

16-1 Practice

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

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

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

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

8. $5 \log x + 3 \log x^2$

9. $\log_6 3 - \log_6 6$

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

11. $3(4 \log t^2)$

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

Expand each logarithm. Simplify if possible.

13. $\log xyz$

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

15. $\log 6x^3 y$

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

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

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

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

19. $\log_4 32$

20. $\log_3 5$

21. $\log_2 15$

22. $\log_6 17$

23. $\log_6 10$

24. $\log_5 6$

25. $\log_8 1$

26. $\log_9 11$

16-1 Practice (continued)

Properties of Logarithms

Use the properties of logarithms to evaluate each expression.

27. $\log_2 8 + \log_2 4$

28. $\log_2 160 - \log_2 5$

29. $\log_6 27 + \log_6 8$

30. $\log_7 14 - \log_7 2$

31. $\log_4 64 + 2\log_4 2$

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

State the property or properties used to rewrite each expression.

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

34. $6 \log 2 = \log 64$

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

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

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

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

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 (W/m^2) and I_0 is 10^{-12} W/m^2 , the intensity of a barely audible sound.

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

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