Section 8.3 Extra Practice

1. Write each expression in terms of the individual logarithms of x, y, and z.

   a) $\log_7\left(\dfrac{x^2 y}{z}\right)$

   b) $\log_3(x\sqrt{yz})$

   c) $\log_5(xyz)^3$

   d) $\log_2 xy\sqrt[3]{z}$

2. Use the laws of logarithms to simplify and evaluate each expression.

   a) $3\log_8 4 + \log_8 4 + \log_8 2$

   b) $2\log_2 4 + \log_2 5 - \log_2 10$

   c) $\log_5 25\sqrt{5}$

   d) $\dfrac{1}{2}\log 9 - \log 3$

3. Write each expression as a single logarithm in simplest form.

   a) $\log_4 x - 2\log_4 y$

   b) $\log_6 x - 3\log_6 y - 4\log_6 z$

   c) $\dfrac{\log x}{4} - \dfrac{\log y}{4}$

   d) $2 + 3\log x - \log y$

4. Evaluate each of the following.

   a) If $\log_5 x = 25$, determine the value of $\log_5\left(\dfrac{x}{25}\right)$.

   b) Determine the value of $\log_n ab^2$ if $\log_n a = 5$ and $\log_n b = 3$.

   c) If $\log c = 3$, evaluate $\log 10c^2$.

   d) If $\log_a x = 3$ and $\log_a y = 4$, evaluate $\log_a\left(\dfrac{1}{xy}\right)^2$.

5. Simplify.

   a) $5^{\log_6 9 + \log_6 4}$

   b) $a^{\log_a 8 + \log_a 2}$

6. If $\log_5 9 = k$, write an algebraic expression in terms of k for each of the following.

   a) $\log_5 9^4$

   b) $\log_5 45$

   c) $\log_5(81\times125)$

   d) $\log_5 \dfrac{\sqrt[4]{9}}{25}$

7. Write each expression as a single logarithm in simplest form. State any restrictions on the variable.

   a) $\log_3 x - \log_3 \sqrt[4]{x} + \log_3 x^2$

   b) $\log_3 \dfrac{\sqrt{x}}{x} + \log_3 \sqrt[5]{x^2} + \dfrac{3}{2}\log_3 x$

8. In chemistry, the pH scale measures the acidity (0–7) or alkalinity (7–14) of a solution. It is a logarithmic scale in base 10. If neutral water has a pH of 7, what is the pH of a solution that is 4 times more alkaline than water?

9. If bleach has a pH of 13, how many times more alkaline is it than blood, which has a pH of 8?

10. An earthquake off the coast of Alaska measured 6.4 on the Richter scale. Another earthquake near Japan was 50 times worse. What was the Richter scale reading for the earthquake near Japan?