Calculating the pH of Weak Acid Solutions

You are provided with a list of the name of the weak acid, the concentration, and the acid ionization constant, K_a; that may be used to insert in the statement of the problem to solve.

To write an acid ionization equation for the acid, you may use the boldface first letters of the acid name to represent the acid and the anion formed by the ionization of the acid, (for example:
$HA + H_2O \rightleftharpoons H_3O^{+1} + A^{-1}$).

Your task is to determine the pH of the acid. In order to achieve this, complete the following statement:

To determine the pH of a _____ mol dm^{-3} solution of _____ acid, given, K_a =

Weak Acid	K_a	concentration (mol dm^{-3})
Anisic	3.38×10^{-5}	0.150
Cyanoacetic	3.65×10^{-5}	0.220
Ethylbenzoic	4.48×10^{-6}	0.324
Hexanoic	1.31×10^{-5}	0.125
Methylmalonic	1.71×10^{-6}	0.055
Trimethylacetic	9.48×10^{-6}	0.336

1. Choose an acid from the above table, use the K_a of the acid given in the table above.

2. Rewrite the statement of the problem, fill in the blanks with the specified acid name, its concentration and its given K_a.

3. Solve the problem using the following technique:
   a. Write the ionization equation for the acid dissolving in water. Use the boldfaced letters to represent the anion.
   b. Write the K_a expression for the specific acid.
   c. Calculate the pH of the acid solution, showing steps to justify your answer. Do not forget sig. figs. and correct units.

For further practice:

Simply repeat step 1 (i.e. pick an acid and its K_a), but now in step 2 use one of the different concentration given.
Now, repeat step 3.

By changing the concentration each time, you actually have a total of 36 weak acid problems to solve.