Introduction to Logarithms

Solve: $2^x = 8$ $4^{2x} = 8$ $3^x = 10$

If $a^y = x$, then $y = \log_a x$ where $a, x > 0$ and $a \neq 0$

This means "y is the exponent we put on *a* to get x". A logarithm is just an exponent!

$\log_a x$ is pronounced "log *x*, base *a*".

Example Evaluate.

a. $\log_5 25$

b. $\log_3 81$

c. $\log_5 \frac{1}{5}$

d. $\log_{16} 4$

e. $\log_2 16\sqrt{2}$

Basic Properties of Logarithms			
$\log_b 1 = 0$	$\log_b b^x = x$	$\log_b b = 1$	$b^{\log_b x} = x$

Example 2 Evaluate.

a. $\log_3 3$

b. $\log_{1000} 1$

c. $4^{\log_4 16}$

Example 3 Express in logarithmic form.

a. $3^2 = 9$ b. $2^9 = 512$ c. $4^3 = 64$

Example 4 Express in exponential form.

a. $\log_4 2 = \frac{1}{2}$ b. $\log_3 27 = 3$ c. $\log_2 64 = 6$

Base 10 Logarithms (Common Logarithms)

$\log_{10} x$ can be written as $\log x$. So when the base is not written in a logarithm, we know it is 10. Logarithms with a base of 10 are called common logarithms. Your calculator can evaluate Base 10 logarithms.

Example 5 Use your calculator to evaluate.

a. $\log 100$ b. $\log 0.5$ c. $\log 0$