**Factoring – If you are asked to Factor…then Factor!!!**

GCF **-**  Step one is to ALWAYS check for a GCF…remember that you can pull out numbers AND variables. Easiest way to find GCF is to look at the smallest number and see what it’s factors are. Start there!

Count the terms – Only after you have checked for a GCF…

 2-Terms –

**Difference of squares** – Check to see if the first term is a perfect square (ex 4x² is 2x times 2x). Check to see if the second term is a perfect square (ex 9 is 3 times 3). If they are bot perfect squares, then write parenthesis around them (ex (2x 3)), copy and paste them (ex (2x 3)(2x 3)), and then put a + sign between the terms in one set of the parenthesis and a – sign in the other (ex (2x + 3)(2x – 3)) and you are done.

**Sum of Cubes** - Check to see if the first term is a perfect cube (ex Write a set of parentheses with a cube on the outside and see if anything fits. So if the term is 27x³, write parenthesis first ( ( )³ ) and then check to see if the term (27x³) will fit into the parenthesis (( )³). In this example, it does, so write the 3x inside of the ( )³ like this (3x)³ and that would be the “a” term. Then do the same for the second term (“b” term). If they are both perfect cubes, then write the formula for the Sum or Difference of Cubes (a b)(a² ab b²) and then use SOAP to fill in the signs. After that, and directly underneath, rewrite it again, but this time pull the variables out and replace them with parenthesis ( + )(( )² - ( )( ) + ( )² or ( - )(( )² + ( )( ) + ( )² depending on SOAP! Now fill in the “a” and “b” terms. Last step would then be to square the first and third term in the second set of parenthesis and then you are done.

 **Difference of Cubes** – See Sum of Cubes above.

 3-terms –

**Factor with parenthesis** – If your leading coefficient is = 1, then you draw two set of parenthesis below your three terms (ex ( )( ) ) and put your variable in the front spot of both sets of parenthesis. (ex if you had x² + 5x + 6, then you would write (x )(x ) ). Now set up your factor table (or do it in your head if they are easy numbers) and write all of the factors and their sums in the table (Remember that you multiply to get the top number, which is the number all the way to the right in your expression, and you sum to get the bottom number in the table, which is the middle number in your expression. Once you find the factors (pay attention to the signs), place them into the parenthesis

**Bottoms Up**- If your leading coefficient is ≠ 1, then you multiply the leading coefficient by the last term and rewrite the expression. The expression will now be in the format of “Factoring with Parenthesis” (ex 2x² + x – 3 would turn into x² + x – 6). Now factor as you would with leading coefficient = 1. Once you finish factoring, take the original leading coefficient and put it underneath the two factors that you just found (ex (x + $\frac{3}{2}$) (x - $\frac{2}{2}$) ). Now reduce as much as possible. If you have any numbers in the denominators after you have finished reducing, then bring them “up” in front of the “x.”

 4-terms –

**Factor by Grouping**- Remember that this is pretty much just GCF three more times! If you have four terms, then group the first two terms and group the last two terms…do not group the sign in front of the third term. Once you have grouped them, then factor out the GCF from the first two terms and write the leftovers in parenthesis. Then factor out the GCF of the last two terms and write the leftovers in parenthesis. Now look at the two set of parenthesis…if they are the same, then you factor them out and write the leftovers in the next set of parenthesis. If they are not EXACTLY the same, then your expression is prime (unless you pulled out a GCF in the beginning).

**!!!!!!!!!!!!!!!!!!!!!!!!!Remember that the last thing you always do is to CHECK YOUR WORK!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!**