Evaluating Logs

$$y = b^x$$

if and only if

$$x = \log_b y$$

Common log:

Natural log:

$2^2 = 4$	$2^7 = 128$	$3^4 = 81$	$5^4 = 625$	$6^4 = 1296$
$2^3 = 8$	$2^8 = 256$	$3^5 = 243$	$5^5 = 3125$	$6^5 = 7776$
$2^4 = 16$	$2^9 = 512$	$3^6 = 729$	$5^6 = 15625$	$7^2 = 49$
$2^5 = 32$	$3^2 = 9$	$5^2 = 25$	$6^2 = 36$	$7^3 = 343$
$2^6 = 64$	$3^3 = 27$	$5^3 = 125$	$6^3 = 216$	$7^4 = 2401$

*Remember that $b^{-1} = \frac{1}{b}$

Example 1 Rewriting logs and exponentials

Rewrite in exponential form.

A] $\log_2 32 = 5$

B] $\log_7 1 = 0$

C] $\log \frac{1}{100} = -2$

D] $\ln \frac{1}{e} = -1$

Rewrite in log form.

A] $6^{-2} = \frac{1}{36}$

B] $81^{1/4} = 3$

C] $10^2 = 100$

D] $e^1 = e$

Example 2 Evaluate each log without a calculator

1]Rewrite the log in exponential form using x as the variable.

2] Get a common base on both sides of the equation.

3] Set exponents equal to solve.

A] $\log_7 343 =$

D] $\log_{16} 8 =$

G] $\log 10^{12} =$

B] $\log 0.001 =$

E] $\log_{27} \frac{1}{9} =$

H] $\log_8 128 =$

C] $\log_{\frac{1}{3}} 729 =$

F] $\ln \frac{1}{e^3} =$

I] $\log_{\frac{1}{5}} \left(\frac{1}{3125}\right) =$

Example 3 Verify that a point is on the graph

1] Substitute x from the given point into the logarithm eqn.

2] Evaluate the log, following the order of operations.

3] Compare with the given y-value.

Circle the points which are on the graph of $y = -3\log_2(x+6) - 2$

(-4,5) (2, -10) (10, -14)