#19 ~ Sect. 8.3: Logarithmic Functions as Inverses

If $y = b^x$, then $\log_b y = x$.

Ex. 1 : Write the following equation in logarithmic form.

a) $32 = 2^5$

b) $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$

Ex. 2 : Evaluate each expression.

a) $\log_3 81$

b) $\log_9 27$

c) $\log_{64} \frac{1}{32}$

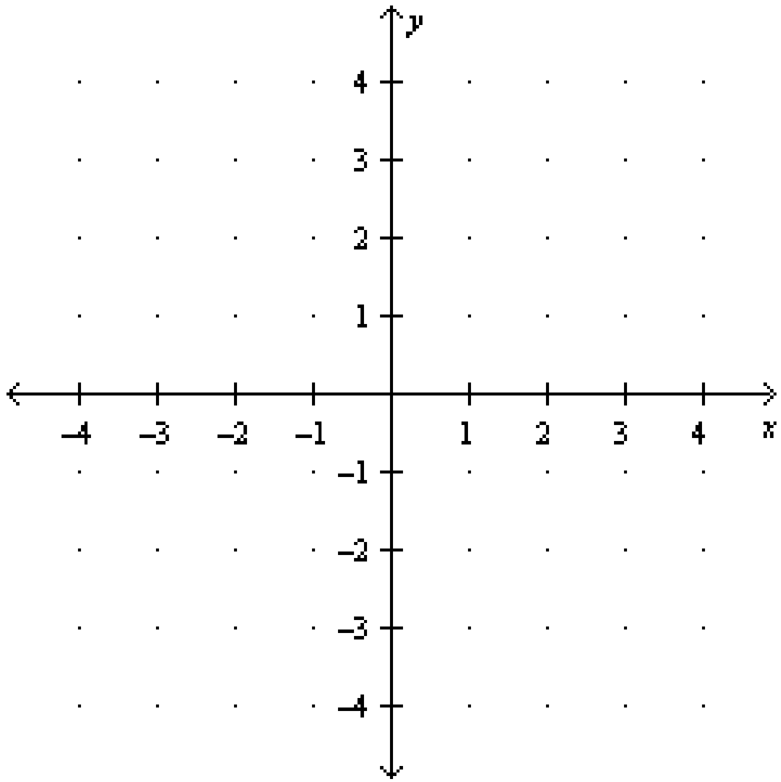
A common logarithm is a logarithm that uses base 10.

You can write the common logarithm $\log_{10} y$ as $\log y$.

A logarithmic function is the inverse of an exponential function.

Therefore, you can graph $y = \log_b x$ as the inverse of $y = b^x$.

Ex. 3: Graph $y = \log_4 x$.



Translation of a Logarithmic Function:

$$y = \log_b (x - h) + k$$

translated right: $x - h$ translated up: $+k$

translated left: $x + h$ translated down: $-k$

Characteristic	$y = \log_b x$	$y = \log_b (x - h) + k$
Asymptote	$x = 0$	$x - h = 0$
Domain	$x > 0$	$x > h$
Range	All real numbers	All real numbers

Ex. 4 : Graph $y = \log_5(x-1)+2$.

Label the vertical asymptote.
State the domain and range.