

Logarithmic Functions

Name: _____

Date: _____

Concepts

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

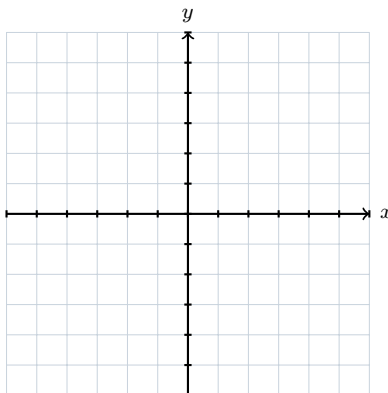
Finding the Rule of a Logarithmic Function

1. The curve of a logarithmic function $f(x) = a \log_2(x - h)$ has the vertical asymptote $x = 3$ and passes through the point $(7, -4)$.
 - a) Find its rule.
 - b) Give the domain of f and the zero of f .
 - c) Evaluate $f(19)$.

Graphing the Logarithmic Function

2. Consider $f(x) = \log_2(x + 4) - 3$.

- Give the equation of the vertical asymptote, the domain and the range.
- Find the zero and the y -intercept, then sketch the curve using also the points of abscissa -3 and -2 .
- Is f increasing or decreasing? Justify.



Properties of Logarithmic Functions

3. Consider $f(x) = -2\log_3(x + 6) + 4$.

- Give the domain and the equation of the asymptote.
- Find the zero of f .
- State the variation of f and justify it from the parameters.
- Give the intervals on which f is positive and negative.

Solving Problems Involving Logarithmic Functions

4. A climbing gym rates how dusty its holds are with a cleanliness index

$$C(n) = 40 - 12 \log n,$$

where $n \geq 1$ is the number of climbers since the last cleaning.

- a) What is the index after 10 climbers?
- b) After how many climbers does the index fall to 4?

The Inverse of the Logarithmic Function

5. Find the rule of the inverse of $f(x) = \log_3(x - 2) + 4$, then state the domain of f and the domain of f^{-1} .

The Logarithmic Function

6. Consider $f(x) = \log_{1/2}(x + 3) - 1$. State its domain, the equation of its asymptote and its direction of variation, then find its zero. Explain in one sentence why $f(-3)$ does not exist.

The Role of the Parameters in a Logarithmic Function

7. Consider $f(x) = 2\log_3(x + 4) - 6$.

- a) Give the equation of the vertical asymptote and the domain.
- b) Is f increasing or decreasing? Justify with the parameters.
- c) 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.