

## Logarithmic Equations

**Solve each equation.**

1)  $\log(n + 9) = \log 4n$

2)  $\log -5x = \log(10 - 3x)$

3)  $\log(-3m - 1) = \log(-4m - 6)$

4)  $\log a = \log(4a - 9)$

5)  $-4\log_3 -9m = -4$

6)  $7\log_9(x + 8) = 7$

7)  $-8 + \log_9(m + 1) = -8$

8)  $-2\log_8(a + 1) = -8$

9)  $\log_2(a^2 - 6a) = \log_2(10 + 3a)$

10)  $\log_{15}(x^2 + 13) = \log_{15}(-9x - 1)$

11)  $\log_{19}(x^2 + 17) = \log_{19}(8x + 2)$

12)  $\log_{12}(m^2 + 73) = \log_{12}(17m + 3)$

$$13) \log x - \log 6 = \log 15$$

$$14) \log 7 + \log x = 2$$

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

$$16) \log x + \log 8 = 1$$

$$17) \log_4 (x^2 - 3) + \log_4 10 = 1$$

$$18) \log_7 2 + \log_7 (x - 5) = 2$$

$$19) \log_5 3 - \log_5 5x = 2$$

$$20) \log_3 (x^2 + 8) - \log_3 4 = 3$$

$$21) \ln (x + 7) + \ln (x + 3) = \ln 77$$

$$22) \ln (x + 1) - \ln (x - 1) = 3$$

$$23) \ln (x + 2) - \ln (x - 1) = 1$$

$$24) \ln (x + 3) - \ln (x + 2) = 5$$

## Logarithmic Equations

**Solve each equation.**

1)  $\log(n + 9) = \log 4n$

 $\{3\}$ 

2)  $\log -5x = \log(10 - 3x)$

 $\{-5\}$ 

3)  $\log(-3m - 1) = \log(-4m - 6)$

 $\{-5\}$ 

4)  $\log a = \log(4a - 9)$

 $\{3\}$ 

5)  $-4\log_3 -9m = -4$

 $\left\{-\frac{1}{3}\right\}$ 

6)  $7\log_9(x + 8) = 7$

 $\{1\}$ 

7)  $-8 + \log_9(m + 1) = -8$

 $\{0\}$ 

8)  $-2\log_8(a + 1) = -8$

 $\{4095\}$ 

9)  $\log_2(a^2 - 6a) = \log_2(10 + 3a)$

 $\{-1, 10\}$ 

10)  $\log_{15}(x^2 + 13) = \log_{15}(-9x - 1)$

 $\{-7, -2\}$ 

11)  $\log_{19}(x^2 + 17) = \log_{19}(8x + 2)$

 $\{5, 3\}$ 

12)  $\log_{12}(m^2 + 73) = \log_{12}(17m + 3)$

 $\{7, 10\}$

$$13) \log x - \log 6 = \log 15$$

$$\{90\}$$

$$14) \log 7 + \log x = 2$$

$$\left\{ \frac{100}{7} \right\}$$

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

$$\{1\}$$

$$16) \log x + \log 8 = 1$$

$$\left\{ \frac{5}{4} \right\}$$

$$17) \log_4 (x^2 - 3) + \log_4 10 = 1$$

$$\left\{ \frac{\sqrt{85}}{5}, -\frac{\sqrt{85}}{5} \right\}$$

$$18) \log_7 2 + \log_7 (x - 5) = 2$$

$$\left\{ \frac{59}{2} \right\}$$

$$19) \log_5 3 - \log_5 5x = 2$$

$$\left\{ \frac{3}{125} \right\}$$

$$20) \log_3 (x^2 + 8) - \log_3 4 = 3$$

$$\{10, -10\}$$

$$21) \ln (x + 7) + \ln (x + 3) = \ln 77$$

$$\{4\}$$

$$22) \ln (x + 1) - \ln (x - 1) = 3$$

$$\left\{ \frac{-1 - e^3}{1 - e^3} \right\}$$

$$23) \ln (x + 2) - \ln (x - 1) = 1$$

$$\left\{ \frac{-2 - e}{1 - e} \right\}$$

$$24) \ln (x + 3) - \ln (x + 2) = 5$$

$$\left\{ \frac{-3 + 2e^5}{1 - e^5} \right\}$$