THINGS TO REMEMBER WHEN SOLVING WEAK ACID/BASE EQUILIBRIUM PROBLEMS

I Be able to write equilibrium expressions in terms of the ionization of a weak acid in water to form H_3O^+ and the conjugate base. . .

And:

Be able to write equilibrium expressions in terms of the ionization of a weak base in water to form OH^- and the conjugate acid.

II Be able to calculate the pH of a solution containing a weak acid or a weak base if they give you the initial concentration. This will require you to use a RICE chart and solve for 'x'.

III After you solve for 'x', remember to use $pH = -\log[H_3O^+]$ if it is an acid, and use $pOH = -\log[OH^-]$, followed by $pH = 14 - pOH$ if it a base.

IV If you are asked to calculate percent ionization, remember that the percent ionization equation IS NOT ON THE FORMULA SHEET. You will have to MEMORIZE the equations:

(acid) $$\% \text{ ionization} = \frac{[H_3O^+]_{eq}}{[HA]_{initial}} \times 100\%$$

(base) $$\% \text{ ionization} = \frac{[OH^-]_{eq}}{[B]_{initial}} \times 100\%$$

V If they give you percent ionization and you are asked to find pH remember that you DO NOT need to use the RICE chart. . . just rearrange the above formulas.

VI Be able to use the formulas:

$$K_a \cdot K_b = K_W \qquad \text{and} \qquad [H_3O^+] \cdot [OH^-] = K_W$$

VII Watch Out! The END of one of these problems is where it might get pretty tricky.

Remember: When solutions are combined YOU MUST ADD THE VOLUMES when you are calculating concentration.

If a solid is added to a solution, THE VOLUME CHANGE IS NEGLIGIBLE.

The quick thing to do is to take everything to moles when you are doing the last part of the problem. That will tell you what kind of problem you are facing later.

If the problem has a strong base (like NaOH) being added to a weak acid OR a strong acid (like HCl) being added to a weak base, ONE OF TWO THINGS MAY HAPPEN.

THING #1: EXACT NEUTRALIZATION OCCURS

When exact neutralization occurs (like the equivalence point in a titration) ALL of the weak acid (or base) has been turned into its conjugate. So, rewrite the equation, recalculate the initial molarity, switch from one constant to another (use the K_a/K_b formula above) and use a normal RICE chart. Then do the pH or whatever.

THING #2: EXACT NEUTRALIZATION DOES NOT OCCUR

If exact neutralization does NOT occur, there is some of BOTH the weak acid (or base) and its conjugate. So calculate the molarities of the weak acid (or base) and its conjugate and use a 'dirty' RICE chart and then do the pH or whatever.