Factoring Polynomials Using a GCF

Level 1 - Find the GCF of an expression that contains a variable
Level 2 - Find the GCF of an expression that contains multiple variables
Level 3 - Find the GCF of an expression where the GCF is a binomial

Factoring is like "undoing" multiplication. When we factor using the GCF, we're pulling out the largest expression that evenly divides each term in a polynomial. This helps us simplify expressions and solve equations more easily.

The GCF is the biggest number, variable, or expression that can divide every term in the polynomial. Factoring it out means writing the polynomial as a product of the GCF and the remaining expression in parentheses.

Steps to Factor Using a GCF:
1. Find the GCF of all terms (numbers and variables) and write it outside of the parentheses.

Rule:	*Example:*
If all terms share a number (like 5), factor it out.	$5x + 10 \rightarrow 5(x + 2)$
If all terms share a variable (like x), factor it out.	$x^2 + 2x \rightarrow x(x + 2)$
If terms share both a number and a variable, factor both.	$6x^2 + 9x \rightarrow 3x(2x + 3)$
Sometimes, the GCF is a whole binomial.	$(x + 2)(3x) + (x + 2)(4) \rightarrow (x + 2)(3x + 4)$

3. Divide each term by the GCF and write the result inside the parentheses.

Example #1 $6x + 12$	Example #2 $8x^2y + 12xy^2$	Example #3 $(x + 1)(2x) - (x + 1)(5)$
Both terms share a GCF of 6 *write 6 outside of the parentheses and divide each term by 6* $6(x + 2)$	*GCF of coefficients : 4* *GCF of variables : xy* *GCF = 4xy* $4xy(2x + 3y)$	*Binomial GCF = $(x + 1)$* *When factored out we are left with $((2x) - (5))$* $(x + 1)(2x - 5)$

Remember:
- Always check for a GCF before trying any other factoring method.
- For expressions with variables, use the lowest exponent that appears in every term.
- If you see the same binomial in more than one term, try factoring it out just like a number or variable.