7-3

Practice (continued)   Form G

Logarithmic Functions as Inverses

Describe how the graph of each function compares with the graph of the parent function, $y = \log_b x$.

24. $y = \log_3 x - 2$

25. $y = \log_8 (x - 2)$

26. $y = \log_6 (x + 1) - 5$

27. $y = \log_2 (x - 4) + 1$

Write each equation in exponential form.

28. $\log_4 256 = 4$ **29.** $\log_7 1 = 0$ **30.** $\log_2 32 = 5$

31. $\log 10 = 1$ **32.** $\log_5 5 = 1$ **33.** $\log_8 \frac{1}{64} = -2$

34. $\log_9 59{,}049 = 5$ **35.** $\log_{17} 289 = 2$ **36.** $\log_{56} 1 = 0$

37. $\log_{12} \frac{1}{144} = -2$ **38.** $\log_2 \frac{1}{1024} = -10$ **39.** $\log_3 6561 = 8$

40. 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?

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

41. 7.2   **42.** 7.3   **43.** 8.2   **44.** 6.2

45. 5.6   **46.** 4.6   **47.** 7.0   **48.** 2.9

Find the inverse of each function.

49. $y = \log_2 x$ **50.** $y = \log_{0.7} x$ **51.** $y = \log_{100} x$

52. $y = \log_8 x$ **53.** $y = \log_2 (4x)$ **54.** $y = \log (x + 4)$

Find the domain and range of each function.

55. $y = \log_3 x - 2$ **56.** $y = 2\log_5 x$ **57.** $y = \log (x + 1)$

7-4   Practice   *Form G*

Properties of Logarithms

Write each expression as a single logarithm.

1. $\log_5 4 + \log_5 3$

2. $\log_6 25 - \log_6 5$

3. $\log_2 4 + \log_2 2 - \log_2 8$

4. $5\log_7 x = 2\log_7 x$

5. $\log_4 60 - \log_4 4 + \log_4 x$

6. $\log 7 - \log 3 + \log 6$

7. $2\log x - 3\log y$

8. $\frac{1}{2}\log r + \frac{1}{3}\log s - \frac{1}{4}\log t$

9. $\log_3 4x + 2\log_3 5y$

13. $(\log 3 - \log 4) - \log 2$

14. $5\log x + 3\log x^2$

15. $\log_6 3 - \log_6 6$

Expand each logarithm. Simplify if possible.

22. $\log xyz$

23. $\log_2 \dfrac{x}{yz}$

24. $\log 6x^3 y$

25. $\log 7(3x - 2)^2$

26. $\log\sqrt{\dfrac{2rst}{5w}}$

27. $\log\dfrac{5x}{4y}$

28. $\log_5 5x^{-5}$

29. $\log\dfrac{2x^2 y}{3k^3}$

30. $\log_4 (3xyz)^2$

~~Use the Change of Base Formula to evaluate each expression. Round your answer to the nearest thousandth.~~ *Evaluate the following logs.*

31. $\log_4 32$

32. $\log_3 5$

33. $\log_2 15$

34. $\log_6 17$

~~39. The concentration of hydrogen ions in a batch of homemade ketchup is 10^{-4}. What is the pH level of the ketchup?~~

Determine if each statement is *true* or *false*. Justify your answer.

40. $\log 12 = \log 4 + \log 3$

41. $\log\dfrac{3}{5} = \dfrac{\log 3}{\log 5}$

Name _____ Class _____ Date _____

7-3 Practice

Form G

Logarithmic Functions as Inverses

Write each equation in logarithmic form.

1. $9^2 = 81$

2. $\frac{1}{64} = \left(\frac{1}{4}\right)^3$

3. $8^3 = 512$

4. $\left(\frac{1}{3}\right)^{-2} = 9$

5. $2^9 = 512$

6. $4^5 = 1024$

7. $5^4 = 625$

8. $10^{-3} = 0.001$

Evaluate each logarithm.

9. $\log_2 128$

10. $\log_4 32$

11. $\log_9 (27)$

12. $\log_2 (-32)$

13. $\log_{\frac{1}{3}} \frac{1}{9}$

14. $\log 100{,}000$

15. $\log_7 7^6$

16. $\log_3 \frac{1}{81}$

In 2004, an earthquake of magnitude 7.0 shook Papua, Indonesia. Compare the intensity level of that earthquake to the intensity level of each earthquake below.

17. magnitude 6.1 in Costa Rica, in 2009

18. magnitude 5.1 in Greece, in 2008

19. magnitude 7.8 in the Fiji Islands, in 2007

20. magnitude 8.3 in the Kuril Islands, in 2006

Graph each logarithmic function.

21. $y = \log x$

22. $y = \log_3 x$

23. $y = \log_6 x$