5-9

Technology LAB

Use with Lesson 5-9

The Family of Linear Functions

A *family of functions* is a set of functions whose graphs have basic characteristics in common. For example, all linear functions form a family. You can use a graphing calculator to explore families of functions.
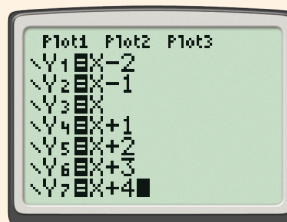
Activity

Graph the lines described by $y = x - 2$, $y = x - 1$, $y = x$, $y = x + 1$, $y = x + 2$, $y = x + 3$, and $y = x + 4$. How does the value of b affect the graph described by $y = x + b$?

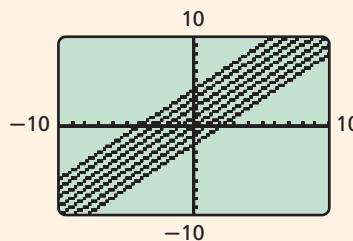**1** All of the functions are in the form $y = x + b$. Enter them into the Y= editor.

| Y= | X,T,θ,n | — | 2 | ENTER |

| X,T,θ,n | — | 1 | ENTER |

and so on.

2 Press ZOOM and select **6:Zstandard.** Think about the different values of b as you watch the graphs being drawn. Notice that the lines are all parallel.

3 It appears that the value of b in $y = x + b$ shifts the graph up or down—up if b is positive and down if b is negative.

Try This

1. Make a prediction about the lines described by $y = 2x - 3$, $y = 2x - 2$, $y = 2x - 1$, $y = 2x$, $y = 2x + 1$, $y = 2x + 2$, and $y = 2x + 3$. Then graph. Was your prediction correct?

2. Now use your calculator to explore what happens to the graph of $y = mx$ when you change the value of m.

    a. Make a Prediction How do you think the lines described by $y = -2x$, $y = -x$, $y = x$, and $y = 2x$ will be related? How will they be alike? How will they be different?

    b. Graph the functions given in part **a**. Was your prediction correct?

    c. How is the effect of m different when m is positive from when m is negative?