Extra Practice

Chapter 7

Lessons 7-1 to 7-5

Simplify each expression. Use only positive exponents.

1. $(2t)^{-6}$ $\frac{1}{64t^6}$

2. $5m^5m^{-8}$ $\frac{5}{m^3}$

3. $(4.5)^4(4.5)^{-2}$ $(4.5)^2$

4. $(m^7t^{-5})^2$ $\frac{m^{14}}{t^{10}}$

5. $(x^2n^4)(n^{-8})$ $\frac{x^2}{n^4}$

6. $(w^{-2}j^{-4})^{-3}(j^7j^3)$ w^6j^{22}

7. $(t^6)^3(m)^2$ $t^{18}m^2$

8. $(3n^4)^2$ $9n^8$

9. $\frac{r^5}{g^{-3}}$ r^5g^3

10. $\frac{1}{a^{-4}}$ a^4

11. $\frac{w^7}{w^{-6}}$ w^{13}

12. $\frac{6}{t^{-4}}$ $6t^4$

13. $\frac{a^2b^{-7}c^4}{a^5b^3c^{-2}}$ $\frac{c^6}{a^3b^{10}}$

14. $\frac{(2t^5)^3}{4t^8t^{-1}}$ $2t^8$

15. $\left(\frac{a^6}{a^7}\right)^{-3}$ a^3

16. $\left(\frac{c^5c^{-3}}{c^{-4}}\right)^{-2}$ $\frac{1}{c^{12}}$

17. $\left(\frac{4x^3}{8x^{-2}}\right)^0$ 1

18. $\left(\frac{y^{-3}}{y^3}\right)^2$ $\frac{1}{y^{12}}$

Evaluate each expression for $m = 2$, $t = -3$, $w = 4$, and $z = 0$.

19. t^m 9

20. t^{-m} $\frac{1}{9}$

21. $(w \cdot t)^m$ 144

22. $w^m \cdot t^m$ 144

23. $(w^z)^m$ 1

24. w^mw^z 16

25. $z^{-t}(m^t)^z$ 0

26. $w^{-t}t^t$ $-\frac{64}{27}$

27. $\left(\frac{t^w}{m^t}\right)^z$ 1

Write each number in scientific notation.

28. 34,000,000 3.4×10^7

29. 0.00063 6.3×10^{-4}

30. 1500 1.5×10^3

31. 0.0002 2×10^{-4}

32. 360,000 3.6×10^5

33. 6,200,000,000 6.2×10^9

34. 0.05 5×10^{-2}

35. 0.000000000891 8.91×10^{-10}

36. 75,000,000,000 7.5×10^{10}

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Write each number in standard notation.

37. 8.05×10^6 **8,050,000**

38. 3.2×10^{-7} **0.00000032**

39. 9.0×10^8 **900,000,000**

40. 4.25×10^{-4} **0.000425**

41. 2.35×10^2 **235**

42. 6.3×10^4 **63,000**

43. 2.001×10^{-5} **0.00002001**

44. 5.2956×10^3 **5295.6**

45. 8.345×10^{-3} **0.008345**

46. Suppose an investment doubles in value every 5 years. This year the investment is worth $12,480. How much will it be worth 10 years from now? How much was it worth 5 years ago? **$49,920; $6240**

Write each number in scientific notation.

47. A bacteria culture has a population of approximately 7,500,000,000. **7.5×10^9**

48. The diameter of a blood cell is about 0.0000082 m. **8.2×10^{-6} m**

Write each answer in scientific notation.

49. A light-year is the distance light travels in one year. If the speed of light is about 3×10^5 km/s, how long is a light-year in kilometers? (Use 365 days for the length of a year). **about 9.5×10^{12} km**

50. The radius of Earth is approximately 6.4×10^6 m. Use the formula $V = \frac{4}{3}\pi r^3$ to find the volume of Earth. **about 1.1×10^{21} m³**

51. A spherical cell has a radius of 2.75×10^{-6} m. Use the formula for the surface area of a sphere $S.A. = 4\pi r^2$ to find the surface area of a cell. **about 9.5×10^{-11} m²**

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52. What is the volume of a cube with a side length of $\frac{4}{5}$ m? **$\frac{64}{125}$ m³**

53. The speed of sound is approximately 1.2×10^3 km/h. How long does it take
for sound to travel 7.2×10^2 km? Write your answer in minutes. **36 min**

Lesson 7-6

**Evaluate each function over the domain $\{-1, 0, 1, 2\}$. As the values of the
domain increase, do the values of the function *increase* or *decrease*?**

54. $y = 3^x$

$\left\{\frac{1}{3}, 1, 3, 9\right\}$; **increase**

55. $y = \left(\frac{3}{4}\right)^x$

$\left\{\frac{4}{3}, 1, \frac{3}{4}, \frac{9}{16}\right\}$; **decrease**

56. $y = 1.5^x$

$\left\{\frac{2}{3}, 1, \frac{3}{2}, \frac{9}{4}\right\}$; **increase**

57. $y = \left(\frac{1}{2}\right) \cdot 3^x$

$\left\{\frac{1}{6}, \frac{1}{2}, \frac{3}{2}, \frac{9}{2}\right\}$; **increase**

58. $y = -3 \cdot 7^x$

$\left\{-\frac{3}{7}, -3, -21, -147\right\}$; **decrease**

59. $y = -(4)^x$

$\left\{-\frac{1}{4}, -1, -4, -16\right\}$; **decrease**

60. $y = 3 \cdot \left(\frac{1}{5}\right)^x$

$\left\{15, 3, \frac{3}{5}, \frac{3}{25}\right\}$; **decrease**

61. $y = 2^x$

$\left\{\frac{1}{2}, 1, 2, 4\right\}$; **increase**

62. $y = 2 \cdot 3^x$

$\left\{\frac{2}{3}, 2, 6, 18\right\}$; **increase**

63. $y = (0.8)^x$

$\left\{\frac{5}{4}, 1, \frac{4}{5}, \frac{16}{25}\right\}$; **decrease**

64. $y = 2.5^x$

$\left\{\frac{2}{5}, 1, \frac{5}{2}, \frac{25}{4}\right\}$; **increase**

65. $y = -4 \cdot (0.2)^x$

$\left\{-20, -4, -\frac{4}{5}, -\frac{4}{25}\right\}$; **increase**

Write and solve an exponential equation to answer each question.

66. Suppose an investment of \$5,000 doubles every 12 years. How much is the
investment worth after 36 years? After 48 years? **$f(x) = 5000 \cdot 2^x$; \$40,000; \$80,000**

67. Suppose 15 animals are taken to an island, and then their population triples
every 8 months. How many animals will there be in 4 years? **$f(x) = 15 \cdot 3^x$; 10,935 animals**

68. The population of a city this year is 34,500. The population is expected to grow
by 3% each year. What will be the population of the city in 12 years? **about 49,189**

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Lesson 7-7

Identify each function as *exponential growth* or *exponential decay*. Then identify the growth factor or decay factor.

69. $y = 8^x$
exponential growth; growth factor = 8

70. $y = \frac{3}{4} \cdot 2^x$
exponential growth; growth factor = 2

71. $y = 9 \cdot \left(\frac{1}{2}\right)^x$
exponential decay; decay factor = $\frac{1}{2}$

72. $y = 4 \cdot 9^x$
exponential growth; growth factor = 9

73. $y = 0.65^x$
exponential decay; decay factor = 0.65

74. $y = 3 \cdot 1.5^x$
exponential growth; growth factor = 1.5

75. $y = \frac{2}{5} \cdot \left(\frac{1}{4}\right)^x$
exponential decay; decay factor = $\frac{1}{4}$

76. $y = 0.1 \cdot 0.9^x$
exponential decay; decay factor = 0.9

77. $y = 0.7 \cdot 3.3^x$
exponential growth; growth factor = 3.3

Write an exponential function to model each situation. Find each amount after the specified time.

78. $200 principal, 4% compounded annually for 5 years   **$y = 200(1.04)^x$; $243.33**

79. $1000 principal, 3.6% compounded monthly for 10 years   **$y = 1000(1.003)^x$; $1432.56**

80. $3000 investment, 8% loss each year for 3 years   **$y = 3000(0.92)^x$; $2336.06**

Find the balance in each account.

81. You deposit $2500 in a savings account with 3% interest compounded annually. What is the balance in the account after 6 years? **$2985.13**

82. You deposit $750 in an account with 7% interest compounded semiannually. What is the balance in the account after 4 years? **$987.61**

83. You deposit $520 in an account with 4% interest compounded monthly. What is the balance in the account after 5 years? **$634.92**