Assignment

Write

Describe how to estimate the value of a logarithm.

Remember

The value of a logarithmic expression is equal to the value of the exponent in the corresponding exponential expression.

For a fixed base greater than 1, as the value of the argument increases, the value of the logarithm increases as well.

For a fixed argument, when the value of the base is greater than 1 and increasing, the value of the logarithm is decreasing.

Practice

1. Solve for the unknown in each logarithmic equation.

   a. $\log 1000 = n$

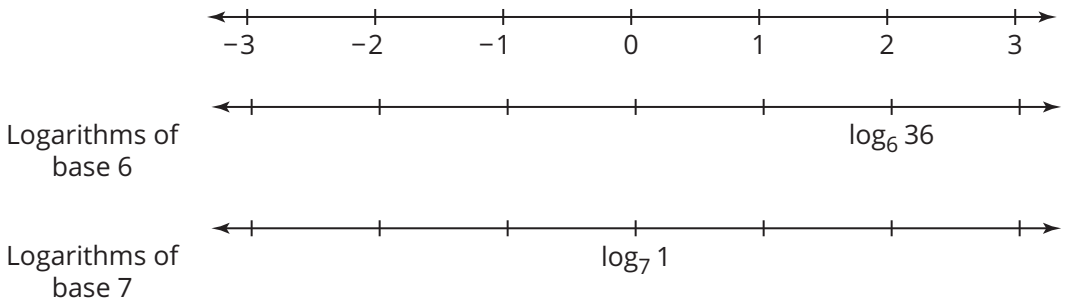
   b. $\log_n \frac{1}{27} = -3$

   c. $\log_{\frac{1}{3}} 81 = n$

   d. $\log_8 16 = n$

2. Consider base 6 and base 7 logarithms.

   a. Label each number line using logarithmic expressions with the indicated base to match the given number line.



   b. Estimate $\log_6 40$.

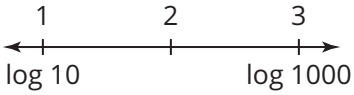
   c. Estimate $\log_7 40$.

   d. Estimate $\log_6 200$.

   e. Estimate $\log_7 100$.

3. Estimate $\log_2 15$ to the nearest tenth. Explain your reasoning.

4. Two students are trying to finish labeling the number line with the base 10 logarithmic expression that equals 2. Dylan says the missing logarithm should be log 505 because 505 is halfway between 10 and 1000, just like 2 is halfway between 1 and 3. Jakob disagrees. He says the missing logarithm should be log 100.



   a. Which student is correct? Explain your reasoning.

   b. For a logarithm with a base greater than 1, how does the argument change for every increase of 1 in the value of the logarithm?

   c. Estimate log 55. Explain your reasoning.

Stretch

Solve the equation $4 = \log_2(x) + \log_2(x - 6)$.

Review

1. Given: $f(x) = 1.5^x$ and $g(x) = -\frac{1}{2}f(4x)$.
   a. Describe the transformation of $f(x)$ that produces $g(x)$.
   b. Write $g(x)$ as an exponential function.
2. Consider $s(x) = 3^{x-1}$, which is a transformation of the function $f(x) = 3^x$.
   a. Describe the transformation(s) of $f(x)$ to produce $s(x)$.
   b. Write the equations of the inverse functions $f^{-1}(x)$ and $s^{-1}(x)$.
   c. Describe the transformation(s) on the graph of $f^{-1}(x)$ to produce $s^{-1}(x)$.
3. Given $p(x) = 2^x$ and $t(x) = 3p(x + 1) + 7$.
   a. Describe the transformation of $p(x)$ that produces $t(x)$.
   b. Write $t(x)$ as an exponential function.
4. Consider the function $h(x)$, which is formed by translating the function $g(x) = \log_3 x$ right 2 units and down 1 unit.
   a. Write $h(x)$ in terms of $g(x)$.
   b. Complete the table by determining the corresponding point on $h(x)$ for each reference point on $g(x)$.

Reference Point on $g(x)$	Corresponding Point on $h(x)$
$(\frac{1}{3}, -1)$	
(1, 0)	
(3, 1)	
(9, 2)	

   c. Write $h(x)$ as a logarithmic function.
   d. List the domain, range, and any asymptotes of the logarithmic function $h(x)$.
5. Determine the quadratic equation that goes through the points $(-1, 10)$, $(2, 4)$, and $(3, -6)$.