Answers for Lesson 8-5 Exercises

1. 1.5850 **2.** 2.1240 **3.** 2.7320 **4.** 3.0101

5. 3 **6.** 3.4650 **7.** 0.9534 **8.** 1.330

9. 0.3579 **10.** 3.2056 **11.** 0.2720 **12.** 2.1073

13. 0.5690 **14.** 1.2871 **15.** 4.7027 **16.** 14.4894

17. 6 **18.** 4.89 **19.** 0.64 **20.** 009, 5.86

21. -0.73 **22.** 2.41

23. about 7.1 years **24.** about 2018

25. 3.1699; $\log_8 729$ **26.** 1.5; $\log_8 22.627$

27. 3.6309; $\log_8 1901.3$ **28.** 2.5643; $\log_8 206.93$

29. 3.1827; $\log_8 748.56$ **30.** 2.8074; $\log_8 343$

31. 3.8737; $\log_8 3149.6$ **32.** 0.0792; $\log_8 1.1790$

33. 0.05 **34.** $\frac{\sqrt{10}}{10}$, or ≈ 0.3162

35. 33 **36.** 10,000

37. $\frac{1}{60}$, or ≈ 0.0167 **38.** 12

39. $\sqrt{10}$, or ≈ 3.1623 **40.** $100\sqrt{10} - 1$, or ≈ 315.2

41. 2 **42.** 3×10^8

43. $100{,}000\sqrt{5}$, or $\approx 223{,}606.8$ **44.** 5

45. $\frac{1}{4}$ **46.** 1357.2

47. 7

48. **a.** 18.9658

b. 18.9658

c. Answers may vary. Sample: You don't have to use the Change of Base formula with the base-10 method, but there is less algebra with the base-2 method.

49. 5.1

50. $20 = 8(1.2)^x$, 5 years

51. $2 = 10\left(\frac{1}{2}\right)^{\frac{x}{1.17}}$, about 2.7 min

52. A

53. -1

54. 3

55. $\frac{1}{2}$

56. 3

57. $\frac{1}{3}$

58. -2

59. 3

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

61. **a.** Let x equal the number of years after 2000. Florida growth factor = 1.0213, $y = 15{,}982{,}378\ (1.0213)^x$; New York growth factor = 1.0054, $y = 18{,}976{,}457 \bullet (1.0054)^x$

b. 2011

62. **a.** Texas growth factor = 1.0208, $y = 20{,}851{,}820\ (1.0208)^x$; California growth factor = 1.013, $y = 33{,}871{,}648 \bullet (1.013)^x$

b. 2063

63. Since Florida's growth rate is larger than Texas's growth rate, in theory, given constant conditions, Florida would exceed Texas in about 543 years. However, since no state has unlimited capacity for growth, it is unrealistic to predict over a long period of time.

64. $\frac{\log 10^2}{\log 10^1} \neq \log 10^{2-1}$

65. Answers may vary. Sample: $\log x = 1.6$

$10^{1.6} = x$, $x \approx 39.81$

66. Answers may vary. Sample: A possible model is $y = 1465(1.0838)^x$ where $x = 0$ represents 1991; the growth is probably exponential and $1465(1.0838)^{10} \approx 3276$; using this model, there will be 10,000 manatees in about 2015.

67. a. $x = \frac{\log b}{\log a}$

b. $x = \log_a b = \frac{\log b}{\log a}$

c. Substituting the result from part (a) into the results from part (b), or vice versa, yields $\log_a b = \frac{\log b}{\log a}$. This justifies the Change of Base Formula.

68. $\frac{\log 2}{\log 7}$ **69.** $\frac{\log 8}{\log 3}$ **70.** $\frac{\log 140}{\log 5}$

71. $\frac{\log 3.3}{\log 9}$ **72.** $\frac{\log 3x}{\log 4}$ **73.** $\frac{\log (1 - x)}{\log 6}$

74. $\frac{\log 5}{\log x}$ **75.** $\frac{\log (x + 1)}{\log x}$

76. a. 10^0 (or 1) W/m^2,10^4 W/m^2

b. 10,000 times more intense

77. a. top up: 10^{-5} W/m^2, top down: $10^{-2.5}$ W/m^2

b. 99.68%

78. a. 10^{-3} W/m^2, 106 W/m^2

b. 10^9 times more intense

79. 2.9315 **80.** 0.2098 **81.** 0.6225 **82.** 625

83. 2.3094 **84.** 10 **85.** 0.8505 **86.** 1.5

87. 7.4168 **88.** 200.8 **89.** 2.9615 **90.** 2.7944

91. 1 **92.** 500 **93.** 1.0451 **94.** $114.\overline{3}$

95. 1.3063 **96.** 3.0417

97. a. bassoon, guitar, harp, violin, viola, cello

b. bassoon, guitar, harp, cello, bass

c. harp, violin

d. harp, violin

98. 478,630 times

99. no; solving $0.65 = \frac{x}{(0.5)^{5430}}$ for x, the age in years of the sample, yields an age of about 3561 yrs.

100. -2,5 **101.** -4,2 **102.** -9,9 **103.** 1

104. 20,031 m above sea level

105. a. 91 hours or 4 days

b. 0.928 mg or 1.061 mg

c. Estimate in hours is more accurate; the days have a larger rounding error.