

5.1 Investigate Families of Lines



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

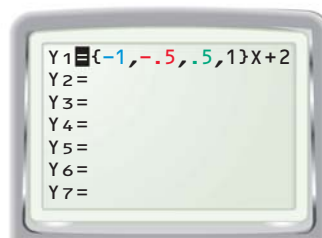
Recall from Chapter 4 that you can create families of lines by varying the value of either m or b in $y = mx + b$. The constants m and b are called *parameters*. Given the value of one parameter, you can determine the value of the other parameter if you also have information that uniquely identifies 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.

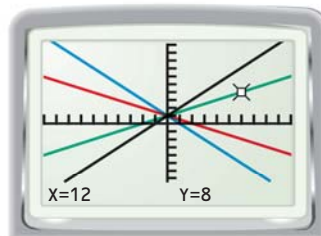
STEP 1 Enter equations

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: $(1, 3.5)$