

**ACTIVITY 8.5**  
Using Technology

# Graphing Logarithmic Functions

Graphing Calculator Activity for use with Lesson 8.5

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

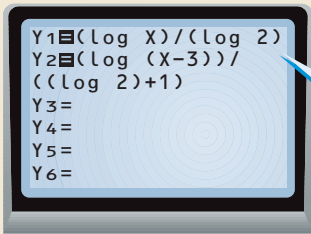
Use a graphing calculator to graph  $y = \log_2 x$  and  $y = \log_2 (x - 3) + 1$ .

## SOLUTION

- Rewrite each function in terms of common logarithms.

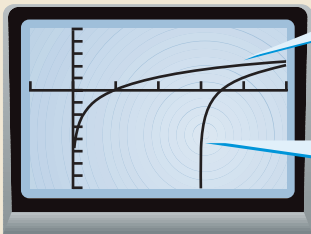
$$\begin{aligned} y &= \log_2 x & y &= \log_2 (x - 3) + 1 \\ &= \frac{\log x}{\log 2} & &= \frac{\log (x - 3)}{\log 2} + 1 \end{aligned}$$

- Enter each function into a graphing calculator.



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

- 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



### KEYSTROKE HELP

See keystrokes for several models of calculators at [www.mcdougallittell.com](http://www.mcdougallittell.com)