

Mixed Exponential/Logarithmic Equations

Date _____ Period _____

Solve each equation. Round your answers to the nearest ten-thousandth.

1) $7 \cdot 8^x = 15$

0.3665

2) $4 \cdot 8^{k-6} + 5.5 = -61$

No solution.

3) $5 \cdot 10^{6v-9.6} = 56$

1.7749

4) $5 \cdot 18^{3v+4} + 7.8 = 55.8$

-1.0725

Solve each equation.

5) $\log_{15}(-4n - 5) = \log_{15}(-3n - 4)$

No solution.

6) $\log_{13}(4v^2 - 11v) = \log_{13}(-24 + 3v^2)$

 $\{8, 3\}$

7) $-2 + \log_{12} v = 0$

 $\{144\}$

8) $8 - 9 \log_7(x + 5) = 8$

 $\{-4\}$

9) $\log_{12}(4k - 2) = 2$

 $\left\{\frac{73}{2}\right\}$

10) $\log_7(-10p - 1) + 4 = 7$

 $\left\{-\frac{172}{5}\right\}$

$$11) -9 - 10\log_7(3n - 3) = 11$$

$$\left\{ \frac{148}{147} \right\}$$

$$12) \log_{19}(x - 9) = \log_{19} 9$$

$$\{18\}$$

$$13) \log_7(x - 2) - \log_7(x + 6) = \log_7 32$$

No solution.

$$14) \log_3 x^2 - \log_3 4 = 2$$

$$\{6, -6\}$$

$$15) \log 4 + \log x^2 = 4$$

$$\{50, -50\}$$

$$16) \log_5 9 + \log_5 x^2 = 4$$

$$\left\{ \frac{25}{3}, -\frac{25}{3} \right\}$$

$$17) \ln 5x + \ln 7 = 4$$

$$\left\{ \frac{e^4}{35} \right\}$$

$$18) \log_6 x + \log_6(x + 1) = 1$$

$$\{2\}$$

$$19) \log_7(x + 2) - \log_7 x = \log_7 57$$

$$\left\{ \frac{1}{28} \right\}$$

$$20) \log_5 2x^2 - \log_5 2 = \log_5 56$$

$$\{2\sqrt{14}, -2\sqrt{14}\}$$

Expand each logarithm.

$$21) \ln \left(\frac{10}{3^4} \right)^2$$
$$2 \ln 10 - 8 \ln 3$$

$$22) \log \left(z^3 \sqrt[3]{x} \right)$$
$$3 \log z + \frac{\log x}{3}$$

$$23) \log_8 \left(z^4 \sqrt{x} \right)$$
$$4 \log_8 z + \frac{\log_8 x}{2}$$

Condense each expression to a single logarithm.

$$24) 2 \log_5 x - 2 \log_5 y$$
$$\log_5 \frac{x^2}{y^2}$$

$$25) \log_8 12 + \log_8 11 + 3 \log_8 5$$
$$\log_8 (132 \cdot 5^3)$$

$$26) \log_6 w + \frac{\log_6 u}{2} + \frac{\log_6 v}{2}$$
$$\log_6 (w \sqrt{vu})$$

Evaluate each expression.

$$27) \log_4 16$$
$$2$$

$$28) \log_{216} \frac{1}{6} - \frac{1}{3}$$

$$29) \log_{25} 5 \frac{1}{2}$$

$$30) \log_2 \frac{1}{4}$$
$$-2$$

Use the properties of logarithms and the values below to find the logarithm indicated. Do not use a calculator to evaluate the logs.

$$31) \log_6 7 \approx 1.1$$
$$\log_6 10 \approx 1.3$$
$$\log_6 8 \approx 1.2$$
$$\text{Find } \log_6 \frac{1}{7}$$
$$-1.1$$

$$32) \log_3 8 \approx 1.9$$
$$\log_3 7 \approx 1.8$$
$$\log_3 10 \approx 2.1$$
$$\text{Find } \log_3 \frac{3}{64}$$
$$-2.8$$

$$33) \log_7 12 \approx 1.3$$
$$\log_7 10 \approx 1.2$$
$$\log_7 9 \approx 1.1$$
$$\text{Find } \log_7 1296$$
$$3.7$$

$$34) \log_7 9 \approx 1.1$$
$$\log_7 6 \approx 0.9$$
$$\log_7 10 \approx 1.2$$
$$\text{Find } \log_7 \frac{5}{162}$$
$$-1.7$$