# SKILL #15

CODE: FP.2

# Factoring by Grouping

## 💡 Core Concept

Factoring by grouping is a method to factor polynomials with four terms by splitting them into two groups and factoring each group separately.

## GULDEN RULE

1. Group the terms into two pairs.
2. Find the GCF for each pair.
3. Look for a common "group" (a common binomial).
4. Factor out that common group!

Factoring by grouping is super useful when you're trying to factor polynomials that are a bit more complex. It's often the first step in solving cubic equations (equations with $x^3$) when other methods don't apply! It's also a key step in a method called "factoring trinomials by grouping" which you'll learn soon!

## Example

Factor $3x^2 - 9x - 2x + 6$ by grouping.

- Four terms: $3x^2, -9x, -2x, 6$.
- Group: $(3x^2 - 9x) + (-2x + 6)$.
- Factor GCF: $3x^2 - 9x = 3x(x - 3)$

$$-2x + 6 = -2(x - 3).$$

- Common binomial: $(x - 3)$.
- Factor: $3x(x - 3) - 2(x - 3) = (x - 3)(3x - 2)$.
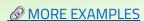- Answer: $(x - 3)(3x - 2)$.

## Big Picture

Let's look at $ax + ay + bx + by$.

- Group 1: $(ax + ay)$
- Group 2: $(bx + by)$
- GCF of Group 1 is a: $a(x + y)$
- GCF of Group 2 is b: $b(x + y)$
- Now, both groups have $(x + y)$ in common!
- Factor out $(x + y) \rightarrow (x + y)(a + b)$

## Why is it Important?

- Essential for factoring higher-degree polynomials
- Solving equations
- Works when other factoring methods fail
- Prepares for Advanced Math

🔗 MORE EXAMPLES

## ⚠️ Common Mistakes to Avoid

❌ Grouping randomly — always try logical pairs.

❌ Forgetting to factor out GCF from each pair.

❌ Dropping or changing signs when factoring.

## 🔗 Additional Resources