

SOLVING RADICAL EQUATIONS (~~6.5, 7.2B~~)

Remember you are SOLVING an equation, so follow the usual procedures for this. The problem with these equations is that the unknown, say x , is "trapped" under a radical. How can we "get at it"? So far, in solving equations, we have been able to add, subtract, multiply and divide both sides of the equation by the same thing (as long as we didn't multiply or divide by 0), and the resulting equation is "equivalent" (has the same solution(s) as the original equation). In these equations, most students realize that we need to somehow "square the square root" so that x is accessible. BUT HOW? We must keep in mind that we are working with an equation, so that it would make sense that if $A = B$, then $A^2 = B^2$. But this means that we are squaring the entire left side of the equation and the entire right side of the equation. What if there are 2 terms on the side being squared? You MUST FOIL. Now if one of the 2 terms is a radical, and you FOIL, what happens? The radical will remain a part of the result as we saw in 6.4. Obviously this would not produce the desired result of "getting at x ", therefore it is ESSENTIAL to:

STEP 1: "ISOLATE" THE RADICAL BEFORE SQUARING (OR CUBING): If there is a *number* multiplied by the radical, that is OK because when you square or cube this product you must square or cube each factor, so that it will still *remove* the *radical* as desired. It is better to leave it in this form than to divide the equation through by the number and create a fraction. The idea is to NOT have anything ADDED to or SUBTRACTED from the RADICAL because the FOIL process would "bring back" another radical.

STEP 2: SQUARE (or CUBE IF CUBE ROOT) BOTH SIDES of the EQUATION: Since the radical was isolated as one term on one side of the equation, the squaring (or cubing) will "remove" the radical, and we can "get at x ." On the other side of the equation, remember to square every *factor* and if it is a binomial, REMEMBER to FOIL!

STEP 3: ANALYZE the "NEW EQUATION": It will be linear or quadratic - solve accordingly.

STEP 4: We are NOT FINISHED!: The problem with the "squaring process" is that the equation we get in Step 2 is not necessarily *equivalent* to the equation in Step 1. Fortunately, our "new equation" does keep all the solutions or roots that the original equation had, but it may have some extra ones, called extraneous solutions. These solutions work in the final equation but not in the original equation. (See "Exceptions" on Notes #5 (Solving Equations - General Info.)) Therefore, we have to:

Step 5: CHECK ANSWERS in the ORIGINAL EQUATION: This check MUST BE SHOWN.