Name _Key_   Class _____ Date _____

Review

Chapter 7

Lessons 7-1 to 7-5

Simplify each expression. Use only positive exponents.

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

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

3. $(4.5)^4 (4.5)^{-2}$ 4.5^2 or 20.25

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

19. t^m $(-3)^2 = 9$

20. t^{-m} $(-3)^{-2} = \dfrac{1}{9}$

21. $(w \cdot t)^m$ $(4 \cdot -3)^2 = 12^2$ or 144

22. $w^m \cdot t^m$ $4^2 \cdot (-3)^2 = 144$

23. $w^{-t} t^t$ $4^{-(-3)}(-3)^{(-3)} = \dfrac{4^3}{-3^3}$ or $\dfrac{64}{-27}$

24. $w^m w^z$ $4^2 \cdot 4^0 = 4^2$ or 16

Write each number in scientific notation.

25. $34{,}000{,}000$ 3.4×10^7

26. 0.00063 6.3×10^{-4}

27. 1500 1.5×10^3

28. 0.0002 2×10^{-4}

29. $360{,}000$ 3.6×10^5

30. $6{,}200{,}000{,}000$ 6.2×10^9

31. 0.05 5×10^{-2}

32. 0.000000000891 8.91×10^{-10}

33. $75{,}000{,}000{,}000$ 7.5×10^{10}

Write each number in standard notation.

34. 8.05×10^6 $8{,}050{,}000$

35. 3.2×10^{-7} $.00000032$

36. 9.0×10^8 $900{,}000{,}000$

37. 4.25×10^{-4} $.000425$

38. 2.35×10^2 235

39. 6.3×10^4 $63{,}000$

40. 2.001×10^{-5} $.00002001$

41. 5.2956×10^3 $5{,}295.6$

42. 8.345×10^{-3} $.008345$

Write each number in scientific notation.

43. A bacteria culture has a population of approximately 7,500,000,000.

7.5×10^9

44. The diameter of a blood cell is about 0.0000082 m.

8.2×10^{-6}

Write each answer in scientific notation.

45. A light-year is the distance light travels in one year. If the speed of light is about 3 × 10⁵ km/s, how long is a light-year in kilometers? (Use 365 days for the length of a year).

$(2 \times 10^3) \times (3 \times 10^2)$

6×10^5

46. The radius of Earth is approximately 6.4 × 10⁶ m. Use the formula $V = \frac{4}{3}\pi r^3$ to find the volume of Earth.

$.33 \times 10^{23}$

$(6.24 \times 10^{23}) - (3.3 \times 10^{22})$

$\begin{array}{r} 6.24 \\ -.33 \\ \hline 5.91 \end{array}$

5.91×10^{23}

47. 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.

$(3 \times 10^{-5}) \times (3 \times 10^8)$

9×10^3

48. The speed of sound is approximately 1.2 × 10³ km/h. How long does it take for sound to travel 6.2 × 10² km? Write your answer in minutes.

$(4.4 \times 10^6) + (6.6 \times 10^6)$

$\begin{array}{r} 6.6 \\ +4.4 \\ \hline 11.0 \end{array}$

11×10^6

1.1×10^7

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*?

49. $y = 3^x$

x	y
-1	1/3
0	1
1	3
2	9

50. $y = \left(\dfrac{3}{4}\right)^x$

x	y
-1	4/3
0	1
1	3/4
2	9/16

51. $y = 1.5^x$

x	y
-1	2/3
0	1
1	1.5
2	2.25

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

x	y
-1	1/6
0	.5
1	1.5
2	4.5

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

x	y
-1	-3/7
0	-3
1	-21
2	-147

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

x	y
-1	-1/4
0	-1
1	-4
2	-16

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

x	y
-1	15
0	3
1	3/5
2	3/25

56. $y = 2^x$

x	y
-1	1/2
0	1
1	2
2	4

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

x	y
-1	2/3
0	2
1	6
2	18

58. $y = (0.8)^x$

x	y
-1	1.25
0	1
1	.8
2	.64

59. $y = 2.5^x$

x	y
-1	.4
0	1
1	2.5
2	6.25

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

x	y
-1	-20
0	-4
1	-.8
2	-.16

Write and solve an exponential equation to answer each question.

61. Suppose an investment of $5,000 doubles every 12 years. How much is the investment worth after 36 years? After 48 years?

$y = \$5000 \cdot 2^3$
$\$40,000$

$y = 5000 \cdot 2^4$
$\$80,000$

62. 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?

$y = 15 \cdot 3^6$
$10,935$

63. 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?

$$y = 34{,}500 \cdot 1.03^{12}$$

(49,189) Rounded up

Lesson 7-7

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

64. $y = 8^x$

Growth
b = 8

65. $y = \dfrac{3}{4} \cdot 2^x$

Growth
b = 2

66. $y = 9 \cdot \left(\dfrac{1}{2}\right)^x$

Decay
b = ½

67. $y = 4 \cdot 9^x$

Growth
b = 9

68. $y = 0.65^x$

Decay
b = .65

69. $y = 3 \cdot 1.5^x$

Growth
b = 1.5

70. $y = \dfrac{2}{5} \cdot \left(\dfrac{1}{4}\right)^x$

Decay
b = ¼

71. $y = 0.1 \cdot 0.9^x$

Decay
b = .9

72. $y = 0.7 \cdot 3.3^x$

Growth
3.3

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

73. $200 principal, 4% compounded annually for 5 years

$$y = 200 \cdot 1.04^5 \qquad y = \$243.33$$

74. $1000 principal, 3.6% compounded monthly for 10 years

$$y = 1000 \cdot 1.036^{120} \qquad y = \$69{,}690.03$$

75. $3000 investment, 8% loss each year for 3 years

$$y = 3000 \cdot 0.92^3 \qquad y = \$2{,}336.06$$

Find the balance in each account.

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

$$y = 2500 \cdot 1.03^6 \qquad y = \$2{,}985.13$$

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

$$y = 750 \cdot 1.07^8 \qquad y = \$1{,}288.64$$

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

$$y = 520 \cdot 1.04^{60} \qquad y = \$5{,}470.21$$