

EXERCISES

For more practice, see *Extra Practice*.

Practice and Problem Solving

A Practice by Example

Example 1 (page 453)

Solve each equation. Round to the nearest ten-thousandth. Check your answers.

1. $2^x = 3$ 2. $4^x = 19$ 3. $5^x = 81.2$ 4. $3^x = 27.3$
5. $8 + 10^x = 1008$ 6. $5 - 3^x = -40$ 7. $9^{2y} = 66$
8. $14^{x+1} = 36$ 9. $12^{y-2} = 20$ 10. $25^{2x+1} = 144$

Example 2 (page 454)

Use the Change of Base Formula to evaluate each expression. Then convert it to a logarithm in base 8.

11. $\log_2 9$ 12. $\log_4 8$ 13. $\log_3 54$ 14. $\log_5 62$
15. $\log_3 33$ 16. $\log_2 7$ 17. $\log_5 510$ 18. $\log_4 1.116$

Example 3 (page 454)

Use the Change of Base Formula to solve each equation.

19. $2^x = 5$ 20. $6^{2x} = 21$ 21. $7^{x+2} = 54$ 22. $3^x = 27.3$
23. $4^{2x} = 17$ 24. $5^{x+1} = 24$ 25. $3^{x+4} = 101$ 26. $4^{x-2} = 89$

Examples 4 and 5 (pages 454 and 455)



Solve by graphing.

27. $4^{7x} = 250$ 28. $5^{3x} = 500$ 29. $6^x = 4565$ 30. $1.5^x = 356$

31. An investment of \$2000 earns 5.75% interest, which is compounded quarterly. After approximately how many years will the investment be worth \$3000?
32. The equation $y = 281(1.0124)^x$ models the U.S. population y , in millions of people, x years after the year 2000. Graph the function on your graphing calculator. Estimate when the U.S. population will reach 350 million.

Example 6 (page 455)

Solve each equation. Check your answers.

33. $\log 2x = -1$ 34. $2 \log x = -1$ 35. $\log (3x + 1) = 2$
36. $\log x + 4 = 8$ 37. $\log 6x - 3 = -4$ 38. $\log (x - 2) = 1$
39. $3 \log x = 1.5$ 40. $2 \log (x + 1) = 5$ 41. $\log (5 - 2x) = 0$

Example 7 (page 456)

Solve each equation.

42. $\log x - \log 3 = 8$ 43. $\log 2x + \log x = 11$
44. $2 \log x + \log 4 = 2$ 45. $\log 5 - \log 2x = 1$
46. $3 \log x - \log 6 + \log 2.4 = 9$ 47. $\log (7x + 1) = \log (x - 2) + 1$

B Apply Your Skills

48. Consider the equation $2^{\frac{x}{3}} = 80$.
a. Solve the equation by taking the logarithm in base 10 of each side.
b. Solve the equation by taking the logarithm in base 2 of each side.
c. **Writing** Compare your result in parts (a) and (b). What are the advantages of either method? Explain.



49. **Seismology** An earthquake of magnitude 7.9 occurred in 2001 in Gujarat, India. It was 11,600 times as strong as the greatest earthquake ever to hit Pennsylvania. Find the magnitude of the Pennsylvania earthquake. (*Hint*: Refer to the Richter Scale on page 438.)