Factoring trinomials: NAME:
Using the Calculator (TI-82, 83, and 84) to Help with the AC Method

It is sometimes challenging to find the factors of *ac* that add to *b* of our trinomial. You can use the calculator to do that work for you. Here are some examples.

Let's say we want to factor $30a^2 + 38a - 20$. The AC method says to multiply $30 \cdot -20$ to get -600. We then need two factors of -600 that add to 38. We will use the calculator to find them. We will then need to continue the AC method on paper to complete the problem.

Enter the **y-editor** of your calculator by pressing the $\boxed{\text{y} =}$ button located below the screen. Enter the expression -600/X for Y_1 . Enter the expression X + -600/X for Y_2. (What you are doing is using X as one the factors of -600 and Y_1 as the other factor. The sum of the factors will be calculated in Y_2.)

Now we will set up the Table properly. Press $\boxed{\text{2}^{\text{nd}}}$ and then the $\boxed{\textbf{WINDOW}}$ button to enter the **Table Setup** (abbreviated **TBLSET**) screen. The **TblStart** value will be the starting X value in the table. Set this value to 0. (This assumes the factors are not that big. We will deal with a complication that may arise with this assumption later.) The $_\Delta$**Tbl** setting should be set to 1. This will ensure that the values used for X (the first factor in our pair of factors) are integers. The settings for **Indpnt** and **Depend** should be both set to Auto.

Now press $\boxed{\text{2}^{\text{nd}}}$ and then $\boxed{\textbf{GRAPH}}$ to view the table. Arrow over to the Y_2 column and scroll down, looking for 38, the coefficient of the middle term in the trinomial. You will see a pattern in the numbers in this column. They may be increasing or decreasing depending on your trinomial.

Once you find the 38 in the Y_2 column, read the two factors you need for the AC method in the X and Y_1 columns. For our example, X should read 50 and Y_1 should read -12. So we rewrite our trinomial as $30a^2 + 50a - 12a - 20$ and continue the AC method on paper.

Complication: What if the Y_2 values are very far from the coefficient of the *x*-term that you are looking for? This would require a crazy amount of scrolling if we do not reset our table.

Let's consider the trinomial $6x^2 + 45x - 5775$. The AC method would have us multiply $6 \cdot -5775$ to get -34,650. We put the expression -34650/X in for Y_1 and X + -34650/X in for Y_2.

Now press $\boxed{2^{\text{nd}}}$ and then $\boxed{\textbf{GRAPH}}$ to view the table. You will notice that the values for Y_2 are very far from the 45 we want to find. In fact, the X values are carried over from the last table we viewed. Notice the Y_2 values are increasing as we scroll down. Also, notice the X values are increasing (they will always increase when $_\Delta$**Tbl** is set to 1). So what that means is that we need to start our table at a higher X value so that the table starts further down.

Press $\boxed{2^{\text{nd}}}$ and then the $\boxed{\textbf{WINDOW}}$ button to enter the **Table Setup** (abbreviated **TBLSET**) screen. Enter a larger **TblStart** value, like 150. Return to the table (by pressing $\boxed{2^{\text{nd}}}$ and then $\boxed{\textbf{GRAPH}}$). Is that enough? No, not quite. So go back to the **Table Setup** screen and increase **TblStart** more. Go back and forth until you get close enough to scroll comfortably to see 45 in the Y_2 column.

Did you find the factors 210 and -165? Use the factors you find to rewrite the trinomial and continue to factor it using the AC method.

Note: If your **y-editor** does not have spaces for Y_1 and Y_2, see me and we will set it up properly. You can do this procedure on the TI-86 too. If you need instruction, see me. The TI-85 has no table function. If you need help with your Casio, come see me and I can try to help.