

Graphing Exponential and Logarithmic Functions

Exponential Function – An exponential function is any function that can be written in the form of $f(x) = a^x$, where x is a real number, a > 0 and $a \ne 1$. The number a is called the base of the exponential function.

Example: Graph the following exponential function by using a table to find at least three ordered pairs.

$$1) f(x) = 2^x$$

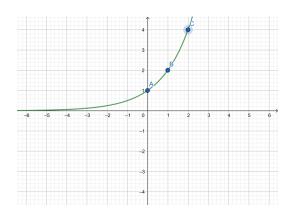
Solution: a) Let x = 0, 1, and 2 and plug into the function to solve for f(x)

A)
$$f(0) = 2^0 = 1$$

B)
$$f(1) = 2^1 = 2$$

B)
$$f(1) = 2^1 = 2$$
 C) $f(2) = 2^2 = 4$

X	у
0	1
1	2
2	4



Example: Graph the following exponential function by using a table to find at least three ordered pairs.

2)
$$f(x) = -2^x$$

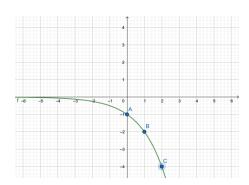
Solution: a) The graph from Example 1 reflected over the x-axis.

A)
$$f(0) = -2^0 = -2^0 = -1$$
 B) $f(1) = -2^1 = -2$ C) $f(2) = -2^2 = -4$

B)
$$f(1) = -2^1 = -2$$

C)
$$f(2) = -2^2 = -4$$

Х	У
0	-1
1	-2
2	-4



Logarithmic Function – Any function in the form of $y = log_a x$ which is the exponent y such that $a^y = x$.

The number a is called the base of the logarithm and a can be any positive constant other than 1.

Example: Graph the following logarithmic function by using a table to find at least three ordered pairs.

3)
$$f(x) = \log_2 x$$

Solution: a) Remember that y = f(x) and in this case $2^y = x$

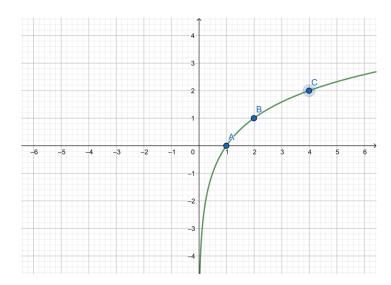
b) Let y = 0, 1, and 2 and plug into the function to solve for x

A)
$$x = 2^0 = 1$$

B)
$$x = 2^1 = 2$$

A)
$$x = 2^0 = 1$$
 B) $x = 2^1 = 2$ C) $x = 2^2 = 4$

Х	У
1	0
2	1
4	2



Example: Graph the following logarithmic function by using a table to find at least three ordered pairs.

$$4) f(x) = -\log_2 x$$

Solution: a) This is the graph of Example 3 has been reflected over the x-axis.

b) Remember that y = f(x) and in this case $2^{-y} = x$

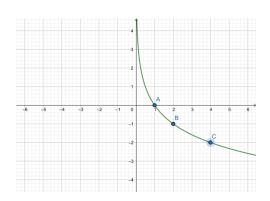
Let y = 0, -1, and -2 and plug into the function to solve for x

A)
$$x = 2^0 = 1$$

A)
$$x = 2^0 = 1$$
 B) $x = 2^{-(-1)} = 2^1 = 2$ C) $x = 2^{-(-2)} = 2^2 = 4$

C)
$$x = 2^{-(-2)} = 2^2 = 4$$

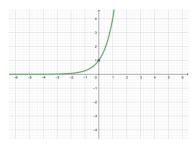
х	У
1	0
2	-1
4	-2



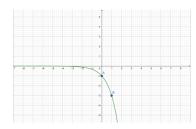
Practice Problems:

Graph the following exponential and logarithmic functions by using a table to make at least three ordered pairs:

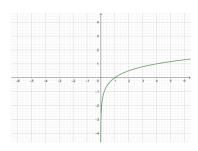
Solution:



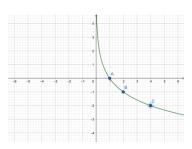
1)
$$f(x) = 4^x$$



2)
$$f(x) = -3^x$$



$$3) f(x) = log_4 x$$



$$4) \ f(x) = -log_3 x$$