Intro to Logarithms Worksheet

Properties of Simple Logarithms

$\log_a 1 = 0$

$\log_a a = 1$

$\log_a a^x = x$ *and* $a^{\log_a x} = x$ (*inverse property*)

If $\log_a x = \log_a y$ *then* $x = y$

Properties of Natural Logarithms

$\ln 1 = 0$

$\ln e = 1$

$\ln e^x = x$ *and* $e^{\ln x} = x$ (*inverse property*)

If $\ln x = \ln y$ *then* $x = y$

A standard logarithm can have any positive number as its base except 1, whereas a natural log is always base e***. Since the natural log is always base*** e***, it will be necessary to use a calculator to evaluate natural logs unless one of the first three examples of the properties of natural logs is used. For anything such as*** $\ln 2 =$***, a calculator must be used.***

When dealing with logarithms, switching between exponential and Logarithmic form is often necessary.

Logarithmic form	**Exponential Form**
$\log_a b = c$	$a^c = b$

Write each of the following in exponential form.

1) $\log_4 16 = 2$ **2)** $\log_9 3 = \frac{1}{2}$ **3)** $\log_9 27 = \frac{3}{2}$ **4)** $\log_4 \frac{1}{16} = -2$

Write each of the following in logarithmic form.

5) $3^4 = 81$ **6)** $16^{1/4} = 2$ **7)** $36^{-1/2} = \frac{1}{6}$ **8)** $16^{5/4} = 32$

Simplifying Logarithms

Evaluate each of the following logarithms without the use of a calculator. Remember to write in exponential form to help if needed.

9) $\log_3 81 =$

10) $\log_4 \frac{1}{2} =$

11) $\log_{12} 144 =$

12) $\log_6 \frac{1}{36} =$

13) $\log_{\frac{2}{3}} \frac{9}{4} =$

14) $\log_{0.25} 4 =$

15) $\log_3 -3 =$

16) $\log_8 4 =$

17) $\log_{81} \frac{1}{27} =$

18) $\log_{\frac{1}{16}} 32 =$

19) $\log_4 0 =$

20) $\log_{10} 1 =$

21) $\log_4 \frac{1}{8} =$

22) $\log_{27} \frac{1}{3} =$

23) $\log_9 3 =$

24) $\log_6 6^{3x} =$

25) $\log_{36} \frac{1}{6} =$

26) $\log_{128} 2 =$

27) $\log_{\frac{1}{4}} 16 =$

28) $\log_z z^{2x} =$

29) $\ln e^{12} =$

30) $3^{\log_3 5} =$

31) $\ln 1 =$

32) $e^{\ln 4x} =$