

## Investigate Families of Lines



Use appropriate tools strategically.

**QUESTION** How can you use a graphing calculator to find equations of lines using slopes and  $y$ -intercepts?

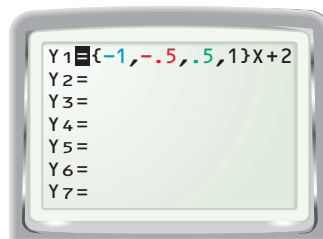
Recall that you can create families of lines by varying the value of either  $m$  or  $b$  in  $y = mx + b$ . The constants  $m$  and  $b$  are called *parameters*. Given the value of one parameter, you can determine the value of the other parameter if you also have information that uniquely identifies one member of the family of lines.

**EXAMPLE 1** Find the slope of a line and write an equation

In the same viewing window, display the four lines that have slopes of  $-1$ ,  $-0.5$ ,  $0.5$ , and  $1$  and a  $y$ -intercept of  $2$ . Then use the graphs to determine which line passes through the point  $(12, 8)$ . Write an equation of the line.

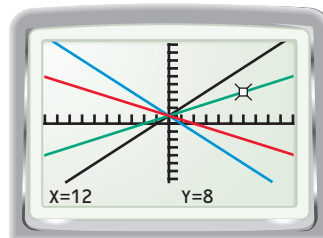
**STEP 1** Enter equations

Press  $\boxed{Y=}$  and enter the four equations. Because the lines all have the same  $y$ -intercept, they constitute a family of lines and can be entered as shown.



**STEP 2** Display graphs

Graph the equations in an appropriate viewing window. Press  $\boxed{\text{TRACE}}$  and use the left and right arrow keys to move along one of the lines until  $x = 12$ . Use the up and down arrow keys to see which line passes through  $(12, 8)$ .



**STEP 3** Find the line

The line that passes through  $(12, 8)$  is the line with a slope of  $0.5$ . So, an equation of the line is  $y = 0.5x + 2$ .

### PRACTICE

Display the lines that have the same  $y$ -intercept but different slopes, as given, in the same viewing window. Determine which line passes through the given point. Write an equation of the line.

- Slopes:  $-3, -2, 2, 3$ ;  $y$ -intercept:  $5$ ; point:  $(-3, 11)$
- Slopes:  $4, -2.5, 2.5, 4$ ;  $y$ -intercept:  $-1$ ; point:  $(4, -11)$
- Slopes:  $-2, -1, 1, 2$ ;  $y$ -intercept:  $1.5$ ; point:  $(1, 3.5)$