Graphing Calculator

A Follow-Up of Lesson 5-8

TI-73

Solving Radical Equations and Inequalities by Graphing

You can use a TI-73 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.*

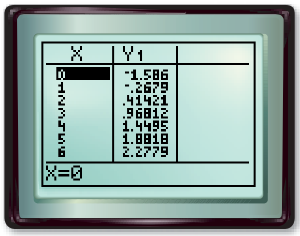
- You can use the TABLE function to locate intervals where the solution(s) lie. First, enter the starting value and the interval for the table.

KEYSTROKES: [2nd] [TBLSET] 0 [ENTER] 1 [ENTER]

Step 3 *Estimate the solution.*

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

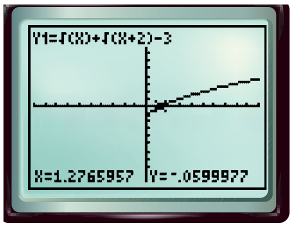
KEYSTROKES: [2nd] [TABLE]



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 trace feature.*

- **KEYSTROKES:** [TRACE]



Use the arrow keys to get as close as possible to the x-axis.

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

www.algebra2.com/other_calculator_keystrokes

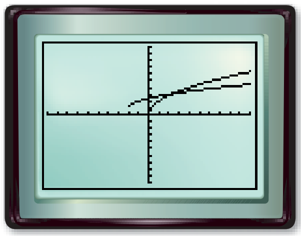
Investigation

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.*

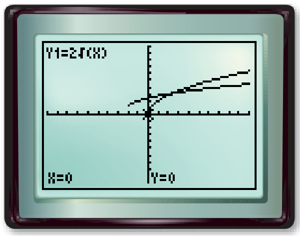
- In the Y= list, enter $y_1 = 2\sqrt{x}$ and $y_2 = \sqrt{x + 2} + 1$. Then press GRAPH.



[−10, 10] scl: 1 by [−10, 10] scl: 1

Step 2 *Use the trace feature.*

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



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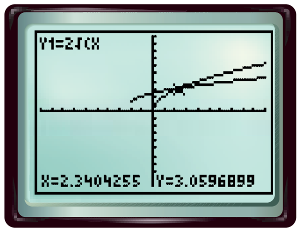
The calculator screen above shows that, for points to the left of where the curves cross, $Y_1 < Y_2$ or $2\sqrt{x} < \sqrt{x + 2} + 1$. To solve the original inequality, you must find points for which $Y_1 > Y_2$. These are the points to the right of where the curves cross.

Step 3 *Continue to use trace.*

The calculator screen shows that the x-coordinate of the point at which the curves cross is about 2.34. Therefore, the solution of the inequality is about $x > 2.34$. *Use the symbol $>$ instead of $\geq$ in the solution because the symbol in the original inequality is $>$.*



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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.

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

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

3. $\sqrt{x + 5} = \sqrt{3x + 4}$ **0.5**

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

5. $\sqrt{3x - 7} = \sqrt{2x - 2} - 1$

6. $\sqrt{x + 8} - 1 = \sqrt{x + 2}$ **4.25**

7. $\sqrt{x - 3} \geq 2$ $\boldsymbol{x \geq 7}$

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. **See margin.**