

Logs Day 1

Date

Solve each equation.

1) $\log_5(3x-9) = \log_5(2x-5)$

$$\begin{array}{r} 3x-9 = 2x-5 \\ -2x \quad -2x \\ \hline x-9 = -5 \\ +9 \quad +9 \\ \hline x = 4 \end{array}$$

3) $\log_4 2x = \log_4(9-3x)$

$$\begin{array}{r} 2x = 9-3x \\ 3x \quad +3x \\ \hline 5x = 9 \\ x = \frac{9}{5} \end{array}$$

5) $\log_{18}(5x+2) = \log_{18}(-3x+10)$

$$\begin{array}{r} 5x+2 = -3x+10 \\ +3x \quad +3x \\ \hline 8x = 8 \\ x = 1 \end{array}$$

7) $\log_2(-2x+3) = \log_2 x^2$

$$\begin{array}{r} -2x+3 = x^2 \\ x^2+2x-3=0 \\ (x-1)(x+3)=0 \end{array}$$

9) $\log_{13}(25+3x^2) = \log_{13} 4x^2$

$$\begin{array}{r} 25+3x^2 = 4x^2 \\ -3x^2 \quad -3x^2 \\ \hline 25 = x^2 \\ x = \pm 5 \end{array}$$

11) $\log_{11}(3x+2) = 3$

$$\begin{array}{r} 11^3 = 3x+2 \\ 1331 = 3x+2 \\ 1329 = 3x \\ x = 443 \end{array}$$

13) $\log_2(3x-9) = 2$

$$\begin{array}{r} 2^2 = 3x-9 \\ 4 = 3x-9 \end{array}$$

$$13 = 3x \quad x = 13/3$$

2) $\log_{20}(4x-9) = \log_{20} 3x$

$$\begin{array}{r} 4x-9 = 3x \\ -4x \quad -4x \\ \hline -9 = -x \\ x = 9 \end{array}$$

4) $\log_{12}(5x-6) = \log_{12}(3x+4)$

$$\begin{array}{r} 5x-6 = 3x+4 \\ -3x \quad -3x \\ \hline 2x-6 = 4 \\ 2x = 10 \\ x = 5 \end{array}$$

6) $\log_{15}(5x-1) = \log_{15}(x^2+3)$

$$\begin{array}{r} 5x-1 = x^2+3 \\ -5x+1 \quad -5x+1 \\ \hline x^2-5x+4=0 \\ (x-4)(x-1)=0 \\ x = 4, 1 \end{array}$$

8) $\log_{14}(-6x+1) = \log_{14}(x^2+6)$

$$\begin{array}{r} -6x+1 = x^2+6 \\ +6x-1 \quad +6x-1 \\ \hline x^2+6x+5 \end{array}$$

10) $\log(81+3x) = \log(x^2+3x)$

$$\begin{array}{r} 81+3x = x^2+3x \\ -3x \quad -3x \\ \hline x^2-81=0 \\ x = \pm 9 \end{array} \quad (x+5)(x+1)=0 \quad x = -7, -5$$

12) $\log_4(2x+8) = 3$

$$\begin{array}{r} 4^3 = 2x+8 \\ 64 = 2x+8 \\ 2x = 56 \\ x = 28 \end{array}$$

14) $\log_2(6x+4) = 2$

$$\begin{array}{r} 2^2 = 6x+4 \\ 4 = 6x+4 \end{array}$$

$$\begin{array}{r} 0 = 6x \\ x = 0 \end{array}$$

$$15) \log_3 (2x+7) = 0$$

$$3^0 = 2x + 7$$

$$1 = 2x + 7$$

$$-6 = 2x \quad x = -3$$

$$16) \log_9 (-2x-9) = 1$$

$$9^1 = -2x - 9$$

$$6561 = -2x - 9$$

$$6570 = -2x \quad x = -3285$$

$$17) \log_5 x^2 - \log_5 2 = \log_5 18$$

$$\log_5 \left(\frac{x^2}{2} \right) = \log_5 18$$

$$\frac{x^2}{2} = \frac{18}{1} \quad x^2 = 36$$

$$x = \pm 6$$

$$18) \log_2 x^2 + \log_2 5 = \log_2 5$$

$$\log_2 (5x^2) = \log_2 5$$

$$5x^2 = 5$$

$$x^2 = 1$$

$$x = \pm 1$$

$$19) \log_8 2 - \log_8 x = \log_8 21$$

$$\log_8 \left(\frac{2}{x} \right) = \log_8 21$$

$$\frac{2}{x} = \frac{21}{1} \quad 21x = 2$$

$$x = 2/21$$

$$20) \log_5 7 - \log_5 x = \log_5 61$$

$$\log_5 \left(\frac{7}{x} \right) = \log_5 61$$

$$\frac{7}{x} = \frac{61}{1}$$

$$61x = 7$$

$$x = 7/61$$

$$21) \log_7 x^2 - \log_7 9 = 2$$

$$\log_7 \left(\frac{x^2}{9} \right) = 2$$

$$7^2 = \frac{x^2}{9} \quad 49 = \frac{x^2}{9} \quad x^2 = 441$$

$$x = \pm 21$$

$$22) \log_4 x^2 - \log_4 9 = 2$$

$$\log_4 \left(\frac{x^2}{9} \right) = 2$$

$$4^2 = \frac{x^2}{9}$$

$$\frac{16}{1} = \frac{x^2}{9}$$

$$x^2 = 144$$

$$x = \pm 12$$

$$23) \log_5 x + \log_5 8 = \log_5 33$$

$$\log_5 (8x) = \log_5 33$$

$$8x = 33$$

$$x = 4.125 \text{ or } 33/8$$

$$24) \log_3 x + \log_3 10 = \log_3 6$$

$$\log_3 (10x) = \log_3 6$$

$$10x = 6$$

$$x = 6/10 = 3/5 \text{ or } .6$$

$$25) \log_3 (x^2 + 9) - \log_3 10 = 2$$

$$\log_3 \left(\frac{x^2 + 9}{10} \right) = 2$$

$$3^2 = \frac{x^2 + 9}{10} \quad 9 = \frac{x^2 + 9}{10}$$

$$26) \log_6 (x^2 + 6) - \log_6 7 = 1$$

$$\log_6 \left(\frac{x^2 + 6}{7} \right) = 1$$

$$\frac{6^1}{1} = \frac{x^2 + 6}{7}$$

$$42 = x^2 + 6$$

$$36 = x^2$$

$$x = \pm 6$$

$$27) \log_9 2x^2 + \log_9 2 = 1$$

$$\log_9 (2x^2 \cdot 2) = 1$$

$$\log_9 (4x^2) = 1$$

$$9 = 4x^2$$

$$9 = 4x^2$$

$$x = \pm \frac{3}{2}$$

$$28) \log_3 7 + \log_3 5x^2 = \log_3 35$$

$$\log_3 (7 \cdot 5x^2) = \log_3 35$$

$$35x^2 = 35$$

$$x^2 = 1$$

$$x = \pm 1$$