

Unit 8: Logarithmic Functions

8.2 Transformations of Logarithmic Functions

Vertically stretch by a factor of $|a|$ about the x-axis. Reflect in the x-axis if $a < 0$.

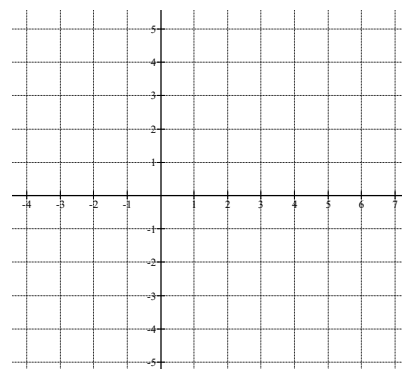
$$y = a \log_c (b(x - h)) + k$$

Vertically translate k units.

Horizontally stretch by a factor of $\left|\frac{1}{b}\right|$ about the y-axis. Reflect in the y-axis if $b < 0$.

Horizontally translate h units.

Ex. Sketch the graph of $y = \log_3(x + 3) + 2$ and identify the requested characteristics.



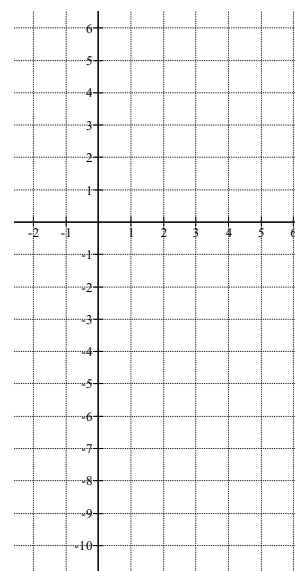
Domain

Asymptote

Range

Intercepts

Ex. Sketch the graph of $y = 3\log_{\frac{1}{2}}(8 - 2x) - 1$ and identify the requested characteristics.



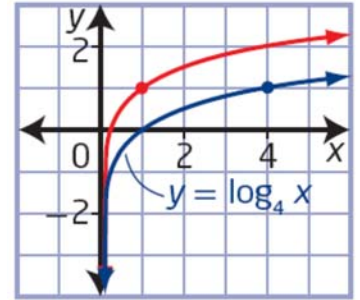
Domain

Asymptote

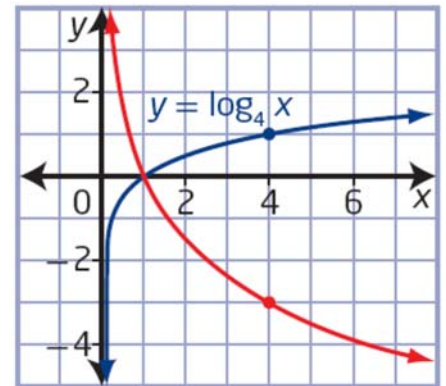
Range

Intercepts

Ex. The red graph can be generated by stretching the blue graph of $y = \log_4 x$. Write the equation that describes the red graph.



Ex. The red graph can be generated by stretching and reflecting the graph of $y = \log_4 x$. Write the equation that describes the red graph.



Ex. Welding is the most common way to permanently join metal parts together. Welders wear helmets fitted with a filter shade to protect their eyes from the intense light and radiation produced by a welding light. The filter shade number, N , is defined by the function $N = \frac{7(-\log T)}{3} + 1$, where T is the fraction of visible light that passes through the filter. Shade numbers range from 2 to 14, with a lens shade number of 14 allowing the least amount of light to pass through. The correct filter shade depends on the type of welding. A shade number 12 is suggested for arc welding. What fraction of visible light is passed through the filter to the welder, as a percent to the nearest ten thousandth?