

EXTRA PRACTICE 38
Solving Exponential and Logarithmic Equations
Use after Section 8.6

Name Key

Examples. Solve.

a) $7^{x-1} = 343$

$7^{x-1} = 7^3$

$x - 1 = 3$

$x = 4$

b) $6^x = 15$

$\log 6^x = \log 15$

$x \log 6 = \log 15$

$x = \frac{\log 15}{\log 6}$

$x \approx \frac{1.1761}{0.7782}$

$x \approx 1.5113$

c) $e^{-3t} = 0.04$

$\ln e^{-3t} = \ln 0.04$

$-3t \ln e = \ln 0.04$

$-3t = \ln 0.04$

$t = \frac{\ln 0.04}{-3}$

$t \approx \frac{-3.2189}{-3}$

$t \approx 1.073$

Solve.

1. $3^{5x} = 81$ $\frac{4}{5}$

2. $e^{4t} = 120$ 1.197

3. $4^x = 6$ $\frac{\log 6}{\log 4} = 1.292$

4. $6^x = 2$ 0.387

5. $e^{-2t} = 0.6$ 0.255

6. $5^{3x+2} = 625$ $\frac{2}{3}$

7. $8^{x+1} = 16$ $\frac{1}{3}$

8. $10^x = 7$ 0.845

9. $7^x = 1520$ 3.765

10. $e^{0.04t} = 10$ 57.565

11. $e^y = 5$ 0.322

12. $6^x = 71$ 1.094

13. $6^{x+3} = 36$ -1

14. $4^{x-1} = 3$ 1.792

15. $12^{2x-3} = 16$ 2.058

16. $10^{5-x} = 1000$ 2

EXTRA PRACTICE 38 (continued)
Solving Exponential and Logarithmic Equations
 Use after Section 8.6

Key

Example. Solve: $\log_2(x+1) - \log_2(x-1) = 4$

$$\log_2(x+1) - \log_2(x-1) = 4$$

$$\log_2 \frac{x+1}{x-1} = 4$$

$$\frac{x+1}{x-1} = 16$$

$$x+1 = 16x-16$$

$$17 = 15x$$

$$\frac{17}{15} = x$$

The solution is $\frac{17}{15}$.

Solve.

17. $\log x + \log(x+15) = 2$ $x=5$

19. $\log_3(2x-7) = 4$ 44

21. $\log x + \log(x-21) = 2$ 25

23. $\log(3x+4) = 1$ $x=2$

25. $\log x - \log(x+5) = -1$ $5/9$

27. $\log_4(x-6) + \log_4(x+6) = 3$ $x=10$

29. $\log x + \log(x-0.21) = -2$

31. $\log_7 x + \log_7(4x+21) = 3$

Check:

$$\log_2(x+1) - \log_2(x-1) = 4$$

$$\log_2\left(\frac{17}{15} + 1\right) - \log_2\left(\frac{17}{15} - 1\right) = 4$$

$$\log_2 \frac{32}{15} - \log_2 \frac{2}{15}$$

$$\log_2\left(\frac{32}{15} + \frac{2}{15}\right)$$

$$\log_2 16$$

$$4$$

18. $\log(x+2) - \log x = 3$ $\frac{2}{999}$

20. $\log_5(x-11) = 2$ 36

22. $\log_2(x-2) + \log_2(x+2) = 5$ $x=6$

24. $\log(x+33) - \log x = 2$ $1/3$

26. $\log_4(x+3) - \log_4 x = 3$ $1/21$

28. $\log_6 x + \log_6(x-9) = 2$ $x=12$

30. $\log(x-48) + \log x = 2$ $x=50$

32. $\log_2(5-x) = 4$ $x=-11$