Graphing Calculator

A Follow-Up of Lesson 8-6

Sharp EL-9900

Families of Graphs

A graphing calculator is a valuable tool when investigating characteristics of linear functions. Before graphing, you must create a viewing window that shows both the x- and y-intercepts of the graph of a function.

You can use the standard viewing window [−10, 10] scl: 1 by [−10, 10] scl: 1 or set your own minimum and maximum values for the axes and the scale factor by using the WINDOW option.

You can use a Sharp EL-9900 graphing calculator to enter several functions and graph them at the same time on the same screen. This is useful when studying a **family of graphs**. A family of linear graphs is related by having the same slope or the same y-intercept.

The tick marks on the x scale and on the y scale are 1 unit apart.

[−10, 10] scl: 1 by [−10, 10] scl: 1

The x-axis goes from −10 to 10.

The y-axis goes from −10 to 10.

Graph $y = 3x - 2$ and $y = 3x + 4$ in the standard viewing window and describe how the graphs are related.

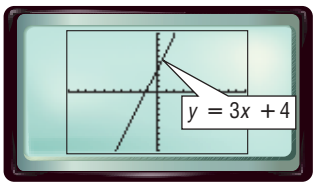
Step 1 *Graph $y = 3x + 4$ in the standard viewing window.*

- Clear any existing equations from the Y= list.

  KEYSTROKES: Y= CL

- Enter the equation and graph.

  KEYSTROKES: Y= 3 X/θ/T/n + 4 ENTER ZOOM 5



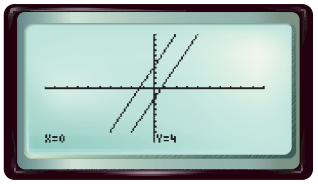
Step 2 *Graph $y = 3x - 2$.*

- Enter the function $y = 3x - 2$ as Y2 with $y = 3x + 4$ already existing as Y1.

  KEYSTROKES: Y= ▼ 3 X/θ/T/n − 2 ENTER

- Graph both functions in the standard viewing window.

  KEYSTROKES: ZOOM 5



The first function graphed is Y1 or $y = 3x + 4$. The second function graphed is Y2 or $y = 3x - 2$. Press TRACE. Move along each function using the right and left arrow keys. Move from one function to another using the up and down arrow keys. The graphs have the same slope, 3, but different y-intercepts at 4 and −2.

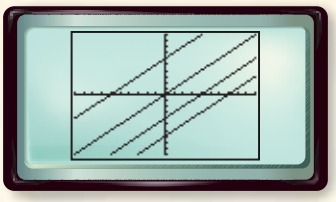
www.pre-alg.com/other_calculator_keystrokes

Investigation

Exercises

Graph $y = 2x - 5$, $y = 2x - 1$, and $y = 2x + 7$.

1. Compare and contrast the graphs. **They all have the same slope, different *y*-intercepts.**
2. How does adding or subtracting a constant c from a linear function affect its graph? **It shifts the graph vertically c units.**
3. Write an equation of a line whose graph is parallel to $y = 3x - 5$, but is shifted up 7 units. **$y = 3x + 2$**
4. Write an equation of the line that is parallel to $y = 3x - 5$ and passes through the origin. **$y = 3x$**
5. Four functions with a slope of 1 are graphed in the standard viewing window, as shown at the right. Write an equation for each, beginning with the left-most graph.
   $y = x + 6$, $y = x$, $y = x - 4$, $y = x - 7$

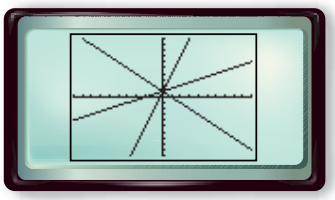


Clear all functions from the Y= menu and graph $y = \frac{1}{3}x$, $y = \frac{3}{4}x$, $y = x$, and $y = 4x$ in the standard viewing window. **6. See margin.**

6. How does the steepness of a line change as the coefficient for x increases?
7. Without graphing, determine whether the graph of $y = 0.4x$ or the graph of $y = 1.4x$ has a steeper slope. Explain. **$y = 1.4x$, because $1.4 > 0.4$**

Clear all functions from the Y= menu and graph $y = -4x$ and $y = 4x$.

8. How are these two graphs different? **8–11. See margin.**
9. How does the sign of the coefficient of x affect the slope of a line?
10. Clear Y2. Then with $y = -4x$ as Y1, enter $y = -x$ as Y2 and $y = -\frac{1}{2}x$ as Y3. Graph the functions and draw the three graphs on grid paper. How does the steepness of the line change as the absolute value of the coefficient of x increases?
11. The graphs of $y = 3x + 1$, $y = \frac{1}{2}x + 1$, and $y = -x + 1$ are shown at the right. Draw the graphs on the same coordinate grid and label each graph with its equation.



12. Describe the similarities and differences between the graph of $y = 2x - 3$ and the graph of each equation listed below.
    a. $y = 2x + 3$ **a–c. See margin.**
    b. $y = -2x - 3$
    c. $y = 0.5x + 3$
13. Write an equation of a line whose graph lies between the graphs of $y = -3x$ and $y = -6x$. **Sample answer: $y = -4x$**