Name _____ Class _____ Date _____

Practice 8-3

Logarithmic Functions as Inverses

Write each equation in exponential form.

1. $\log_4 256 = 4$ **2.** $\log_7 1 = 0$ **3.** $\log_2 32 = 5$ **4.** $\log 10 = 1$

5. $\log_5 5 = 1$ **6.** $\log_8 \frac{1}{64} = -2$ **7.** $\log_9 59{,}049 = 5$ **8.** $\log_{17} 289 = 2$

9. $\log_{56} 1 = 0$ **10.** $\log_{12} \frac{1}{144} = -2$ **11.** $\log_2 \frac{1}{1024} = -10$ **12.** $\log_3 6561 = 8$

Write each equation in logarithmic form.

13. $9^2 = 81$ **14.** $25^2 = 625$ **15.** $8^3 = 512$ **16.** $13^2 = 169$

17. $2^9 = 512$ **18.** $4^5 = 1024$ **19.** $5^4 = 625$ **20.** $10^{-3} = 0.001$

21. $4^{-3} = \frac{1}{64}$ **22.** $5^{-2} = \frac{1}{25}$ **23.** $8^{-1} = \frac{1}{8}$ **24.** $11^0 = 1$

25. $6^1 = 6$ **26.** $6^{-3} = \frac{1}{216}$ **27.** $17^0 = 1$ **28.** $17^1 = 17$

29. A single-celled bacterium divides every hour. The number N of bacteria after t hours is given by the formula $\log_2 N = t$. After how many hours will there be 32 bacteria?

Evaluate each logarithm.

30. $\log_2 16$ **31.** $\log_2 8$ **32.** $\log_2 4$ **33.** $\log_2 2$

34. $\log_2 1$ **35.** $\log_2 \frac{1}{2}$ **36.** $\log_2 \frac{1}{4}$ **37.** $\log_2 \frac{1}{8}$

38. $\log_{16} 16$ **39.** $\log_5 125$ **40.** $\log_{11} 121$ **41.** $\log 0.1$

42. $\log 1$ **43.** $\log_3 1$ **44.** $\log_6 216$ **45.** $\log_{12} 12$

46. $\log_{30} 30$ **47.** $\log 100{,}000$ **48.** $\log_3 \frac{1}{9}$ **49.** $\log_3 \frac{1}{27}$

50. $\log \frac{1}{100}$ **51.** $\log_4 32$ **52.** $\log_7 \frac{1}{49}$ **53.** $\log_{81} 9$

For each pH given, find the concentration of hydrogen ions $[H^+]$. Use the formula $pH = -\log[H^+]$.

54. 7.2 **55.** 7.3 **56.** 8.2 **57.** 6.2

58. 5.6 **59.** 4.6 **60.** 7.0 **61.** 2.9

Graph each logarithmic function.

62. $y = \log x$ **63.** $y = \log_3 x$ **64.** $y = \log_6 x$

65. $y = \log_{\frac{1}{2}} x$ **66.** $y = \log_3 (x + 1)$ **67.** $y = \log_2 x - 3$

68. $y = \log_6 (x + 2)$ **69.** $y = \log_5 (x - 4) + 1$ **70.** $y = \log_2 (x - 3) + 1$