Factoring Study Guide ☺

* Factoring means *EXPANDING*
* A polynomial can often be factored *MORE THAN ONCE*
* When we factor, our **final answer should be equivalent to the polynomial we were given** in the first place. There are two ways you can check your answer when factoring:
	+ If you plug the same value in for x for both versions, your answer should be the same
	+ You can go backwards and distribute. If you have done so correctly and have combined like terms (if possible) you should end up with the original polynomial

① FIRST, look to see if there is a GCF of the variables and/or of the numbers 🡪 if there is one, write the GCF outside of a set of parentheses, then factor out the GCF from each term, leaving the remnants in the parentheses

Ex) $Factor 10x^{²}-35x$ 🡪

$$5x(2x-7)$$

* After you’ve factored out a GCF, try to factor again. Factor as many times as possible so that you have “factored completely”

Ex) $2x^{2}-10x+8$ 🡪 $2(x^{2}-5x+4)$ what is inside of parentheses can be factored further…

 🡪

$$2(x-4)(x-1)$$

② If there is no GCF:

* For a **TRINOMIAL with a leading coefficient of 1**🡪 you will have to find factor pairs of the constant, and figure out which pair have a sum which equals the middle term of the trinomial

Ex) $Factor x^{2}+8x+12$

 Factor pairs of 12 🡪 1, 12 2,6 3,4

 The pair 2,6 can be added together to = 8 🡪 $2+6=8$

 So, we can factor using the pair 🡪 $(x+2)(x+6)$

* For a **TRINOMIAL with a leading coefficient greater than 1**🡪 you will have to make a list of the factor pairs of the constant and the factor pairs of the leading coefficient. Plug combinations of these pairs into two sets of parentheses, and distribute to see what combinations work

Ex) $Factor 2x^{2}-12x+10$

 Factors of 2🡪 1,2 (would write x in one set of parentheses and 2x in the other)

 Factors of 10🡪 1,10 2,5 10,1 5,2 -1,-10 -10,-1 -2,-5 -5,-2

 Try all combinations, distributing to see if your factored result works

$$(2x-2)(x-5)$$

 Answer:

* For a **BINOMIAL**🡪 rewrite the binomial so that each term is written as w “squared” term. Then, place on of each squared term into 2 sets of parentheses- one set will be adding and one will be subtracting

Ex) $Factor 36x^{2}-16$

 Rewrite so each term is a “squared term” 🡪 $\left(6x\right)^{2}-4^{2}$

$$(6x-4)(6x+4)$$

 Write each term once in each set of ( ), adding once and subtracting once 🡪

* For a **4 TERM POLYNOMIAL**🡪 factor by grouping terms, pulling out the GCF of each group, and simplifying your work

Ex) $Factor x^{2}-x+2x-2$

 Group using parentheses 🡪 $ (x^{2}-x)+(2x-2)$ factor out GCF🡪$x\left(x-1\right)+2(x-1)$

 Finally, simplify:

$$(x+2)(x-1)$$