PreCalculus 12 Date _____

Unit 8: Logarithmic Functions

8.1 Understanding Logarithms

Logarithmic Function:

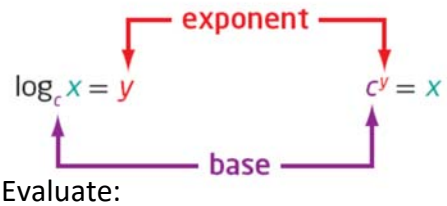
A function of the form $y = \log_c x$, where $c > 0$ and $c \neq 1$.

The inverse of the exponential function $y = c^x$.

Logarithm:

Common Logarithm:

Logarithmic Form **Exponential Form**



Ex. Evaluate:

a) $\log_7 49$ b) $\log_6 1$ c) $\log 0.001$ d) $\log_2 \sqrt{8}$

A few general rules …

$\log_c 1 =$ $\log_c c =$ $\log_c c^x =$ $c^{\log_c x} =$

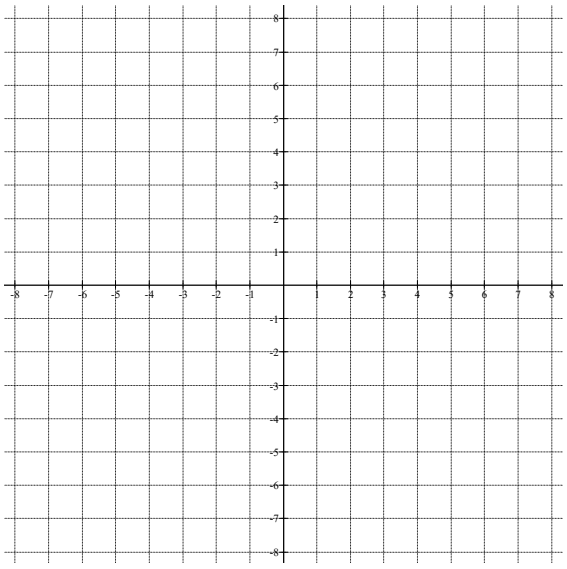
Ex. Determine the value of x:

a) $\log_5 x = -3$ b) $\log_x 36 = 2$ c) $\log_{64} x = \frac{2}{3}$ d) $\log(-100) = x$

Ex. Given $f(x) = 2^x$:

a) State the inverse of $f(x)$.

b) Sketch $f(x) = 2^x$ and its inverse $f^{-1}(x)$. State the domain, range, intercepts, and asymptote equations for each.



Did You Know?

A "standard" earthquake has amplitude of 1 micron, or 0.0001 cm, and magnitude 0. Each increase of 1 unit on the Richter scale is equivalent to a tenfold increase in the intensity of an earthquake.

Ex. The Richter magnitude, *M*, of an earthquake is defined as $M = \log\frac{A}{A_0}$, where A is the amplitude of the ground motion, usually in microns, measured by a sensitive seismometer, and A_0 is the amplitude, corrected for the distance to the actual earthquake, that would be expected for a "standard" earthquake.

a) In 1946, an earthquake struck Vancouver Island off the coast of British Columbia. It had an amplitude that was $10^{7.3}$ times A_0. What was the earthquake's magnitude on the Richter scale?

b) The strongest recorded earthquake in Canada struck Haida Gwaii, off the coast of British Columbia, in 1949. It had a Richter reading of 8.1. How many times as great as A_0 was its amplitude?

c) Compare the seismic shaking of the 1949 Haida Gwaii earthquake with that of the earthquake that struck Vancouver Island in 1946.

Practice: pg. 380/ # 1 – 7, 10 – 16, 18 – 24