

Chapter 0 Algebraic Concepts 2

Sections 3-4

1. Evaluate the expression.

$$-4^3$$

- A) -64
- B) 81
- C) 256
- D) 64
- E) -256

Ans: A

2. Evaluate the expression.

$$-4^3$$

- A) 64
- B) 256
- C) -64
- D) -256
- E) 16

Ans: C

3. Evaluate the expression.

$$5^{-1}$$

- A) 0
- B) 1
- C) 5
- D) $\frac{1}{5}$
- E) undefined

Ans: D

4. Evaluate the expression.

$$\left(\frac{5}{2}\right)^3$$

- A) $\frac{8}{125}$
- B) $\frac{25}{4}$
- C) $\frac{5}{8}$
- D) $\frac{4}{25}$
- E) $\frac{125}{8}$

Ans: E

5. Use the rules of exponents to simplify the expression.

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

- A) 7^{-5}
- B) 7^4
- C) 7^5
- D) 7^6
- E) 7^{-4}

Ans: C

6. Use the rules of exponents to simplify the expression.

$$\frac{4^6}{(4^{-3} \cdot 4^5)}$$

- A) 4^1
- B) 4^{-2}
- C) 4^{14}
- D) 4^4
- E) 4^9

Ans: D

7. Use the rules of exponents to simplify the expression.

$$(5^{-1})^2$$

- A) 5^3
- B) 5^{-2}
- C) 5^1
- D) 5^{-3}
- E) 5^{-1}

Ans: B

8. Use the rules of exponents to simplify the expression.

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

A) $\left(\frac{2}{3}\right)^8$

B) $-\left(\frac{2}{3}\right)^8$

C) $\left(\frac{3}{2}\right)^8$

D) $-\left(\frac{3}{2}\right)^8$

E) $3^8\left(\frac{1}{2}\right)^8$

Ans: A

9. Simplify the expression so that it contains only positive exponents ($x \neq 0$).

$$(x^{-4})^3$$

A) x

B) x^{12}

C) $\frac{1}{x}$

D) $\frac{1}{x^{12}}$

E) $\frac{1}{x^3}$

Ans: D

10. Simplify the expression so that it contains only positive exponents ($x \neq 0$).

$$x^{-4}$$

A) 1

B) x

C) $\frac{1}{x^4}$

D) x^4

E) $\frac{1}{x^{-4}}$

Ans: C

11. Simplify the expression so that it contains only positive exponents ($x, y \neq 0$).

$$(xy^5)^0$$

A) 1

B) xy^5

C) $\frac{x}{y^5}$

D) $\frac{1}{xy^5}$

E) $\frac{1}{x^5y^5}$

Ans: A

12. Use the rules of exponents to simplify the expression.

$$a^7 \cdot a$$

A) a^7

B) a^8

C) a^6

D) $\frac{1}{a^7}$

E) $\frac{1}{a^8}$

Ans: B

13. Use the rules of exponents to simplify the expression so that only positive exponents remain.

$$y^{-3} \cdot y^{-3}$$

A) y

B) y^9

C) y^6

D) $\frac{1}{y^6}$

E) $\frac{1}{y^9}$

Ans: D

14. Use the rules of exponents to simplify the expression so that only positive exponents remain.

$$\frac{a^7}{a^{-3}}$$

- A) a
- B) a^4
- C) a^{10}
- D) $\frac{1}{a^4}$
- E) $\frac{1}{a^{10}}$

Ans: C

15. Use the rules of exponents to simplify the expression so that only positive exponents remain.

$$\frac{y^{-4}}{y^{-5}}$$

- A) y
- B) y^4
- C) y^{20}
- D) $\frac{1}{y}$
- E) $\frac{1}{y^4}$

Ans: A

16. Use the rules of exponents to simplify the expression so that only positive exponents remain.

$$(y^{-2})^4$$

- A) y
- B) y^2
- C) y^8
- D) $\frac{1}{y^2}$
- E) $\frac{1}{y^8}$

Ans: E

17. Use the rules of exponents to simplify the expression.

$$(2m)^3$$

- A) $8m^3$
 - B) $2m^3$
 - C) $16m^3$
 - D) $8m$
 - E) $16m$
- Ans: A

18. Use the rules of exponents to simplify the expression.

$$\left(\frac{2}{x^4}\right)^5$$

- A) $\frac{16}{x^{20}}$
 - B) $\frac{2}{x^9}$
 - C) $\frac{32}{x^{20}}$
 - D) $\frac{32}{x^9}$
 - E) $\frac{16}{x^9}$
- Ans: C

19. Use the rules of exponents to simplify the expression.

$$\left(\frac{8}{a^3}\right)^3$$

- A) $\frac{64}{a^9}$
 - B) $\frac{512}{a^9}$
 - C) $\frac{512}{a^3}$
 - D) $\frac{64}{a^6}$
 - E) $\frac{512}{a^6}$
- Ans: B

20. Compute and simplify so that only positive exponents remain.

$$(-18x^6)^{-3}$$

- A) $\frac{-1}{5832x^9}$
 B) $-5832x^{18}$
 C) $\frac{-5832}{x^{18}}$
 D) $\frac{-1}{5832x^{18}}$
 E) $\frac{-5832}{x^9}$

Ans: D

21. Compute and simplify so that only positive exponents remain.

$$(-3a^5b^{-3})(3a^2b^{-4})$$

- A) $-9a^7b^{12}$
 B) $-9a^7b^7$
 C) $-9a^{10}b^{12}$
 D) $-\frac{9a^7}{b^7}$
 E) $-\frac{9a^7}{b^{12}}$

Ans: D

22. Compute and simplify so that only positive exponents remain.

$$(-2m^4y^{-1})(-3m^{-5}y^{-3})$$

- A) $\frac{6}{my^4}$
 B) $\frac{6}{m^{20}y^4}$
 C) $\frac{-6}{m^{20}y^3}$
 D) $\frac{6y^3}{m^{20}}$
 E) $\frac{-6m}{y^4}$

Ans: A

23. Compute and simplify so that only positive exponents remain.

$$(6a^{-4}b^2c) \div (2a^6b^5)$$

A) $\frac{3b^3c}{a^{24}}$

B) $\frac{3c}{a^2b^3}$

C) $\frac{3b^{10}c}{a^{24}}$

D) $\frac{3c}{a^{10}b^3}$

E) $\frac{3c}{a^2b^7}$

Ans: D

24. Compute and simplify so that only positive exponents remain.

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

A) $\frac{y^5}{x^6}$

B) $\frac{1}{x^6y^5}$

C) $\frac{x^8}{y^6}$

D) $\frac{y^6}{x^8}$

E) $\frac{1}{x^8y^6}$

Ans: E

25. Compute and simplify so that only positive exponents remain.

$$\left(\frac{x^{-2}}{y}\right)^{-3}$$

A) x^6y^3

B) x^3y^6

C) $\frac{x^6}{y^3}$

D) $\frac{y^3}{x^6}$

E) $\frac{x^6}{y}$

Ans: A

26. Compute and simplify so that only positive exponents remain.

$$\left(\frac{2x^{-2}y^{-40}}{2^{-2}x^4y^{-20}} \right)^{-2}$$

A) $\frac{x^2y^{-60}}{16}$

B) $\frac{x^2y^{40}}{64}$

C) $\frac{x^{12}y^{40}}{64}$

D) $\frac{x^{12}y^{40}}{16}$

E) $\frac{x^2y^{-60}}{64}$

Ans: C

27. Compute and simplify so that only positive exponents remain.

$$\frac{2^{-1}x^{-3}}{(2x)^2}$$

A) $8x$

B) $4x$

C) $\frac{1}{8x}$

D) $\frac{1}{8x^5}$

E) $\frac{1}{4x}$

Ans: D

28. Compute and simplify so that only positive exponents remain.

$$\frac{3^{-1}x^{-2}}{3x^2}$$

A) 1

B) $\frac{1}{9x^4}$

C) $\frac{1}{x^4}$

D) $\frac{1}{9}$

E) $\frac{9}{x^4}$

Ans: B

29. Compute and simplify so that only positive exponents remain.

$$\frac{(5x^{-2})^{-1}}{(5x)^{-2}}$$

- A) $\frac{1}{5x^4}$
 B) $25x^4$
 C) $5x^2$
 D) $5x^4$
 E) $\frac{1}{25x^4}$

Ans: D

30. In many applications, it is often necessary to write expressions in the form cx^n , where c is a constant and n is an integer. Write the expression below in this form.

$$\frac{1}{x^6}$$

- A) x^{-5}
 B) $\frac{1}{6}x^6$
 C) x^{-6}
 D) $\frac{1}{6}x^{-6}$
 E) x^{-7}

Ans: C

31. In many applications, it is often necessary to write expressions in the form cx^n , where c is a constant and n is an integer. Write the expression below in this form.

$$(4x)^3$$

- A) $256x^4$
 B) $64x^3$
 C) $4x^3$
 D) $64x^4$
 E) $256x^3$

Ans: B

32. In many applications, it is often necessary to write expressions in the form cx^n , where c is a constant and n is an integer. Write the expression below in this form.

$$\frac{7}{5x^5}$$

- A) $\frac{5}{7}x^{-5}$
 B) $\frac{7}{5}x^{-6}$
 C) $\frac{7}{5}x^5$
 D) $\frac{5}{7}x^{-6}$
 E) $\frac{7}{5}x^{-5}$

Ans: E

33. In many applications, it is often necessary to write expressions in the form cx^n , where c is a constant and n is an integer. Write the expression below in this form.

$$\left(\frac{-x}{2}\right)^2$$

- A) $4x^2$
 B) $\frac{1}{4}x^2$
 C) $\frac{-1}{4}x^2$
 D) $\frac{-1}{2}x^2$
 E) $-4x^2$

Ans: B

34. Use a calculator to approximate the indicated power. Round your answer to three decimal places.

$$(-3.8)^3$$

- A) -54.872
 B) 54.872
 C) 14.440
 D) 208.514
 E) -14.440

Ans: A

35. Use a calculator to approximate the indicated power. Round your answer to maximum decimal places.

$$(-0.55)^{-6}$$

- A) 0.027681
- B) -65.684239
- C) 36.12633
- D) -36.126332
- E) -0.027681

Ans: C

36. If \$ P is invested for n years at rate i (as a decimal), compounded annually, the future value that accrues is given by $S = P(1+i)^n$, and the interest earned is $I = S - P$. Find S for the given P , n , and i . Round your answer to two decimal places.

\$2400 for 9 years at 10%

- A) \$5659.07
- B) \$3259.07
- C) \$5144.61
- D) \$929.81
- E) \$6224.98

Ans: A

37. If \$ P is invested for n years at rate i (as a decimal), compounded annually, the future value that accrues is given by $S = P(1+i)^n$, and the interest earned is $I = S - P$. Find I for the given P , n , and i . Round your answer to two decimal places.

\$1800 for 5 years at 10%.

- A) \$2898.92
- B) \$835.38
- C) \$1062.88
- D) \$1098.92
- E) \$4698.92

Ans: D

38. If \$ P is invested for n years at rate i (as a decimal), compounded annually, the future value that accrues is given by $S = P(1+i)^n$, and the interest earned is $I = S - P$. Find S for the given P , n , and i . Round your answer to two decimal places.

\$750 for 15 years at 10.25%

- A) \$2491.46
- B) \$3573.71
- C) \$2940.10
- D) \$3991.46
- E) \$3241.46

Ans: E

39. If $\$P$ is invested for n years at rate i (as a decimal), compounded annually, the future value that accrues is given by $S = P(1+i)^n$, and the interest earned is $I = S - P$. Find I for the given P , n , and i . Round your answer to two decimal places.

$\$800$ for 16 years at 9.75%

- A) $\$3544.56$
- B) $\$2744.56$
- C) $\$3090.16$
- D) $\$4344.56$
- E) $\$2429.67$

Ans: B

40. If an investment has a goal (future value) of $\$S$ after n years, invested at interest rate i (as a decimal), compounded annually, then the present value P that must be invested is given by $P = S(1+i)^{-n}$. Find P for the given S , n , and i . Round your answer to two decimal places.

$\$24,000$ after 10 years at 7.75%

- A) $\$10,712.11$
- B) $\$13,287.89$
- C) $\$11,377.28$
- D) $\$13,209.09$
- E) $\$12,622.72$

Ans: C

41. If an investment has a goal (future value) of $\$S$ after n years, invested at interest rate i (as a decimal), compounded annually, then the present value P that must be invested is given by $P = S(1+i)^{-n}$. Find P for the given S , n , and i .

$\$80,000$ after 20 years at 12.5%

- A) $\$7586.47$
- B) $\$2750.62$
- C) $\$8534.77$
- D) $\$9601.62$
- E) $\$5536.70$

Ans: A

42. Suppose the number of endangered species y can be approximated by the formula

$$y = \frac{1883}{1 + 7.692(1.127)^{-t}}$$

where t is the number of years past 1980. How many species

does the formula estimate will be added to the endangered species list between 2007 and 2020? Round your answer to the nearest whole number.

- A) 331 species.
- B) 326 species.
- C) 343 species.
- D) 338 species.
- E) 317 species.

Ans: B

43. Assume that the national health care expenditure H (in billions of dollars) can be modeled (that is, accurately approximated) by the formula $H = 27.38(1.098)^t$ where t is the number of years past 1960. Approximate the national health expenditure in 1972. Round your answer to the nearest tenth of a billion.

- A) \$92.3 billion
- B) \$76.6 billion
- C) \$84.1 billion
- D) \$83.6 billion
- E) \$91.8 billion

Ans: C

44. Evaluate the following expression if it represents a real number.

$$\sqrt[5]{-32^3}$$

- A) 8
- B) 4
- C) -8
- D) -4
- E) not a real number

Ans: C

45. Evaluate the following expression if it represents a real number.

$$\sqrt[4]{-27^5}$$

- A) 61.546691
- B) 14348907
- C) -531441
- D) -61.546691
- E) not a real number

Ans: E

46. Evaluate the following expression if it represents a real number.

$$8^{4/3}$$

- A) 8
- B) 16
- C) 2
- D) 1.260
- E) 2.520

Ans: B

47. Evaluate the following expression if it represents a real number.

$$(-81)^{-3/2}$$

- A) 0.001372
- B) 729
- C) -0.001372
- D) 6561
- E) not a real number

Ans: E

48. Evaluate the following expression if it represents a real number.

$$-27^{-1/3}$$

- A) -3
- B) 9
- C) $-\frac{1}{3}$
- D) 3
- E) $\frac{1}{3}$

Ans: C

49. Evaluate the following expression if it represents a real number.

$$243^{4/5}$$

- A) 243
- B) 2.40822
- C) 3486784401
- D) 81
- E) 3.94822

Ans: D

50. Evaluate the following expression if it represents a real number.

$$\left(\frac{8}{27}\right)^{-2/3}$$

A) $\frac{9}{4}$

B) $\frac{4}{9}$

C) $\frac{27}{8}$

D) $\frac{8}{27}$

E) not a real number

Ans: A

51. Evaluate the following expression if it represents a real number.

$$\left(\frac{27}{8}\right)^{2/3}$$

A) $\frac{4}{9}$

B) $\frac{9}{4}$

C) $\frac{4}{27}$

D) $\frac{27}{9}$

E) $\frac{27}{4}$

Ans: B

52. Evaluate the following expression if it represents a real number.

$$9^{-3/2}$$

A) 9

B) 27

C) $\frac{1}{27}$

D) $\frac{1}{9}$

E) $\frac{1}{3}$

Ans: C

53. Evaluate the following expression if it represents a real number.

$$-27^{2/3}$$

- A) -9
- B) -27
- C) $\frac{1}{9}$
- D) $\frac{1}{27}$
- E) not a real number

Ans: A

54. Rewrite the radical with a fractional exponent.

$$\sqrt[4]{(5.37)^3}$$

- A) $(5.37)^{4/3}$
- B) $(5.37)^{7/4}$
- C) $(5.37)^{5/3}$
- D) $(5.37)^{3/4}$
- E) $(5.37)^{3/7}$

Ans: D

55. Rewrite the radical with a fractional exponent.

$$\sqrt[14]{4.96}$$

- A) $(4.96)^{1/15}$
- B) $(4.96)^{14}$
- C) $(4.96)^{1/13}$
- D) $(4.96)^{1/14}$
- E) $(4.96)^{1/12}$

Ans: D

56. Replace the radical with a fractional exponent. Do not simplify.

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

- A) $x^{4/3}$
- B) $x^{3/4}$
- C) $x^{-4/3}$
- D) x^7
- E) $x^{1/3}$

Ans: A

57. Replace the radical with a fractional exponent. Do not simplify.

$$\sqrt[5]{x^4}$$

- A) $x^{-4/5}$
- B) $x^{5/4}$
- C) $x^{4/5}$
- D) $x^{1/4}$
- E) x^{-9}

Ans: C

58. Write the expression in radical form. Do not simplify.

$$x^{7/3}$$

- A) $\sqrt[3]{x^{-7}}$
- B) $\sqrt[7]{x^3}$
- C) $\sqrt[3]{x^3}$
- D) $\sqrt[3]{x^7}$
- E) $\sqrt{x^3}$

Ans: D

59. Write the expression in radical form. Do not simplify.

$$y^{6/5}$$

- A) $\sqrt[5]{y^6}$
- B) $\sqrt[5]{y^5}$
- C) $\sqrt[5]{y^6}$
- D) $\sqrt[5]{y^{-6}}$
- E) $\sqrt[6]{y^5}$

Ans: A

60. Write the expression in radical form. Do not simplify.

$$-x^{-7/4}$$

- A) $-\sqrt[4]{x^7}$
- B) $\frac{-\sqrt[4]{x}}{x^7}$
- C) $\frac{x^7}{\sqrt[4]{x}}$
- D) $\frac{1}{\sqrt[7]{x^4}}$
- E) $\frac{-1}{\sqrt[4]{x^7}}$

Ans: E

61. Use the properties of exponents to simplify the expression so that only positive exponents remain.

$$x^{2/5} \cdot x^{1/7}$$

- A) $x^{5/7}$
 B) $x^{19/35}$
 C) $x^{19/7}$
 D) $x^{2/35}$
 E) $x^{12/35}$

Ans: B

62. Use the properties of exponents to simplify the expression so that only positive exponents remain.

$$x^{-2/7} \cdot x^2$$

- A) $x^{4/7}$
 B) $x^{16/7}$
 C) $x^{12/7}$
 D) x^{-2}
 E) $x^{-4/7}$

Ans: C

63. Use the properties of exponents to simplify the expression so that only positive exponents remain.

$$z^{-4} \cdot z^{3/5}$$

- A) $\frac{1}{z^{17/5}}$
 B) $\frac{1}{z^{17}}$
 C) $z^{5/17}$
 D) $z^{17/5}$
 E) $z^{7/5}$

Ans: A

64. Use the properties of exponents to simplify the expression so that only positive exponents remain.

$$\frac{x^{-1/5}}{x^{-6/5}}$$

- A) $x^{6/5}$
 B) $x^{1/5}$
 C) $x^{7/5}$
 D) $x^{1/6}$
 E) x

Ans: E

65. Use the properties of exponents to simplify the expression so that only positive exponents remain.

$$\frac{x^{3/7}}{x^{1/10}}$$

- A) $x^{3/70}$
- B) $x^{3/17}$
- C) $x^{23/70}$
- D) $x^{4/17}$
- E) $x^{3/10}$

Ans: C

66. Use the properties of exponents to simplify the expression so that only positive exponents remain.

$$(x^{3/5})^4$$

- A) $x^{5/12}$
- B) $x^{7/5}$
- C) $x^{5/7}$
- D) $x^{12/5}$
- E) $x^{3/5}$

Ans: D

67. Use the properties of exponents to simplify the expression so that only positive exponents remain.

$$(x^{-5/4})^{-2/5}$$

- A) $x^{7/9}$
- B) $x^{7/20}$
- C) $x^{10/9}$
- D) $x^{3/20}$
- E) $x^{1/2}$

Ans: E

68. Simplify the expression by using the properties of radicals. Assume nonnegative variables.

$$\sqrt[3]{-8x^6y^6}$$

- A) $2x^2y^2$
- B) $-2x^6y^2$
- C) $2x^2y^6$
- D) $-2x^2y^6$
- E) $-2x^2y^2$

Ans: E

69. Simplify the expression by using the properties of radicals. Assume nonnegative variables.

$$\sqrt[3]{54x^{14}z^{11}}$$

- A) $3x^5z^3\sqrt[3]{2x^2z^2}$
- B) $3x^4z^3\sqrt[3]{2xz^2}$
- C) $3x^4z^3\sqrt[3]{2xz}$
- D) $3x^4z^3\sqrt[3]{2x^2z^2}$
- E) $3x^4z^4\sqrt[3]{2x^2z}$

Ans: D

70. Simplify the expression by using the properties of radicals. Assume nonnegative variables.

$$\sqrt{125x^7y}$$

- A) $5x^6\sqrt{10xy}$
- B) $5x^3\sqrt{5xy}$
- C) $5x^6\sqrt{5xy}$
- D) $5x^6\sqrt{5y}$
- E) $10x^3\sqrt{5xy}$

Ans: B

71. Perform the indicated operations and simplify.

$$\sqrt{12x^3y} \cdot \sqrt{3x^2y}$$

- A) $4x^3\sqrt{x}$
- B) $6x^2y\sqrt{x}$
- C) $6x^2\sqrt{x}$
- D) $4x^2\sqrt{x}$
- E) $6x^2$

Ans: B

72. Perform the indicated operations and simplify.

$$\sqrt[3]{18x^2y} \cdot \sqrt[3]{3x^2y}$$

- A) $3y\sqrt[3]{2x}$
- B) $3\sqrt[3]{2x^2y}$
- C) $3y\sqrt[3]{2x^2}$
- D) $3x\sqrt[3]{2xy^2}$
- E) $3x\sqrt[3]{2x^2y^2}$

Ans: D

73. Perform the indicated operations and simplify.

$$\sqrt{10xz^{10}} \cdot \sqrt{30x^{11}z}$$

- A) $3x^5z^6\sqrt{3x}$
- B) $10x^6z^5\sqrt{3z}$
- C) $3x^6z^5\sqrt{3z}$
- D) $10x^5z^6\sqrt{3x}$
- E) $10x^5z^5\sqrt{3xz}$

Ans: B

74. Perform the indicated operations and simplify.

$$\frac{\sqrt{12x^{13}y^{14}}}{\sqrt{27xy^2}}$$

- A) $\frac{2x^6y^6}{3}$
- B) $\frac{4x^6y^{10}}{3}$
- C) $\frac{2x^{10}y^{10}}{3}$
- D) $\frac{2x^6y^6}{9}$
- E) $\frac{2x^6y^{10}}{3}$

Ans: A

75. Perform the indicated operations and simplify.

$$\frac{\sqrt{16xy^{13}z^4}}{\sqrt{50x^7y^2}}$$

- A) $\frac{2y^5z\sqrt{y}}{5x^3}$
- B) $\frac{2y^5z\sqrt{y}}{5x^6}$
- C) $\frac{2y^5z^2\sqrt{2y}}{5x^3}$
- D) $\frac{2y^3z^2\sqrt{2}}{5x^{10}}$
- E) $\frac{2y^3z^2\sqrt{2}}{5x^5}$

Ans: C

76. Perform the indicated operations and simplify.

$$\frac{\sqrt[3]{-14x^{12}y^6}}{\sqrt[3]{112y^4}}$$

A) $\frac{-x \sqrt[3]{y^2}}{2}$

B) $\frac{-x^4 \sqrt[3]{y^4}}{8}$

C) $\frac{-x \sqrt[3]{y^2}}{14}$

D) $\frac{-x^4 \sqrt[3]{y^4}}{14}$

E) $\frac{-x^4 \sqrt[3]{y^2}}{2}$

Ans: E

77. Use the properties of exponents to determine the value for x that makes the equation true.

$$(B^{18})^x = B$$

A) $\frac{1}{18}$

B) -17

C) -18

D) 17

E) $1 - \frac{1}{18}$

Ans: A

78. Use the properties of exponents and radicals to determine the value for x that makes the equation true.

$$(\sqrt[5]{R})^x = R$$

A) $\frac{1}{5}$

B) 5

C) $\frac{-1}{5}$

D) -5

E) 4

Ans: B

79. Use the properties of exponents and radicals to determine the value for x that makes the equation true.

$$(\sqrt{T^7})^x = T$$

- A) $\frac{1}{7}$
- B) 7
- C) $\frac{2}{7}$
- D) 14
- E) $\frac{7}{2}$

Ans: C

80. Rationalize the denominator and then simplify.

$$\frac{\sqrt{3}}{8}$$

- A) $\frac{\sqrt{6}}{4}$
- B) $\frac{\sqrt{3}}{2}$
- C) $\frac{\sqrt{3}}{4}$
- D) $\frac{3}{2}$
- E) $\frac{\sqrt{6}}{2}$

Ans: A

81. Rationalize the denominator and then simplify.

$$\frac{7x^5w}{\sqrt{9xw^2}}$$

- A) $\frac{7x^4w\sqrt{x}}{3}$
- B) $\frac{7x^4\sqrt{x}}{9}$
- C) $\frac{7x^4\sqrt{x}}{3}$
- D) $\frac{7x^4}{3}$
- E) $\frac{7x^5w\sqrt{x}}{9}$

Ans: C

82. Rationalize the denominator and then simplify.

$$\frac{\sqrt[3]{m^6 x^3}}{\sqrt[3]{m^5 x^7}}$$

A) $\frac{\sqrt[3]{m^5 x^2}}{x^2}$

B) $\frac{\sqrt[3]{mx^2}}{mx^2}$

C) $\frac{\sqrt[3]{mx^2}}{x}$

D) $\frac{\sqrt[3]{mx^2}}{x^2}$

E) $\frac{\sqrt[3]{m^5 x^2}}{x}$

Ans: D

83. Rationalize the denominator and then simplify.

$$\frac{\sqrt[4]{mx^3}}{\sqrt[4]{y^6 z^9}}$$

A) $\frac{\sqrt[4]{mx^3 y^3 z^2}}{y^2 z^3}$

B) $\frac{\sqrt[4]{mx^3 z^3}}{y^2 z^3}$

C) $\frac{\sqrt[4]{mx^3 y^2 z^3}}{y^3 z^4}$

D) $\frac{\sqrt[4]{my^2 z^3}}{y^3 z^4}$

E) $\frac{\sqrt[4]{mx^3 y^2 z^3}}{y^2 z^3}$

Ans: E

84. In calculus, it is frequently important to write an expression in the form cx^n , where c is a constant and n is a rational number. Write the expression in this form.

$$\frac{-5}{7\sqrt[4]{x^5}}$$

- A) $-\frac{5}{7}x^{-9/5}$
 B) $-\frac{7}{5}x^{-1/5}$
 C) $-\frac{5}{7}x^{-5/4}$
 D) $-\frac{5}{7}x^{-4/5}$
 E) $-\frac{7}{5}x^{4/5}$

Ans: C

85. In calculus, it is frequently important to write an expression in the form cx^n , where c is a constant and n is a rational number. Write the expression in this form.

$$\sqrt{x} \cdot \sqrt[3]{x}$$

- A) $x^{5/6}$
 B) $x^{1/5}$
 C) x^{-6}
 D) x^{-5}
 E) $x^{6/5}$

Ans: A

86. In calculus problems, the answers are frequently expected to be in a simple form with a radical instead of an exponent. Write the expression with radicals.

$$\frac{3}{5}x^{1/7}$$

- A) $\frac{3}{5}\sqrt{x^7}$
 B) $\frac{3}{5\sqrt[7]{x}}$
 C) $\frac{3}{5}\sqrt[7]{x}$
 D) $\frac{3}{5}\sqrt[7]{x}$
 E) $\frac{5}{3}\sqrt[7]{x}$

Ans: C

87. In calculus problems, the answers are frequently expected to be in a simple form with a radical instead of an exponent. Write the expression with radicals.

$$-\frac{2}{5}x^{-5/2}$$

A) $-\frac{2}{5\sqrt{x^5}}$

B) $-\frac{2}{5^5\sqrt{x^2}}$

C) $\frac{2\sqrt{x}}{5x^5}$

D) $\frac{2}{5}\sqrt{x^5}$

E) $\frac{2}{5}\sqrt[5]{x^2}$

Ans: A

88. The Richter scale reading for an earthquake measures its intensity (as a multiple of some minimum intensity used for comparison). The intensity I corresponding to a Richter scale reading R is given by $I = 10^R$. A quake measuring 8.5 on the Richter scale would be severe. Express the intensity of such a quake in exponential and radical form.

A) $\sqrt{17^{10}}$

B) $\sqrt{10^{17}}$

C) $\sqrt{10^{8.5}}$

D) $\sqrt{8.5^{10}}$

E) $\sqrt[10]{10^{17}}$

Ans: B

89. The Richter scale reading for an earthquake measures its intensity (as a multiple of some minimum intensity used for comparison). The intensity I corresponding to a Richter scale reading R is given by $I = 10^R$. Find the intensity of a quake measuring 6.5 rounded to the nearest integer.

A) 3,162,278

B) 134,627,433

C) 1,778

D) 11,603

E) 42

Ans: A

90. The Richter scale reading for an earthquake measures its intensity (as a multiple of some minimum intensity used for comparison). The intensity I corresponding to a Richter scale reading R is given by $I = 10^R$. An earthquake occurred near San Francisco in 1923 that measured 7.3; another earthquake occurred in 1947 that measured 8.5. Calculate the ratio of these intensities (larger to smaller). Round your answer to six decimal places.

A) 0.063096
B) 1.164384
C) 14.601032
D) 15.848932
E) 0.010135

Ans: D

91. The intensity of sound I (as a multiple of the average minimum threshold of hearing intensity) is related to the decibel level D (or loudness of sound) according to $I = 10^{D/10}$. Express $10^{D/10}$ using radical notation when $D = 64$.

A) $\sqrt[10]{10^{64}}$
B) $\sqrt[64]{10^{10}}$
C) $\sqrt[10]{64^{74}}$
D) $\sqrt[64]{10^{74}}$
E) $\sqrt[64]{64^{10}}$

Ans: A

92. The intensity of sound I (as a multiple of the average minimum threshold of hearing intensity) is related to the decibel level D (or loudness of sound) according to $I = 10^{D/10}$. The background noise level of a relatively quiet room has a decibel reading of 34. Find the intensity I of this noise level. Round your answer to three decimal places.

A) 206,437.775
B) 1.968
C) 2511.886
D) 2.821
E) 64.125

Ans: C

93. The intensity of sound I (as a multiple of the average minimum threshold of hearing intensity) is related to the decibel level D (or loudness of sound) according to $I = 10^{D/10}$. A decibel reading of 140 is at the threshold of pain. If I_2 is the intensity of this threshold and I_1 is the intensity when $D = 99$, express the ratio I_2 / I_1 as a power of 10.

- A) 10^{41}
- B) $10^{239/10}$
- C) $10^{51/10}$
- D) $10^{41/10}$
- E) 10^{239}

Ans: D

94. Use the fact that the quantity of a radioactive substance after t years is given by $q = q_0(2^{-t/k})$, where q_0 is the original amount of radioactive material and k is its half-life (the number of years it takes for half the radioactive substance to decay).

The half-life of strontium-90 is 25 years. Find the amount of strontium-90 remaining after 9 years if $q_0 = 93$ kg. Round your answer to one decimal place.

- A) 13.6 kg
- B) 72.5 kg
- C) 7.5 kg
- D) 119.4 kg
- E) 0.2 kg

Ans: B

95. Use the fact that the quantity of a radioactive substance after t years is given by $q = q_0(2^{-t/k})$, where q_0 is the original amount of radioactive material and k is its half-life (the number of years it takes for half the radioactive substance to decay).

The half-life of carbon-14 is 5600 years. Find the amount of carbon-14 remaining after 11,500 years if $q_0 = 41.0$ g. Round your answer to four decimal places if required.

- A) 29.2547 g
- B) 57.4609 g
- C) 0.0001 g
- D) 9.8764 g
- E) 20.5 g

Ans: D

96. Suppose it has been determined that the sales at Ewing Gallery decline after the end of an advertising campaign, with daily sales given by $S = 2100(2^{-0.2x})$, where S is in dollars and x is the number of days after the campaign ends. What are the daily sales 5 days after the end of the campaign?

- A) \$2090.00
- B) \$65.62
- C) \$1050.00
- D) \$525.00
- E) \$262.50

Ans: C