

PRACTICE

Properties and Laws of Logarithms

$\log_b 1 = 0$	$\log_b x^n = n \log_b x$
$\log_b b = 1$	$\log_b xy = \log_b x + \log_b y$
$\log_b b^n = n$	$\log_b \frac{x}{y} = \log_b x - \log_b y$
$b^{\log_b n} = n$	$\log_b x = \frac{\log x}{\log b}$



1. Solve for x.

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|----------------------------------|--------------------------------|
| a) $\log_x 7 = \frac{1}{2}$ | b) $2 \log x = 1$ |
| c) $\log_5(\log_3 x) = 0$ | d) $\log_2(\log_4 x) = 1$ |
| e) $\log_x 16 = 4$ | f) $\log_2 x = 3 \log_2 2$ |
| g) $\log_{216} x = -\frac{2}{4}$ | h) $\log_{\frac{1}{2}} x = -3$ |

2. Solve each equation.

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| a) $\log_3(x^2 - 1) = 1$ | b) $\frac{1}{2} \log_3 64 - \log_3 x = \log_3 4$ |
| c) $\log_2(3x) + \log_2 x = \frac{1}{2} \log_2 81$ | d) $\log x - \log 3 = 1$ |
| e) $3 \log x - \log 3 = 2 \log 3$ | f) $\log_5 2x + \frac{1}{2} \log_5 9 = 2$ |

3. Solve each equation.

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| a) $2 \log_3 x - \log_3(x - 2) = 2$ | b) $\log_9(x - 5) + \log_9(x + 3) = 1$ |
| c) $\log_5(x - 1) + \log_5(x - 2) - \log_5(x + 6) = 0$ | d) $\log(x^2 + 4) = 1 + 2 \log x$ |
| e) $\log_2 5x - \log_2(x - 1) = 2 \log_2 3$ | f) $\log_9(2x - 1) + \log_9 x = \frac{1}{2}$ |
| g) $\log_5(x - 4) = 1 - \log_5(x + 3)$ | h) $\log_7(2x + 2) - \log_7(x - 1) = \log_7(x + 1)$ |

4. Solve.

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| a) $\frac{1}{2} \log_a(x + 2) + \frac{1}{2} \log_a(x - 1) = \frac{2}{3} \log_a 27$ |
| b) $\log_b(x - 1) + \log_b(x + 2) = \log_b(8 - 2x)$ |

5. Solve each equation.

a) $\log x^3 = 3\log 12 - 2\log 8$

b) $10^{\log_{10} 3x} = 15$

c) $\log_6(x+1) + \log_6 x = 1$

d) $\frac{1}{2}\log_3 36 - \log_3(x-2) = 3\log_3 2 - \log_3(x+1)$

6. Without a calculator, solve each equation.

a) $\log_3 x^2 + \log_9 x^4 = 4$

b) $\log_x 7 + \log_7 x = 2$

c) $x^{\log_3 x} = \frac{9}{x}$

d) $\log_x 10 = 5\log x + 4$

7. Solve.

a. $\log_3 \sqrt[5]{x^2 - 1} = \frac{3}{5}$

b. $\log_{\sqrt{2}} x = -8$

c. $\log_x \sqrt[3]{8} = \frac{1}{3}$

8. Solve for all values of x .

$\log_{x+4}(17x-4) = 2$