

10-3 Practice

Properties of Logarithms

Use $\log_{10} 5 \approx 0.6990$ and $\log_{10} 7 \approx 0.8451$ to approximate the value of each expression.

1. $\log_{10} 35$ 1.5441 2. $\log_{10} 25$ 1.3980 3. $\log_{10} \frac{7}{5}$ 0.1461 4. $\log_{10} \frac{5}{7}$ -0.1461
 5. $\log_{10} 245$ 2.3892 6. $\log_{10} 175$ 2.2431 7. $\log_{10} 0.2$ -0.6990 8. $\log_{10} \frac{25}{7}$ 0.5529

Solve each equation. Check your solutions.

9. $\log_7 n = \frac{2}{3} \log_7 8$ 4 10. $\log_{10} u = \frac{3}{2} \log_{10} 4$ 8
 11. $\log_6 x + \log_6 9 = \log_6 54$ 6 12. $\log_8 48 - \log_8 w = \log_8 4$ 12
 13. $\log_9 (3u + 14) - \log_9 5 = \log_9 2u$ 2 14. $4 \log_2 x + \log_2 5 = \log_2 405$ 3
 15. $\log_3 y = -\log_3 16 + \frac{1}{3} \log_3 64$ $\frac{1}{4}$ 16. $\log_2 d = 5 \log_2 2 - \log_2 8$ 4
 17. $\log_{10} (3m - 5) + \log_{10} m = \log_{10} 2$ 2 18. $\log_{10} (b + 3) + \log_{10} b = \log_{10} 4$ 1
 19. $\log_8 (t + 10) - \log_8 (t - 1) = \log_8 12$ 2 20. $\log_3 (a + 3) + \log_3 (a + 2) = \log_3 6$ 0
 21. $\log_{10} (r + 4) - \log_{10} r = \log_{10} (r + 1)$ 2 22. $\log_4 (x^2 - 4) - \log_4 (x + 2) = \log_4 1$ 3
 23. $\log_{10} 4 + \log_{10} w = 2$ 25 24. $\log_8 (n - 3) + \log_8 (n + 4) = 1$ 4
 25. $3 \log_5 (x^2 + 9) - 6 = 0$ ± 4 26. $\log_{16} (9x + 5) - \log_{16} (x^2 - 1) = \frac{1}{2}$ 3
 27. $\log_6 (2x - 5) + 1 = \log_6 (7x + 10)$ 8 28. $\log_2 (5y + 2) - 1 = \log_2 (1 - 2y)$ 0
 29. $\log_{10} (c^2 - 1) - 2 = \log_{10} (c + 1)$ 101 30. $\log_7 x + 2 \log_7 x - \log_7 3 = \log_7 72$ 6

31. **SOUND** The loudness L of a sound in decibels is given by $L = 10 \log_{10} R$, where R is the sound's relative intensity. If the intensity of a certain sound is tripled, by how many decibels does the sound increase?
 about 4.8 db

32. **EARTHQUAKES** An earthquake rated at 3.5 on the Richter scale is felt by many people, and an earthquake rated at 4.5 may cause local damage. The Richter scale magnitude reading m is given by $m = \log_{10} x$, where x represents the amplitude of the seismic wave causing ground motion. How many times greater is the amplitude of an earthquake that measures 4.5 on the Richter scale than one that measures 3.5?
 10 times