

ACTIVITY 8.5

Using Technology

Graphing Calculator Activity for use with Lesson 8.5

Graphing Logarithmic Functions

You can use a graphing calculator to graph logarithmic functions simply by using the **LOG** or **LN** key. To graph a logarithmic function having a base other than 10 or e , you need to use the change-of-base formula to rewrite the function in terms of common or natural logarithms.

EXAMPLE

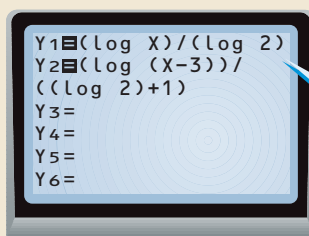
Use a graphing calculator to graph $y = \log_2 x$ and $y = \log_2(x - 3) + 1$.

SOLUTION

- 1 Rewrite each function in terms of common logarithms.

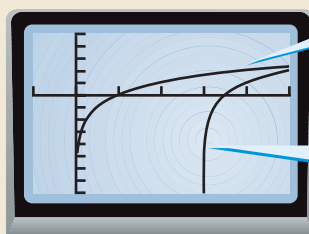
$$\begin{aligned}y &= \log_2 x & y &= \log_2(x - 3) + 1 \\ &= \frac{\log x}{\log 2} & &= \frac{\log(x - 3)}{\log 2} + 1\end{aligned}$$

- 2 Enter each function into a graphing calculator.



Although the calculator will correctly evaluate the function without parentheses, you can include them for clarity.

- 3 Graph the functions.



The graph of $y = \log_2 x$ passes through $(1, 0)$, and the line $x = 0$ is a vertical asymptote.

The graph of $y = \log_2(x - 3) + 1$ passes through $(4, 1)$, and the line $x = 3$ is a vertical asymptote.

EXERCISES

Use a graphing calculator to graph the function. Give the coordinates of a point through which the graph passes, and state the vertical asymptote of the graph.

- $y = \log_3 x$
- $y = \log_9 x$
- $y = \log_4 x$
- $y = \log_7 x$
- $y = \log_5 x$
- $y = \log_{11} x$
- $y = \log_5(x - 2)$
- $y = \log_4(x + 1)$
- $y = \log_2(x - 5) - 3$
- $y = \log_4(x - 7) + 9$
- $y = \log_5(x + 2) + 6$
- $y = \log_7(x - 4) + 4$
- Compare the domains of the graphs of $y = \log x$ and $y = \log |x|$.

STUDENT HELP



See keystrokes for several models of calculators at www.mcdougallittell.com