1)   Find the GCF: 36, 48, 84

2)   Find the GCF: $6a^5b$, $15a^4b^2$

3)   Factor completely: $40x^8y^8 - 16x^3y^6 - 20x^6y^4$

4)   Factor completely: $ac + bc + a + b$

5)   Factor completely: $x^2 - x - 72$

6)   Factor completely: $x^2 + 3x - 70$

7)   Factor completely: $x^2 + 3x - 88$

8)   Factor completely: $z^2 - 64$

9)   Factor completely: $u^2 - 3uv - 40v^2$

10)   Factor completely: $3x^2 - 3x - 18$

11)   Factor completely: $5x^4 + 45x^3 + 100x^2$

12)   Factor completely: $49x^2 - 64$

13)   Factor completely: $15z^2 - 11z - 12$

14)   Factor completely: $2ax + ay - 6bx - 3by$

15)   Factor completely: $18x^2 - 78x - 60$

16)   Factor completely: $36x^3 - 93x^2y + 60xy^2$

17)   Factor completely: $49k^2 - 4m^2$

18)   Factor completely: $6x^2 + 8x - 9x - 12$

19)   Factor completely: $7x^2 - 7$

20)   Factor completely: $x^2 - 10xy + 25y^2$

21)   Factor completely: $x^3 + 8$

22)   Factor completely: $64 - 27y^3$

23)   Factor completely: $5a^3 + 625b^3$

24)   Factor completely: $a^4 - 81$

25)   Factor completely: $10a^2b^2 - 10b^3 + 15a^2b - 15b^2$

Solve the equation.

26) $x^2 - x = 20$

27)   Factor completely: $18x^2 - 18$

28)   Factor completely: $x^2 - 18xy + 81y^2$

29)   Factor completely: $x^3 + 8$

30)   Factor completely: $64 - 27y^3$

31)   Factor completely: $5a^3 + 625b^3$

32)   Factor completely: $a^4 - 81$

33)   Factor completely: $10a^2b^2 - 10b^3 + 15a^2b - 15b^2$

Solve the equation.

34) $x^2 - x = 30$

35) $m(m - 1)(m + 2) = 0$

36) $y^3 - 16y^2 + 60y = 0$

37) $16x^2 = 25$

38) $3x(x - 9) = -60$

Set up an equation and solve each of the following problems.

39)   The width of a rectangle is 6 kilometers less than twice its length. If its area is 216 square kilometers, find the dimensions of the rectangle.

40) One leg of a right triangle is 24 inches, the other leg is 7 inches. Find the length of the hypotenuse .

41) A number is 6 less than its square. Find all such numbers.

42) Simplify $\dfrac{-30x^2y^2z^2}{-35xz^3}$

43) Simplify $\dfrac{x^2 - 4}{x^2 + 2x}$

44) Simplify $\dfrac{4x^2 - 15x - 4}{7x^2 - 30x + 8}$

45) Simplify $\dfrac{3x - x^2}{x^2 - 9}$

46) Perform the operation and leave in simplest form. $\dfrac{4x^2}{5y^2} \cdot \dfrac{15xy}{24x^2y^2}$

47) Perform the operation and leave in simplest form. $\dfrac{x^2 + 3x}{x^3 - 36x} \cdot \dfrac{x^2 - 8x + 12}{x^2 - 9}$

48) Perform the operation and leave in simplest form. $\dfrac{x^4 - 81}{x^2 - 6x + 9} \div \dfrac{5x^2 + 8x - 21}{6x^2 - 11x - 21}$

49) Perform the operation and leave in simplest form. $\dfrac{6x}{x - 3} - \dfrac{18}{x - 3}$

50) Perform the operation and leave in simplest form. $\dfrac{7}{3x^2} - \dfrac{9}{4x} - \dfrac{5}{2x}$

51) Perform the operation and leave answer in simplest form. $2 + \dfrac{4x}{3x - 1}$

52) Perform the operation and leave answer in simplest form. $\dfrac{3x}{x^2 - 36} - \dfrac{2}{5x + 30}$

53) Perform the operation and leave in simplest form. $\dfrac{2x}{6x^2 + 11x - 10} + \dfrac{x}{2x^2 - 3x - 20}$

54) Perform the operation and leave in simplest form. $\dfrac{32x + 9}{12x^2 + x - 6} - \dfrac{3}{4x + 3} - \dfrac{x + 5}{3x - 2}$

3

55) Solve $\dfrac{5}{7x} - \dfrac{5}{6} = \dfrac{1}{6x}$

56) Solve $\dfrac{5}{2x-1} = \dfrac{-6}{3x+2}$

57) Solve $\dfrac{2x}{x-2} + \dfrac{15}{x^2-7x+10} = \dfrac{3}{x-5}$

58) Solve $\dfrac{2}{n-2} - \dfrac{n}{n+5} = \dfrac{10n+15}{n^2+3n-10}$

59) Solve $\dfrac{x}{x+2} + \dfrac{3}{x+4} = \dfrac{14}{x^2+6x+8}$

60) Suppose that Wendy rides her bicycle 30 miles in the same time that it takes Kim to ride her bicycle 20 miles. If Wendy rides 5 miles per hour faster than Kim, find the rate of each.
(NO EQUATION = NO CREDIT)

61) If an airplane travels 1050 miles in the same amount of time that a car travels 150 miles, and the speed of the
plane is 50 mph more than six times the speed of the car, how fast is each moving?
(NO EQUATION = NO CREDIT)

62) The speed of a stream is 5 mph. If a boat travels 52 miles downstream in the same time that it takes to travel
26 miles upstream, what is the speed of the boat in still water? (NO EQUATION = NO CREDIT)

63) If $f(x) = \sqrt{2x+4}$, find f(0).

64) Neglecting air resistance, the velocity of an object, v, in meters per second can be found after falling h meters using the formula $v = \sqrt{18.1h}$. Find the velocity of a ball that has been dropped from a roof after falling 7 meters. Round your answer to 3 decimal places.

65) Simplify $\sqrt[4]{36}$ Express your answer in radical form.

66) Simplify $\sqrt[3]{-\dfrac{8}{27}}$

67) Simplify $\sqrt{160}$

68) Simplify $-4\sqrt{54}$

69) Simplify $\dfrac{6\sqrt{5}}{5\sqrt{12}}$

70) Simplify $\dfrac{3}{\sqrt[3]{3}}$

71) Simplify $13\sqrt{28} - 2\sqrt{63} - 7\sqrt{7}$

72) Simplify $\dfrac{3}{8}\sqrt{96} - \dfrac{2}{3}\sqrt{54}$

73) Simplify $-3\sqrt[3]{2} - 2\sqrt[3]{16} + \sqrt[3]{54}$

74) Simplify $\sqrt{96a^7b^8}$

75) Simplify $\dfrac{\sqrt{5y}}{\sqrt{18x^3}}$

76) Simplify $\dfrac{\sqrt[3]{2y}}{\sqrt[3]{3x}}$

77) Simplify $-3\sqrt{2x^3} + 4\sqrt{8x^3} - 3\sqrt{32x^3}$

78) Simplify $(-3\sqrt{3})(-4\sqrt{8})$

79) Simplify $\left(4\sqrt[3]{3}\right)\left(5\sqrt[3]{9}\right)$

80) Simplify $\sqrt{2x}\left(\sqrt{12xy} - \sqrt{8y}\right)$

81) Simplify $\left(7\sqrt{3} - \sqrt{7}\right)\left(2\sqrt{3} + 4\sqrt{7}\right)$

82) Simplify $\left(2\sqrt{3} + \sqrt{11}\right)\left(2\sqrt{3} - \sqrt{11}\right)$

83) Simplify $2\sqrt[3]{2}\left(3\sqrt[3]{6} - 4\sqrt[3]{5}\right)$

84) Simplify $\dfrac{\sqrt{7}}{3\sqrt{2} - 5}$

85) Simplify $\dfrac{4}{\sqrt{2} - \sqrt{3}}$

86)   Solve $2\sqrt{n} - 7 = 0$

87)   Solve $\sqrt{x^2 + 3} - 2 = 0$

88)   Solve $\sqrt{n^2 - 2n - 4} = n$

89)   Solve $\sqrt[3]{2x + 5} = \sqrt[3]{4 - x}$

90)   Solve $y - 1 = \sqrt{2y - 2}$

91)   Solve $\sqrt{x + 4} = \sqrt{x - 1} + 1$

92)   Simplify $16^{\frac{3}{2}}$

93)   Simplify $\left(\frac{1}{8}\right)^{-\frac{2}{3}}$

94)   Simplify $(-32)^{\frac{1}{5}}$

95)   Express in radical form $5x^{\frac{1}{4}}$

96)   Simplify $\left(y^{\frac{3}{4}}\right)\left(y^{-\frac{2}{3}}\right)$

97)   Simplify $\left(9x^2y^4\right)^{\frac{3}{2}}$

98)   Simplify $\left(a^2b^{-3}\right)^{-\frac{1}{3}}$

99)   Solve $6x^2 - 5x - 21 = 0$

100)   Solve $\sqrt{3x} + 6 = x$

101)   Solve $3t^2 = 8$

102)   Solve $(t + 5)^2 = 12$

103) Solve $(9s + 7)^2 = 9$

104) Solve using the quadratic formula. $9x^2 - 6x + 1 = 0$

105) Solve using the quadratic formula. $4x^2 - 2x = 3$

106) Solve $\dfrac{5}{n-3} - \dfrac{3}{n+3} = 1$

107) A 24-foot ladder resting against a house reaches a windowsill 16 feet above the ground. How far is the foot   of the ladder from the house? (to the nearest tenth of a foot)   (NO EQUATION = NO CREDIT)

108) Two pipes together can fill a large tank in 10 hr. One of the pipes, used alone, takes 15 hr longer than the other to fill the tank. How long would each pipe take to fill the tank alone?
(NO EQUATION = NO CREDIT)

109) A square sheet of metal has an area of 676 square inches. What is the length of each side?
(NO EQUATION = NO CREDIT)

110) The length of a table is 15 inches more than its width. If the area of the table is 2106 square inches, what is its length?   (NO EQUATION = NO CREDIT)

111) A rectangular sign must have an area of 42 square feet. The length of the sign is 2 feet more than the width. Find the <u>dimensions</u> of the sign.   (NO EQUATION = NO CREDIT)

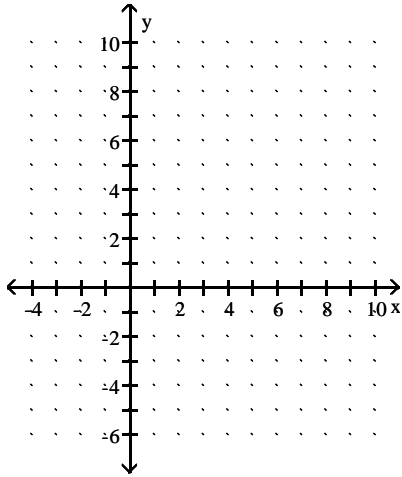112) Given the following quadratic equation: $y = -(x + 4)^2 + 1$
   a.   What is the vertex?

   b.   Which way does the parabola open?

   c.   What is the y-intercept?
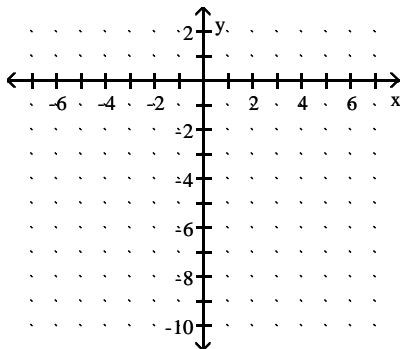
   d.   What is the Axis of Symmetry?

   e.   Graph.

113) A record company discovers that the number of CDs sold each week after release of an new album follows a parabolic pattern. The function $n(t) = -200t^2 + 4000t$ describes the number, n, of CDs an artist sold each of t weeks after the release of the album.
   a.   Which week had the greatest number of CDs sold?
   b.   How many CDs sold that week?

114)   Given the following quadratic equation: $y = 4x^2 - 24x + 32$
   a.   What is the vertex?   b.   What are the x–intercepts (if any)?

   c.   What is the y–intercept?   d.   Which way does the parabola open?

   e.   What is the Axis of Symmetry?   f.   Graph.

115)   Given the following quadratic equation: $y = -2x^2 - 4x - 5$
   a.   What is the vertex?   b.   What are the x–intercepts (if any)?

   c.   What is the y–intercept?   d.   Which way does the parabola open?

   e.   What is the Axis of Symmetry?   f.   Graph.

1) 12

2) $3a^4b$

3) $4x^3y^4(10x^5y^4 - 4y^2 - 5x^3)$

4) $(a + b)(c + 1)$

5) $(x + 8)(x - 9)$

6) $(x + 10)(x - 7)$

7) $(x + 11)(x - 8)$

8) $(z + 8)(z - 8)$

9) $(u + 5v)(u - 8v)$

10) $3(x + 2)(x - 3)$

11) $5x^2(x + 4)(x + 5)$

12) $(7x + 8)(7x - 8)$

13) $(3z - 4)(5z + 3)$

14) $(2x + y)(a - 3b)$

15) $6(3x + 2)(x - 5)$

16) $3x(4x - 5y)(3x - 4y)$

17) $(7k + 2m)(7k - 2m)$

18) $(2x - 3)(3x + 4)$

19) $7(x + 1)(x - 1)$

20) $(x - 5y)^2$

21) $(x + 2)(x^2 - 2x + 4)$

22) $(4 - 3y)(16 + 12y + 9y^2)$

23) $5(a + 5b)(a^2 - 5ab + 25b^2)$

24) $(a + 3)(a - 3)(a^2 + 9)$

25) $5b(a^2 - b)(2b + 3)$

26) $x = -4, x = 5$

27) $18(x + 1)(x - 1)$

28) $(x - 9y)^2$

29) $(x + 2)(x^2 - 2x + 4)$

30) $(4 - 3y)(16 + 12y + 9y^2)$

31) $5(a + 5b)(a^2 - 5ab + 25b^2)$

32) $(a + 3)(a - 3)(a^2 + 9)$

33) $5b(a^2 - b)(2b + 3)$

34) $x = -5, x = 6$

35) $\{0, 1, -2\}$

36) $\{0, 6, 10\}$

37) $x = \dfrac{5}{4}, x = -\dfrac{5}{4}$

38) $x = 4, x = 5$

39) length = 12 km, width = 18 km

40) 25 inches

41) −2 and 3

42) $\dfrac{6xy^2}{7z}$

43) $\dfrac{x - 2}{x}$

44) $\dfrac{4x + 1}{7x - 2}$

45) $\dfrac{-x}{x + 3}$

46) $\dfrac{x}{2y^3}$

47) $\dfrac{x - 2}{(x + 6)(x - 3)}$

48) $\dfrac{(x^2 + 9)(6x + 7)}{5x - 7}$

49) 6

50) $\dfrac{28 - 57x}{12x^2}$

51) $\dfrac{10x - 2}{3x - 1}$

52) $\dfrac{13x + 12}{5(x + 6)(x - 6)}$

53) $\dfrac{5x^2 - 10x}{(2x + 5)(3x - 2)(x - 4)}$

54) $\dfrac{-4x^2}{(4x + 3)(3x - 2)}$

55) $\dfrac{23}{35}$

56) $-\dfrac{4}{27}$

57) $3, \dfrac{7}{2}$

58) −1

59) −8, 1

60) 10 mph for Kim and 15 mph for Wendy

61) Car is traveling 50mph and the plane is traveling 350mph

62) 15 mph

63) 2

64) 11.256 m/s

65) $\sqrt{6}$

66) $-\dfrac{2}{3}$

67) $4\sqrt{10}$

68) $-12\sqrt{6}$

69) $\dfrac{\sqrt{15}}{5}$

70) $\sqrt[3]{9}$

71) $13\sqrt{7}$

72) $\dfrac{-\sqrt{6}}{2}$

73) $-4\sqrt[3]{2}$

74) $4a^3b^4\sqrt{6a}$

75) $\dfrac{\sqrt{10xy}}{6x^2}$

76) $\dfrac{\sqrt[3]{18x^2y}}{3x}$

77) $-7x\sqrt{2x}$

78) $24\sqrt{6}$

79) 60

80) $2x\sqrt{6y} - 4\sqrt{xy}$

81) $14 + 26\sqrt{21}$

82) 1

83) $6\sqrt[3]{12} - 8\sqrt[3]{10}$

84) $\dfrac{3\sqrt{14} + 5\sqrt{7}}{-7}$

85) $-4\left(\sqrt{2} + \sqrt{3}\right)$ or $-4\sqrt{2} - 4\sqrt{3}$

86) $\dfrac{49}{4}$

87) 1, -1

88) $\varnothing$

89) $-\dfrac{1}{3}$

90) 1, 3

91) 5

92) 64

93) 4

94) -2

95) $5\sqrt[4]{x}$

96) $y^{\frac{1}{12}}$

97) $27x^3y^6$

98) $\dfrac{b}{a^{\frac{2}{3}}}$

99) $-\dfrac{3}{2}, \dfrac{7}{3}$

100) 12

101) $\pm\dfrac{2\sqrt{6}}{3}$

102) $-5 \pm 2\sqrt{3}$

103) $\left\{-\dfrac{4}{9}, -\dfrac{10}{9}\right\}$

104) discriminant is 0, so 1 real root

$\dfrac{1}{3}$

105) discriminant is 52, so 2 real roots

$\dfrac{1 \pm \sqrt{13}}{4}$

106) $1 \pm \sqrt{34}$
107) 17.9 feet
108) 15 hour & 30 hours
109) 26 inches
110) 54 inches
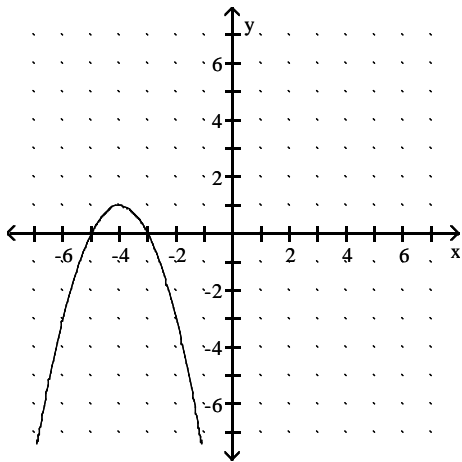111) $(1 + \sqrt{43})$ yards by $(-1 + \sqrt{43})$ yards
112) a. $(-4, 1)$
    b.   down
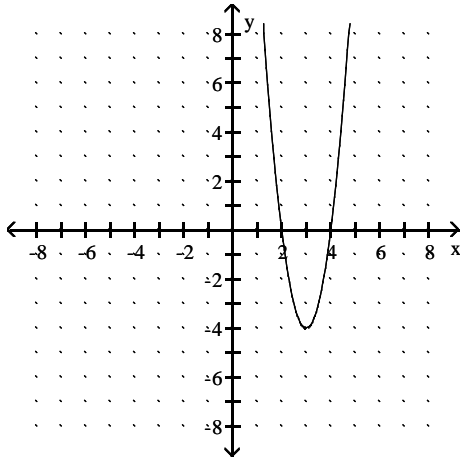   c. $(0, -15)$
    d. $x = -4$
    e.

113) a.   the 10th week
    b.   20,000 CDs

114) a. (3, −4)
   b. (4, 0) and (2, 0)
   c. (0, 32)
   d. up
   e. x = 3
   f.

115) a. (−1, −3)
   b. No x−intercepts
   c. (0, −5)
   d. down
   e. x = −1
   f.