> **KEY CONCEPT** *For Your Notebook*
>
> **Definition of Logarithm with Base b**
>
> Let b and y be positive numbers with $b \neq 1$. The **logarithm of y with base b** is denoted by $\log_b y$ and is defined as follows:
>
> $$\log_b y = x \quad \text{if and only if} \quad b^x = y$$
>
> The expression $\log_b y$ is read as "log base b of y."

Ex 1: Rewrite each logarithm in exponential form.

Logarithmic Form	Exponential Form
A. $\log_5 625 = 4$	
B. $\log_2 \frac{1}{16} = -4$	
C. $\log_{64} 4 = \frac{1}{3}$	

Ex 2: Solve for the unknown in the logarithmic equation.

A. $\log_9 x = 2$

B. $\log_5 125 = y$

Ex 3: Use a calculator to evaluate each logarithm. Round to the nearest thousandth.

A. $\log 15.125$ B. $\ln 2.371$ C. $\ln e^2$

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Ex 4: Evaluate each logarithmic expression without a calculator.

A. $log_7 49$

B. $log_3 27$

C. $log_6 \sqrt{6}$

D. $log_3 \frac{1}{9}$

E. $log_{81} 9$

F. $log_{11} 11$

G. $log_6 1$

H. $log_4 4^6$

I. $log_8 32$

Properties of Logarithms

★ $log_b 1 =$

★ $log_b b =$

★ $log_b b^x =$

★ $b^{log_b x} =$

Ex 5: Simplify the expression.

A. $log_6 36^x$

B. $7^{log_7 x}$

C. $10^{log 4}$