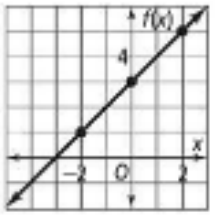
Chapter 5

Get Ready! p. 291

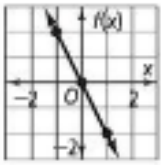
1. yes **2.** no **3.** yes **4.** $y = \frac{1}{2}x + 2$ **5.** $y = 3x - 2$
6. $y = -x - 2$ **7.** boat **8.** bean plant
9.

x	$f(x)$
−2	1
0	3
2	5



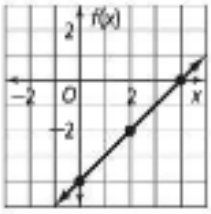
10.

x	$f(x)$
−1	2
0	0
1	−2



11.

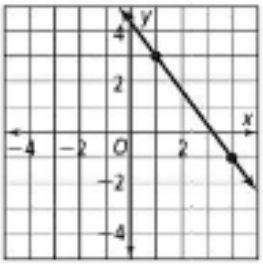
x	$f(x)$
0	−4
2	−2
4	0



12. $A(n) = 2 + (n - 1)3$ **13.** $A(n) = 13 + (n - 1)(-3)$
14. $A(n) = -3 + (n - 1)2.5$ **15.** the steepness of the line
16. Two lines are parallel if they lie in the same plane and do not intersect. **17.** A y-intercept is the y-coordinate of the point where the line crosses the y-axis.

Lesson 5-1 pp. 294–300

Got It? 1. Yes; the rate of change is constant. **2a.** $\frac{2}{5}$
b. $-\frac{1}{3}$ **c.** yes **3a.** $-\frac{4}{3}$
b. Yes, because the slope is $-\frac{4}{3}$ and the line slopes downward from left to right.

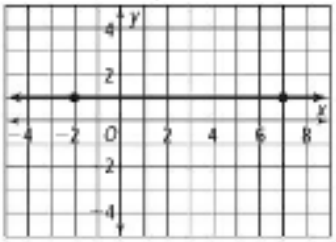


4a. undefined **b.** 0
Lesson Check 1. Yes; the rate of change between any two points is the same. **2.** $-\frac{1}{5}$ **3.** $-\frac{5}{3}$ **4.** Slope; slope is the ratio of vertical change to horizontal change. **5.** 0; the slope of a horizontal line is 0. **6.** Answers may vary.

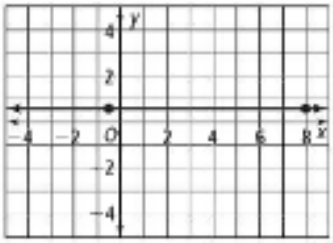
Sample: Both methods give the same result. You need the graph to count the units of change. You need the coordinates of the points to use the slope formula.
7. The student calculated the ratio of horizontal change to vertical change, but slope is the ratio of vertical change to horizontal change; $\frac{1}{2}$.

Exercises **9.** Yes; 1; there is one bun per hot dog. **11.** -2 **13.** 4 **15.** $\frac{3}{4}$ **17.** 1 **19.** -1 **21.** $\frac{7}{10}$ **23.** 0 **25.** 0 **27.** positive; 9 **29.** positive; 12 **31.** independent: number of people; dependent: cost; $12/person

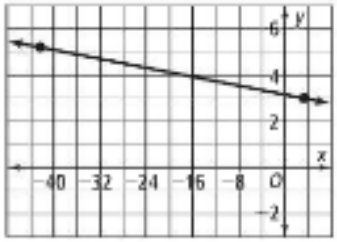
33. 0; yes, because the slope is 0 and the line is horizontal.



35. 0; yes, because the slope is 0 and the line is horizontal.

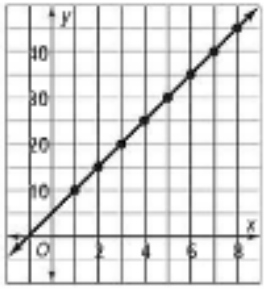


37. −0.048352; yes, because the slope is approximately −0.05 and the line slopes downward from left to right.



39. horse; mouse **41.** $2050 per month **43.** 6 **45.** 4 **47.** 3

49a. 5 **b.**



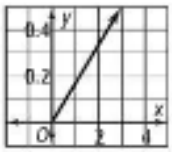
c. The slope is equal to the common difference.

51. Yes; the slopes from G to H, from H to I, and from G to I all equal $\frac{1}{2}$ **53.** No; the slopes between all pairs of points are not the same. **55.** No; the slopes between all pairs of points are not the same. **57.** $\frac{-n}{2m}$ **59.** C **61a.** $30 > 2(x + 2 + 6) > 20$ **b.** line graph with open circle on 2 to open circle on 7 **c.** line graph with open circle at 16 to open circle at 31 **62.** 5, 9, 21 **63.** 1, 13, 49 **64.** 15, 21, 39 **65.** {2, 4} **66.** {3} **67.** {8} **68.** {2, 3, 4, 5, 6, 7, 8, 10} **69.** {1, 2, 3, 4, 5, 7, 8} **70.** 7.5 **71.** 20 **72.** 5 **73.** −10 **74.** 81

Lesson 5-2 pp. 301–306

Got It! **1.** yes; $-\frac{4}{5}$ **2.** $y = -5x$; 75

3a. $y = 0.166x$

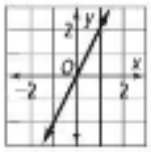


b. 0.38; the slope is the coefficient of the x-term.
4. yes; $y = -0.75x$

Lesson Check **1.** yes; 3 **2.** $y = 10x$ **3.** 30 muffins **4.** yes; $y = -\frac{1}{2}x$ **5.** always **6.** never **7.** sometimes **8.** Yes; if $q = kp$, then $p = \frac{1}{k}q$, which is a direct variation with constant of variation $\frac{1}{k}$.

Exercises **9.** no **11.** yes; −2 **13.** yes; $\frac{7}{3}$ **15.** $y = -5x$; −60 **17.** $y = \frac{5}{2}x$; 30 **19.** $y = 2.6x$; 31.2

21.



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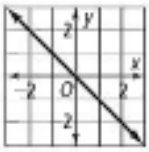
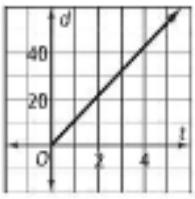
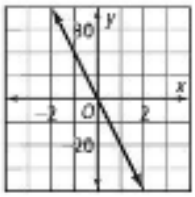


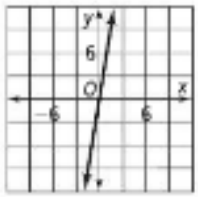
25. $d = 10.56t$



27. yes; $y = -1.5x$; check students' graphs **29.** no; check students' graphs
31. $y = -20x$



33. $y = 6x$



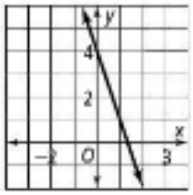
35a. 48 volts **b.** 0.75 ohm **37.** No; as the rate increases, the time decreases. **39.** No; as the number of items you purchase increases, the amount of money you have left decreases. **41.** y does not vary directly with x because

$y \neq 0$ when $x = 0$. **43a.** $\frac{2}{5}$ **b.** $y = \frac{2}{5}x$; 52 lb **45.** -6
47a. $c = 3.85g$; yes; the constant of variation is 3.85
b. c is about 0.12m **c.** about \$28.80 **49.** 165.6
51. 280.50 **52.** 1 **53.** 0 **54.** 6 **55.** $-\frac{5}{3}$ **56.** 15
57. -11 **58.** 6 **59.** -7

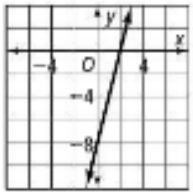
Lesson 5-3 pp. 308–314

Got It? 1a. $-\frac{1}{2}, \frac{2}{3}$ **b.** The graph moves down 3 units; the equation of the line changes to $y = -\frac{1}{2}x + \frac{2}{3} - 3 = -\frac{1}{2}x - \frac{7}{3}$. **2.** $y = \frac{3}{2}x - 1$ **3a.** The graph slants down from left to right, so the slope of the line should be negative. The slope is -1. **b.** $y = -x + 2$ **c.** No; the slope is constant, so it is the same between any two points on the line. **4.** $y = \frac{1}{2}x - \frac{7}{2}$

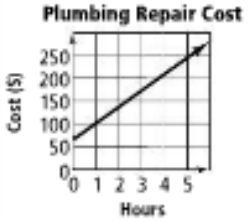
5a.



b.

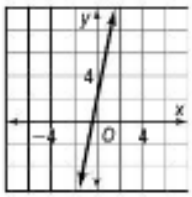


6. $y = 35x + 65$



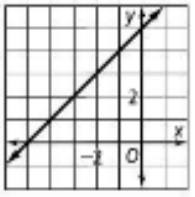
Lesson Check 1. $y = 6x - 4$ **2.** $y = -x + 1$

3.

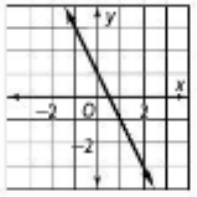


4. Yes; it is a horizontal line with a y-intercept of 5.
5. Sometimes; answers may vary. Sample: $y = 3x$ represents direct variation, but $y = 3x + 1$ does not.
6. Answers may vary. Sample: You can plot points or you can use the slope-intercept form to plot the y-intercept and then use the slope to find a second point.
Exercises 7. 3, 1 **9.** 2, −5 **11.** 5, −3 **13.** 0, 4
15. $\frac{1}{4}, -\frac{1}{3}$ **17.** $y = 3x + 2$ **19.** $y = 0.7x - 2$
21. $y = -2x + \frac{8}{5}$ **23.** $y = 2x - 3$ **25.** $y = -2x + 4$
27. $y = \frac{5}{2}x - \frac{1}{2}$ **29.** $y = -x + 2$

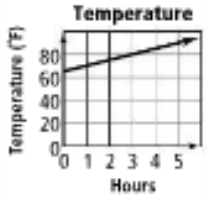
31.



33.



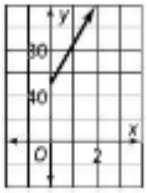
49. $y = 5x + 65$



37. $-3, 2$
39. $9, \frac{1}{2}$
41. $9, -15$
43. $2 - a, a$
45. 2030

47a. $y = 35x + 50$
c. The amount of time the repair takes and the cost must be positive.

b.



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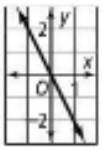

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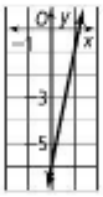
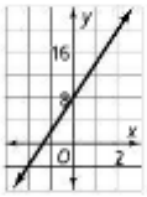


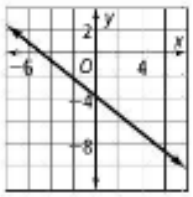
53.



55. $a_1 = -1, a_n = a_{n-1} + 4$; $y = 4x - 5$; the common difference of 4 is equal to the slope of the line in slope-intercept form. **57.** Answers may vary. Samples: graph the line, determine whether the equation can be rewritten in the form $y = mx + b$. **59.** $\frac{-1}{2}$ **61.** $\frac{3}{4}$ **63.** B **65.** D
67. Sometimes true; if $a > 0$ then $ab > ac$; otherwise $ab < ac$. **68.** $y = 5x$; 50 **69.** $y = 2x$; 20 **70.** $y = 3x$; 30
71. $t = -9$ **72.** $q = 27$ **73.** $x = 7$ **74.** $-3x + 15$
75. $5x + 10$ **76.** $-\frac{4}{9}x + \frac{8}{3}$ **77.** $1.5x + 18$

Lesson 5-4 pp. 315–320

Got It? 1. $y + 4 = \frac{2}{3}(x - 8)$ **2.**

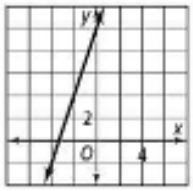


3a. $y + 3 = \frac{7}{3}(x + 2)$ **b.** They are both equal to $y = \frac{7}{3}x + \frac{5}{3}$; you can use any point on a line to write an

equation of the line in point-slope form. **4a.** Answers may vary. Sample: $y - 3320 = 1250(x - 2)$; the rate at which water is being added to the tank, in gallons per hour **b.** $y = 1250x + 820$; the initial number of gallons of water in the tank

Lesson Check **1.** $\frac{4}{9}$; $(-7, 12)$ **2.** $y + 8 = -2(x - 3)$

3.



4. Answers may vary. Sample: $y + 2 = 2(x + 1)$

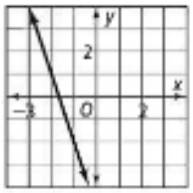
5. the slope m of the line and a point (x_1, y_1) on the line

6. yes; $1 - 4 = 3(-2 + 1)$ **7.** Yes; answers may vary. Sample: $y - a = m(x - b)$, $y = mx - mb + a$, $y = mx + (a - mb)$

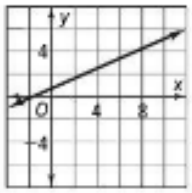
Exercises **9.** $y - 2 = -\frac{5}{3}(x - 4)$

11. $y = -1(x - 4)$

13.



15.

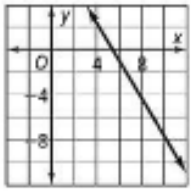


17. Answers may vary. Sample: $y - 1 = -\frac{3}{4}(x - 1)$

19–21. Point-slope forms may vary. Samples are given.

19. $y - 4 = \frac{3}{2}(x - 1)$; $y = \frac{3}{2}x + \frac{5}{2}$ **21.** $y - 6 = -\frac{1}{3}(x + 6)$; $y = -\frac{1}{3}x + 4$ **23.** $y = 8.5x$; the slope 8.5 represents the hourly wage in dollars; the y-intercept 0 represents the amount earned for working 0 h.

25.



27. Answers may vary. Sample: $C - 10 = \frac{5}{9}(F - 50)$; 15°C **29.** $b = -0.0018a + 212$; 207.5°F

31a. $j(x) = 2x - 2$; check students' drawings.

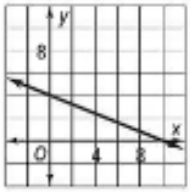
b. $k(x) = 2x + 1$; check students' drawings. **c.** Sample answer: Adding a number to a function changes the y-intercept, and the slope remains the same. Adding a number to the x-value of a function changes the y-intercept and the slope remains the same. **33.** A **35.** D **37.** 1, 4

38. 6, 0 **39.** −1, −13 **40.** $y = \frac{z}{7x}$ **41.** $y = \frac{7b + 3}{a}$

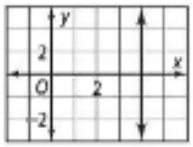
42. $y = \frac{6x - c}{6}$

Lesson 5-5 pp. 322–328

Got It? **1a.** 12; −10 **b.** 4; $\frac{3}{2}$ **2.**



3a.



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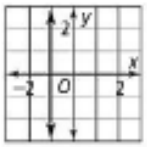
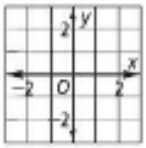
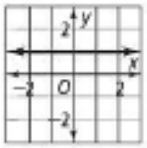


c.



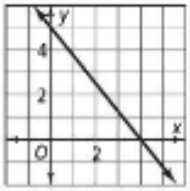
d.



4. $x + 3y = 0$ **5a.** $x + 15y = 60$ **b.** domain: nonnegative integers less than or equal to 60; range: {0, 1, 2, 3, 4}

Lesson Check **1.** 3, $-\frac{9}{4}$

2.



3. horizontal line

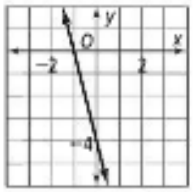
4. $x - 2y = -6$

5. $10x + 25y = 285$; answers may vary. Sample: 1 $10 card and 11 $25 cards, 6 $10 cards and 9 $25 cards, 11 $10 cards and 7 $25 cards

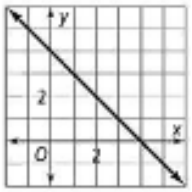
6a. point-slope form **b.** slope-intercept form **c.** point-slope form **d.** standard form **7.** Answers may vary. Sample: slope-intercept form; it is easy to find the y-intercept and calculate the slope from the graph.

Exercises **9.** 2, −1 **11.** $-\frac{20}{3}$, 4 **13.** 1.5, −2.5

15.



17.



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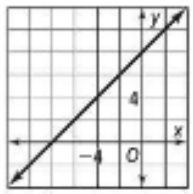

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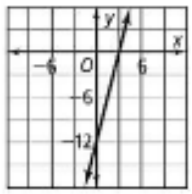
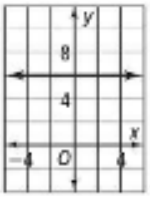


23. horizontal **25.** horizontal

27.



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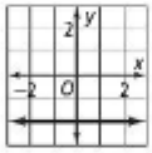
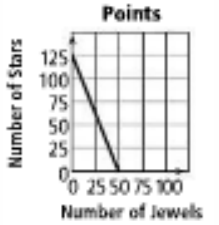


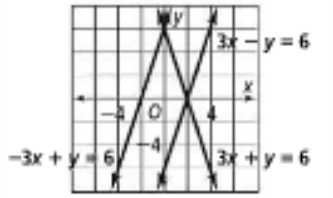
31. $2x - y = -5$ **33.** $2x + y = 10$ **35.** $2x + 3y = -3$ **37.** $5j + 2s = 250$



Answers may vary. Sample: 50 jewels and 0 stars, 48 jewels and 5 stars, 42 jewels and 20 stars

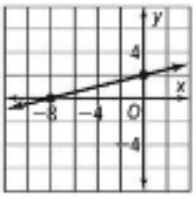
39. When you have a slope and the y-intercept, use the slope-intercept form. When you have two points or a slope and a point, use the point-slope form. When you have the standard form, it is easy to graph.

41.



Two lines have the same slope but different y-intercepts. Two lines have the same y-intercept but different slopes. **43.** The student did not subtract 1 from each side of the equation. The correct equation is $4x - y = -1$.

45.



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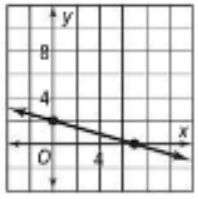
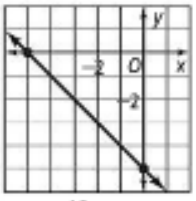


49.



51. Both functions have a y-intercept at (0, 3). Both functions have a negative slope. The first function has a slope of $-\frac{3}{4}$ and the second function has a slope of $-\frac{1}{2}$.

53. 10, $-\frac{10}{3}$ **55.** 6, 6 **57.** 4, $-\frac{8}{5}$ **59.** square; the graph of $x + 4y = 8$ is a line that passes through (0, 2) and (8, 0); the graph of $4x - y = -1$ is a line that passes through (0, 1) and (1, 5); the graph of $x + 4y = -12$ is a line that passes through (0, −3) and (−4, −2); the graph of $4x - y = 20$ is a line that passes through (5, 0) and (4, −4). **61.** $4x - y = -2$ **63a.** $200s + 150a = 1200$ **b.** Answers may vary. Sample: student \$1.50 and adult \$6, student \$2.25 and adult \$5, student \$3 and adult \$4. **b.** Check students' work. **65.** H **67.** H

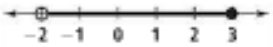
69–71. Point-slope forms may vary. Samples are given.

69. $y + 1 = -\frac{5}{8}(x - 5)$; $y = -\frac{5}{8}x + \frac{17}{8}$

70. $y + 2 = \frac{4}{3}x$; $y = \frac{4}{3}x - 2$

71. $y + 1 = x + 2$; $y = x + 1$

72. $-2 < t \leq 3$



73. $1.7 \leq y < 12.5$

74. $x \leq -1$ or $x > 3$

75. 2 **76.** 3 **77.** 0

Lesson 5-6 pp. 330–335

Got It? 1. $y = 2x + 5$ **2a.** Neither; the slopes are not equal or opposite reciprocals. **b.** Parallel; the slopes are equal. **3.** $y = -\frac{1}{2}x + \frac{17}{2}$ **4.** $y = -\frac{2}{3}x + 10$

Lesson Check 1. $y = 6x$ and $y = 6x - 2$; $y = -\frac{1}{6}x$ and $y = 6x$, $y = -\frac{1}{6}x$ and $y = 6x - 2$ **2.** $y = -4x + 11$ **3.** $y = -x - 1$ **4a.** yes **b.** no **c.** no **6.** In both cases, you compare the slopes of the lines. If the slopes are equal, then the lines are parallel. If the slopes are opposite reciprocals, the lines are perpendicular.

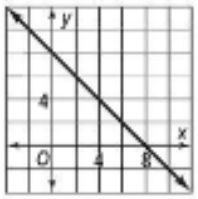
Exercises 7. $y = 3x$ **9.** $y = 4x - 7$ **11.** $y = \frac{2}{3}x$

13. Perpendicular; the slopes are opposite reciprocals.

15. Parallel; the slopes are equal. **17.** Perpendicular; one line is vertical and the other line is horizontal. **19.** $y = \frac{1}{3}x$ **21.** $y = -\frac{1}{5}x - \frac{9}{5}$ **23.** $y = -\frac{1}{2}x + \frac{5}{2}$ **25.** $y = -\frac{1}{2}x + 4$ **27.** a and f; b and d, c and e **29.** Sometimes; if the slopes are equal and the y-intercepts are not equal, then the lines are parallel. **31.** 2; the common difference of an arithmetic sequence represents the slope of the linear graph. Since the graphs of the sequences are parallel, their slopes must be equal.

33. $x = 3$ **35.** $y = -100x + 600$, $y = -100x + 1000$; parallel; the slopes are the same. **37.** No; the slope of segment PQ is 2, the slope of segment QR is -1, and the slope of segment PR is $\frac{1}{2}$. No two slopes are opposite reciprocals, so no angle of the triangle is a right angle. **39.** G

41.



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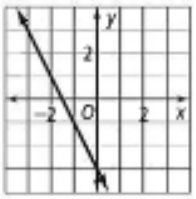

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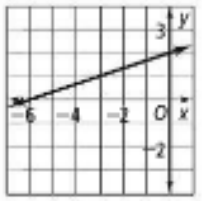
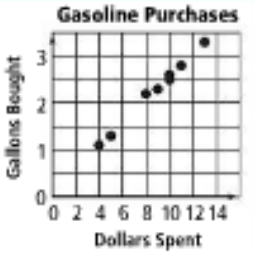


44. $y = 3x - 2$
45. $y = -\frac{2}{5}x + \frac{29}{5}$
46. $y = 0.25x + 1.875$
47. $y = -\frac{40}{7}x + \frac{660}{7}$

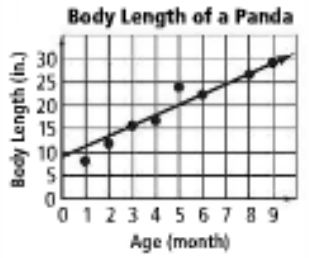
Lesson 5-7 pp. 336–343

Got It? 1a.



positive correlation

b. No correlation; the length of a city's name and the population are not related. **2a.** Answers may vary. Sample:

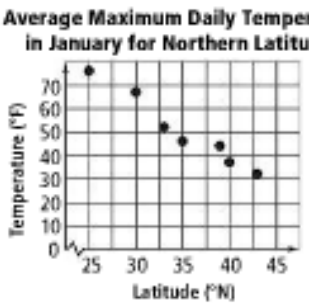


$y = 2.23x + 8.8$; about 24.4 in. **b.** No; an adult panda does not grow at the same rate as a young panda.

3a. about \$9964 **b.** The slope tells you that the cost increases at a rate of about \$409.43 per year. **4a.** There may be a positive correlation, but it is not causal because a more expensive vacation does not cause a family to own a bigger house. **b.** There is a positive correlation and a causal relationship. The more time you spend exercising, the more Calories you burn.

Lesson Check

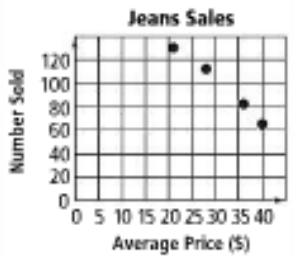
1.



negative correlation

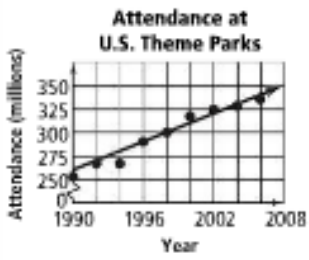
2–3. Answers may vary. Samples are given.
2. $y = -2x + 120$ **3.** about 20°F **4.** You use interpolation to estimate a value between two known values. You use extrapolation to predict a value outside the range of the known values. **5.** Both the trend line and the line of best fit show a correlation between two sets of data. The line of best fit is the most accurate trend line. **6.** If y decreases as x decreases, then there is a positive correlation because a trend line will have a positive slope.

Exercises 7.



negative correlation

9. Answers may vary. Sample:



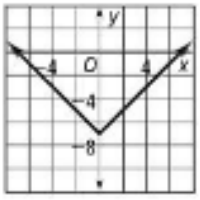
$y = 5x - 9690$; about 335 million

11. $y = 21.4x - 41557$; 0.942; 1542.6 million tickets **13.** no correlation likely **15.** There is likely a correlation and a possible causal relationship, because the higher the price of hamburger, the less people are likely to buy. **17.** Check students' answers. **19.** about 7 cm **21a.** $y = 10.5x + 88.2$ **b.** 10.5; the sales increase by about 10.5 million units each year. **c.** 88.2; the estimated number of units sold in the year 1990 **23.** A **25.** D **27.** $y = 5x - 13$ **28.** $y = -x + 5$ **29.** $y = -\frac{2}{3}x + \frac{10}{3}$ **30.** 5 **31.** 0 **32.** 18 **33.** 12

Lesson 5-8 pp. 346–351

Got It! 1a. The graph is the graph of $y = |x|$ translated 4 units up. **b.** The domain of both graphs is all real numbers. The range of $y = |x|$ is $y \geq 0$. The range of $y = |x| - 2$ is $y \geq -2$.

2.



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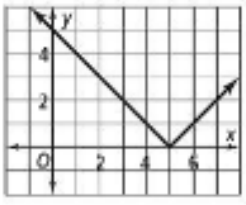

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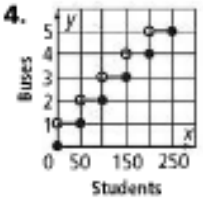
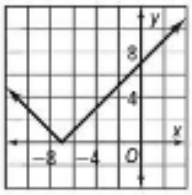


Lesson Check **1.** $y = |x| - 8$ is $y = |x|$ translated 8 units down; the graphs have the same shape.

2. $y = |x| + 9$

3.

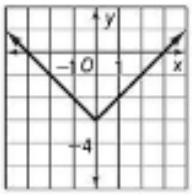


4. The graphs have the same shape; $y = |x| - 4$ is $y = |x|$ translated 4 units down and $y = |x - 4|$ is $y = |x|$ translated 4 units right.

5. The student should translate the graph 10 units to the right.

Exercises **7.** It is a translation of $y = |x|$ left 4 units.

9.



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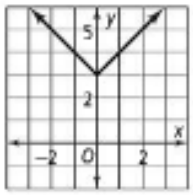

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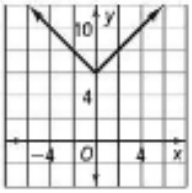

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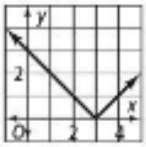

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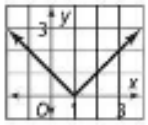

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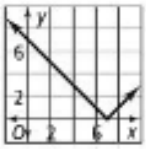

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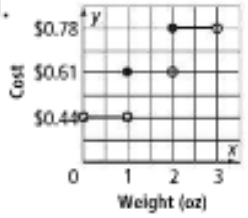

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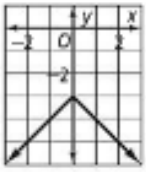

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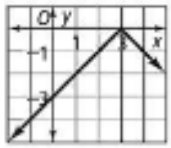
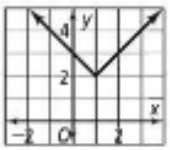


27. $y = -|x + 2.25|$ **29.** $y = -|x - 4|$

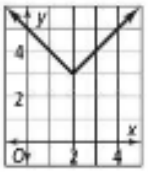
31. $(-1, 3)$

33.



It is a translation of $y = |x|$ up 2 units and right 1 unit.

35a.



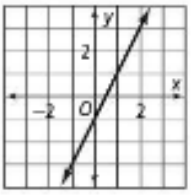
b. $(2, 3)$ **c.** The x-coordinate is the horizontal translation and the y-coordinate is the vertical translation; (h, k).

37. Graph of $y = -|x + 4| - 7$ is a V-shaped graph opening downward with the left side going through $(-6, -9)$ and $(-4, -7)$ and the right side going through $(-4, -7)$ and $(-2, -9)$. **39.** $\frac{-3}{8}$ **41.** $\frac{1}{2}$

42–43. Answers may vary. Samples are given.

42. $y = 0.25x + 5.05$ **43.** $y = 12.5x$

44.



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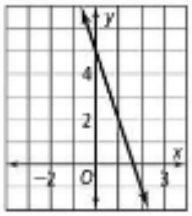

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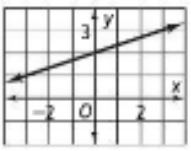

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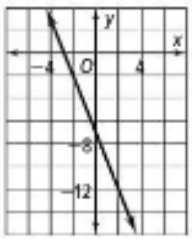
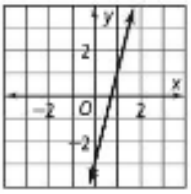


Chapter Review pp. 353–356

1. interpolation **2.** rate of change **3.** point-slope form **4.** opposite reciprocals **5.** line of best fit **6.** -1 **7.** 0 **8.** 3 **9.** undefined **10.** 3 **11.** $-\frac{1}{2}$ **12.** $y = -2x$; -14 **13.** $y = \frac{5}{2}x$; $\frac{35}{2}$ **14.** $y = \frac{1}{3}x$; $\frac{7}{3}$ **15.** $y = -x$; -7 **16.** no **17.** yes; $y = -2.5x$ **18.** $y = 4$ **19.** $y = x - 5$ **20.** $y = \frac{2}{3}x + 1$ **21.** $y = -x - 1$

22.



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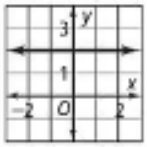

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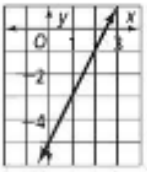
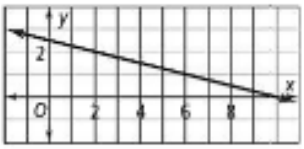


25.



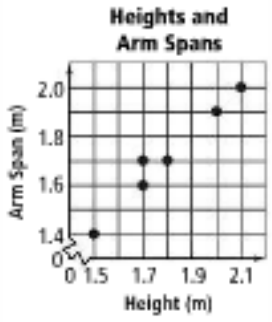
26. $y = 5x - 11$ **27.** $y = 9x - 5$ **28.** Parallel; the slopes are equal. **29.** Neither; the slopes are not equal

or opposite reciprocals. **30.** $y = \frac{1}{3}x + 4$

31. $y = -\frac{1}{8}x + \frac{21}{2}$ **32.** negative correlation

33. no correlation **34.** positive correlation

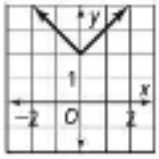
35a.



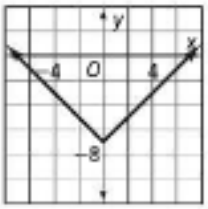
b–d. Answers may vary. Samples are given.

b. $y = 0.96x - 0.01$ **c.** about 1.5 m **d.** about 2.1 m

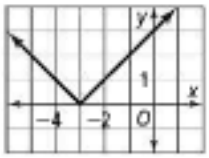
36.



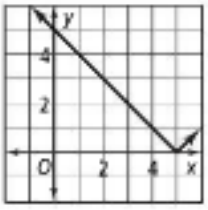
37.



38.



39.



40.