

Logarithmic Functions

Name: _____

Date: _____

Concepts

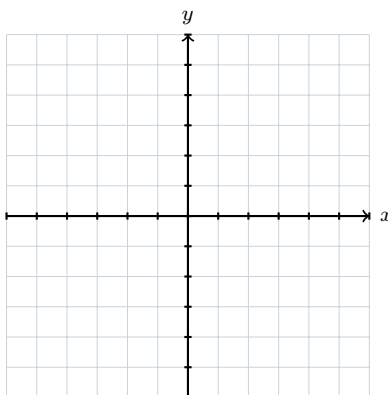
- Finding the Rule of a Logarithmic Function
- Graphing the Logarithmic Function
- Properties of Logarithmic Functions
- The Inverse of the Logarithmic Function
- The Logarithmic Function (theory)
- The Role of the Parameters in a Logarithmic Function

Finding the Rule of a Logarithmic Function

1. The function $f(x) = a \log_2(x - 1)$ passes through the point $(9, 6)$.
 - a) Find the value of a .
 - b) Using this rule, compute $f(5)$ and state the equation of the vertical asymptote.

Graphing the Logarithmic Function

2. Sketch $f(x) = \log_2(x - 1)$ on the grid, using at least three exact points. Give the equation of the vertical asymptote, the domain, the range and the zero.



Properties of Logarithmic Functions

3. Evaluate each expression without a calculator, naming the logarithm property used.

a) $\log_3 81$

b) $\log_5 100 - \log_5 4$

c) $2 \log_2 6 - \log_2 9$

d) $\log_7 1 + \log_4 4$

The Inverse of the Logarithmic Function

4. Let $f(x) = \log_3(x - 2) + 1$. Find the rule of f^{-1} , its domain and its range.

The Logarithmic Function

5. The logarithm is defined by $\log_c(x) = y \iff c^y = x$.
- State the conditions the base c must satisfy for $f(x) = \log_c(x)$ to be a logarithmic function, and say why each excluded value fails.
 - Use the definition to explain why $\log_c(-9)$ does not exist for any admissible base, and deduce the domain and the asymptote of f .

The Role of the Parameters in a Logarithmic Function

6. Consider $f(x) = 2\log_3(x - 4) - 4$.
- State the domain and the equation of the vertical asymptote.
 - Evaluate $f(85)$.
 - Find the zero of f .

Want the harder problems and the worked solutions?

The *Challenge Problems* set and the *Answer Keys* for Logarithmic Functions — with the reasoning written out in full — are available at tutorinmontreal.ca.