Name _____ Class _____ Date _____

Extra Practice

Chapter 7

Lessons 7-1 to 7-4

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
28. Suppose an investment doubles in value every 5 years. This is 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**
29. What is the volume of a cube with a side length of $\frac{4}{5}$ m? $\frac{64}{125}$ m^3

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Extra Practice (continued)

Chapter 7

30. 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

31. 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} m^3

32. 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} m^2

33. 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

Lessons 7-5

Find the value of each expression.

34. $\sqrt[2]{64}$ 8

35. $\sqrt[3]{343}$ 7

36. $\sqrt[4]{16}$ 2

37. $\sqrt[3]{125}$ 5

38. $\sqrt[4]{256}$ 4

39. $\sqrt[2]{144}$ 12

Write each expression in radical form.

40. $b^{\frac{3}{4}}$ $\sqrt[4]{b^3}$

41. $16a^{\frac{2}{3}}$ $16\sqrt[3]{a^2}$

42. $(4c)^{\frac{1}{2}}$ $2\sqrt{c}$

43. $y^{\frac{1}{4}}$ $4\sqrt{y}$

44. $(32b)^{\frac{2}{3}}$ $8\sqrt[3]{2b^2}$

45. $12a^{\frac{3}{4}}$ $12\sqrt[4]{a^3}$

Write each expression in exponential form.

46. $\sqrt[4]{n^3}$ $n^{\frac{3}{4}}$

47. $\sqrt[3]{27m^2}$ $3m^{\frac{2}{3}}$

48. $\sqrt{81z}$ $9z^{\frac{1}{2}}$

49. $\sqrt[3]{128y^2}$ $4 \cdot 2^{\frac{1}{3}} \cdot y^{\frac{2}{3}}$

50. $\sqrt{(5b)^4}$ $25b^2$

51. $\sqrt[4]{(16x)^2}$ $4x^{\frac{1}{2}}$

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Extra Practice (continued)

Chapter 7

Lessons 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*?

52. $y = 3^x$
$\left\{\frac{1}{3}, 1, 3, 9\right\}$; increase

53. $y = \left(\frac{3}{4}\right)^x$
$\left\{\frac{4}{3}, 1, \frac{3}{4}, \frac{9}{16}\right\}$; decrease

54. $y = 1.5^x$
$\left\{\frac{2}{3}, 1, \frac{3}{2}, \frac{9}{4}\right\}$; increase

55. $y = \left(\frac{1}{2}\right) \cdot 3^x$
$\left\{\frac{1}{6}, \frac{1}{2}, \frac{3}{2}, \frac{9}{2}\right\}$; increase

56. $y = -3 \cdot 7^x$
$\left\{-\frac{3}{7}, -3, -21, -147\right\}$; decrease

57. $y = -(4)^x$
$\left\{-\frac{1}{4}, -1, -4, -16\right\}$; decrease

58. $y = 3 \cdot \left(\frac{1}{5}\right)^x$
$\left\{15, 3, \frac{3}{5}, \frac{3}{25}\right\}$; decrease

59. $y = 2^x$
$\left\{\frac{1}{2}, 1, 2, 4\right\}$; increase

60. $y = 2 \cdot 3^x$
$\left\{\frac{2}{3}, 2, 6, 18\right\}$; increase

61. $y = (0.8)^x$
$\left\{\frac{5}{4}, 1, \frac{4}{5}, \frac{16}{25}\right\}$; decrease

62. $y = 2.5^x$
$\left\{\frac{2}{5}, 1, \frac{5}{2}, \frac{25}{4}\right\}$; increase

63. $y = -4 \cdot (0.2)^x$
$\left\{-20, -4, -\frac{4}{5}, -\frac{4}{25}\right\}$; increase

Write and solve an exponential equation to answer each question.

64. 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

65. 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

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

Lessons 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*?

67. $y = 8x$
exponential growth; growth factor = 8

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

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

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

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

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

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

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

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

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Extra Practice (continued)

Chapter 7

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

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

77. \$1000 principal, 3.6% compounded monthly for 10 years $y = 1000(1.003)^x$; \$1432.56

78. \$3000 investment, 8% loss each year for 3 years $y = 3000(0.92)^x$; \$2336.06

Find the balance in each account.

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

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

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

Lessons 7-8

Determine whether the sequence is a geometric sequence. Explain.

82. 2, 10, 50, 250, ...
There is a common ratio, $r = 5$. So, the sequence is geometric.

83. 7, 15, 23, 31, ...
There is no common ratio. So, the sequence is not geometric.

84. 3, 12, 48, 192, ...
There is a common ratio, $r = 4$. So, the sequence is geometric.

85. $-1, 7, -49, 343, \ldots$
There is a common ratio, $r = -7$. So, the sequence is geometric.

86. 48, 24, 12, 6, ...
There is a common ratio, $r = \frac{1}{2}$. So, the sequence is geometric.

87. 17, 15, 13, 11, ...
There is no common ratio. So, the sequence is not geometric.

Write the explicit formula for each geometric sequence.

88. 2, 6, 18, 54, ...
$a_n = 2 \cdot 3^{n-1}$

89. $4, -16, 64, -256, \ldots$
$a_n = 4 \cdot (-4)^{n-1}$

90. 200, 100, 50, 25, ...
$a_n = 200 \cdot \left(\frac{1}{2}\right)^{n-1}$

91. $\frac{1}{100}, \frac{1}{10}, 1, 10, \ldots$
$a_n = \frac{1}{100} \cdot 10^{n-1}$

92. $-5, 5, -5, 5, \ldots$
$a_n = -5 \cdot (-1)^{n-1}$

93. $6, 2, \frac{2}{3}, \frac{2}{9}, \ldots$
$a_n = 6 \cdot \left(\frac{1}{3}\right)^{n-1}$

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