6x - 4$
34. Yes; you can find the slope and then substitute m and the coordinates of the point in $y = mx + b$, solve for b , and write the equation.
35. Yes; you can substitute m and the coordinates of the point in $y = mx + b$, solve for b , and write the equation.
36. No; many lines have the same slope but different y -intercepts.
37. Yes; you can find the slope of the line, then substitute the y -intercept for b , and write the equation.
38. $y = \frac{3}{2}x - \frac{1}{2}$

Answers for 5.2 *continued*

For use with pages 296–299

39. $y = \frac{9}{2}x - \frac{1}{2}$

40. $y = \frac{3}{2}x + \frac{11}{2}$

41. The lines $y = \frac{3}{2}x - \frac{1}{2}$ and $y = \frac{9}{2}x - \frac{1}{2}$ and the lines $y = \frac{9}{2}x - \frac{1}{2}$ and $y = \frac{3}{2}x + \frac{11}{2}$ intersect because they have different slopes; the lines $y = \frac{3}{2}x - \frac{1}{2}$ and $y = \frac{3}{2}x + \frac{11}{2}$ will not intersect, they have the same slope, so they are parallel.

42. The three points lie on the same line. If you find the equation of the line between two of the points and then check to see that the third point is a solution, you can see that all three points are on the line $y = \frac{3}{4}x + 1$.

43. The three points do not lie on the same line. If you find the equation of the line between two of the points and then check to see that the third point is a solution, you can see they do not lie on the same line.

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46. 7; find the equation of the line through $(-2, 3)$ and $(2, 5)$ to be $y = \frac{1}{2}x + 4$, then substitute 6 for x to find k .

5.2 Problem Solving

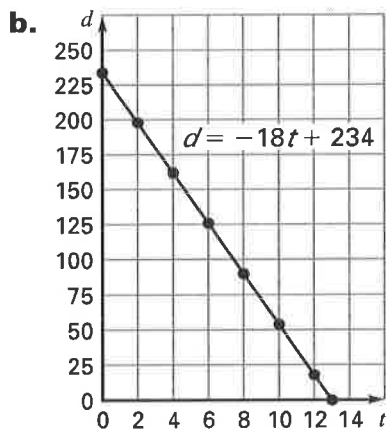
47. $\frac{3}{4}$ ft/yr; 6 ft

48. a. \$2.95 b. \$25.95

49. 115 min or 1 h 55 min; substitute 30 for m , 2 for x , and 85 for y into the equation $y = mx + b$ to find $b = 25$. Then substitute 3 for x into the equation $y = 30x + 25$ to solve for y .

Answers for 5.2 *continued*
For use with pages 296–299

- 50. a.** \$358
b. $y = 27.8x + 358$
c. \$886.20
- 51. a.** about 584 newspapers
b. $y = 11.8x + 584$
c. about 938 newspapers
- 52. a.** 17,381 airports
b. $y = 175x + 17,381$
c. 2002
- 53. a.** $d = -81t + 234$



The slope is the rate that the hurricane is traveling, the y -intercept represents the distance from the town at 12 P.M.

- c.** 1 A.M.; find the t -intercept to find the value of t when the distance to the town is 0; substitute 0 for d and solve for t ; $t = 13$, so you need to add 13 hours to 12 P.M. to get 1 A.M.

- 54. a.** $d = 10t + 60$
- b.** The rate of change, 10 meters per second, represents the skaters' top racing speed; the initial value, 60, represents the distance the skater traveled from a stand-still to where he reached his top racing speed; d meters $= \left(10 \frac{\text{meters}}{\text{seconds}}\right)(x \text{ seconds}) + 60$ meters.
- c.** 54 sec; the total distance is the length of the race track times 3 laps, 600 meters. If you substitute 600 for d , $t = 54$.

Answers for 5.2 *continued*
For use with pages 296–299

5.2 Mixed Review

55. 3 **56.** -18

57. -3 **58.** -8.8

59. $y = -5x - 2$

60. $y = \frac{2}{7}x - 3$

61. $y = x - 4$

62. $y = 9x + 14$

63. $y = -\frac{4}{5}x + 6$

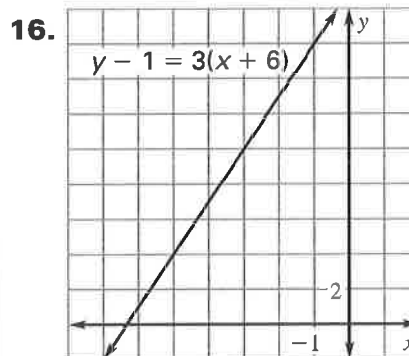
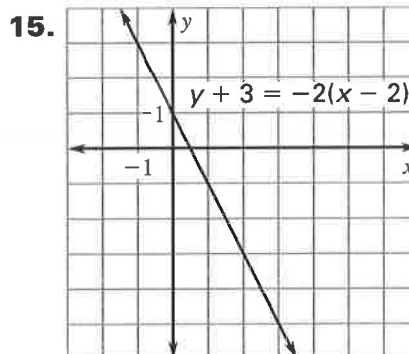
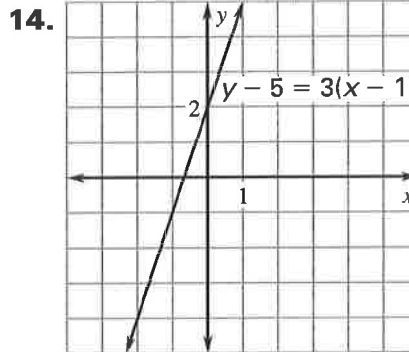
64. $y = -\frac{1}{12}x + 2$

Answers for 5.3

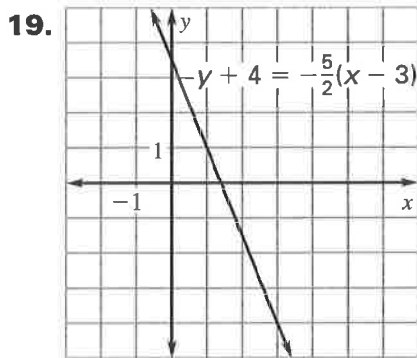
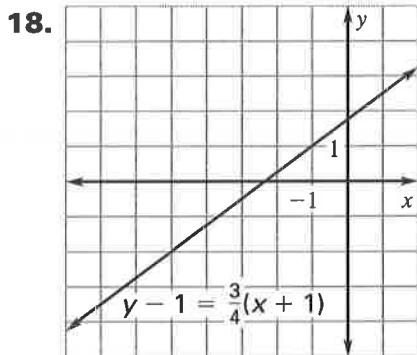
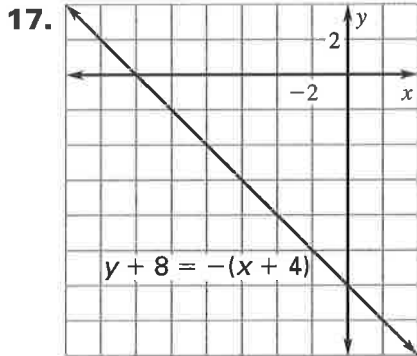
For use with pages 305–308

5.3 Skill Practice

1. $-2; (-5, 5)$
2. Find the slope and substitute it for m in the equation $y - y_1 = m(x - x_1)$. Then pick one of the points and substitute the coordinates in for y_1 and x_1 .
3. $y - 1 = 2(x - 2)$
4. $y - 5 = -(x - 3)$
5. $y + 1 = -6(x - 7)$
6. $y + 1 = -2(x - 5)$
7. $y - 2 = 5(x + 8)$
8. $y - 6 = \frac{3}{2}(x + 6)$
9. $y + 3 = -9(x + 11)$
10. $y + 9 = \frac{7}{3}(x + 3)$
11. $y + 12 = -\frac{2}{5}(x - 5)$
12. C
13. The form $y - y_1$, so the left side should be $y - (-5)$ or $y + 5$;
 $y + 5 = -2(x - 1)$.



Answers for 5.3 *continued*
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20. $y - 1 = 2(x - 3)$ or
 $y + 3 = 2(x - 1)$

21. $y - 4 = (x - 1)$ or
 $y - 1 = (x + 2)$

22. $y - 4 = -\frac{1}{2}(x + 5)$ or
 $y - 2 = -\frac{1}{2}(x + 1)$

23. $y - 2 = -2(x - 7)$ or
 $y - 12 = -2(x - 2)$

24. $y + 2 = \frac{1}{2}(x - 6)$ or
 $y - 1 = \frac{1}{2}(x - 12)$

25. $y + 1 = -\frac{3}{5}(x + 4)$ or
 $y + 7 = -\frac{3}{5}(x - 6)$

26. $y - 5 = \frac{5}{4}(x - 4)$ or
 $y + 5 = \frac{5}{4}(x + 4)$

27. $y + 20 = 8(x + 3)$ or
 $y - 36 = 8(x - 4)$

28. $y + 19 = \frac{16}{5}(x + 5)$ or
 $y - 13 = \frac{16}{5}(x - 5)$

29. A point was not substituted into the equation, the y -coordinates of the two points were substituted;
 $y - 2 = \frac{2}{3}(x - 1)$.

30. B

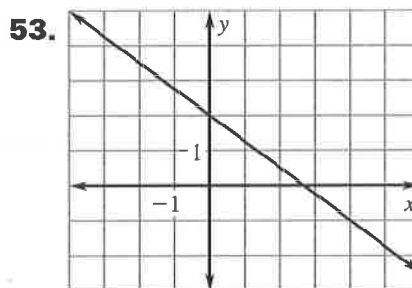
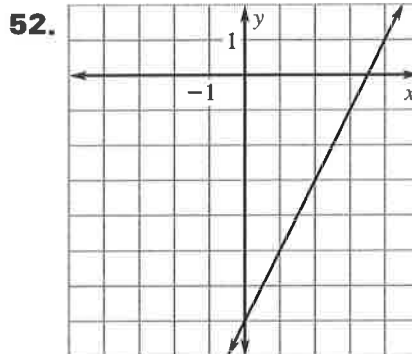
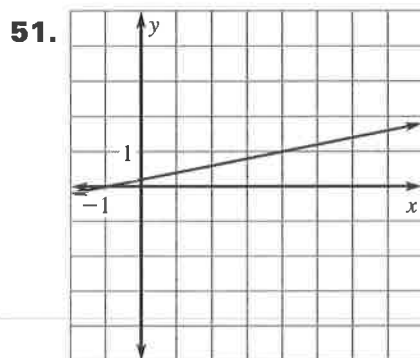
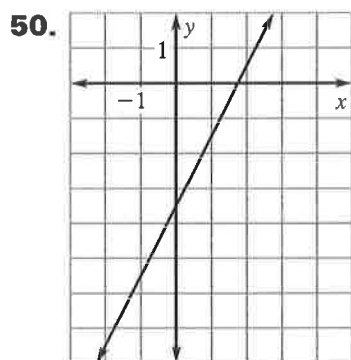
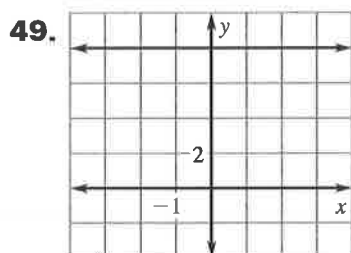
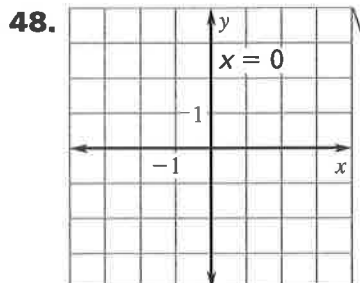
Answers for 5.3 *continued*

For use with pages 305–308

- 31.** No; because the increase is not at a constant rate, the situation cannot be modeled by a linear equation.
- 32.** Yes; because the rate is increasing at a constant rate, the situation can be modeled by a linear equation. *Sample answer:*
$$y - 1.2 = \frac{1}{5}(x - 1)$$
- 33.** No; because the increase is not at a constant rate, the situation cannot be modeled by a linear equation.
- 34.** Yes; because the rate is decreasing at a constant rate, the situation can be modeled by a linear equation. *Sample answer:*
$$y - 16 = 3(x + 3)$$
- 35.** 2; $y - 8 = -(x - 2)$ or $y - 6 = -(x - 4)$
- 36.** -3 ; $y - 3 = 3(x - 4)$ or $y = 3(x - 3)$
- 5.3 Problem Solving**
- 37. a.** $y = 130x + 530$
b. \$1570
- 38.** Since the cost increases at a constant rate of \$1714 per month, the situation can be modeled by a linear equation; \$5950; \$1714.
- 39.** $y = 10,000x + 67,000$; \$127,000
- 40. a.** $y = 1.4x + 30$
b. 45.4 gal
- 41. a.** Since the cost increases at a constant rate of \$.49 per print, the situation can be modeled by a linear equation.
b. Sample answer:
$$y - 1.98 = 0.49(x - 1)$$

c. \$1.49 **d.** \$1.79
- 42. a.** $y = 2.45x + 13.45$
b. about 26.64 million metric tons
- 43. a.** $y - 17.6 = -0.06(x - 60)$
b. 16.4 ft/sec
- 44. a.** 1.59 billion lb; find the number of cans recycled per pound of aluminum in 2002 by substituting 30 for x to get about 33.9 cans per pound. Divide 53.8 million aluminum cans by 33.9 cans per pound to find the number of pounds of aluminum.
b. $y = 0.417391x + 21.413$
- 5.3 Mixed Review**
- 45.** 0.4 **46.** 2.3 **47.** 14

Answers for 5.3 *continued*
 For use with pages 305–308



54. $y = -3x + 5$

55. $y = 8x - 1$

56. $y = \frac{2}{3}x - 3$

57. $y = -\frac{4}{3}x + 7$

Answers for 5.4

For use with pages 314–317

5.4 Skill Practice

- standard form
 - slope-intercept form
 - point-slope form
 - Find the slope of the line then substitute the slope and one of the points into the point-slope form. Collect variables on one side and constants on the other side.
- 5–10.** Sample answers are given.
- $2x + 2y = -20, 3x + 3y = -30$
 - $x + 2y = 3, 10x + 20y = 30$
 - $x - 2y = -9, -2x + 4y = 18$
 - $-3x - 4y = 2, -6x - 8y = 4$
 - $3x - y = -4, 6x - 2y = -8$
 - $2x - 4y = 5, -4x + 8y = -10$
 - $-x + y = 5$
 - $-3x + y = -13$
 - $2x + y = 5$
 - $4x + y = -32$
 - $\frac{3}{2}x + y = -10$
 - $-\frac{1}{6}x + y = -9$
 - $\frac{2}{3}x + y = -\frac{4}{3}$
 - $-x + y = 7$
 - $-\frac{4}{3}x + y = -1$
 - $-4x + y = -3$
 - $-\frac{1}{2}x + y = 1$
 - $y = -2$
 - $y = 2, x = 3$
 - $y = -3, x = -5$
 - $y = 3, x = -1$
 - $y = 3, x = 5$
 - $y = 4, x = -1$
 - $y = -2, x = -6$
 - (1, -4) was substituted incorrectly, 1 should be substituted for x and -4 substituted for y .
 $A(1) - 3(-4) = 5, A + 12 = 5,$
 $A = -7.$
 - B
 - 4; $4x + 3y = 5$
 - $\frac{1}{2}; \frac{1}{2}x - 4y = -1$
 - 4; $-x - 4y = 10$
 - 11; $8x + 11y = 4$
 - 5; $-5x - 3y = -5$
 - $\frac{2}{7}; 2x + \frac{2}{7}y = -4$
 - $\frac{a}{b}x + y = a$

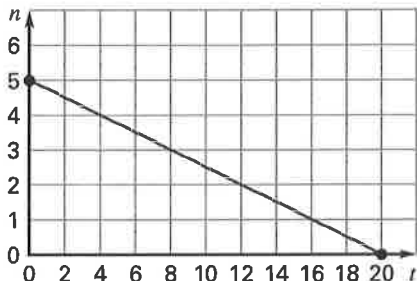
Answers for 5.4 *continued*
For use with pages 314–317

5.4 Problem Solving

- 38.** $2.5p + 1.2v = 300$;
Sample answer: 120 phlox plants and 0 vinca plants; 0 phlox plants and 250 vinca plants; 60 phlox plants and 125 vinca plants

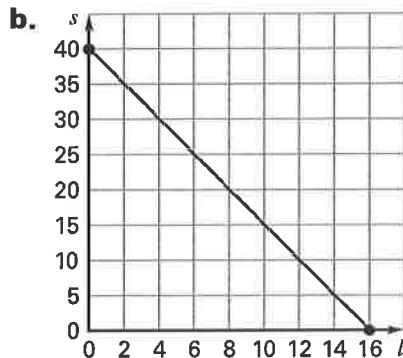
- 39. a.** 15 oz
b. $12c + 15w = 120$
c. 10 corn, 0 wheat; 5 corn, 4 wheat; 0 corn, 8 wheat

- 40.** $20n + 5t = 100$;



The n -intercept, 5, is the number of nights of boarding the dog at the kennel without any treats. The t -intercept, 20, is the number of treats that can be bought without boarding the dog for any nights.

- 41. a.** $100l + 40s = 1600$



c.

Large rafts	Small rafts
16	0
14	5
12	10
10	15
8	20
6	25
4	30
2	35
0	40

- 42. a.** $0.75b + s = 63$
b. 18 subway rides; if you ride the bus 60 times, it costs $(0.75)\$60 = \45 without the pass. The pass costs \$63, you need to spend \$18 on subway rides, $\$18 \div 1 = \18 .

Answers for 5.4 *continued*

For use with pages 314–317

43. $2l + 2w = 60$; *Sample answer:*

Length (ft)	Width (ft)
5	25
10	20
15	15
20	10
25	5

44. a. $0.4x + 0.6y = 1000$
b. 1200 mL c. 420 mL

5.4 Mixed Review

45. Parallel; if you write each equation in slope-intercept form, you can see that the slopes are equal.
46. Not parallel; if you write each equation in slope-intercept form, you can see that the slopes are not equal.
47. $y + 4 = x - 3$
48. $y - 6 = -2(x + 6)$
49. $y + 1 = 5(x + 8)$

5.1–5.4 Mixed Review of Problem Solving

1. a. \$13 per month; \$100
b. $C = 13m + 100$
c. \$256

2. a. $d = 3.5t + 5$

b. 19 mi

3. a. Because the cost increases at a constant rate of \$16 per person, the situation can be modeled by a linear equation.

b. $C = 16p$ c. \$1920

4. $V = 3t$; substitute 150 for V and solve for t ; $t = 50$ minutes.

5. a. Because the same length of path is paved each day, the situation can be modeled by a linear equation.

b. $d = -\frac{1}{2}d + 10$

c. 20 days

6. *Sample answer:* $0.05n + 0.1d = 3$

Nickels	Dimes
60	0
50	5
40	10
30	15
20	20
10	25
0	30

Answers for 5.4 *continued*
 For use with pages 314–317

7. \$190;

	1	9	0
	/	/	
.	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

8. \$69.50;

6	9	.	5
/	/		
.	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

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Answers for 5.5

For use with pages 322–324

5.5 Skill Practice

- perpendicular
- Identify the slopes of the lines.
If the slopes are negative reciprocals, then the lines are perpendicular.
- $y = 2x + 5$
- $y = -\frac{5}{2}x + 23$
- $y = -\frac{3}{5}x + 2$
- $y = 5x + 7$
- $y = 6x + 1$
- $y = \frac{1}{3}x - 4$
- $y = 2x + 9$
- $y = x - 5$
- $y = 3x + 30$
- parallel: none;
perpendicular: a and b
- parallel: a and b ;
perpendicular: none
- parallel: none;
perpendicular: none
- parallel: none;
perpendicular: a and b
- D
- The line through points (6, 4) and (4, 1) is perpendicular to the line through points (1, 3) and (4, 1); the slope of the line through the points (6, 4) and (4, 1) is $\frac{3}{2}$, the slope of the line through the points (1, 3) and (4, 1) is $-\frac{2}{3}$. The slopes are negative reciprocals, so the lines are perpendicular.
- $y = -x$
- $y = -\frac{1}{3}x - 1$
- $y = -\frac{1}{5}x + 2$
- $y = -2x + 24$
- $y = \frac{7}{2}x + 3$
- $y = -\frac{3}{4}x - 4$
- $y = -\frac{2}{3}x + 5$
- $y = -\frac{1}{2}x - \frac{1}{2}$
- $y = 2x - 17$
- (2, 1) was substituted incorrectly, 2 should be substituted for x , and 1 should be substituted for y ;
 $1 = 2(2) + b$, $1 = 4 + b$,
 $-3 = b$.
- B

Answers for 5.5 *continued*

For use with pages 322–324

29. Yes; the slope of the line through $(4, 3)$ and $(3, -1)$ is 4 and the slope of the line through $(-3, 3)$ and $(1, 2)$ is $-\frac{1}{4}$. The slopes are negative reciprocals, so the lines are perpendicular.

30. *Sample answer:* $y = 2x + 1$ and $y = 2x + 3$; $y = -\frac{1}{2}x + 2$

31. $m = \frac{x_1 - x_2}{y_1 - y_2}$

5.5 Problem Solving

32. a. $y = 2x + 8$

b. $y = -2x + 8$

c. No; the slopes -2 and 2 are not negative reciprocals.

33. a. $w_1 = 200d + 6000$;
 $w_2 = 200d + 6250$

b. 12,000 lb; 12,250 lb

c. The graphs of the lines are parallel because they have the same slope, 200. The w -intercept of the second line is 250 more than the w -intercept of the first line.

34. Parallel: 2nd Street and Park

Street; the slope of both streets is $\frac{2}{3}$. Since they have the same

slope, the streets are parallel.

Perpendicular: 2nd Street and Sea Street, Park Street and Sea Street;

the slope of Sea Street is $-\frac{3}{2}$,

which is the negative reciprocal

of $\frac{2}{3}$, the slope of 2nd Street and

Park Street. Since the slopes are

negative reciprocals, the streets

are perpendicular.

35. Different registration fees;

because the lines are parallel, the

rate of change, the monthly fee,

for each must be equal. Therefore,

the students paid different

registration fees.

36. a. $C = 38.75m + 49$

b. $C = 38.75m + 149$

c. The graphs of the lines are parallel; they have the same slope, 38.75. The C -intercept of the second graph is 100 more than the C -intercept of the first graph.

d. \$100; \$100

Answers for 5.5 *continued*

For use with pages 322–324

- 37. a.** $y = -2.5x + 50$;
 $y = -2.5x + 30$
- b.** The graphs of the lines are parallel; they have the same slope, -2.5 . The y -intercept of the second line is 20 less than the y -intercept of the first line.
- c.** 20; 12; the x -intercepts show the number of months of nonuse it would take for the value of the gift card to be \$0.

5.5 Mixed Review

38. 7 **39.** -1 **40.** 4.2

- 41. a.** Compare the ratios, $\frac{c}{n}$, for all data pairs (n, c) :

$$\frac{15}{1} = \frac{45}{3} = \frac{75}{5} = \frac{135}{9} = 15.$$

Because the ratios all equal 15, c varies directly with n .

b. $c = 15n$

42. $-2x + y = -15$