Introducing Radical equations in a Developmental Math classroom:

When teaching solving with radical equations, how many of us still use algebraic skills to introduce the topic? Whether your curriculum is reform based or traditional, chances are in many text books that are in use today, solving radical equations would mimic the following steps.

Problem: **Solve** $2\sqrt{x+2} = 10$

First isolate the radical by dividing both sides of the equation by 2

$$\sqrt{x+2} = 5$$

Next, square both sides of the equation

$$\left(\sqrt{x+2}\right)^2 = 5^2$$

$$x+2 = 25$$

$x = 23$, now check for extraneous solutions, and

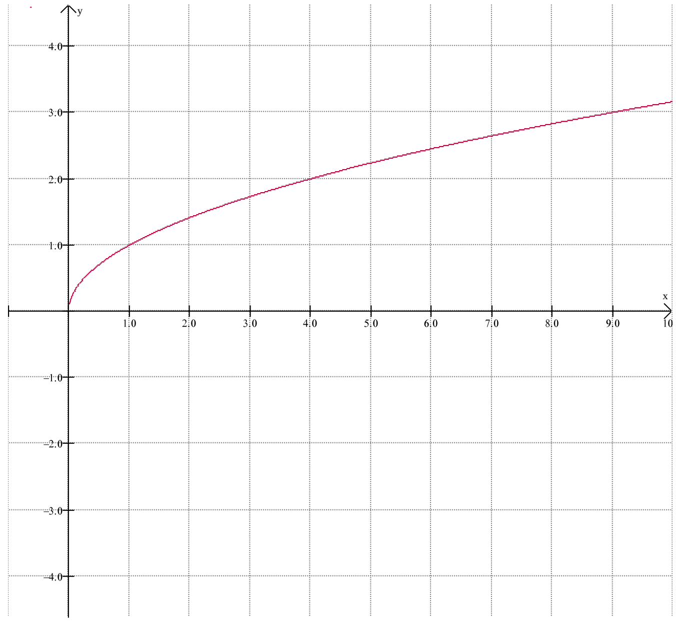
conclude $x = 23$ is the correct solution.

Following this, some texts would have a graphing calculator shot of the equation, and read off the solution as the point of intersection. That is (23, 10) lies on the graph, so $x = 23$ is the solution to this equation.

What I have tried to do in my Elementary Algebra class is a shift of philosophy.
Here is an example of a lesson introducing solving with radicals. The lesson begins with an important exercise.

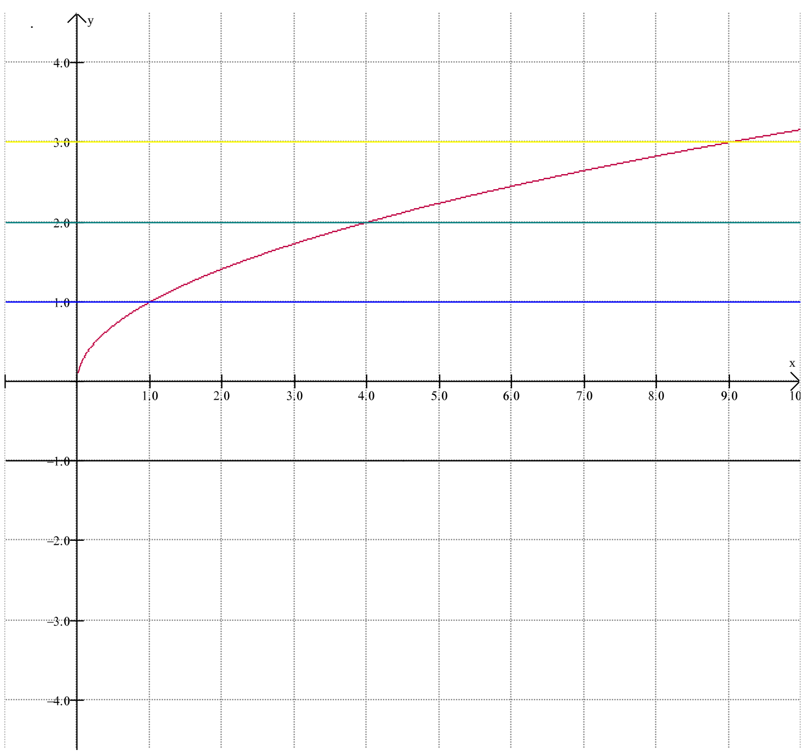
Exercise: **Draw the basic square root function by hand, with the aid of an input/output table.**

x	$f(x)=\sqrt{x}$
0	$\sqrt{0}=0$
1	$\sqrt{1}=1$
2	$\sqrt{2}=1.414$
3	$\sqrt{3}=1.732$
4	$\sqrt{4}=2$
5	$\sqrt{5}=2.236$
7	$\sqrt{7}=2.646$
9	$\sqrt{9}=3$



Having students draw the graph of $f(x)=\sqrt{x}$ by hand, we are helping them refresh some ideas that has been discussed before. One of the important realizations would be the concept of domain.

Upon creating the graph of $f(x)=\sqrt{x}$, we can now ask students to draw the graphs of $f(x)=1,\ f(x)=2,\ f(x)=3,\ and\ f(x)=-1$ all on the same axes.



Students could now be asked to provide the solutions for the equations with the aid of the graphs they see

$\sqrt{x} = 1, \sqrt{x} = 2, \ \sqrt{x} = 3, \ \sqrt{x} = -1$

This way of introducing the graph and making the students see the intersections being the solutions visually help make sense of the entire situation. Having done these graphs prior would help them have a better perspective when the algebraic skills are introduced. Observing there is no point of intersection for $\sqrt{x} = -1$, helps the student understand extraneous solutions very well when explained algebraically.

Once these basics have been communicated, I feel students are better equipped to handle the algebra. The relevance of basic graphs makes a lasting impression for the study of any equation or function. Radical equations would be a great place to try this technique.

Once this is done, students may proceed to working problems algebraically, you might want to even talk about inside/outside changes and the effects on the graphs in proceeding further to tie the graphs to the algebraic equations.

For example, consider showing solving of $\sqrt{x+2} = 3$ using graphs & tables with translations. (prompt students with questions like, Give the basic function in $f(x) = \sqrt{x+2}$, What are the translations in words? Draw a graph of f labeling all important points.

As Developmental math faculty we need to realize the different learning styles each student possess. Tying the algebra to graphs and tables could only help more students learn and appreciate mathematics.