

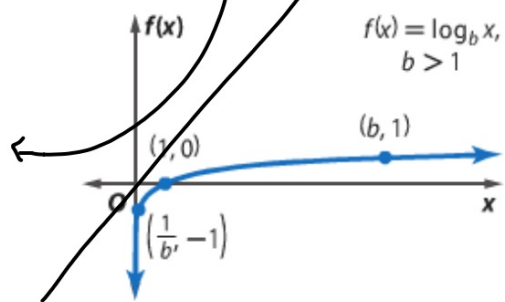
Algebra 2 7.3
Evaluate logarithmic expressions
Graph logarithmic functions
inverse function
base
exponent
logarithm
whiteboards

Quiz 7.1-7.2

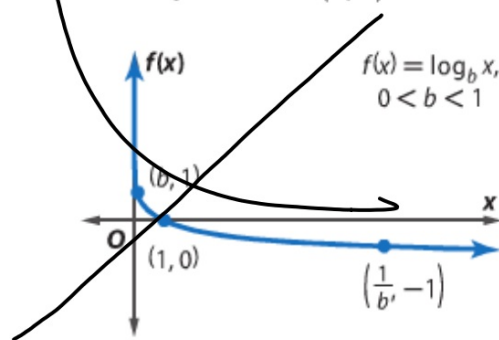


Key Concept Parent Function of Logarithmic Functions

Parent function: $f(x) = \log_b x$
Domain: all positive real numbers
Asymptote: $f(x)$ -axis



Type of graph: continuous, one-to-one
Range: all real numbers
Intercept: $(1, 0)$



$$y = x^2$$

Same process as other parent graph functions

$$y = (x-3)^2 + 5$$

Key Concept Transformations of Logarithmic Functions

$$f(x) = a \log_b (x - h) + k$$

h – Horizontal Translation

h units right if h is positive
 $|h|$ units left if h is negative

k – Vertical Translation

k units up if k is positive
 $|k|$ units down if k is negative

$a \rightarrow \text{neg}$

a – Orientation and Shape

If $a < 0$, the graph is reflected across the x -axis.

If $|a| > 1$, the graph is stretched vertically.

If $0 < |a| < 1$, the graph is compressed vertically.

Graph parent graph and then translate, etc.

$$y = \log_{10} x$$

$$x = 10$$

() or ()

Parent graph
Transform

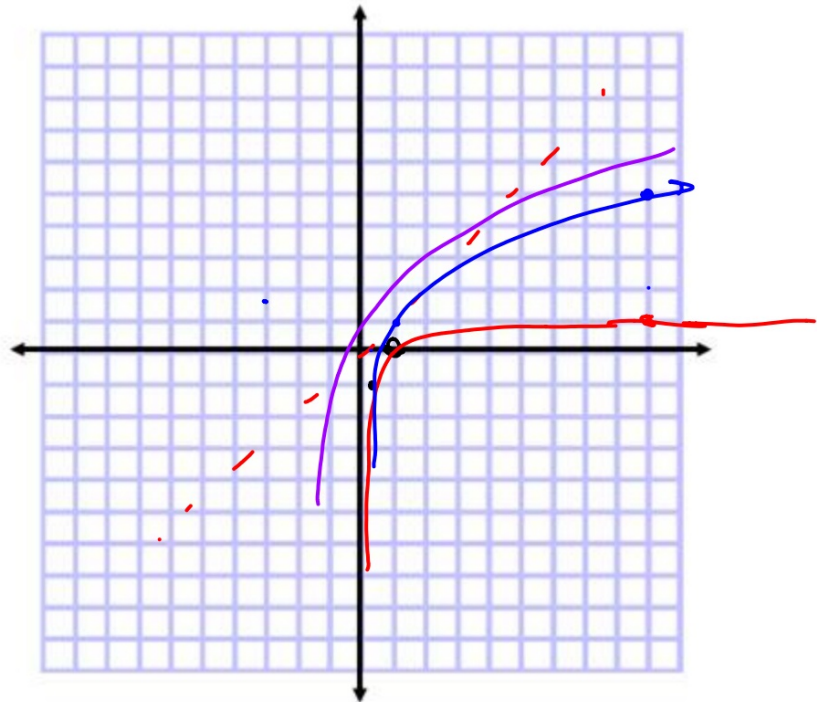
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Example 5 Graph Log

Graph each function.

a. $f(x) = 3 \log_{10}(x + 1)$

x	y
1	0
10	1
0.1	-1



Guided Practice

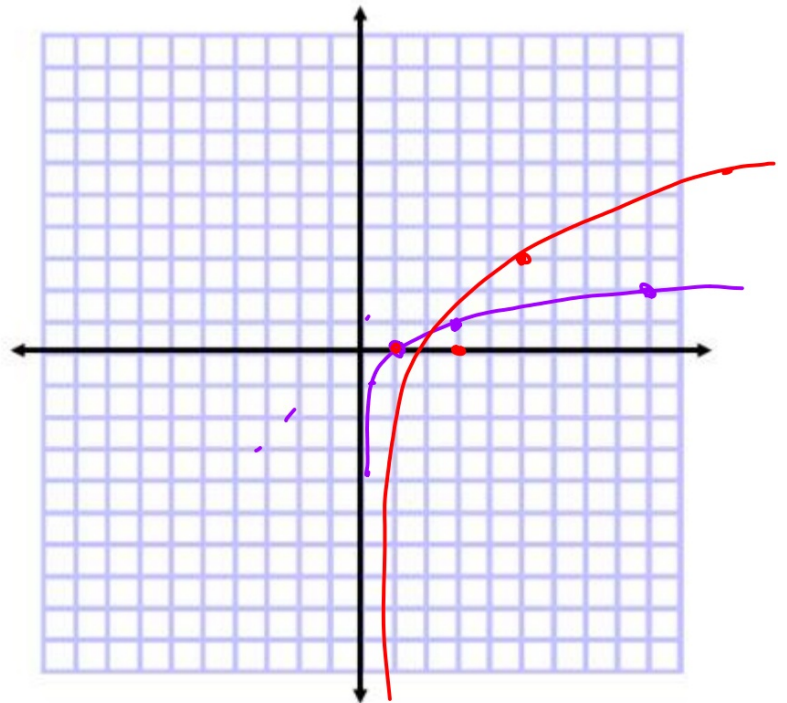
Graph each function.

5A. $f(x) = 2 \log_3(x - 2)$

$y = \log_3 x$

$x = 3^y$

1	0
3	1
9	2
$\frac{1}{3}$	-1



b. $f(x) = \log_{\frac{1}{4}}(x)$

$$y = \log_{1/4} x$$

5B. $f(x) = \log_{\frac{1}{2}}(x)$

Earthquake (Richter Scale)

CA earthquakes last year 5.1

AK earthquake 1964 9.2

10-10-10-10



Real-WorldLink

The largest recorded earthquake in the United States was a magnitude 9.2 that struck Prince William Sound, Alaska, on Good Friday, March 28, 1964.

Source: United States Geological Survey

National
y Images

Real-World Example 6 Find Inverses of Exponential Functions

EARTHQUAKES The Richter scale measures earthquake intensity. The increase in intensity between each number is 10 times. For example, an earthquake with a rating of 7 is 10 times more intense than one measuring 6. The intensity of an earthquake can be modeled by $y = 10^{x-1}$, where x is the Richter scale rating.

- a. Use the information at the left to find the intensity of the strongest recorded earthquake in the United States.



Real-WorldLink

The largest recorded earthquake in the United States was a magnitude 9.2 that struck Prince William Sound, Alaska, on Good

$$\log_{10} y = x - 1$$

What is the antilog? () or not?

b. Write an equation of the form $y = \log_{10} x + c$ for the inverse of the function.

$$23. \quad \overset{\text{loud}}{\downarrow} L = 10 \log_{10} \overset{\text{inten.}}{\downarrow} R$$

$$\frac{120}{10} = \frac{10}{10} \log_{10} R$$

$$12 = \log_{10} R$$

$$10^{12} = R$$

$$24. \log_{10} A = \log_{10} \left[\underset{\uparrow}{1000} (\underset{\uparrow}{1.04})^{\overset{\downarrow}{5}} \right]$$

$$\log_{10} A = \log_{10} \left[1000 (1.04)^5 \right]$$

$$\log_{10} A = \log_{10} 1217$$

$$10^{\log_{10} A} = 1217$$