



Graph Logarithms

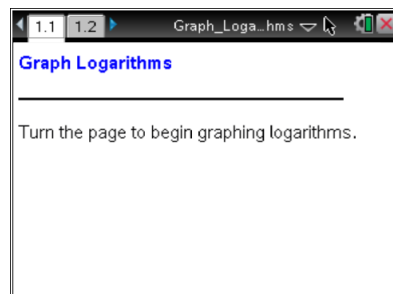
Student Activity

Name _____

Class _____

Open the TI-Nspire document *Graph_Logarithms.tns*.

This activity explores the family of logarithmic functions, $f(x) = \log_a x$ where $a > 0$ and $a \neq 1$. You will investigate the graphs of logarithmic functions and examine their general characteristics, such as end behavior, domain, and range.



Move to page 1.2.

Press **ctrl** **▶** and **ctrl** **◀** to navigate through the lesson.

1. Explore several different **a**-values by clicking Δ or ∇ .
 - a. Set **a** = 1. Describe the graph.
 - b. By definition, for the logarithmic function $f(x) = \log_a(x)$, **a** cannot equal 1. What mathematical reason can you give for this restriction?
 - c. Set **a** = 0. Describe the graph.
 - d. By definition, for the logarithmic function $f(x) = \log_a(x)$, **a** cannot equal 0. What mathematical reason can you give for this restriction?
2. Explore several different **a**-values by clicking Δ or ∇ .
 - a. For what **a**-values is the function increasing? Why?
 - b. For what **a**-values is the function decreasing? Why?



3. Explore several different a -values by clicking Δ or ∇ .
 - a. For each a -value, identify the x -intercept of the function. Interpret your results.

 - b. When $a > 0$, why is there no y -intercept?

 - c. For each a -value, what part of point P remains the same? Interpret your results.

4. Explore several different a -values by clicking Δ or ∇ , such that $a > 1$.
 - a. What does $f(x)$ approach as x approaches ∞ ? Explain.

 - b. What does $f(x)$ approach as x approaches 0 ? Explain.

 - c. What is the equation of the vertical asymptote?

5. Explore several different a -values by clicking Δ or ∇ , such that $0 < a < 1$.
 - a. What does $f(x)$ approach as x approaches ∞ ? Explain.

 - b. What does $f(x)$ approach as x approaches 0 ? Explain.

 - c. What is the equation of the vertical asymptote?

6. Find the domain and range for the family of logarithmic functions $f(x) = \log_a x$ where $a > 0$ and $a \neq 1$.



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7. Gail believes $f(x) = \log_a x$ will eventually intersect the y -axis. Is she correct? Why or why not?

8. Judy believes $f(x) = \log_a x$ has a horizontal asymptote. Is she correct? Why or why not?