Practice

Use the product and quotient laws to express each as a single logarithm and then evaluate.

1. $\log_{10} 8 + \log_{10} 1.25$
2. $\log_4 32 + \log_4 2$
3. $\log_3 108 - \log_3 4$
4. $\log_2 80 - \log_2 5$
5. $\log_6 4 + \log_6 9$
6. $\log_5 500 - \log_5 4$
7. $\log_3 8 - \log_3 24$
8. $\log_7 245 + \log_7 \dfrac{1}{5}$
9. $\log_8 6 - \log_8 3 + \log_8 2$
10. $\log_{10} 4 + \log_{10} 5 - \log_{10} 2$

Use the power and root laws to simplify and then evaluate each.

11. $\log_3 9^{20}$
12. $\log_2 8^{25}$
13. $\log_{10} \sqrt{0.1}$
14. $\log_3 \sqrt[3]{9}$
15. $\log_5 5\sqrt{5}$
16. $\log_7 49^{2.5}$
17. $\log_8 2^{\frac{3}{2}}$
18. $\log_2 16^5$

If $\log 17 = k$, determine an expression for each of the following.

19. $\log 170$
20. $\log 17\,000$
21. $\log 1.7$
22. $\log \sqrt{17}$
23. $\log 17^{10}$
24. $\log \dfrac{17}{1000}$

If $\log_3 4 = x$, express each of the following in terms of x.

25. $\log_3 64$
26. $\log_3 2$
27. $\log_3 144$
28. $\log_3 \sqrt[5]{4^7}$

If $\log_3 x = 8$, evaluate the following.

29. $\log_3 9x$
30. $\log_3 x^2$
31. $\log_3 \dfrac{x^4}{27}$
32. $\log_3 \dfrac{3}{x}$

Evaluate.

33. $2\log_3 12 - 2\log_3 4$
34. $\log_4 6 + \log_4 \dfrac{64}{3} - \log_4 8$
35. $\log_3 (9 \times 27 \times 81)$
36. $\dfrac{1}{2}\log_3 144 - \log_3 4 + 2\log_3 3$
37. $7^{\log_7 3}$
38. $\log_5 \sqrt{175} - \log_5 \sqrt{7}$

Write each expression as a single logarithm.

39. $\log_2 a + \log_2 b - \log_2 c$
40. $\log x^2 - 5\log y$
41. $\log A + \log \sqrt{B} - 3\log C$
42. $\log_7 \sqrt[3]{x} - \log_7 y^3 + 2\log_7 y$