

Name: \_\_\_\_\_

## Logs & Exponentials

Rewrite each equation in exponential form.

1)  $\log_{\frac{1}{2}} v = -1$

$$\left(\frac{1}{2}\right)^{-1} = v$$

2)  $\log_n m = -15$

$$n^{-15} = m$$

3)  $\log_{19} x = y$

$$19^y = x$$

4)  $\log_n \frac{5}{13} = m$

$$n^m = \frac{5}{13}$$

Rewrite each equation in logarithmic form.

5)  $n^6 = m$

$$\log_n(m) = 6$$

6)  $a^{18} = b$

$$\log_a b = 18$$

7)  $20^x = y$

$$\log_{20}(y) = x$$

8)  $x^8 = y$

$$\log_x y = 8$$

Evaluate each expression.

9)  $\log_3 81$

$$\log_3 3^4 = 4$$

10)  $\log_2 4$

$$\log_2 2^2 = 2$$

11)  $\log_6 216$

$$\log_6 6^3 = 3$$

12)  $\log_5 \frac{1}{125}$

$$\log_5 \frac{1}{5^3} = \log_5 5^{-3} = -3$$

Condense each expression to a single logarithm.

$$13) 3\log_8 c + \frac{\log_8 a}{3}$$

$$\log_8 (c^3 \sqrt[3]{a})$$

$$14) 20\log_8 x + 4\log_8 y$$

$$\log_8 (x^{20} y^4)$$

$$15) \frac{\log_2 u}{3} + \frac{\log_2 v}{3} + \frac{\log_2 w}{3}$$

$$\log_2 \sqrt[3]{uvw}$$

$$16) 36\log_9 a - 6\log_9 b$$

$$\log_9 \left( \frac{a^{36}}{b^6} \right)$$

$$17) 2\log_2 x - 8\log_2 y$$

$$\log_2 \left( \frac{x^2}{y^8} \right)$$

$$18) 3\log_5 u + 18\log_5 v$$

$$\log_5 (u^3 v^{18})$$

Expand each logarithm.

$$19) \log (5 \sqrt[3]{8} \cdot 11)$$

$$\log 5 + \frac{1}{3} \log 8 + \frac{1}{3} \log 11$$

$$20) \log_6 \left( \frac{x^4}{y} \right)^6 = \log_6 \frac{x^{24}}{y^6}$$

$$24 \log_6 x - 6 \log_6 y$$

$$21) \log_9 (c \sqrt[3]{a \cdot b})$$

$$\log_9 c + \frac{1}{3} \log_9 a + \frac{1}{3} \log_9 b$$

$$22) \log_5 \frac{x^4}{y^3}$$

$$4 \log_5 x - 3 \log_5 y$$

$$23) \log_3 (w^6 \sqrt[3]{u})$$

$$6 \log_3 w + \frac{1}{3} \log_3 u$$

$$24) \log_3 (u^2 \cdot v)^6 = \log_3 u^{12} v^6$$

$$12 \log_3 u + 6 \log_3 v$$