Radicals and Radical Functions - ANSWERS

RD.1 Exercises

1. principal

3. radicand

5. irrational

7. nonnegative

9. even

11. -9

13. 0.3

15. $\frac{8}{15}$

17. -5

19. 10

21. 2

23. -1

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

27. **a.** positive **b.** negative **c.** 0

29. 15

31. $|x|$

33. $12|y|$

35. $|2-x|y^2$ or $|x-2|y^2$

37. $|3x+5|$

39. x

41. $-0.2(x-1)$

43. 10

45. $a+b$

47. $|x|^3$

49. a^4

51. $|x|y^2$

53. -0.927

55. 1.246

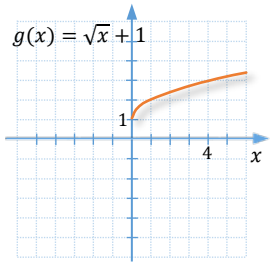
57. 10

59. 9

61. 30

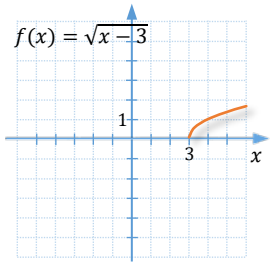
63. **C.**

65. $D=[0,\infty)$
range $=[1,\infty)$



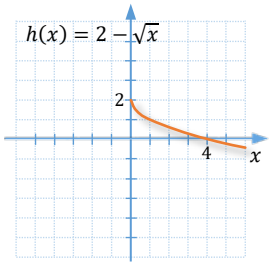
Translation: 1 step up

67. $D=[3,\infty)$
range $=[0,\infty)$



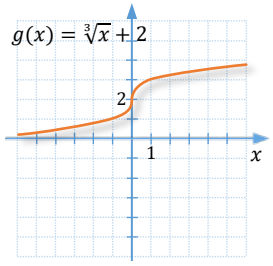
Translation: 3 steps to the right

69. $D=[0,\infty)$
range $=(-\infty,2]$



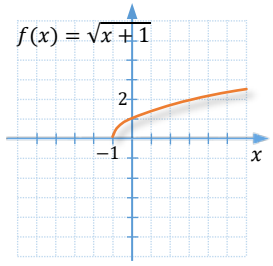
Reflection in x-axis, then
Translation: 2 steps up

71. $D=\mathbb{R}$
range $=\mathbb{R}$



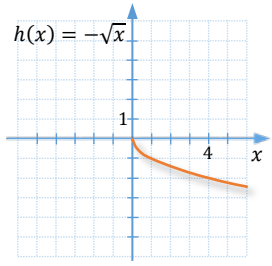
Translation: 2 steps up

73. $D=[-1,\infty)$
range $=[0,\infty)$



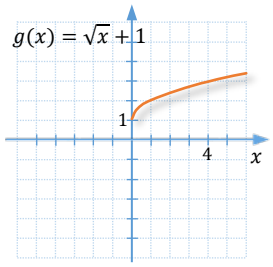
Translation: 1 step to the left

75. $D=[0,\infty)$
range $=(-\infty,0]$



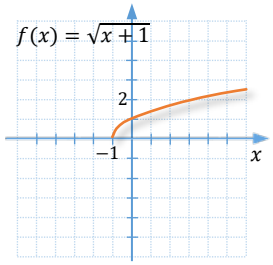
Reflection in x-axis

77. $D = [0, \infty)$
range $= [1, \infty)$



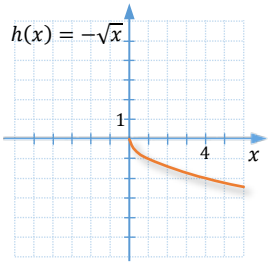
Translation: 1 step up

79. $D = [-1, \infty)$
range $= [0, \infty)$



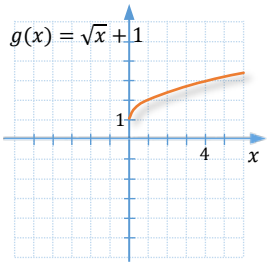
Translation: 1 step to the left

81. $D = [0, \infty)$
range $= (-\infty, 0]$



Reflection in x-axis

83. $D = [0, \infty)$
range $= [1, \infty)$



Translation: 1 step up

85. 15 mi

87. 88 days

89. 6 m^2

RD.2 Exercises

1. **a.-B.**; **b.-A.**; **c.-C.**; **d.-F.**; **e.-D.**; **f.-E.**

3. 2

5. -343

7. $-\frac{1}{10}$

9. $\frac{8}{27}$

11. not a real number

13. -2

15. $5^{\frac{1}{2}}$

17. x^3

19. $4x^2$

21. $5x^{-\frac{5}{2}}$

23. 32

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

27. $\sqrt[3]{9}$

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

31. $3^{\frac{7}{8}}$

33. $2^{\frac{3}{4}}$

35. $5^{\frac{5}{4}}$

37. $x^{\frac{1}{2}} \cdot y^{\frac{10}{3}}$

39. $\frac{x^{\frac{5}{9}}}{y^{\frac{1}{2}}}$

41. $5x^{\frac{4}{15}}$

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

45. y^{-3} or $\frac{1}{y^3}$

47. $\sqrt[3]{9}$

49. $2y^2$

51. $2x^2\sqrt[3]{2y^2}$

53. $2x\sqrt{y}$

55. $\sqrt[6]{5^5}$

57. $\sqrt[6]{9a^5}$

59. $x\sqrt{x}$

61. $\frac{\sqrt{x}}{x^2}$ or $\frac{1}{x\sqrt{x}}$

63. $\frac{2}{\sqrt[12]{x^5}}$

65. $\sqrt[12]{xy}$

67. $\sqrt[24]{x}$

69. $\sqrt[8]{x^3}$

71. To treat an equation as an identity, the equation must be true for all variable values in the domain. The fact that the equation is true for specific values does not guarantee that it is true for all values of a and b.

73. ~31 beats per minute

RD.3 Exercises

1. index; product

3. simplified

5. Pythagorean; right

7. 6

9. $3\sqrt{10}$

11. $30\sqrt{2}$

13. $5ay^3\sqrt{3ay}$

15. $6a^2b^4\sqrt{15ab}$

17. $2a^2\sqrt[4]{5}$

19. $2\sqrt{2}$

21. $x\sqrt{3}$

23. $y\sqrt{7y}$

25. $2a\sqrt{ab}$

27. 3

29. $2x^2y^2$

31. $-9m^4n^2\sqrt{n}$

33. $5xy^2\sqrt{2x}$

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

37. $5pq^2\sqrt{3p}$

39. $p^2qr^4\sqrt[5]{p^4q^2r^3}$

41. $-2xy^2\sqrt[4]{2xy^2}$

43. $\frac{3}{5}$

45. $\frac{8}{x^2}$

47. $\frac{6x^2}{y^3}$

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

51. $\sqrt{3}$

53. $x^3\sqrt[3]{x}$

55. $\frac{4x^5\sqrt[3]{y^2z}}{y^2z^2}$

57. $\frac{pq^4\sqrt{p}}{r^3}$

59. $\sqrt[6]{3^3\cdot 2^4}$ or $\sqrt[6]{432}$

61. $\sqrt[12]{x^{11}}$

63. $\sqrt[6]{a}$

65. $\sqrt[12]{x^2y^5}$

67. $\sqrt[6]{4x}$

69. $\sqrt[12]{3^5}$

71. $\sqrt{74}$

73. $\sqrt{n}$

75. $4\sqrt{3}$

77. 10

79. $9\sqrt{2}$

81. $\sqrt{13}$

83. $\sqrt{95}$

85. $h\sqrt{2}$

87. 15.7 in

89. $(-4, 0)$ and $(4, 0)$

RD.4 Exercises

1. like

3. coefficients

5. rationalize

7. factoring

9. Yes. The equation is true for any a and b satisfying the condition $ab = 0$.

11. $2\sqrt[3]{x}$

13. $8a\sqrt{5b}$

15. $12\sqrt{3}-\sqrt{5}$

17. $-\sqrt[4]{2}$

19. $(2-x)\sqrt[3]{3x}$

21. $(21x+1)\sqrt{3x}$

23. $21\sqrt{2a}$

25. $-49y\sqrt{3}$

27. $(7x^2-4y^2)\sqrt{xy}$

29. $-7p^3$

31. $5a\sqrt{5a}-10a\sqrt[3]{a}$ or $5a\left(\sqrt{5a}-2\sqrt[3]{a}\right)$

33. $4\sqrt{a-1}$ **35.** $(x-2)\sqrt{x-1}$ **37.** $\frac{10\sqrt{3}}{9}$ **39.** $\frac{7x^2+9}{x^4}$

41. $\frac{-4y\sqrt[3]{4}+3\sqrt[3]{9}}{y^4}$ **43.** **A.-e.**; **B.-c.**; **C.-a.**; **D.-f.**; **E.-d.**; **F.-b.** **45.** $9-\sqrt{6}$

47. $-12+3\sqrt{2}$ **49.** $3+2\sqrt[3]{63}$ **51.** -2 **53.** 18

55. $11+6\sqrt{2}$ **57.** $4x-9y$ **59.** $15-10\sqrt{2}$ **61.** $62-20\sqrt{6}$

63. $42+\sqrt{15}$ **65.** $x-4$ **67.** $2x+2\sqrt{x^2-4}$

69. $(f+g)(x)=x\sqrt[4]{4x};\ (fg)(x)=-24x^2\sqrt{x}$ **71.** $\frac{\sqrt{3}}{5}$ **73.** $-\frac{5\sqrt{6}}{4}$

75. $\frac{\sqrt{15x}}{10}$ **77.** $\frac{\sqrt[3]{63ab^2}}{3b}$ **79.** $\frac{n\sqrt[3]{75mn}}{5m}$ **81.** $\frac{\sqrt[5]{2^4\cdot 3^3x^2}}{3x}$

83. $3+\sqrt{5}$ **85.** $\frac{6(\sqrt{6}+1)}{5}$ **87.** $\frac{7+4\sqrt{6}}{47}$ **89.** $\frac{4(\sqrt{x}+2\sqrt{y})}{x-4y}$

91. $\frac{3x-\sqrt{xy}-6\sqrt{x}+2\sqrt{y}}{9x-y}$ **93.** $\frac{x-2\sqrt{xy}+y}{x-y}$ **95.** $2+\sqrt{3}$ **97.** $1+\sqrt{2}$

99. $\frac{3x+\sqrt{2}}{5}$ **101.** $920\ m$

RD.5 Exercises

1. radical **3.** extraneous; solution **5.** False, as the radicals do not contain a variable.

7. True, as the radical cannot be negative. **9.** $x=\frac{39}{7}$ **11.** $x=\frac{2}{3}$

13. no solution **15.** $x=-27$ **17.** $y=19$ **19.** $a=\frac{1}{25}$

21. $r=5$ **23.** $y=18$ **25.** $x=9$ **27.** $x\in\{-1,3\}$

29. $y=4$ **31.** $x=5$ **33.** not correct, as $(8-x)^2=64-16x+x^2$

35. $x=2$ **37.** $p=9$ **39.** No solution **41.** $t=-1$

43. No solution **45.** $n=3$ **47.** $n=-2$ **49.** $a\in\{2,6\}$

51. No solution **53.** $m=2$ **55.** $x\in\left\{-1,\frac{1}{3}\right\}$ **57.** $x\in\{1,9\}$

59. $x=\frac{4}{9}$ **61.** $k\in\{-2,-1\}$ **63.** $x\in\{-5,5\}$ **65.** $a\in\left\{0,\frac{125}{4}\right\}$

67. $L=CZ^2$ **69.** $m=\frac{2K}{V^2}$ **71.** $F=\frac{Mm}{r^2}$ **73.** $C=\frac{1}{4\pi^2F^2L}$

75. $r=\frac{a}{4\pi^2N^2}$ **77.** 180 cm **79.** 60 ft