Algebra 2 7.3

Evaluate logarithmic expressions

Graph logarithmic functions

inverse function

base

exponent

logarithm

whiteboards

$10^2 = 100$

$\log_{10} 100 = 2$ exp

base A.L.

Quiz 7.1-7.2

KeyConcept Parent Function of Logarithmic Functions

Parent function: $f(x) = \log_b x$

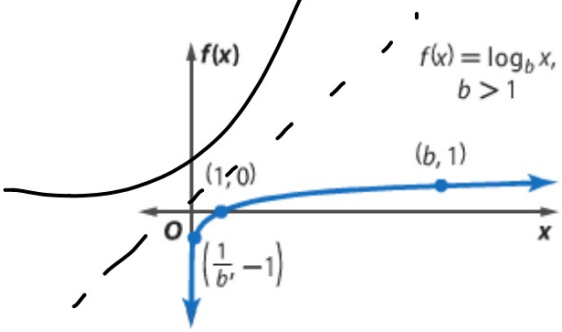
Domain: all positive real numbers

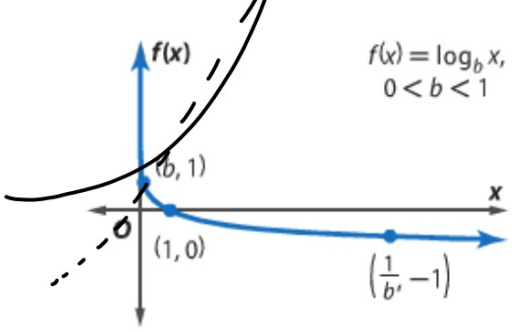
Asymptote: $f(x)$-axis

Type of graph: continuous, one-to-one

Range: all real numbers

Intercept: (1, 0)





Same process as other parent graph functions $y = x^2$ $y = \frac{1}{2}(x-3)^2 + 5$

KeyConcept Transformations of Logarithmic Functions

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

h – Horizontal Translation	k – Vertical Translation
h units right if h is positive $\lvert h \rvert$ units left if h is negative	k units up if k is positive $\lvert k \rvert$ units down if k is negative

a – Orientation and Shape	
If $a < 0$, the graph is reflected across the x-axis.	If $\lvert a \rvert > 1$, the graph is stretched vertically. If $0 < \lvert a \rvert < 1$, the graph is compressed vertically.

Graph parent graph and then translate, etc.

( ) or ( )

??

Parent graph
Transform
Maybe a couple of ordered pairs...

Example 5 Graph Logarithmic Functions

Graph each function.

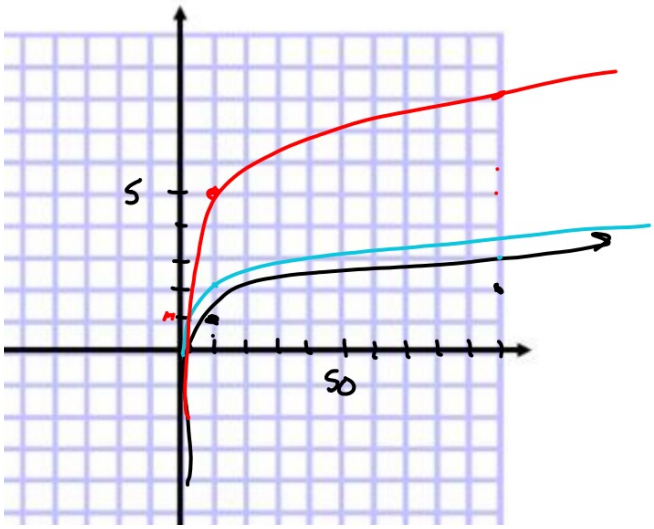
a. $f(x) = 3\log_{10} x + 1$

$y = \log_{10} x$

$y = \log_{10} x$

$x = 10^y$

1	0
10	1
100	2
0.1	−1



GuidedPractice

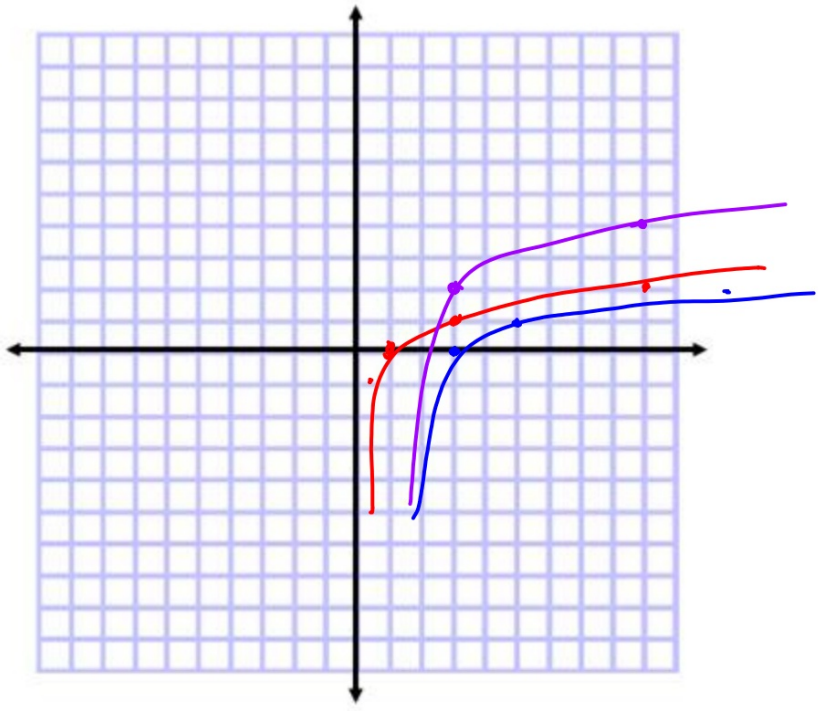
Graph each function.

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. $f(x) = \frac{1}{2}\log_{\frac{1}{4}}(x - 3)$

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

$x = \left(\frac{1}{4}\right)^y$

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

5B. $f(x) = \frac{1}{4}\log_{\frac{1}{2}}(x+1) - 5$

$y = \log_{\frac{1}{2}} x$

$y = \left(\frac{1}{2}\right)^x$

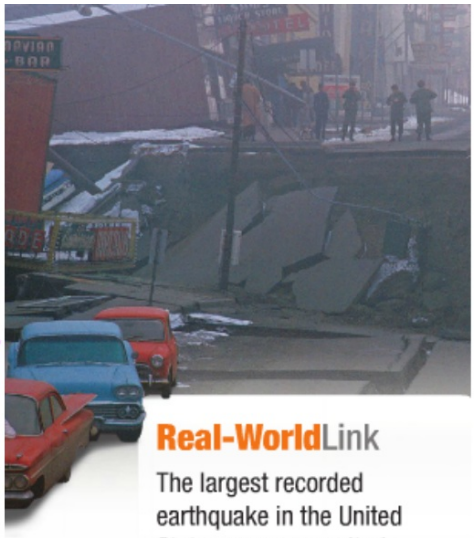
Earthquake (Richter Scale)
CA earthquakes last year: 5.1
AK earthquake 1964 9.2

$\times 10$

5-6-7-8-9

10^4

10,000



Real-World Link

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

lational
y Images

Real-World Example 6 Find Inverses of Exponential Functions

PT

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.

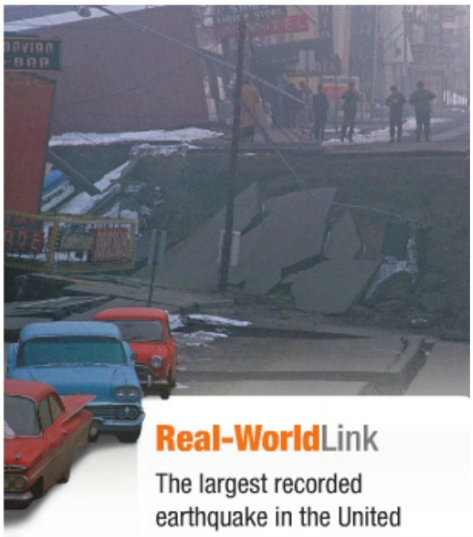
a. Use the information at the left to find the intensity of the strongest recorded earthquake in the United States.

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

$y = 10^{9.2-1}$

$y = 10^{8.2}$

$y \approx 158{,}489{,}319$



Real-World Link

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

What is the antilog? ( ) or not?

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

WB prac. 7.3

ods + 22,24