Properties of Logarithms - Part 1

Logarithmic Form	Exponential Form
$\log_a x = y$	$x = a^y$

Properties of Logarithms

1. $\log_a 1 = 0$
2. $\log_a a = 1$
3. $\log_a a^x = x$
4. If $\log_a x = \log_a y$, then $x = y$.
5. $\log_a (u \bullet v) = \log_a u + \log_a v$
6. $\log_a \dfrac{u}{v} = \log_a u - \log_a v$
7. $\log_a u^n = n \bullet \log_a u$
8. $\log_a \sqrt[n]{u} = \dfrac{1}{n} \bullet \log_a u$
9. $\log_a x = \dfrac{\log_{10} x}{\log_{10} a}$ where $a \neq 10$ (Change-of-Base Formula)

Directions: Write the logarithmic equation in exponential form.

1. $\log_3 9 = 2$
2. $\log_{16} 4 = \dfrac{1}{2}$
3. $\log 1 = 0$
4. $\log_8 \dfrac{1}{64} = -2$

Directions: Evaluate each logarithmic expression without a calculator.

5. $\log_2 64$
6. $\log_3 81$
7. $\log_9 3$

8. $\log_{10} \frac{1}{1000}$

9. $\log_6 1$

10. $\log_6 6$

Directions: Solve each equation for *x* using the properties of logarithms.

11. $\log_8 x = \log_8 9$

12. $\log_7 7 = x$

13. $\log_6 6^4 = x$

14. $\log_8 1 = x$

Directions: Evaluate each logarithm using the Change-of-Base formula. Round your answer to the nearest thousandth.

15. $\log_3 7$

16. $\log_{\frac{1}{4}} 9$