



# Graphing Calculator

A Follow-Up of Lesson 5-8

Sharp EL-9900

## Solving Radical Equations and Inequalities by Graphing

You can use a Sharp EL-9900 to solve radical equations and inequalities. One way to do this is by rewriting the equation or inequality so that one side is 0 and then using the zero feature on the calculator.

Solve  $\sqrt{x} + \sqrt{x+2} = 3$ .

### Step 1 Rewrite the equation.

- Subtract 3 from each side of the equation to obtain  $\sqrt{x} + \sqrt{x+2} - 3 = 0$ .
- Enter the function  $y = \sqrt{x} + \sqrt{x+2} - 3$  in the Y= list.

**KEYSTROKES:** Review entering a function on page 128.

### Step 2 Use a table.

- You can use the TABLE function to locate intervals where the solution(s) lie. First, enter the starting value and the interval for the table.

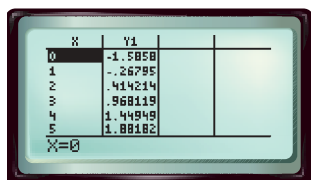
**KEYSTROKES:**  $2^{nd}$ F [TBLSET] [ENTER]  $\nabla$  0  
[ENTER] 1 [ENTER]



### Step 3 Estimate the solution.

- Complete the table and estimate the solution(s).

**KEYSTROKES:** [TABLE]

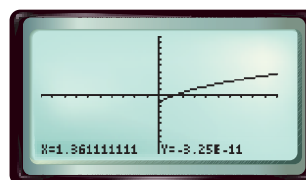


Since the function changes sign from negative to positive between  $x = 1$  and  $x = 2$ , there is a solution between 1 and 2.

### Step 4 Use the X\_Incpt feature.

- Graph, then select X\_Incpt from the CALC menu.

**KEYSTROKES:** [GRAPH]  $2^{nd}$ F [CALC] 5



[-10, 10] scl: 1 by [-10, 10] scl: 1

The solution is about 1.36. This agrees with the estimate made by using the TABLE.



[www.algebra2.com/other\\_calculator\\_keystrokes](http://www.algebra2.com/other_calculator_keystrokes)

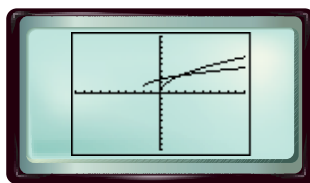
# Investigation

Instead of rewriting an equation or inequality so that one side is 0, you can also treat each side of the equation or inequality as a separate function and graph both.

Solve  $2\sqrt{x} > \sqrt{x+2} + 1$ .

**Step 1** Graph each side of the inequality.

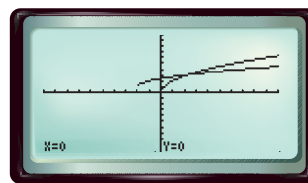
- In the  $Y=$  list, enter  $y_1 = 2\sqrt{x}$  and  $y_2 = \sqrt{x+2} + 1$ . Then press **GRAPH**.



$[-10, 10]$  scl: 1 by  $[-10, 10]$  scl: 1

**Step 2** Use the trace feature.

- Press **TRACE**. You can use  $\blacktriangle$  or  $\blacktriangledown$  to switch the cursor between the two curves.



$[-10, 10]$  scl: 1 by  $[-10, 10]$  scl: 1

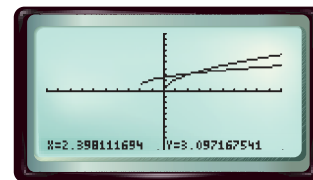
The calculator screen above shows that, for points to the left of where the curves cross,  $Y_1 < Y_2$  or  $2\sqrt{x} < \sqrt{x+2} + 1$ . To solve the original inequality, you must find points for which  $Y_1 > Y_2$ . These are the points to the right of where the curves cross.

**Step 3** Use the intersect feature.

- You can use the **INTERSECT** feature on the **CALC** menu to approximate the  $x$ -coordinate of the point at which the curves cross.

**KEYSTROKES:** **2nd F** **[CALC]** **2**

The calculator screen shows that the  $x$ -coordinate of the point at which the curves cross is about 2.40. Therefore, the solution of the inequality is about  $x > 2.40$ . Use the symbol  $>$  instead of  $\geq$  in the solution because the symbol in the original inequality is  $>$ .



$[-10, 10]$  scl: 1 by  $[-10, 10]$  scl: 1

**Exercises** 4. about 3.89 5. about 2.52 8. about  $0 \leq x < 1$  9. about  $1 \leq x < 4.52$

Solve each equation or inequality.

- $\sqrt{x+4} = 3$  **5**
- $\sqrt{3x-5} = 1$  **2**
- $\sqrt{x+5} = \sqrt{3x+4}$  **0.5**
- $\sqrt{x+3} + \sqrt{x-2} = 4$
- $\sqrt{3x-7} = \sqrt{2x-2} - 1$
- $\sqrt{x+8} - 1 = \sqrt{x+2}$  **4.25**
- $\sqrt{x-3} \geq 2$   **$x \geq 7$**
- $\sqrt{x+3} > 2\sqrt{x}$
- $\sqrt{x} + \sqrt{x-1} < 4$

- Explain how you could apply the technique in the first example to solving an inequality. **See margin.**