

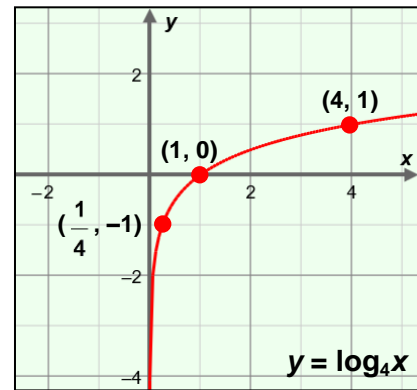


Vocabulary: Logarithmic Functions: Translating and Scaling



Vocabulary

- **Asymptote** – a line that a curve approaches as x or y goes to infinity.
- **Base** – a number or expression raised to an exponent.
 - The logarithmic function $y = \log_b(x)$ is said to have base b , because $y = \log_b(x)$ written in exponential form is $b^y = x$.
- **Domain** – the set of all x -values of a relation or function.
- **Logarithmic function** – the inverse of an exponential function.
 - The logarithmic function $y = \log_b(x)$ is the inverse of $y = b^x$, where $b > 0$ and $b \neq 1$.
 - For example, the function $y = \log_4(x)$, graphed to the right, is logarithmic.
 - “Key points” on the graph of $y = \log_4(x)$ include $(\frac{1}{4}, -1)$, $(1, 0)$, $(4, 1)$, $(16, 2)$, etc.
 - The value of $\log_4(1) = 0$ because $4^0 = 1$.
 - The graph of a logarithmic function is the graph of the associated exponential function reflected over the line $y = x$.
 - A logarithm to the base e (approximately 2.71828) is a *natural logarithm*, and is written as $\ln(x)$.



- **Scale (a function)** – to stretch or shrink a graph by multiplying the x - or y -values of a function by a constant.
 - For example, the graph of $y = 2 \log_4(x) + 3$, shown to the right, has been vertically scaled (stretched) by a factor of 2.
- **Transform (a function)** – to scale, translate, rotate, or reflect the graph of a function.
- **Translate (a function)** – to shift a graph by increasing or decreasing the x - or y -values of a function by a constant.
 - For example, the graph of $y = 2 \log_4(x) + 3$, shown above, has been translated up by 3 units.

