

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

Name \_\_\_\_\_

Examples. Solve.

a)  $7^{x-1} = 343$   
 $7^{x-1} = 7^3$   
 $x - 1 = 3$   
 $x = 4$

b)  $6^x = 15$   
 $\log 6^x = \log 15$   
 $x \log 6 = \log 15$   
 $x = \frac{\log 15}{\log 6}$   
 $x \approx \frac{1.1761}{0.7782}$   
 $x \approx 15113$

c)  $e^{-3t} = 0.04$   
 $\ln e^{-3t} = \ln 0.04$   
 $-3t \ln e = \ln 0.04$   
 $-3t = \ln 0.04$   
 $t = \frac{\ln 0.04}{-3}$   
 $t \approx \frac{-3.2189}{-3}$   
 $t \approx 1073$

Solve.

- |                            |                             |
|----------------------------|-----------------------------|
| 1. $3^{5x} = 81$ _____     | 2. $e^{4t} = 120$ _____     |
| 3. $4^x = 6$ _____         | 4. $6^x = 2$ _____          |
| 5. $e^{-2t} = 0.6$ _____   | 6. $5^{3x+2} = 625$ _____   |
| 7. $8^{x+1} = 16$ _____    | 8. $10^x = 7$ _____         |
| 9. $7^x = 1520$ _____      | 10. $e^{0.04t} = 10$ _____  |
| 11. $e^{5t} = 5$ _____     | 12. $6^x = 71$ _____        |
| 13. $6^{x+3} = 36$ _____   | 14. $4^{x-1} = 3$ _____     |
| 15. $12^{2x-3} = 16$ _____ | 16. $10^{5-x} = 1000$ _____ |

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

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


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


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


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


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


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


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


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


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Check:

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

$$\left. \begin{array}{l} \log_2\left(\frac{17}{15} + 1\right) - \log_2\left(\frac{17}{15} - 1\right) \\ \log_2 \frac{32}{15} - \log_2 \frac{2}{15} \\ \log_2\left(\frac{32}{15} \div \frac{2}{15}\right) \\ \log_2 16 \\ 4 \end{array} \right| 4$$

18.  $\log(x+2) - \log x = 3$   


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


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


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


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


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


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


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


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