Name_____Properties of Logarithms Period _____

1. Find the value of y.

(1) $\log_5 25 = y$ (2) $\log_3 1 = y$ (3) $\log_{16} 4 = y$ (4) $\log_2 \frac{1}{8} = y$

(5) $\log_5 1 = y$ (6) $\log_2 8 = y$ (7) $\log_7 \frac{1}{7} = y$ (8) $\log_3 \frac{1}{9} = y$

(9) $\log_y 32 = 5$ (10) $\log_9 y = -\frac{1}{2}$ (11) $\log_4 \frac{1}{8} = y$ (12) $\log_9 \frac{1}{81} = y$

2. Evaluate.

(1) $\log_3 1$ (2) $\log_4 4$ (3) $\log_7 7^3$ (4) $b^{\log_b 3}$ (3) $\log_{25} 5^3$ (4) $16^{\log_4 8}$

3. Write the following expressions in terms of logs of x, y and z.

(1) $\log x^2 y$ (2) $\log \frac{x^3 y^2}{z}$ (3) $\log \frac{\sqrt{x}\sqrt[3]{y^2}}{z^4}$ (4) $\log xyz$

(5) $\log \frac{x}{yz}$ (6) $\log \left(\frac{x}{y}\right)^2$ (7) $\log (xy)^{\frac{1}{3}}$ (8) $\log x\sqrt{z}$

(9) $\log \frac{\sqrt[3]{x}}{\sqrt[3]{yz}}$ (10) $\log \sqrt[4]{\frac{x^3 y^2}{z^4}}$ (11) $\log x\sqrt{\frac{\sqrt{x}}{z}}$ (12) $\log \sqrt{\frac{xy^2}{z^8}}$

4. Write the following equalities in exponential form.

(1) $\log_3 81 = 4$ (2) $\log_7 7 = 1$ (3) $\log_{\frac{1}{2}} \frac{1}{8} = 3$ (4) $\log_3 1 = 0$

(5) $\log_4 \frac{1}{64} = -3$ (6) $\log_6 \frac{1}{36} = -2$ (7) $\log_x y = z$ (8) $\log_m n = \frac{1}{2}$

5. Write the following equalities in logarithmic form.

(1) $8^2 = 64$ (2) $10^3 = 10000$ (3) $4^{-2} = \frac{1}{16}$ (4) $3^{-4} = \frac{1}{81}$

(5) $\left(\frac{1}{2}\right)^{-5} = 32$ (6) $\left(\frac{1}{3}\right)^{-3} = 27$ (7) $x^{2z} = y$ (8) $\sqrt{x} = y$

6. True or False?

(1) $\log\left(\frac{x}{y^3}\right) = \log x - 3\log y$ (2) $\log(a-b) = \log a - \log b$ (3) $\log x^k = k \cdot \log x$

(4) $(\log a)(\log b) = \log(a+b)$ (5) $\frac{\log a}{\log b} = \log(a-b)$ (6) $(\ln a)^k = k \cdot \ln a$

(7) $\log_a a^a = a$ (8) $-\ln\left(\frac{1}{x}\right) = \ln x$ (9) $\ln_{\sqrt{x}} x^k = 2k$