

GRAPHING BASIC LOGARITHMS ALGEBRA 2 WITH TRIGONOMETRY

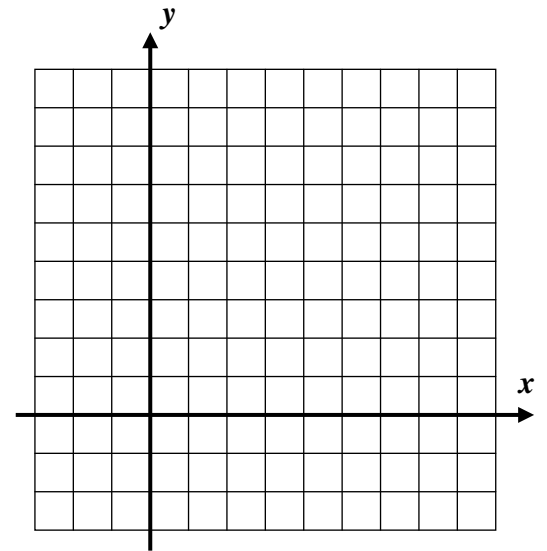
The vast majority of logarithms that are used in the real world have bases greater than one; the pH scale that we saw on the last homework assignment is a good example. In this lesson we will further explore graphs of these logarithms, including their construction, transformations, and domains and ranges.

Exercise #1: Consider the logarithmic function $y = \log_3 x$ and its inverse $y = 3^x$.

- (a) Construct a table of values for $y = 3^x$ and then use this to construct a table of values for the function $y = \log_3 x$.

x	-2	-1	0	1	2
$y = 3^x$					

x					
$y = \log_3 x$					



- (b) Graph $y = 3^x$ and $y = \log_3 x$ on the grid given. Label with equations.

- (c) State the natural domain and range of $y = 3^x$ and $y = \log_3 x$. State your answers in set-builder notation.

$$y = 3^x$$

Domain:

Range:

$$y = \log_3 x$$

Domain:

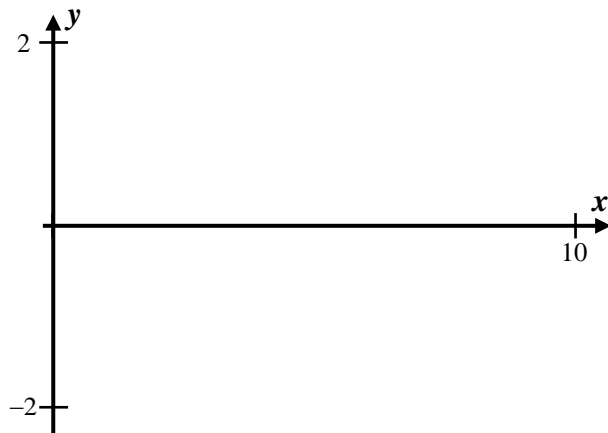
Range:

Exercise #2: Using your calculator, sketch the graph of $y = \log_{10} x$ on the axes below. Label the x -intercept.

State the domain and range of $y = \log_{10} x$.

Domain:

Range:



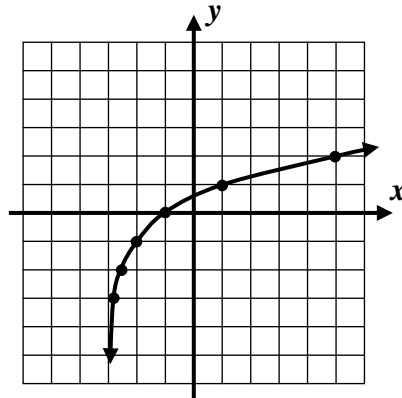
Exercise #3: Which of the following equations describes the graph shown below?

(1) $y = \log_3(x+2) - 1$

(2) $y = \log_2(x-3) + 1$

(3) $y = \log_2(x+3) - 1$

(4) $y = \log_3(x+3) - 1$



The fact that finding the logarithm of a non-positive number (negative or zero) is not possible in the real number system allows us to find the domains of a variety of logarithmic functions.

Exercise #4: Determine the domain of the function $y = \log_2(3x-4)$. State your answer in set-builder notation.

Exercise #5: For the logarithmic function shown below, set up a quadratic inequality that would give the domain of this function. Solve the quadratic inequality to find this domain. State your answer using interval notation.

$$y = \log(x^2 - 3x - 10)$$



GRAPHING BASIC LOGARITHMS
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

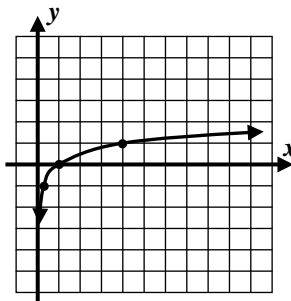
SKILLS

1. The domain of $y = \log_3(x+5)$ in the real numbers is

- (1) $\{x \mid x > 0\}$ (3) $\{x \mid x > 5\}$
 (2) $\{x \mid x > -5\}$ (4) $\{x \mid x \geq -4\}$

2. Which of the following equations describes the graph shown below?

- (1) $y = \log_5 x$ (3) $y = \log_3 x$
 (2) $y = \log_2 x$ (4) $y = \log_4 x$



3. Which of the following represents the y-intercept of the function $y = \log_2(32-x) - 1$?

- (1) 8 (3) -1
 (2) -4 (4) 4

4. Which of the following values of x is *not* in the domain of $f(x) = \log_5(10-2x)$?

- (1) -3 (3) 5
 (2) 0 (4) 4

5. Which of the following is true about the function $y = \log_4(x+16) - 1$?

- (1) It has an x -intercept of 4 and a y -intercept of -1.
 (2) It has x -intercept of -12 and a y -intercept of 1.
 (3) It has an x -intercept of -16 and a y -intercept of 1.
 (4) It has an x -intercept of -16 and a y -intercept of -1.



6. Determine the domains of each of the following logarithmic functions. State your answers in set-builder notation. Be sure to show the inequality that you are solving to find the domain and the work you use to solve the inequality.

(a) $y = \log_5(2x - 1)$

(b) $y = \log(6 - x)$

7. Determine the domain of each of the following logarithmic functions. State your answers in interval notation. Be sure to show the inequality that you are solving to find the domain and the work you use to solve the inequality.

(a) $y = \log_2(16 - x^2)$

(b) $y = \log_4(x^2 - 5x)$

8. Graph the logarithmic function $y = \log_4 x$ on the graph paper given. For a method, see *Exercise #1*.

