Graphing Calculator Lab

Sharp EL-9900C

Solving Radical Equations and Inequalities

You can use a **Sharp EL-9900C** graphing calculator 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.

ACTIVITY 1 **Solve $\sqrt{x} + \sqrt{x+2} = 3$.**

Step 1 Rewrite the equation.

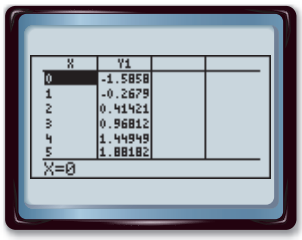
- Subtract 3 from each side of the equation to obtain $\sqrt{x} + \sqrt{x+2} - 3 = 0$.
- Enter the function $y = \sqrt{x} + \sqrt{x+2} - 3$ in the Y= list.

KEYSTROKES: *Review entering a function in your textbook.*

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.

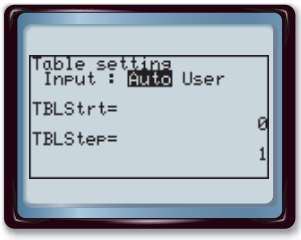
KEYSTROKES: 2ndF TBLSET



Step 3 Estimate the solution.

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

KEYSTROKES: TABLE

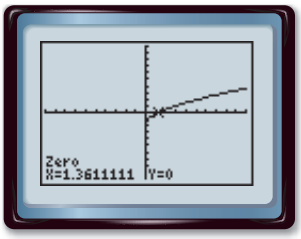


Since the function changes sign from negative to positive between $x = 1$ and $x = 2$, there is a solution between 1 and 2.

Step 4 Use the zero feature.

- Graph, then select zero from the CALC menu.

KEYSTROKES: GRAPH 2nd [CALC] 2



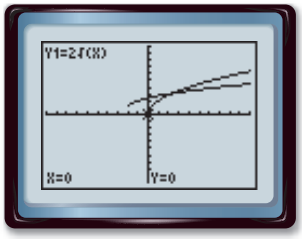
[−10, 10] scl: 1 by [−10, 10] scl: 1

Place the cursor to the left of the zero and press ENTER for the Left Bound. Then place the cursor to the right of the zero and press ENTER for the Right Bound. Press ENTER to solve. The solution is about 1.36. This agrees with the estimate made by using the TABLE.

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

Step 1 Graph each side of the inequality and use the trace feature.

- 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

- Press TRACE. You can use ▲ or ▼ to switch the cursor between the two curves.

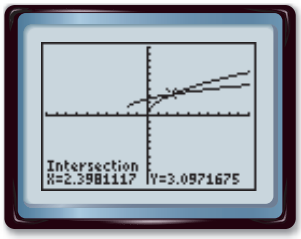
The calculator screen above shows that, for points to the left of where the curves cross, Y1 < Y2 or $2\sqrt{x} < \sqrt{x+2} + 1$. To solve the original inequality, you must find points for which Y1 > Y2. These are the points to the right of where the curves cross.

Step 2 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 [CALC] 5

- Press ENTER for each of First curve?, Second curve?, and Guess?.



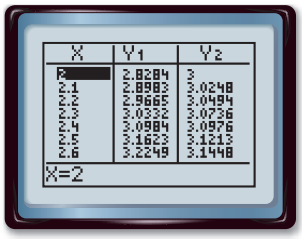
[−10, 10] scl: 1 by [−10, 10] scl: 1

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 > in the solution because the symbol in the original inequality is >.*

Step 3 **Use the TABLE feature to check your solution.**

Start the table at 2 and show x-values in increments of 0.1. Scroll through the table.

KEYSTROKES: 2nd [TBLSET] 2 ENTER .1 ENTER 2nd [TABLE]



Notice that when x is less than or equal to 2.4, Y1 < Y2. This verifies the solution $\{x \mid x > 2.40\}$.

EXERCISES

Solve each equation or inequality.

1. $\sqrt{x+4} = 3$ **2.** $\sqrt{3x-5} = 1$ **3.** $\sqrt{x+5} = \sqrt{3x+4}$

4. $\sqrt{x+3} + \sqrt{x-2} = 4$ **5.** $\sqrt{3x-7} = \sqrt{2x-2} - 1$ **6.** $\sqrt{x+8} - 1 = \sqrt{x+2}$

7. $\sqrt{x-3} \geq 2$ **8.** $\sqrt{x+3} > 2\sqrt{x}$ **9.** $\sqrt{x} + \sqrt{x-1} < 4$

10. Explain how you could apply the technique in the first example to solving an inequality.