

**7-4 Practice**

Form G

Write each expression as a single logarithm. **Complete Only 1,7,13,19,22,28,31,32,35,40,44,49,51,56**

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

10.  $5 \log 2 - 2 \log 2$

11.  $\frac{1}{3} \log 3x + \frac{2}{3} \log 3x$

12.  $2 \log 4 + \log 2 + \log 2$

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

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

15.  $\log_6 3 - \log_6 6$

16.  $\log 2 + \log 4 - \log 7$

17.  $\log_3 2x - 5 \log_3 y$

18.  $\frac{1}{2} (\log_2 x - \log_2 y)$

19.  $\frac{1}{2} \log x + \frac{1}{3} \log y - 2 \log z$

20.  $3(4 \log t^2)$

21.  $\log_5 y - 4(\log_5 r + 2 \log_5 t)$

Expand each logarithm. Simplify if possible.

22.  $\log xyz$

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

24.  $\log 6x^3 y$

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

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

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

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

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

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

Use the Change of Base Formula to evaluate each expression. Round your answer to the nearest thousandth.

31.  $\log_4 32$

32.  $\log_3 5$

33.  $\log_2 15$

34.  $\log_6 17$

35.  $\log_6 10$

36.  $\log_5 6$

37.  $\log_8 1$

38.  $\log_9 11$

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

**7-4 Practice** (continued)

Form G

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

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

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

42.  $\log_6 12 + \log_6 3 = 2$

43.  $\frac{1}{2} \log_4 4x = \log_4 2x$

**Use the properties of logarithms to evaluate each expression.**

44.  $\log_2 8 + \log_2 4$

45.  $\log_2 160 - \log_2 5$

46.  $\log_6 27 + \log_6 8$

47.  $\log_7 14 - \log_7 2$

48.  $\log_4 64 + 2 \log_4 2$

49.  $\frac{1}{4} \log_3 162 - \log_3 \sqrt[4]{2}$

**State the property or properties used to rewrite each expression.**

50.  $\log 6 - \log 3 = \log 2$

51.  $6 \log 2 = \log 64$

52.  $\log 3x = \log 3 + \log x$

53.  $\frac{1}{3} \log_2 x = \log_2 \sqrt[3]{x}$

54.  $\frac{2}{3} \log 7 = \log \sqrt[3]{49}$

55.  $\log_4 20 - 3 \log_4 x = \log_4 \frac{20}{x^3}$

**The formula for loudness in decibels (dB) is  $L = 10 \log \frac{I}{I_0}$ , where  $I$  is the intensity of a sound in watts per square meter ( $\text{W}/\text{m}^2$ ) and  $I_0$  is  $10^{-12} \text{ W}/\text{m}^2$ , the intensity of a barely audible sound.**

56. A sound has an intensity of  $5.92 \times 10^{25} \text{ W}/\text{m}^2$ . What is the loudness of the sound in decibels? Use  $I_0 = 10^{-12} \text{ W}/\text{m}^2$ .

57. Suppose you decrease the intensity of a sound by 45%. By how many decibels would the loudness be decreased?

58. **Writing** Explain why  $\left(\frac{9}{4}\right) \neq \frac{\log 9}{\log 4}$ .