Algebra 2
Lesson 6-1 - Practice and Problem-Solving Exercises Answers

10. Square roots of 225 are 15 and -15.

11. Square roots of 0.0049 are 0.07 and -0.07.

12. $-\frac{1}{121}$ has no real square roots

13. Square roots of $\frac{64}{169}$ are $\frac{8}{13}$ and $-\frac{8}{13}$.

14. The cube root of -64 is -4.

15. The cube root of 0.125 is 0.5.

16. The cube root of $-\frac{27}{216}$ is $-\frac{3}{6}$, or $-\frac{1}{2}$.

17. The cube root of 0.000343 is 0.07.

18. The fourth roots of 16 are 2 and -2.

19. -16 has no real fourth roots.

20. The fourth roots of 0.0081 are 0.3 and -0.3.

21. The fourth roots of $\frac{10{,}000}{81}$ are $\frac{10}{3}$ and $-\frac{10}{3}$.

22. 6

23. 0.5

24. -4

25. -3

26. $4|x|$

27. $3y^2$

28. $|x^5y^7|$

29. $2y^2$

30. $R = 49$

31. $x = 10,\ -10$

32. $x = 1,\ -1$

33. $x = 0.5,\ -0.5$

34. $x = \frac{2}{3},\ -\frac{2}{3}$

35. Find the difference between the radii to find the amount of increase:
$\sqrt[3]{\frac{600}{\pi}} - \sqrt[3]{\frac{375}{\pi}} = 15\sqrt[3]{\frac{1}{\pi}}$
$15\sqrt[3]{\frac{1}{\pi}}$ in. increase

36. 80 volts

37a. about 79.01 ft

37b. about 44.44 ft

38. 0.5

39. $\frac{1}{3}$

40. 0.2

41. $\frac{1}{4}$

42. $2|c|$

43. Answers may vary. Sample:
$\sqrt[3]{-8x^6},\ -\sqrt[4]{16x^8},\ \sqrt[5]{-32x^{10}}$

44a. true for all positive integers

44b. true for all odd positive integers

45. $\sqrt{x^4} = x^2$, is *always* true, because x^2 is always nonnegative.

46. $\sqrt{x^6} = x^3$, is *sometimes* true; they are equal for $x \geq 0$.

47. $\sqrt[3]{x^8} = x^2$, is *sometimes* true; they are equal for $x = -1,\ 0,\ 1$.

48. $\sqrt[3]{x^3} = |x|$, is *sometimes* true; they are equal for $x \geq 0$.

49. $\sqrt[n]{m^n} = |m|$ if n is even;
$\sqrt[n]{m^n} = m$ if n is odd

50. $\sqrt[n]{m^{2n}} = \sqrt[n]{\left(m^2\right)^n}$ if n is even or odd
$= m^2$

51. $\sqrt[n]{m^{3n}} = \sqrt[n]{\left(m^3\right)^n}$ if n is even
$= |m^3|$

$\sqrt[n]{m^{3n}} = \sqrt[n]{\left(m^3\right)^n}$ if n is odd
$= m^3$

52. $\sqrt[n]{m^{4n}} = \sqrt[n]{\left(m^4\right)^n}$ if n is even or odd
$= m^4$

53. There are 48 square roots in the interval between 24 and 25.

54. No; the square root of 4 is ± 2. -2 is neither positive nor irrational.

55. The diagonal of a square with side 5 is greater.

56. B

57. G

58. C

59. The first equation simplifies to $1 = d$. The second equation simplifies to $3 = 8a + 4b + 2c + 1$ and the third equation simplifies to $7 = 64a + 16b + 4c + 1$.
Solve for a, b, c, d.
solution:
$a = 0.35$
$b = -1.85$
$c = 3.3$
$d = 1$
cubic polynomial:
$y = 0.35x^3 - 1.85x^2 + 3.3x + 1$

60. Add 3 to translate up 3 units. $y = x^3 \rightarrow y = x^3 + 3$
Replace x with $x + 2$ to translate left 2 units.
$y = x^3 + 3 \rightarrow y = (x + 2)^3 + 3$

61. Multiply by $\frac{1}{2}$ to compress. $y = x^3 \rightarrow y = \frac{1}{2}x^3$

Subtract 2 to translate down 2 units. $y = \frac{1}{2}x^3 \rightarrow y = \frac{1}{2}x^3 - 2$

62. $a = -4$, $b = 7$, $c = -3$
$x = \frac{3}{4}$ or 1

63. $a = 3$, $b = -5$, $c = 3$
$x = \frac{5 \pm i\sqrt{11}}{6}$

64. $a = 36$, $b = -132$, $c = 121$
$x = \frac{11}{6}$

65. $2x^3y^3$

66. $\frac{ac}{3}$

67. $\frac{4}{x^2}$

Algebra 2
Lesson 6-2 - Practice and Problem-Solving Exercises Answers

10. 16

11. 4

12. -9

13. not possible;
The indices are different.

14. $5i$

15. 5

16. -6

17. 6

18. $25\sqrt{6}$

19. $2|x|\sqrt{5x}$

20. $3x\sqrt[3]{3}$

21. $5x^2\sqrt{2x}$

22. $2a\sqrt[3]{4a^2}$

23. $3y\sqrt[3]{2y}$

24. $10|a^3b^3|\sqrt{2b}$

25. $-5x^2y\sqrt[3]{2y^2}$

26. $2|y|\sqrt[4]{4x^3y^2}$

27. $-2xy\sqrt[5]{xy^2}$

28. $2\sqrt[3]{12}$

29. $8y^3\sqrt{5y}$

30. $2x^3\sqrt{6}$

31. $40x|y|\sqrt{3}$

32. $30y^2\sqrt[3]{2y}$

33. $-2x^2y\sqrt[3]{30x}$

34. $6x^2y\sqrt[4]{2y}$

35. $4xy^2\sqrt[3]{y}$

36. $3a^2\sqrt[3]{108a^2b^2}$

37. 10

38. $\frac{4x}{|y|}$

39. $2x^2y^2\sqrt{2}$

40. $5x\sqrt[3]{x^2y^2}$

41. $\frac{2\sqrt[3]{x^2y}}{x}$

42. $\frac{2\sqrt{a}}{3ab}$

43. $\frac{\sqrt{2x}}{2}$

44. $\frac{\sqrt{10x}}{4x}$

45. $\frac{\sqrt[3]{4x}}{2}$

46. $\frac{\sqrt[3]{45x^2}}{3x}$

47. $\frac{\sqrt[4]{250}}{5}$

48. $5x^2\sqrt{5}$

49. $\frac{\sqrt{15y}}{5y}$

50. $\frac{|x|\sqrt{10}}{2|y|}$

51. $\frac{\sqrt[3]{150ab^2c}}{5a}$

52. The difference in time is $5\text{ s} - 4\text{ s} = 1\text{ s}$.

53. The area of the triangle is 6 cm^2.

54. $v = \frac{\sqrt{Fmr}}{m}$

55. about 212 mi/h greater

56a. $\frac{\sqrt{6}+3}{15}$

56b. $\frac{\sqrt{6}+3}{15}$

56c. Answers may vary. Sample:
First simplify the denominator.
Since $\sqrt{98} = \sqrt{2 \cdot 49} = 7\sqrt{2}$, to rationalize the denominator, multiply the fraction by $\frac{\sqrt{2}}{\sqrt{2}}$. This yields $\frac{\sqrt{2 \cdot 2} + \sqrt{3 \cdot 2}}{7\sqrt{2 \cdot 2}} = \frac{2+\sqrt{6}}{14}$.

57. $5\sqrt{10}$

58. $4\sqrt[3]{5}$

59. $3x^6y^5\sqrt{2y}$

60. $20x^2y^3\sqrt{y}$

61. $10 + 7\sqrt{2}$

62. $5 + 5\sqrt{3}$

63. $\frac{|x|\sqrt{10y}}{2y^2}$

64. $\frac{5\sqrt{14x}}{21x}$

65. $\frac{\sqrt[3]{3x^2}}{3x}$

66. $\frac{2\sqrt[3]{25x}}{x}$

67. $\frac{\sqrt[3]{2xy^2}}{xy}$

68. $-\frac{\sqrt{33x}}{4x}$

69. The density of the object is 4 g/cm^3.

70. For some values; it is easy to see that the equation is true if $x = 0$ or $x = 1$. But when $x < 0$, $\sqrt{x^3}$ is not a real number, although $\sqrt[3]{x^2}$ is.

71. Check students' work.

72. A product of two square roots can be simplified in this way only if the square roots are real numbers. $\sqrt{-2}$ and $\sqrt{-8}$ are not real numbers.

73. Always; the cube root of a negative number is always a real number.

74. Sometimes: the square root of $-(0)^2$ is a real number, namely 0.

75. Sometimes; if $x > 0$, then the expression is not a real number; if $x \le 0$, then the expression is a real number.

76. $2xy$

77. $2\sqrt{5}$

78. $\frac{\sqrt[6]{x^4y^3}}{y}$

79. $a = -2c$ and $b = -6d$

80. A

81. H

82. A

83. F

84. $y = -2x^2 - 5x + 4$
$a = -2,\ b = -5$

$$x = -\frac{b}{2a}$$

axis of symmetry: $$= -\frac{(-5)}{2(-2)}$$

$$= -\frac{5}{4}$$

85. $11\left|a^{45}\right|$

86. $9c^{24}d^{32}$

87. $4a^{27}$

88. $2y^5$

89. $y^2 - 4y + 16,\ \mathrm{R}\ -128$

90. $6a^2 - 5a + 4$

91. 25

92. 25

93. $\frac{121}{4}$

94. $\frac{121}{4}$

95. $\frac{3}{5} + \frac{1}{5}i$

96. $\frac{10}{13} - \frac{15}{13}i$

97. $\frac{16}{17} - \frac{4}{17}i$

98. $-\frac{7}{74} - \frac{5}{74}i$

Algebra 2
Lesson 6-3 - Practice and Problem-Solving Exercises Answers

10. $6\sqrt{6}$

11. $4\sqrt[3]{3}$

12. $4\sqrt{3} + 4\sqrt[3]{3}$
different indices; cannot combine

13. $-2\sqrt{x}$

14. $14\sqrt{x} + 3\sqrt{y}$
different radicands; cannot combine

15. $5\sqrt[3]{x^2}$

16. $\ell \approx 127.3$ in.

17. $33\sqrt{2}$

18. $13\sqrt{5}$

19. $7\sqrt{2}$

20. $5\sqrt[3]{2}$

21. $9\sqrt[3]{3} - 6\sqrt[3]{2}$

22. $2\sqrt[4]{2} + 2\sqrt[4]{3}$

23. $8 + 4\sqrt{5}$

24. $23 + 7\sqrt{7}$

25. $63 - 38\sqrt{2}$

26. $8 + 2\sqrt{15}$

27. $49 + 12\sqrt{13}$

28. $38 + 12\sqrt{10}$

29. 14

30. 4

31. -40

32. -2

33. $-2 + 2\sqrt{3}$

34. $\frac{12\sqrt{3} + 8}{23}$

35. $13 + 7\sqrt{3}$

36. $\frac{11 + 8\sqrt{2}}{-14}$

37. Total Area ≈ 140.4 in.^{2}

38. $13\sqrt{2}$

39. $8\sqrt{3}$

40. $48\sqrt{2x}$

41. $5\sqrt{3} - 4\sqrt{2}$

42. $33|y|\sqrt{6}$

43. $-2\sqrt[3]{2}$

44. $17 + 31\sqrt{2}$

45. $-11 + \sqrt{21}$

46. $y - 6\sqrt{2y} - 14$

47. $84 + 24\sqrt{6}$

48. -0.6

49. 2

50. In the second step, the student did not use the FOIL method correctly. The steps should be:

$$\ldots = \frac{3^2 + 6\sqrt{2} + (\sqrt{2})^2}{3^2 - (\sqrt{2})^2}$$
$$= \frac{9 + 6\sqrt{2} + 2}{9 - 2}$$
$$= \frac{11 + 6\sqrt{2}}{7}$$

51. $6x\sqrt{3} - 2x\sqrt{3} = (6x - 2x)\sqrt{3}$
$= 4x\sqrt{3}$

Metal A is oxidized $4x\sqrt{3}$ seconds faster than Metal B.

52. $\sqrt{72} + \sqrt{a} = 6\sqrt{2} + \sqrt{a}$

possibilities for a: $2\left(1^2\right),\ 2\left(2^2\right),\ 2\left(3^2\right),\ \ldots$

a must be twice a perfect square.

53. Answers may vary. Sample:
Without simplifying first, you must estimate three separate square roots, and then add the estimates.
If they are first simplified, then they can be combined as $13\sqrt{2}$. Then only one square root needs to be estimated.

54. Ratio of the legs of the first triangle:
$3 - 2\sqrt{2}$

Ratio of the legs of the second triangle:
$3 - 2\sqrt{2}$

Since the ratios of the corresponding sides are equivalent and the included angles are congruent, the triangles are similar.

55. Answers may vary. Sample:
$\left(\sqrt{7} + 2\right)\left(\sqrt{7} - 2\right)$ $\left(2\sqrt{2} + \sqrt{5}\right)\left(2\sqrt{2} - \sqrt{5}\right)$

56. $\frac{89 + 42\sqrt{3}}{-239}$

57. $2\sqrt{3} - \sqrt{2}$

58. $\frac{\sqrt{3} - \sqrt{7}}{2}$

59. $11|x| - 3|x|\sqrt{11}$

60. 2

61. $\frac{3\sqrt{5} + 2\sqrt{3}}{3}$

62. $1 + 2\sqrt[3]{4}$

63. $\frac{x + 5\sqrt[4]{x^3}}{x}$

64. $2\sqrt[3]{2} - \sqrt[3]{12}$

65. $-\frac{1}{2}$

66. $4\sqrt{3}$

67. $\left(a = 0 \text{ and } b \geq 0\right)$ or $\left(b = 0 \text{ and } a \geq 0\right)$

68a. m and n can be any positive integers.

68b. m must be even or n must be odd.

68c. m must be even, and n can be any positive integer.

69. 13

70. 2

71. The value of the y-intercept is $\frac{15}{7}$.

72. The slope of the line perpendicular to the line is $\frac{5}{2}$.

73. 9

74. $3\sqrt[3]{2}$

75. $\frac{2\sqrt[3]{x^2}}{x}$

76. 4

77. 6

78. $2x$

79. $7x^2\sqrt{2}$

80. $x\sqrt{15}$

81. $15x^2$

82. $x = 2$ or
$x = -1 \pm i\sqrt{3}$

83. $x = -10$ or
$x = 5 \pm 5i\sqrt{3}$

84. $x = \frac{1}{5}$ or
$x = \frac{-1 \pm i\sqrt{3}}{10}$

85. $x = \pm\sqrt{7}$

86. $x = \pm\frac{2\sqrt{5}}{5}$

87. $x = \pm\frac{1}{3}$ or $x = \pm\frac{1}{3}i$

88. x^6

89. p^5q^5

90. 512

91. 27

Algebra 2
Lesson 6-4 - Practice and Problem-Solving Exercises Answers

10. 6

11. 3

12. 7

13. 10

14. -3

15. $7\sqrt{3}$

16. 8

17. 3

18. 3

19. $\sqrt[6]{x}$

20. $\sqrt[5]{x}$

21. $\sqrt[7]{x^2}$ or $\left(\sqrt[7]{x}\right)^2$

22. $\sqrt[5]{y^2}$ or $\left(\sqrt[5]{y}\right)^2$

23. $\frac{1}{\sqrt[8]{y^9}}$ or $\frac{1}{\left(\sqrt[8]{y}\right)^9}$

24. $\frac{1}{\sqrt[4]{t^3}}$ or $\frac{1}{\left(\sqrt[4]{t}\right)^3}$

25. $\sqrt{x^3}$ or $\left(\sqrt{x}\right)^3$

26. $\sqrt[5]{y^6}$ or $\left(\sqrt[5]{y}\right)^6$

27. $(-10)^{\frac{1}{2}}$

28. $\left(7x^3\right)^{\frac{1}{2}}$ or $7^{\frac{1}{2}}x^{\frac{3}{2}}$

29. $\left(7x^3\right)^{\frac{1}{2}}$ or $(7x)^{\frac{3}{2}}$

30. $(7x)^{\frac{3}{2}}$

31. $a^{\frac{2}{3}}$

32. $a^{\frac{2}{3}}$

33. $c^{\frac{1}{2}}$

34. $(5xy)^2$ or $25x^2y^2$

35. about 72.8 m

36. about 15.1 m

37. about 7.9 m

38. about 1.6 m

39. $\sqrt[12]{6^7}$

40. $\frac{\sqrt[3]{y}}{y^3}$

41. $\sqrt[10]{5^7}$

42. $\sqrt[21]{7^{10}}$

43. $\frac{\sqrt[3]{4}}{2}$

44. $6\sqrt[4]{2}$

45. $\frac{\sqrt[6]{7776}}{6}$

46. $\frac{x\sqrt{x}}{y\sqrt{y}}$ or $\frac{x\sqrt{xy}}{y^2}$

47. 4

48. 256

49. 4

50. 64

51. $\frac{1}{16}$

52. 8

53. 64

54. 1000

55. $\frac{1}{x^2}$

56. x^4

57. $\frac{\sqrt[3]{x}}{3x}$

58. $\frac{5\sqrt[3]{x}}{x}$

59. $-\frac{3}{x^3}$

60. $-2y^3$

61. $\frac{y^4}{x^3}$

62. $\frac{y^2}{x^8}$

63. $\frac{1}{x}$

64. $x^4\sqrt[3]{x}$

65. x^3y^9

66. $\frac{y^5}{x^{10}}$

67. After 2000 years ≈ 78%
After 4000 years ≈ 61%
After 8000 years ≈ 37%

68. A

69. -7

70. -3

71. 64

72. 729

73. 2,097,152

74. 1,000,000,000

75. $-\frac{1}{81}$

76. 10

77. 125

78. ≈ 251,000,000 in. or 3,961 mi

79. $x^{\frac{1}{2}}$

80. $y^{\frac{4}{5}}$

81. $x^{\frac{3}{10}}$

82. $y^{\frac{1}{2}}$

83. $x^{\frac{1}{6}}y^{\frac{1}{4}}$

84. $\frac{x^{\frac{3}{4}}y^{\frac{1}{6}}}{xy}$

85. $\frac{4x^7}{9y^9}$

86. $\dfrac{9y^8}{4x^6}$

87. $\dfrac{2x^2}{3y^3}$

88. Answers may vary. Sample:

$4-5^{\frac{1}{2}}$, $2\left(4-5^{\frac{1}{2}}\right)$, $\dfrac{4-5^{\frac{1}{2}}}{2}$;

No, if a is rational and the product is rational, then $4+5^{\frac{1}{2}}$ would have to be rational.

89a. $\sqrt{x}\cdot\sqrt{x}\cdot\sqrt{x}\cdot\sqrt{x} = x\cdot x$
$= x^2$
so $\sqrt[4]{x^2} = \sqrt{x}$

89b. $\sqrt{x}\cdot\sqrt{x}\cdot\sqrt{x}\cdot\sqrt{x} = x\cdot x$
$= x^2$
so $\sqrt[4]{x^2} = \sqrt{x}$

90a. $\sqrt[4]{x^2} = \left(x^2\right)^{\frac{1}{4}}$
$= x^{\frac{2}{4}}$
$= x^{\frac{1}{2}}$
$= \sqrt{x}$

90b. $4^{\frac{1}{2}}\times 4^{\frac{1}{2}} = 4^{\frac{1}{2}+\frac{1}{2}}$
$= 4^1$
$= 4$

90c. $4^{\frac{1}{2}}\times 4^{\frac{1}{2}} = \sqrt{4}\times\sqrt{4}$
$= \sqrt{2^2}\times\sqrt{2^2}$
$= 2\times 2$
$= 4$

91. 49

92. 9

93. $x^{2\pi}$

94. 1

95. $3^{\sqrt{2}}$

96. 9

97. 33.13 mi/h

98. 2

99. 12

100. There are 3 real roots.

101. 3

102. $4\sqrt[3]{3}$

103. $21\sqrt{2}$

104. $1+3\sqrt{5}$

105. -7

106. $-8\sqrt{3}$

107. $9\sqrt[4]{2}$

108. $4x\left(x^2-2x+4\right)$

109. $(x+2)^2$

110. $(x-9)^2$

111. $(4a-3b)(4a+3b)$

112. $(5x-4y)^2$

113. $(3x+8)^2$

114. The solutions are $x=-3$ and $x=2$.

115. The solutions are $x=7$ and $x=-2$.

116. The solutions are $x=-\dfrac{3}{2}$ and $x=1$.

117. The solutions are $x=-\dfrac{1}{3}$ and $x=2$

118. The solutions are $x = \frac{1}{2}$ and $x = -\frac{5}{2}$.

119. The solutions are $x = \frac{3}{2}$ and $x = -\frac{2}{3}$.

Algebra 2
Lesson 6-5 - Practice and Problem-Solving Exercises Answers

9. 16

10. 1

11. 22

12. 15

13. 5

14. 2

15. 4

16. 23

17. $\frac{2}{3}$

18. $x = 3$ or $x = -13$

19. $x = 25$ or $x = -29$

20. 18

21. 78

22. 8

23. 0

24. about 25.8 ft

25. ≈ 3.7 in.
The diameter of the pipe is about 4 in.

26. The only solution is 6.

27. The only solution is 1.

28. The only solution is -2.

29. The only solution is 3.

30. The solutions are 4 and 1.

31. The solutions are –3 and –4.

32. The only solution is 9.

33. The only solution is 1.

34. The only solution is 2.

35. 3

36. 5

37. 1

38. 5

39. The only solution is –2.

40. The only solution is 6.

41. The only solution is 1.

42. The only solution is 8.

43. 5

44. The solutions are 2 and -1.

45. 13.16 cm

46. $36\sqrt{2} - 36$
The length is about 14.9 in.

47. 5

48. The answer is B.

49. 8

50. 4

51. 5

52. 23

53. 1

54. 6.5

55. The solutions are –7 and 9.

56. $\frac{81}{16}$

57. 9

58. The solution is 11.

59. $x = 4$ is a solution, but $x = 1$ is an extraneous solution.

60. $d = \frac{v^2}{64}$

61. Answers may vary. Sample:
$\sqrt{x-3} = \sqrt{3x+5}$

62a. A counterexample is $a = 3,\ b = -3$.

62b. A counter example is $a = -5,\ b = 3$.

63. C

64. The only solution is 1.

65. The solutions are 0 and 2.

66. The only solution is 2.

67. The only solution is 0.

68. Plan 1: Use a calculator to evaluate $\sqrt{2} + 2$ and store the result as x. Evaluate $\sqrt{2+x}$ and store the result as x. Continue this procedure about seven times, until it becomes clear that the values are approaching 2.
Plan 2: The given equation is equivalent to $x = \sqrt{2+x}$. Solve this equation to find that $x = 2$.

69. $\sqrt{6}$ is greater.

70. $\sqrt{3} + \sqrt{11}$ is greater.

71. $\sqrt{10}$ is greater.

72. $\sqrt{19} + \sqrt{3}$ is greater.

73. B

74. F

75. D

76. $\sqrt[4]{25^3}$;
$\frac{\sqrt{10}}{5}$

77. 3

78. 2

79. 625

80. 512

81. $\frac{1}{1000}$

82. 16

83. 125

84. $6\sqrt{2}$

85. The solutions are 3 and 4.

86. The solutions are 3 and 5.

87. The solutions are –5 and –4.

88. The solutions are –2 and $-\frac{2}{3}$.

89. The solutions are $-\frac{1}{3}$ and $-\frac{4}{3}$.

90. The solutions are –2 and $-\frac{3}{4}$.

91. domain: $\{0,\ 2,\ 4\}$
range: $\{-5,\ -3,\ -1\}$
Yes, the relation is a function because each x-coordinate corresponds to exactly one y-coordinate.

92. domain: $\{-1,\ 0,\ 1\}$
range: $\{2,\ 0,\ 1\}$
Yes, the relation is a function because each x-coordinate corresponds to exactly one y-coordinate.

93. domain: $\{-2,\ 0,\ 1\}$
range: $\{-2,\ 0,\ 1\}$
Yes, the relation is a function because each x-coordinate corresponds to exactly one y-coordinate.

94. domain: $\{3,\ 4,\ 5\}$
range: $\{-1\}$
Yes, the relation is a function because each x-coordinate corresponds to exactly one y-coordinate.

95. domain: $\{0,\ 1,\ 2\}$
range: $\{0,\ 1,\ 2\}$
No, the relation is not a function because the x-coordinate 2 corresponds to 1 and 2.

96. domain: $\{0\}$
range: $\{-2,\ 0,\ 2\}$
No, the relation is not a function because the x-coordinate 0 corresponds to -2, 0, and 2.

Algebra 2
Lesson 6-6 - Practice and Problem-Solving Exercises Answers

9. $x^2 + 7x + 5$

domain: all real numbers

10. $-x^2 + 7x + 5$

domain: all real numbers

11. $x^2 - 7x - 5$

domain: all real numbers

12. $7x^3 + 5x^2$

domain: all real numbers

13. $\frac{7x + 5}{x^2}$

domain: all real numbers except $x = 0$

14. $\frac{x^2}{7x + 5}$

domain: all real numbers except $x = -\frac{5}{7}$

15. $2 - x + \frac{1}{x}$

domain: all real numbers except $x = 0$

16. $2 - x - \frac{1}{x}$

domain: all real numbers except $x = 0$

17. $\frac{1}{x} + x - 2$

domain: all real numbers except $x = 0$

18. $\frac{2 - x}{x}$

domain: all real numbers except $x = 0$

19. $2x - x^2$

domain: all real numbers except $x = 0$

20. $\frac{1}{2x - x^2}$

domain: all real numbers except $x = 0, 2$

21. $2x^2 + 2x - 4$

domain: all real numbers

22. $2x^2 - 2$

domain: all real numbers

23. $-2x^2 + 2$

domain: all real numbers

24. $2x^3 - x^2 - 4x + 3$

domain: all real numbers

25. $2x + 3$

domain: all real numbers except $x = 1$

26. $\frac{1}{2x + 3}$

domain: all real numbers except $x = -\frac{3}{2}, 1$

27. 8

28. 104

29. 20

30. 16

31. 8

32. $2a^2 + 8$

33. $4a$

34. $a^4 + 8a^2 + 20$

35. $4a^2 + 4$

36. 1

37. 25

38. -3

39. 9

40. 9.25

41. 0.25

42. $a^2 - 6a + 9$

43. $a^2 - 3$

44. $a^2 + 6a + 9$

45a. $f(x) = 0.95x$

45b. $g(x) = x - 200$

45c. \$1225

45d. \$1235

46a. $(g \circ f)x = 2.1105x$

46b. 31.6575 pesos

47. $x^2 - x + 7$
domain: all real numbers

48. $6x + 13$
domain: all real numbers

49. $x^2 - 5x - 3$
domain: all real numbers

50. domain: all real numbers

51. domain: all real numbers

52. $2x^2 + 2x + 24$
domain: all real numbers

53. $4x^2 - 14x + 3$
domain: all real numbers

54. $-2x^2 + 8x + 1$
domain: all real numbers

55. $2x^3 - x^2 - 11x + 10$
domain: all real numbers

56. $-6x^3 + 3x^2 + 33x - 30$
domain: all real numbers

57. $\dfrac{(2x+5)}{(x^2 - 3x + 2)}$
domain: all real numbers except $x = 1$ and 2

58. $\dfrac{10x + 25}{(x^2 - 3x + 2)}$
domain: all real numbers except $x = 1$ and 2

59. \$79,850

60a. The score is greater with the 10-point bonus first and then the 9% increase.

60b. Yes; the "10-point bonus first then the 9% increase" is $1.09x + 10.9$ and the "9% increase first then the 10-point bonus" is $1.09x + 10$. The first option is 0.9 points greater than the second.

61a. $g(x)$ is the bonus earned when x is the amount of sales over \$5000. $h(x)$ is the excess of x sales over \$5000.

61b. $(g \circ h)(x)$ represents the weekly bonus because you first need to find the excess sales over \$5000 to calculate the bonus.

62. $f(x) = x^2 - 1$

63. 1

64. -4

65. 0

66. 2

67. 8

68. 17

69. -2

70. $-\frac{8}{9}$

71a. the area after 2 seconds is about 1963 in.^{2}

71b. about 7854 in.^{2}

72. $f(g(x)) = 3x^2$
$g(f(x)) = 9x^2$

73. $f(g(x)) = x - 2$
$g(f(x)) = x - 2$

74. $f(g(x)) = 12x^2 + 2$
$g(f(x)) = 6x^2 + 4$

75. $f(g(x)) = x - 3$
$g(f(x)) = x - 6$

76. $f(g(x)) = -4x - 7$
$g(f(x)) = -4x - 28$

77. $f(g(x)) = \frac{x^2 + 5}{2}$
$g(f(x)) = \frac{x^2 + 10x + 25}{4}$

78a. Answers may vary. Sample: $g(x) = 0.12x$
You save $(g(x))$ 12% of what you earn (x).

78b. Answers may vary. Sample: $f(x) = 9.50x$
You earn $(f(x))$ \$9.50 for each hour (x) you work.

78c. Answers may vary. Sample:
$$(g \circ f)(x) = 0.12(9.50x)$$
$$= 1.14x$$
Your savings will be \$1.14 for each hour you work.

79. $x^7 - x^6 - 16x^5 + 10x^4 + 85x^3 - 25x^2 - 150x$
domain: all real numbers

80. $\frac{x^2 + 2x}{x - 3}$
domain: all real numbers except 3, $\sqrt{5}$, and $-\sqrt{5}$

81. $\frac{x - 3}{x^2 + 2x}$
domain: all real numbers except 0, -2, $\sqrt{5}$, and $-\sqrt{5}$

82. $\frac{1}{x}$

83. 2

84. 4

85. $8a + 4h$

86. D

87. H

88. C

89. Look at the 5th number in Row 7 of Pascal's triangle to find the coefficient of the x^3y^4 term in the expansion of $(x + y)^7$.
$35(3x)^3(-y)^4 = 945x^3y^4$, so 945 is the coefficient.

90. 1

91. -3

92. 4

93. 3

94. 2

95. 3

96. $x^8 + 32x^7 + 448x^6 + 3584x^5 + 17{,}920x^4 + 57{,}344x^3$
$+ 114{,}688x^2 + 131{,}072x + 65{,}536$

97. $x^6 + 6x^5y + 15x^4y^2 + 20x^3y^3 + 15x^2y^4 + 6xy^5 + y^6$

98. $16x^4 - 32x^3y + 24x^2y^2 - 8xy^3 + y^4$

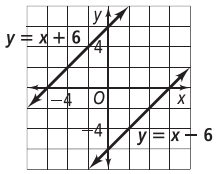
99. $128x^7 - 1344x^6y + 6048x^5y^2 - 15{,}120x^4y^3 + 22{,}680x^3y^4$
$- 20{,}412x^2y^5 + 10{,}206xy^6 - 2187y^7$

100. $59{,}049 - 65{,}610x + 29{,}160x^2 - 6480x^3 + 720x^4 - 32x^5$

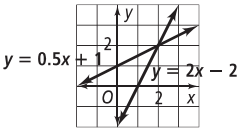
101. $1024x^5 - 1280x^4y + 640x^3y^2 - 160x^2y^3 + 20xy^4 - y^5$

102. $x^8 + 4x^7 + 6x^6 + 4x^5 + x^4$

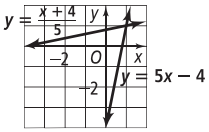
103. $x^{12} + 12x^{10}y^3 + 60x^8y^6 + 160x^6y^9 + 240x^4y^{12} + 192x^2y^{15} + 64y^{18}$

104. 

no solution

105. 

$(2, 2)$

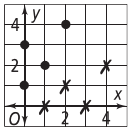
106. 

$(1, 1)$

Algebra 2
Lesson 6-7 - Practice and Problem-Solving Exercises Answers

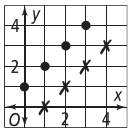
8.

x	0	1	0	2
y	1	2	3	4



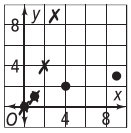
9.

x	0	1	2	3
y	1	2	3	4



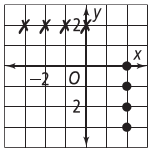
10.

x	0	1	4	9
y	0	1	2	3



11.

x	2	2	2	2
y	−3	−2	−1	0



12. $f^{-1}(x) = \frac{1}{3}x - \frac{1}{3}$, yes

13. $f^{-1}(x) = \frac{1}{2}x + \frac{1}{2}$, yes

14. $f^{-1}(x) = -\frac{1}{3}x + \frac{4}{3}$, yes

15. $f^{-1}(x) = \pm\sqrt{\frac{5-x}{2}}$, no

16. $f^{-1}(x) = \pm\sqrt{x-4}$, no

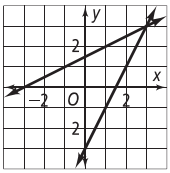
17. $f^{-1}(x) = \pm\sqrt{\frac{x+5}{3}}$, no

18. $f^{-1}(x) = \pm\sqrt{x} + 8$, no

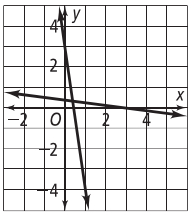
19. $f^{-1}(x) = \frac{4 \pm \sqrt{x}}{3}$, no

20. $f^{-1}(x) = \frac{1 \pm \sqrt{x-5}}{2}$, no

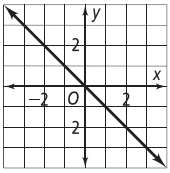
21. $f^{-1}(x) = \frac{1}{2}x + \frac{3}{2}$



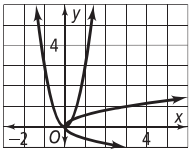
22. $f^{-1}(x) = -\frac{1}{7}x + \frac{3}{7}$



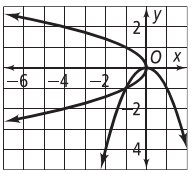
23. $f^{-1}(x) = -x$



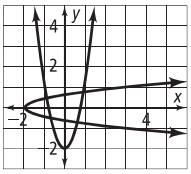
24. $f^{-1}(x) = \pm\sqrt{\frac{x}{3}}$



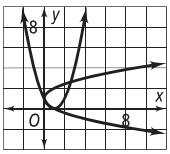
25. $f^{-1}(x) = \pm\sqrt{-x}$



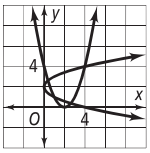
26. $f^{-1}(x) = \pm\dfrac{\sqrt{x+2}}{2}$



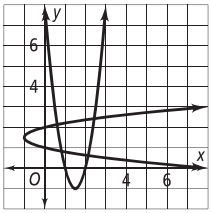
27. $f^{-1}(x) = 1 \pm \sqrt{x}$



28. $f^{-1}(x) = 2 \pm \sqrt{x}$



29. $f^{-1}(x) = \dfrac{3 \pm \sqrt{x+1}}{2}$



30. $f^{-1}(x) = \dfrac{x-4}{3}$

domain and range for both f and f^{-1} are all real numbers

f^{-1} is a function.

31. $f^{-1}(x) = x^2 + 5$

domain of $f : x \geq 5$, range of $f : y \geq 0$

domain of $f^{-1} : x \geq 0$, range of $f^{-1} : y \geq 5$

f^{-1} is a function.

32. $f^{-1}(x) = x^2 - 7$

domain of $f : x \geq -7$, range of $f : y \geq 0$

domain of $f^{-1} : x \geq 0$, range of $f^{-1} : y \geq -7$

f^{-1} is a function.

33. $f^{-1}(x) = \dfrac{3 - x^2}{2}$

domain of $f : x \leq \dfrac{3}{2}$, range of $f : y \geq 0$

domain of $f^{-1} : x \geq 0$, range of $f^{-1} : y \leq \dfrac{3}{2}$

f^{-1} is a function.

34. $f^{-1}(x) = \pm\sqrt{\dfrac{x-2}{2}}$

domain of f : all real numbers, range of $f : y \geq 2$

domain of $f^{-1} : x \geq 2$, range of f^{-1} : all real numbers

f^{-1} is not a function.

35. $f^{-1}(x) = \pm\sqrt{1-x}$

domain of f :all real numbers, range of $f : y \leq 1$

domain of $f^{-1} : x \leq 1$, range of f^{-1} : all real numbers

f^{-1} is not a function.

36a. $C = \dfrac{5}{9}(F - 32)$, yes

36b. –3.9°C

37a. yes

37b. 20.29 ft

38. 10

39. –10

40. 0.2

41. $\left(f \circ f^{-1}\right)(d) = d$

42. $f^{-1}(x) = \sqrt[3]{x}$

yes

43. $f^{-1}(x) = \pm\sqrt[4]{x}$

no

44. $f^{-1}(x) = \pm\sqrt{\dfrac{5x-5}{2}}$

no

45. $f^{-1}(x) = \pm\sqrt{\dfrac{2x+8}{3}}$

no

46. $f^{-1}(x) = \pm 2\sqrt{\frac{x}{3}}$

no

47. $f^{-1}(x) = \frac{x^2 - 6x + 10}{2}$, $x \geq 3$.

yes

48. When the flow is 40 ft per second the depth is 25 ft.
When the flow is 20 ft per second the depth is 6.25 ft.

49. -1

50. The range of the inverse of f is the domain of f, which is $x \geq 1$.

51. $f^{-1}(x) = x^2$
domain of $f: x \geq 0$, range of $f: y \leq 0$
domain of $f^{-1}: x \leq 0$, range of $f^{-1}: y \geq 0$
f^{-1} is a function.

52. $f^{-1}(x) = (x-3)^2$
domain of $f: x \geq 0$, range of $f: y \geq 3$
domain of $f^{-1}: x \geq 3$, range of $f^{-1}: y \geq 0$
f^{-1} is a function.

53. $f^{-1}(x) = 3 - x^2$, $x \geq 0$
domain of $f: x \leq 3$, range of $f: y \geq 0$
domain of $f^{-1}: x \geq 0$, range of $f^{-1}: y \leq 3$
f^{-1} is a function.

54. $f^{-1}(x) = x^2 - 2$
domain of $f: x \geq -2$, range of $f: y \geq 0$
domain of $f^{-1}: x \geq 0$, range of $f^{-1}: y \geq -2$
f^{-1} is a function.

55. $f^{-1}(x) = \pm\sqrt{2x}$, $x \geq 0$
domain of f: all real numbers, range of $f: y \geq 0$
domain of $f^{-1}: x \geq 0$, range of f^{-1}: all real numbers
f^{-1} is not a function.

56. $f^{-1}(x) = \pm\frac{1}{\sqrt{x}}$
domain of $f: x \neq 0$, range of $f: y > 0$
domain of $f^{-1}: x > 0$, range of $f^{-1}: y \neq 0$
f^{-1} is not a function.

57. $f^{-1}(x) = \pm\sqrt{x} + 4$
domain of f: all real numbers, range of $f: y \geq 0$
domain of $f^{-1}: x \geq 0$, range of f^{-1}: all real numbers
f^{-1} is not a function.

58. $f^{-1}(x) = 7 \pm \sqrt{x}$
domain of f: all real numbers, range of $f: y \geq 0$
domain of $f^{-1}: x \geq 0$, range of f^{-1}: all real numbers
f^{-1} is not a function.

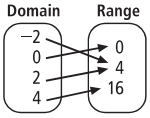
59. $f^{-1}(x) = \pm\frac{1}{\sqrt{x}} - 1$
domain of $f: x \neq -1$, range of $f: y > 0$
domain of $f^{-1}: x \geq 0$, range of $f^{-1}: y \neq -1$
f^{-1} is not a function.

60. $f^{-1}(x) = \left(\frac{4-x}{2}\right)^2$
domain of $f: x \geq 0$, range of $f: y \leq 4$
domain of $f^{-1}: x \leq 4$, range of $f^{-1}: y \geq 0$
f^{-1} is a function.

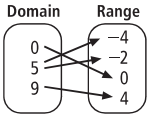
61. $f^{-1}(x) = \left(\frac{3}{x}\right)^2$, $x > 0$
domain of $f\{x|x>0\}$, range of $f\{y|y>0\}$
domain of $f^{-1}\{x|x>0\}$, range of $f^{-1}\{y|y>0\}$
f^{-1} is a function.

62. $f^{-1}(x) = -\frac{1}{2}\left(\frac{1}{x}\right)^2$
domain of $f: x < 0$, range of $f: y > 0$
domain of $f^{-1}: x > 0$, range of $f^{-1}: y > 0$
f^{-1} is a function.

63a. Answers may vary. Sample:



63b. Answers may vary. Sample:



64. r is not a function because there are two y-values for one x-value.
r^{-1} is a function because each of its x-values has one y-value.

65. about 4.2 in.

66. Answers may vary. Sample:
$f(x) = \sqrt{-(x+1)} - 2$

67a. The horizontal line test tells you if there is more than one x-value for every y-value. Since the graph of f^{-1} interchanges x and y values of f, if f passes the horizontal line test, f^{-1} will pass the vertical line test and it will be a function.

67b. No; if you connect the points with a smooth curve, the function does not pass the horizontal line test.

68. $f^{-1}(x) = \sqrt[3]{5x}$
yes

69. $f^{-1}(x) = x^3 + 5$
yes

70. $f^{-1}(x) = 27x^3$
yes

71. $f^{-1}(x) = 2 + \sqrt[3]{x}$
yes

72. $f^{-1}(x) = x^4, x \geq 0$
yes

73. $f^{-1}(x) = \pm\sqrt[4]{\frac{5x}{6}}$
no

74. Yes; $f(x)$ is a one-to-one function, and its graph will pass the horizontal line test.

75. C

76. F

77. B

78. To find the x-intercepts of $f(x)$:
$0 = (x+1)^2 - 2$
$2 = (x+1)^2$
$\pm\sqrt{2} = x + 1$
$-1 \pm \sqrt{2} = x$
so the x-intercepts are $(-1 \pm \sqrt{2}, 0)$.

To find the y-intercepts of $f(x)$:
$f(x) = (0+1)^2 - 2$
$= -1$
so the y-intercept is $(0, -1)$.

To find the inverse of $f(x)$:
$x = (y+1)^2 - 2$
$\pm\sqrt{x+2} = y + 1$
$-1 \pm \sqrt{x+2} = y$
so $f^{-1}(x) = -1 \pm \sqrt{x+2}$.

$f^{-1}(x)$ is not a function.

79. $2x + 7$

80. $-x - 10$

81. $-\frac{3}{2}x + 11$

82. $2x^2 + 28x$

83. 32

84. $2x + 28$

85. -2

86. No real root.

87. 3

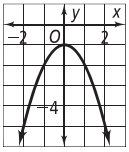
88. -3

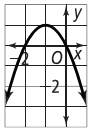
89. -3

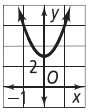
90. 0.4

91. 30

92. 0.05

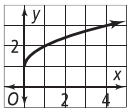
93. 

94. 

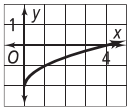
95. 

Algebra 2
Lesson 6-8 - Practice and Problem-Solving Exercises Answers

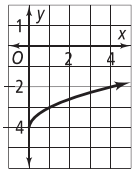
7. $y = \sqrt{x} + 1$



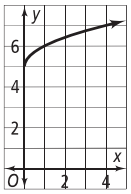
8. $y = \sqrt{x} - 2$



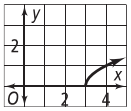
9. $y = \sqrt{x} - 4$



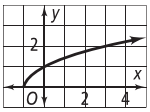
10. $y = \sqrt{x} + 5$



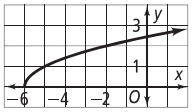
11. $y = \sqrt{x - 3}$



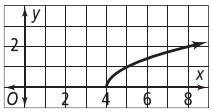
12. $y = \sqrt{x + 1}$



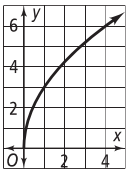
13. $y = \sqrt{x + 6}$



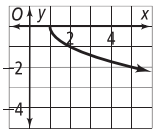
14. $y = \sqrt{x - 4}$



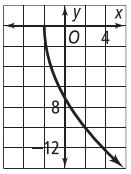
15. $y = 3\sqrt{x}$



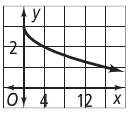
16. $y = -\sqrt{x - 1}$



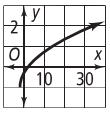
17. $y = -5\sqrt{x + 2}$



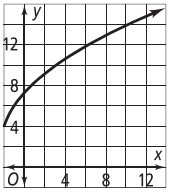
18. $y = -0.5\sqrt{x} + 3$



19. $y = \frac{1}{2}\sqrt{x + 2} - 1$



20. $y = 3\sqrt{x + 1} + 4$

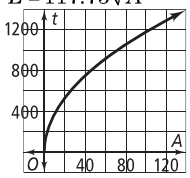


21. The intersection is at $x = 147$, so the solution is 147.

22. The intersection is at $x = 9.5$, so the solution is 9.5.

23. The intersection is at $x = -1$, so the solution is -1.

24a. $L = 117.75\sqrt{A}$

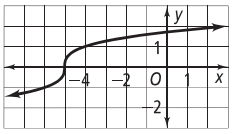


24b. $L = 800$ in.: ≈ 46 sq yds

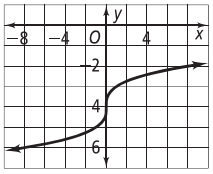
$L = 1300$ in.: ≈ 122 sq yds

$L = 500$ in.: ≈ 18 sq yds

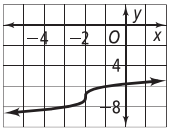
25. $y = \sqrt[3]{x+5}$



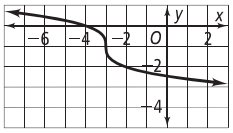
26. $y = \sqrt[3]{x} - 4$



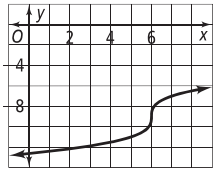
27. $y = \sqrt[3]{x+2} - 7$



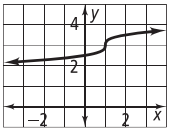
28. $y = -\sqrt[3]{x+3} - 1$



29. $y = 2\sqrt[3]{x-6} - 9$



30. $y = \frac{1}{2}\sqrt[3]{x-1} + 3$



31. The graph of $y = 3\sqrt{x-1}$ is the graph of $y = 3\sqrt{x}$ translated 1 unit to the right.

32. The graph of $y = -4\sqrt{x+2}$ is the graph of $y = -4\sqrt{x}$ translated 2 units to the left.

33. The graph of $y = -4\sqrt{x+4}$ is the graph of $y = -4\sqrt{x}$ translated 4 units to the left.

34. The graph of $y = 4\sqrt[3]{x+2}$ is the graph of $4\sqrt[3]{x}$ translated 2 units to the left.

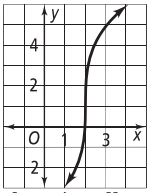
35. The graph of $y = 5\sqrt{x+5} - 3$ is the graph of $y = 5\sqrt{x}$ translated 5 units to the left and 3 units down.

36. The graph of $y = 2\sqrt[3]{x-3} + 1$ is the graph of $y = 2\sqrt[3]{x}$ translated 3 units to the right and 1 unit up.

37. graph ℓ vs. t and find the value of ℓ for $t = 4.5$ and $t = 6$; use the equation $t = 1.11\sqrt{\ell}$ and substitute $t = 4.5$ and $t = 6$.

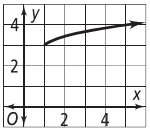
≈ 16.44 ft, ≈ 29.22 ft

38. $y = 4\sqrt[3]{x-2} + 1$



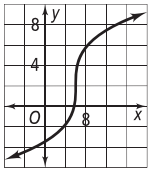
domain: all real numbers
range: all real numbers

39. $y = \frac{1}{2}\sqrt{x-1} + 3$



domain: $x \geq 1$
range: $y \geq 3$

40. $y = \sqrt[3]{x-6} + 2$



domain: all real numbers
range: all real numbers

41a. The graph is $y = \sqrt{x}$ translated 2 units to the right and 2 units down: $y = \sqrt{x-2} - 2$

41b. domain: $x \geq 2$
range: $y \geq -2$

41c. No; the function pairs the number 3 with the number -1, which is not a non-negative number.

42. Answers may vary. Sample:
$y = -\sqrt{x-2} + 3$

43. $y = 5\sqrt{x-4} - 1$
the graph is the graph of $y = 5\sqrt{x}$, translated 4 units right and 1 unit down.

44. $y = 6\sqrt{x+3} + 4$
the graph is the graph of $y = 6\sqrt{x}$, translated 3 units left and 4 units up.

45. $y = -2\sqrt[3]{x - \frac{1}{4}}$
the graph is the graph of $y = -2\sqrt[3]{x}$, translated $\frac{1}{4}$ unit right.

46. $y = \frac{1}{2}\sqrt{x-1} - 2$
the graph is the same as $y = \frac{1}{2}\sqrt{x}$, translated 1 unit right and 2 units down.

47. $y = 10 - \frac{1}{3}\sqrt[3]{x+3}$
the graph is the same as $y = -\frac{1}{3}\sqrt[3]{x}$, translated 3 units left and 10 units up.

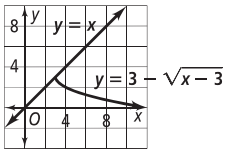
48. $y = \frac{1}{3}\sqrt{x+9} + 5$
the graph is the same as $y = \frac{1}{3}\sqrt{x}$, translated 9 units left and 5 units up.

49. $\frac{1}{3}$

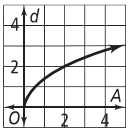
50. The only solution is $x = 1$.

51. The solutions are $x = 0, 9, 1$.

52a. The only solution is $x = 3$.

52b. 

52c. There is an extraneous solution that must be eliminated when solving algebraically.

53a. $d = \frac{5}{6}\sqrt{3A}$


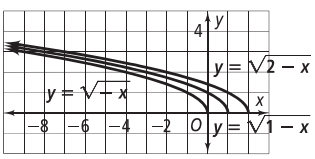
53b. $15\sqrt{2}$ in., or ≈ 21.2 in.

54. The object's initial height is about 240.35 m.

55. $y = -\sqrt{8}\sqrt{x - \frac{3}{4}}$
The graph is the graph of $y = -\sqrt{8}\sqrt{x}$, translated $\frac{3}{4}$ unit to the right.
domain: $x \geq \frac{3}{4}$
range: $y \leq 0$

56. $y = \sqrt{3}\sqrt{x - \frac{5}{6}} + 6$
The graph is the graph of $y = \sqrt{3x}$, translated $\frac{5}{3}$ units right and 6 units up.
domain: $x \geq \frac{5}{3}$
range: $y \geq 6$

57. $y = -\sqrt{12}\sqrt{x + \frac{3}{2}} - 3$
The graph is the graph of $y = -\sqrt{12x}$, translated $\frac{3}{2}$ units left and 3 units down.
domain: $x \geq -\frac{3}{2}$
range: $y \leq -3$

58a. 

58b. The graph of $y = \sqrt{h - x}$ is a reflection of the graph of $y = \sqrt{x - h}$ across the line $x = h$.

59. for all odd positive integers

60. D

61. F

62. B

63. For $f(x) = \sqrt{x-1}$ the domain is $x \geq 1$ and the range is $y \geq 0$. For $g(x) = \sqrt{x} - 1$ the domain is $x \geq 0$ and the range is $y \geq -1$.

64. $f^{-1}(x) = \dfrac{3(x+3)}{2}$
yes

65. $f^{-1}(x) = (x+4)^2 - 3$
yes

66. $f^{-1}(x) = \dfrac{-1 \pm \sqrt{x}}{2}$
no

67. $\dfrac{x\sqrt{3xy}}{y}$

68. $\dfrac{\sqrt{6xy}}{2y}$

69. $\dfrac{\sqrt[3]{9xy^2}}{3y}$

70. $\dfrac{\sqrt[5]{48x^3y^4}}{2y}$

71. $\dfrac{9 \pm \sqrt{21}}{2}$

72. $\dfrac{-3 \pm 3\sqrt{5}}{2}$

73. $\dfrac{-1 \pm \sqrt{61}}{10}$

74. 8

75. 16

76. 2