Name:_____Date:_____Period:___

7.1 Intro to Logarithmic Functions

Complete the table below for the function $f(x) = 2^x$. Then, reverse the coordinates and enter them in Table 2.

Table 1

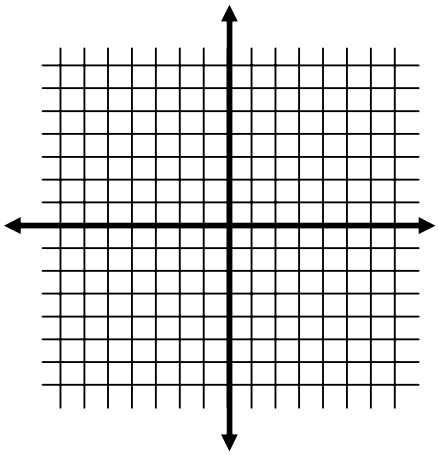
x	f(x)
-2	
-1	
0	
1	
2	
3	

Table 2

x	f(x)

Plot the points from each table on the graph below. Plot Table 1 in blue ink, and plot Table 2 in black. Finally, draw in the line y=x in red ink.

What is the relationship between the blue graph and the black graph?



Remember that when you switch the X and Y coordinates of a function, you create its inverse. The inverse of an Exponential function is a Logarithmic Function. The inverse of the function $y=2^x$ is the function $y=\log_2 X$ (read Log base 2 of X). If the function had been $y=3^x$, its inverse would have been $y=\log_3 X$.

Find the value of each log:

Exponential Form		Logarithmic Form
$2^x=8$	means	$\log_2 8$ = _____
$2^x=16$	means	$\log_2 16$ = _____
$2^x=1$	means	$\log_2 1$ = _____
$2^x=1/2$	means	$\log_2 (1/2)$ = _____
$2^x=N$	means	$\log_2 N$ = _____

What number can the base of a logarithm not be?_____
Why not?
_____
_____
_____

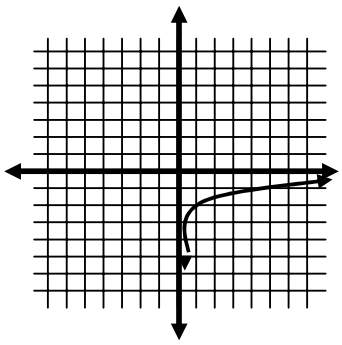
Definition of Logarithm:

If b and N are positive numbers ($b \neq 1$), $\log_b N=k$ if and only if $b^k=N$.

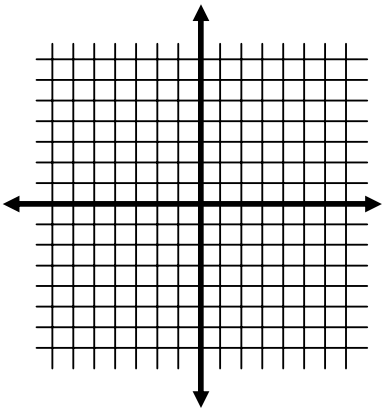
The base that your calculator uses is base 10. When you see y=log X, it is assumed that you are using base 10. This is what it known as the Common Log.

Rewrite y = log X using exponential notation._____

The parent function of a Logarithmic function is $y = \log x$. A sample Logarithmic function (not necessarily $y = \log x$ exactly) is sketched below.



1. Identify a reasonable domain for this function:
2. Identify a reasonable range for this function:
3. Is there an X-intercept? If yes, what is it?
4. Is there a Y-intercept? If yes, what is it?



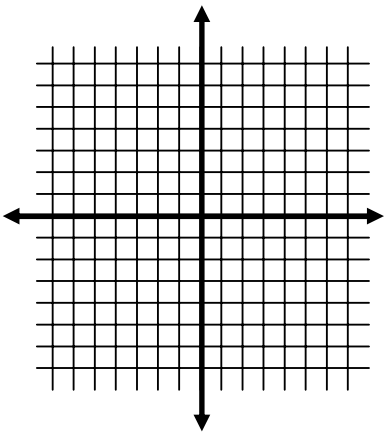
5. Graph the function $y = \log x$ and sketch it below (use a couple of specific points).

6. Identify the domain for this function.

7. Identify the range for this function.

8. Does the function ever cross the x - axis? If yes, identify the x-intercept.

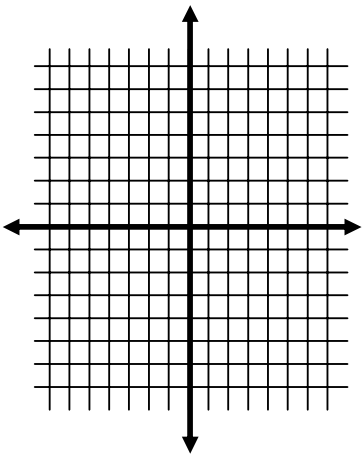
9. Does the function ever cross the y-axis? If yes, identify the y-intercept.



10. Sketch the graphs of:

    a. $y = \log x + 1$ b. $y = \log x - 2$ c. $y = \log(x - 2)$
    d. $y = \log(x + 2)$

11. Now compare the graphs of $y = \log x$ and $y = \log(x - 1) + 2$. What is different and what is the same about the two graphs?



12. Now sketch the graphs of:

    a. y=2log(x) b. y=.5log(x) c. y=-log(x)

13. What does putting multiplying by a negative do to the graph?

14. Write the equation of a graph that is a reduction of the graph of y= log(x) by a factor of .5.

15. Write the equation of a graph that is an enlargement of the graph of y=log(x) by a factor of 5.