

# Practice 8-4

## Properties of Logarithms

Assume that  $\log 3 \approx 0.4771$ ,  $\log 4 \approx 0.6021$ , and  $\log 5 \approx 0.6990$ . Use the properties of logarithms to evaluate each expression. Do not use a calculator.

1.  $\log 12$

$1.0792$

2.  $\log \frac{3}{5}$

$-.2219$

3.  $\log 60$

$1.7782$

Write each logarithmic expression as a single logarithm.

4.  $\log_5 4 + \log_5 3$

$\log_5 12$

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

$\log_2 1$

6.  $5 \log_7 x - 2 \log_7 x^3$

$\log_7 x^3$

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

$\log_4 15x$

8.  $2 \log x - 3 \log y$

$\log \frac{x^2}{y^3}$

9.  $5 \log 2 - 2 \log 2$

$\log 8$

10.  $5 \log x + 3 \log x^2$

$\log \frac{1}{x}$

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

$\log_3 \frac{2x}{y^5}$

Expand each logarithm.

12.  $\log xyz$

$\log x + \log y + \log z$

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

$\log_2 x - \log_2 y - \log_2 z$

14.  $\log 6x^3y$

$\log 6 + 3 \log x + \log y$

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

$\log_5 5 - 5 \log_5 x$

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

$\log 2 + 2 \log x + \log y - \log 3 - 3 \log k$

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

$2 \log_4 3 + 2 \log_4 x + 2 \log_4 y + 2 \log_4 z$

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

$\log 5 + \log x - \log 4 - \log y$