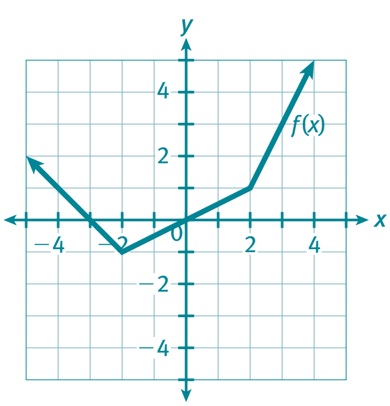
Answers to Algebra 1 Unit 3 Practice

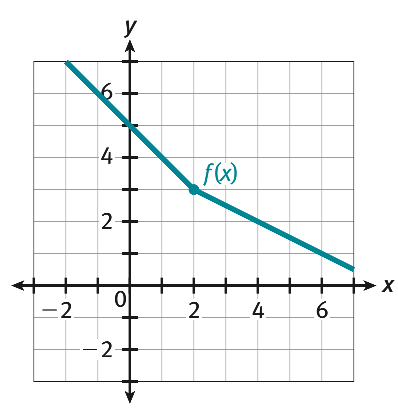
1. $C(t) = 13t + 39$
2. \$13/day; each extra day the canoe is rented increases the total cost by \$13.
3. B
4. Disagree; the average rate of change between years 0 and 2 is $\frac{14{,}000 - 10{,}120}{2 - 0} = \frac{3880}{2} = 1940$, while the average rate of change between years 2 and 5 is $\frac{10{,}120 - 6240}{5 - 2} = \frac{3880}{3} = 1293.\overline{3}$.
5. The rate of change is 25 minutes/pound. For each extra pound that a chicken weighs, the cooking time increases by 25 minutes.
6. $C(w) = 0.035w$, where C is the cost in dollars and w is the weight in pounds; domain: $\{w \mid 0 < w < 700\}$; range: $\{C(w) \mid 0 < C(w) < 24.5\}$
7. $C(w) = 2.1 + 0.032w$, where C is the cost in dollars and w is the weight in pounds; domain: $\{w \mid w \geq 700\}$; range: $\{C(w) \mid C(w) \geq 24.5\}$
8. B
9. $C(w) = \begin{cases} 0.035w, \text{ when } 0 < w < 700 \\ 2.1 + 0.032w, \text{ when } w \geq 700 \end{cases}$
10. $M(a) = \begin{cases} 100 + 13a, \text{ when } 0 \leq a \leq 14 \\ 282 + 22(a - 14), \text{ when } 14 < a \leq 28, \end{cases}$

    or equivalent; the mass of the baby panda increased by $590 - 304 = 286$ grams
11. $A(8) = 110$; After 8 weeks, Teresa has saved \$110.
12. D
13.



14. Alan used the wrong piece of the function rule to find the value of $f(4)$. Alan used the first piece, which only applies to value of x less than 4. He should have used the second piece, which applies to values of x greater than or equal to 4. The correct answer is $f(4) = -7$.
15. Answers may vary. Both are piecewise-defined functions with two pieces. The functions are identical for $0 < t \leq 4$ with a rate of change of \$10/hour. For values of $t > 4$, the rate of change for Valdez Bikes drops to \$5/hour. For Adam's Bicycles, the rate of change does not drop to \$5/hour until $t > 5$.
16. C
17. $f(x) = \begin{cases} -2x + 5, \text{ when } x < 1 \\ \frac{1}{2}x + \frac{5}{2}, \text{ when } x \geq 1 \end{cases}$, or equivalent
18. Answers may vary. Both are piecewise-defined functions with two pieces. The domains of the pieces are the same, and the graphs of both functions change direction at the point (1, 3). For $x < 1$, the rates of change for the functions are both negative, but the graph of $f(x)$ is steeper. For $x \geq 1$, the rates of change for the functions have opposite signs.
19. Students should represent both functions as equations or as graphs. The equation for $g(x)$ is

    $g(x) = \begin{cases} -x + 5, \text{ when } -1 \leq x \leq 2 \\ -\frac{1}{2}x + 4, \text{ when } 2 < x \leq 6 \end{cases}$. The graph of $f(x)$ is shown below. Students should note that the functions are identical except for their domains. The domain of $f(x)$ is all real numbers, and the domain of $g(x)$ is $\{x \mid -1 \leq x \leq 6\}$.



20. $d = 10 - 0.2t$

21. a. -0.2; Shari's speed is 0.2 km/min.

b. The graph shows Shari's remaining distance to the finish, and this quantity is decreasing over time.

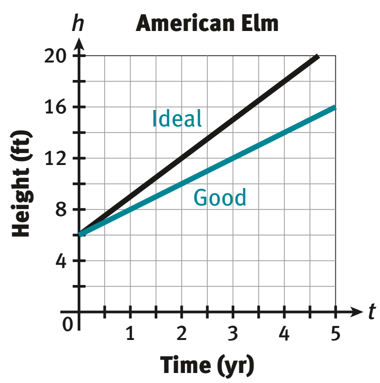
22. 50 min; explanations may vary. The graph shows that Shari had 0 kilometers of distance remaining after 50 minutes.

23. B

24. 10 min; explanations may vary. The equation that represents Jody's data is $d = 10 - 0.25t$, where d is the distance in kilometers remaining and t is the time in minutes. Substituting 0 for d and solving for t gives $t = 40$. So, Jody finished the race in 40 minutes, which is 10 minutes faster than Shari's time.

25. 3 ft/yr; the rate of change equals the slope of the graph, which is 3.

26.



27. $h = 2t + 6$; the constant 6 represents the height of the tree in feet when it is planted. The coefficient of t is 2; it represents the average increase in the height of the tree in feet per year.

28. B

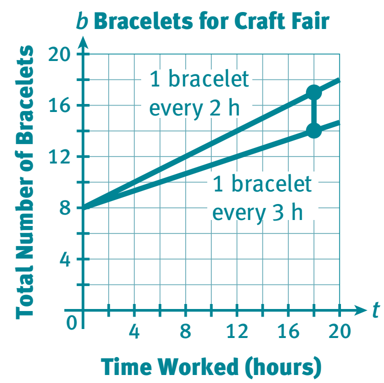
29. The tree was planted between 4 and 6 years ago. I determined this by extending the coordinate plane so I could see the value of of $h = 6 + 2t$ where $h = 18$. The height of a tree grown under ideal conditions would reach 18 feet after 4 years; the height of an elm grown under good conditions would reach 18 feet after 6 years.

30. A

31. $b = \frac{1}{3}t + 8$

32. In Item 30, the coefficient of t is $\frac{1}{2}$; it represents the number of bracelets Carly can make per hour when it takes her 2 hours to make each bracelet. In Item 31, the coefficient of t is $\frac{1}{3}$; it represents the number of bracelets Carly can make per hour when it takes her 3 hours to make each bracelet. The constant of 8 in both equations represents the number of bracelets Carly already has.

33.



34. If Carly works 18 hours, she will have between 14 and 17 bracelets for the craft fair; $14 \le b \le 17$

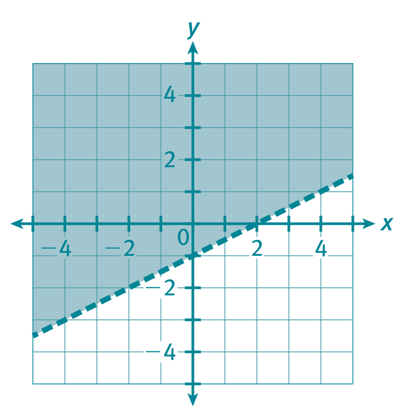
35. D

36. $4x + 6y \le 30$, or equivalent

37. Answers may vary. Five large sandwiches alone would cost $5(\$6) = \$30$, which is the total amount on the gift card. So, Jesse could not buy 2 regular sandwiches in addition to 5 large sandwiches.

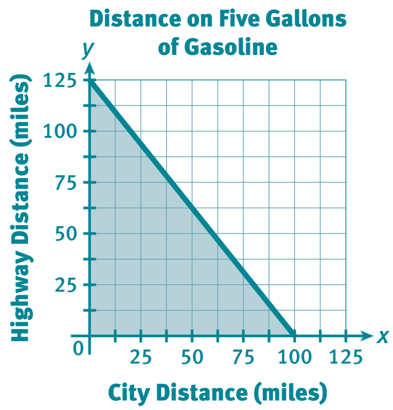
38. If Jesse buys 1 regular sandwich and 2 large sandwiches, he will have spent $1(\$4) + 2(\$6) = \$16$ of the gift card, leaving \$14 on the gift card. The inequality is now $4x + 6y \le 14$. Jesse should then buy 2 regular sandwiches and 1 large sandwich; this is the only combination of sandwiches that totals \$14.

39.



40. C

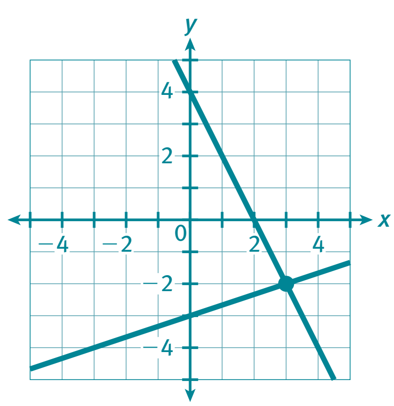
41.



42. The x-intercept is (100, 0), which means that the greatest distance Dale could drive in the city, with 0 miles driven on the highway, is 100 miles. The y-intercept is (0, 125), which means that the greatest distance Dale could drive on the highway, with 0 miles driven in the city, is 125 miles.

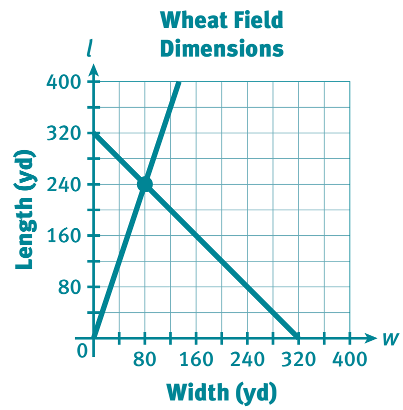
43. Answers may vary. Solve the inequality for y. Then graph the boundary line. Use a dashed line for $<$ or $>$. Use a solid line for $\leq$ or $\geq$. Check a test point in the inequality, such as (0, 0). If the test point makes the inequality true, shade the half-plane that includes the test point. If the test point makes the inequality false, shade the half-plane that does not include the test point.

44. $(3, -2)$



45. B

46. (80, 240); the solution represents the width (80 yards) and length (240 yards) of a field that has a 640-yard perimeter, and a length that is three times its width.



47. Regina is not correct. The ordered pair (4, 4) is a solution of the first equation in the system, but not the second equation in the system. An ordered pair must be a solution of both equations in a system of two equations in order to be a solution of the system.

48. (4, 6); tables may vary.

$y = 3x - 6$	
x	y
0	−6
1	−3
2	0
3	3
4	6

$y = -2x + 14$	
x	y
0	14
1	12
2	10
3	8
4	6

49. Answers may vary. Enter $y = 3x - 6$ as Y_1 and enter $y = -2x + 14$ as Y_2. Next, view a graph of the equations on the same screen. Then use the Intersect feature to verify that the graphs of the equations intersect at the point (4, 6).

50. $(-2, 5)$

51. A

52. $(5, 53.45)$; the total cost of the web hosting services will be the same if the services are used for 5 months. The total cost for 5 months with both services is \$53.45.

53. Answers may vary. Use substitution because both equations in the system are already solved for y. Set the two expressions for y equal to each other and then solve for x. Then use the value of x to determine the value of y.

54. A

55. Sample answer: Sarah bought a bottle of fruit juice and 2 sandwiches for \$9 while Manuel bought 2 bottles of fruit juice and 3 sandwiches for \$14. The solution $(1, 4)$ represents the prices of these items: a bottle of fruit juice is \$1 while a sandwich is \$4.

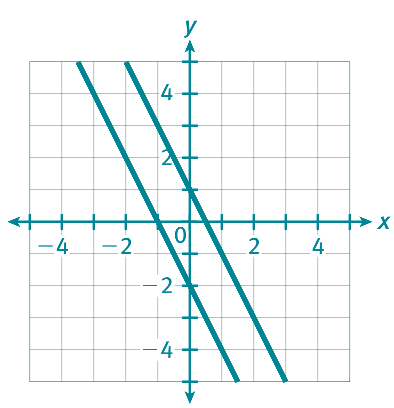
56. $r + g = 16$ and $15r + 12.5g = 224$, where r is the number of fluid ounces of orange juice and g is the number of fluid ounces of grapefruit juice

57. $(9.6, 6.4)$; each bottle will hold 9.6 fluid ounces of orange juice and 6.4 fluid ounces of grapefruit juice.

58. 125 milliliters of the 10% solution and 375 milliliters of the 30% solution; explanations may vary. Write the system $x + y = 500$ and $0.1x + 0.3y = 0.25(500)$ to represent the situation, where x is the number of milliliters of the 10% solution and y is the number of milliliters of the 30% solution. Then use elimination to solve the system. The solution is $(125, 375)$.

59. A

60. None; the graph of the system is a pair of parallel lines. Parallel lines do not intersect, so the system has no solution.



61. $y = \frac{1}{2}x + 3$ and $y = \frac{1}{2}x + 3$; the system has infinitely many solutions because the equations of the lines are equivalent.

62. No; explanations may vary. The system $c = 65 + 60(t - 1)$ and $c = 60t + 12$ represents the situation, where c is the total charge in dollars and t is the length of the job in hours. A graph of the system consists of two parallel lines, so the system has no solution. In this context, a system with no solution means that there is no job length for which the total charge for Duke Electric is the same as the total charge for Spence Electrical.

63. No; explanations may vary. The system $d = 8t$ and $d = 120 + 8(t - 15)$ represents this situation, where d is the distance in feet from Kaye's starting point and t is the time in seconds since Kaye started jogging. A graph of this system consists of a pair of coincident lines, so the system has infinitely many solutions. In this context, a system with infinitely many solutions means that once Kaye reaches Tanner, they stay together, running at the same speed without either passing the other.

64. Infinitely many; explanations may vary. The slope-intercept forms of the equations in the system are identical. Therefore, the lines are coincident, which means that the system has infinitely many solutions.

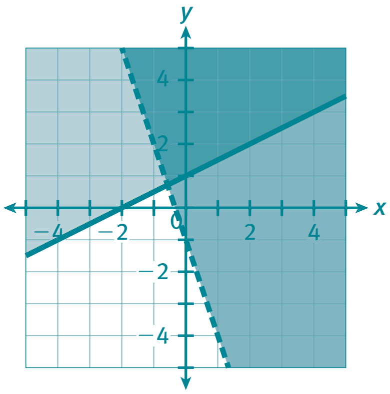
65. The lines are parallel. Explanations may vary. The slope-intercept forms of the equations show that the lines both have a slope of $\frac{1}{2}$, but different y-intercepts. Therefore, the lines are parallel.

66. Answers and explanations may vary. $2x + 4y = 3$ and $x + 8y = 6$; solving the system by elimination shows that it has one solution of $\left(0, \frac{3}{4}\right)$. Systems with one solution are independent (because their graphs consist of two distinct intersecting lines) and consistent (because they have a solution).

67. D

68. Answers may vary. If the lines have different slopes, then the system is independent and consistent. If the lines have the same slope and different y-intercepts, then the system is independent and inconsistent. If the lines have the same slope and the same y-intercept, then the system is dependent and consistent.

69.



70. B

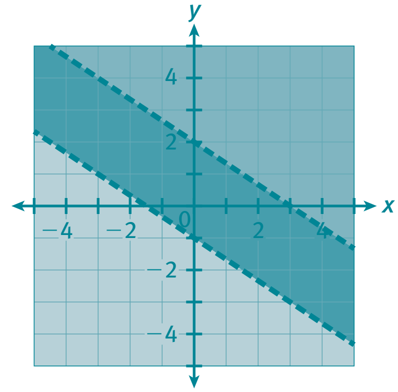
71. $y \le -\frac{1}{3}x - 2$

$y > x - 1$

72. No; explanations may vary. The point $(-2, -3)$ lies within the solution region of the inequality $y \le -\frac{1}{3}x - 2$, but it lies on the boundary line of the inequality $y > x - 1$. Because this second inequality includes the symbol $>$, points on the boundary line are not included in the solution set. So, $(-2, -3)$ is not a solution of the system because it is not a solution of $y > x - 1$.

73. Sample answers: $(2, -2)$, $(3, 3)$, and $(4, 0)$

74. The solution region lies between the parallel boundary lines.



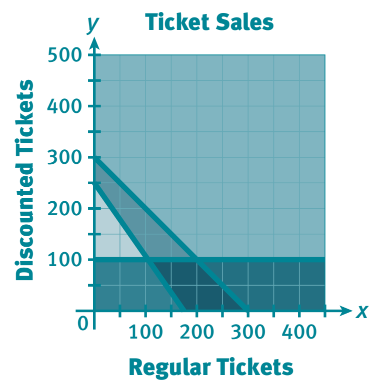
75. C

76. Let x represent the number of regular tickets sold to a performance and y represent the number of discounted tickets sold to a performance. Note that students could interchange the meanings of x and y, in which case the equations will change to reflect that.

$y \le 100$

$20x + 14y \ge 3500$

77.



78. Answers may vary. The ordered pair (200, 50) is in the solution region and makes sense in this context because it is possible for the theater to sell 200 regular tickets and 50 discounted tickets and make a profit. The ordered pair (150.5, 90.5) is in the solution region, but does not make sense in this context because the theater can only sell whole numbers of tickets.