71.

x	10	20	30	40	50
y	-3	-6	-9	-12	-15

$-3 = k \cdot 10$ $\quad -6 = k \cdot 20$

$-\frac{3}{10} = k$ $\quad -\frac{6}{20} = k$

$-\frac{3}{10} = k$

Using any two pairs of numbers, k is $-\frac{3}{10}$.

75. $y = kx^2$

$y = k(2x)^2$

$y = k(4x^2)$

$y = 4kx^2$

y will quadruple.

Section 7.2 Graphs of Linear Inequalities

1. $x - 2y < 4$

(a) $0 - 2(0) \stackrel{?}{<} 4$

$0 < 4$

$(0, 0)$ is a solution.

(b) $2 - 2(-1) \stackrel{?}{<} 4$

$2 + 2 < 4$

$4 \not< 4$

$(2, -1)$ is not a solution.

(c) $3 - 2(4) \stackrel{?}{<} 4$

$3 - 8 < 4$

$-5 < 4$

$(3, 4)$ is a solution.

(d) $5 - 2(1) \stackrel{?}{<} 4$

$5 - 2 < 4$

$3 < 4$

$(5, 1)$ is a solution.

3. $3x + y \geq 10$

(a) $3(1) + 3 \stackrel{?}{\geq} 10$

$9 \not\geq 10$

$(1, 3)$ is not a solution.

(b) $3(-3) + 1 \stackrel{?}{\geq} 10$

$-8 \not\geq 10$

$(-3, 1)$ is not a solution.

(c) $3(3) + 1 \stackrel{?}{\geq} 10$

$10 \geq 10$

$(3, 1)$ is a solution.

(d) $3(2) + 15 \stackrel{?}{\geq} 10$

$21 \geq 10$

$(2, 15)$ is a solution.

5. $y > 0.2x - 1$

(a) $2 \stackrel{?}{>} 0.2(0) - 1$

$2 > -1$

$(0, 2)$ is a solution.

(b) $0 \stackrel{?}{>} 0.2(6) - 1$

$0 > 0.2$

$(6, 0)$ is not a solution.

(c) $-1 \stackrel{?}{>} 0.2(4) - 1$

$-1 \not> -0.2$

$(4, -1)$ is not a solution.

(d) $7 \stackrel{?}{>} 0.2(-2) - 1$

$7 > -1.4$

$(-2, 7)$ is a solution.

7. $y \leq 3 - |x|$

(a) $4 \stackrel{?}{\leq} 3 - |-1|$

$4 \not\leq 3 - 1$

$(-1, 4)$ is not a solution.

(b) $-2 \stackrel{?}{\leq} 3 - |2|$

$-2 \leq 3 - 2$

$(2, -2)$ is a solution.

(c) $0 \stackrel{?}{\leq} 3 - |6|$

$0 \leq 3 - 6$

$0 \not\leq -3$

$(6, 0)$ is not a solution.

(d) $-2 \stackrel{?}{\leq} 3 - |5|$

$-2 \leq 3 - 5$

$-2 \leq -2$

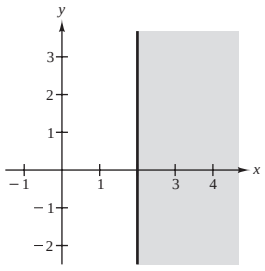
$(5, -2)$ is a solution.

9. $y \geq -2$ (b)

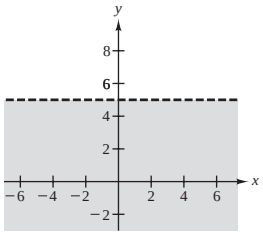
11. $3x - 2y < 0$ (d)

13. $x + y < 4$ (f)

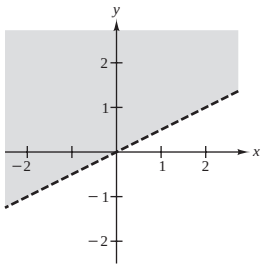
15. $x \geq 2$



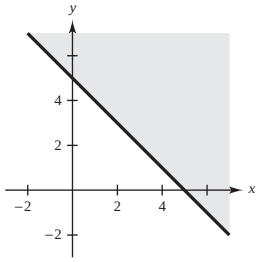
17. $y < 5$



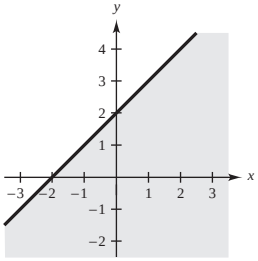
19. $y > \frac{1}{2}x$



21. $y \geq 5 - x$

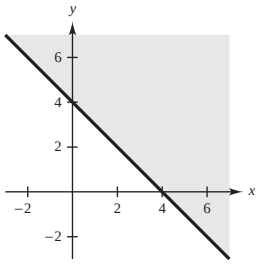


23. $y \leq x + 2$

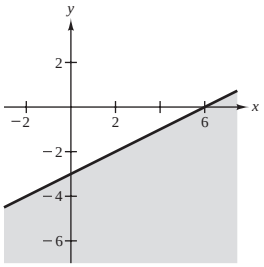


25. $x + y \geq 4$

$y \geq -x + 4$



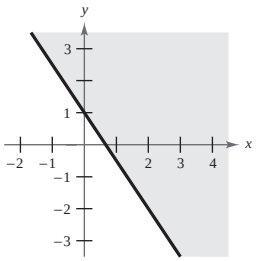
27. $x - 2y \geq 6$



29. $3x + 2y \geq 2$

$2y \geq -3x + 2$

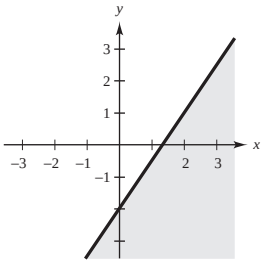
$y \geq -\frac{3}{2}x + 1$



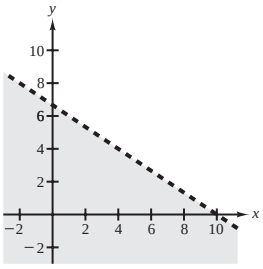
31. $3x - 2y \geq 4$

$-2y \geq -3x + 4$

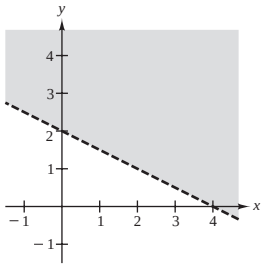
$y \leq \frac{3}{2}x - 2$



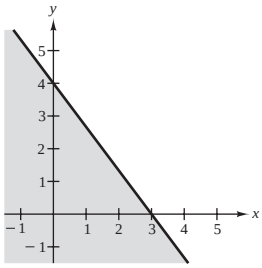
33. $0.2x + 0.3y < 2$ or $y < -\frac{2}{3}x + \frac{20}{3}$



35. $y - 1 > -\frac{1}{2}(x - 2)$



37. $\frac{x}{3} + \frac{y}{4} \leq 1$ or $y \leq -\frac{4}{3}x + 4$

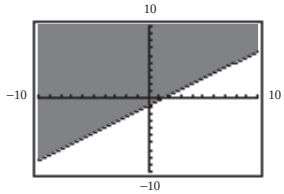


39. $y \geq \frac{3}{4}x - 1$

Keystrokes:

Y= .75 X,T,θ − 1

DRAW 7 (Y-VARS 1 1 , 10) ENTER

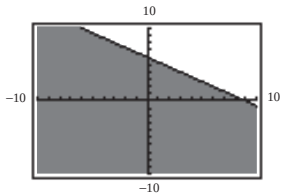


41. $y \leq -\frac{2}{3}x + 6$

Keystrokes:

Y= ((−) 2 ÷ 3) X,T,θ + 6

DRAW 7 ((−) 10 , Y-VARS 1 1) ENTER



43. $x - 2y - 4 \geq 0$

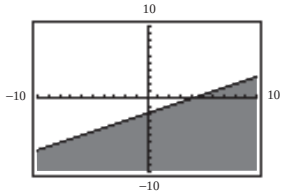
$-2y \geq -x + 4$

$y \leq \frac{1}{2}x - 2$

Keystrokes:

Y= .5 X,T,θ − 2

DRAW 7 ((−) 10 , Y-VARS 1 1) ENTER



45. $2x + 3y - 12 \leq 0$

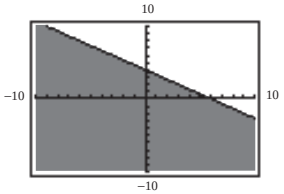
$3y \leq -2x + 12$

$y \leq -\frac{2}{3}x + 4$

Keystrokes:

Y= ((−) 2 ÷ 3) X,T,θ + 4

DRAW 7 ((−) 10) Y-VARS 1 1) ENTER



47. $m = \dfrac{2-5}{3+1} = -\dfrac{3}{4}$ $\quad y - 2 > -\dfrac{3}{4}(x - 3)$

$4y - 8 > -3x + 9$

$3x + 4y > 17$

49. $y < 2$

51. $m = \dfrac{1-0}{2-0} = \dfrac{1}{2}$ $\quad y > \dfrac{1}{2}x$

$2y > x$

$-x + 2y > 0$

$x - 2y < 0$

53. $P = 2x + 2y$

$2x + 2y \leq 500$

or

$0 \leq x + y \leq 250$

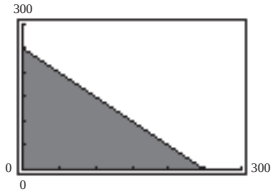
or

$y \leq -x + 250$

(*Note:* x and y cannot be negative.)

Keystrokes: Y= (−) X,T,θ + 250

DRAW 7 (0 , Y-VARS 1 1) ENTER

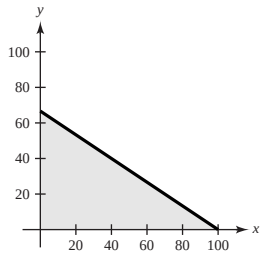


55. $10x + 15y \leq 1000$ (*Note:* x and y cannot be negative.)

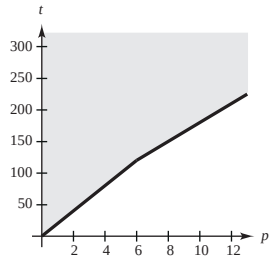
$15y \leq -10x + 1000$

$y \leq -\frac{2}{3}x + \frac{200}{3}$

(*Note:* x and y cannot be negative.)



57. (12, 220) yes



59. *Verbal model:* [Cost of cheese pizzas] + [Cost for extra toppings] + [Cost for drinks] ≤ 48

Labels: Cost of cheese pizzas $= 3(9) = \$27$

Cost for extra toppings $= 1.00x$ (dollars)

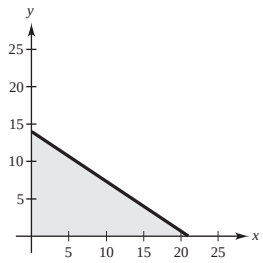
Cost for drinks $= 1.50y$ (dollars)

Inequality: $27 + 1.00x + 1.50y \le 48$

$1.00x + 1.50y \le 21$

$x + 1.5y \le 21$

(*Note:* x and y cannot be negative.)



(6, 8)

$6 + 1.5(8) \stackrel{?}{\le} 21$

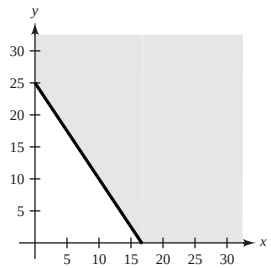
$6 + 12 \stackrel{?}{\le} 21$

$18 \le 21$ yes

61. $9x + 6y \ge 150$ (Note: x and y cannot be negative.)

$6y \ge -9x + 150$

$y \ge -\frac{3}{2}x + 25$



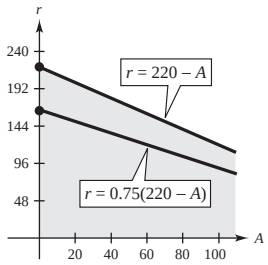
Here are some examples of ordered pairs that are solutions. Note that there are other correct answers.

(2, 22) (4, 21)

(10, 10) (20, 1)

(12, 7) (22, 0)

63. $r = 0.75(220 - A)$



65. (x_1, y_1) is a solution of a linear inequality in x and y means the inequality is true when x_1 and y_1 are substituted for x and y respectively.

67. The solution of $x - y > 1$ does not include the points on the line $x - y = 1$. The solution of $x - y \geq 1$ does include the points on the line $x - y = 1$.

69. On the real number line, the solution of $x \leq 3$ is an unbounded interval.

On a rectangular coordinate system, the solution of $x \leq 3$ is a half-plane.

Section 7.3 Graphs of Quadratic Functions

1. $y = 4 - 2x$ (e)

3. $y = x^2 - 3$ (b)

5. $y = (x - 2)^2$ (d)

7. $y = x^2 + 2 = (x - 0)^2 + 2$

vertex $(0, 2)$

9. $y = x^2 - 4x + 7$

$= (x^2 - 4x + 4) + 7 - 4$

$= (x - 2)^2 + 3$

vertex $= (2, 3)$

11. $y = x^2 + 6x + 5$

$y = (x^2 + 6x + 9) + 5 - 9$

$y = (x + 3)^2 - 4$

vertex $= (-3, -4)$

13. $y = -x^2 + 6x - 10$

$y = -1(x^2 - 6x) - 10$

$y = -1(x^2 - 6x + 9) - 10 + 9$

$y = -1(x - 3)^2 - 1$

vertex $(3, -1)$

15. $y = -x^2 + 2x - 7$

$= -1(x^2 - 2x + 1) - 7 + 1$

$= -1(x - 1)^2 - 6$

vertex $= (1, -6)$

17. $y = 2x^2 + 6x + 2$

$= 2\left(x^2 + 3x + \frac{9}{4}\right) + 2 - \frac{9}{2}$

$= 2\left(x + \frac{3}{2}\right)^2 - \frac{5}{2}$

vertex $= \left(-\frac{3}{2}, -\frac{5}{2}\right)$

19. $f(x) = x^2 - 8x + 15$

$a = 1 \quad b = -8$

$x = \frac{-b}{2a} = \frac{-(-8)}{2(1)} = 4$

$f\left(-\frac{b}{2a}\right) = 4^2 - 8(4) + 15$

$= 16 - 32 + 15$

$= -1$

vertex $= (4, -1)$

21. $g(x) = -x^2 - 2x + 1$

$a = -1 \quad b = -2$

$x = \frac{-b}{2a} = \frac{-(-2)}{2(-1)} = -1$

$g\left(\frac{-b}{2a}\right) = -(-1)^2 - 2(-1) + 1$

$= -1 + 2 + 1$

$= 2$

vertex $= (-1, 2)$

23. $y = 4x^2 + 4x + 4$

$a = 4 \quad b = 4$

$x = \frac{-b}{2a} = \frac{-4}{2(4)} = \frac{-1}{2}$

$y = 4\left(-\frac{1}{2}\right)^2 + 4\left(-\frac{1}{2}\right) + 4$

$= 4\left(\frac{1}{4}\right) - 2 + 4$

$= 1 - 2 + 4$

$= 3$

vertex $= \left(-\frac{1}{2}, 3\right)$