The Factoring Process for Common Polynomial Expressions

Methods of Factoring
Common Factors ▪ Difference of Squares ▪ Perfect Square Trinomials ▪ General Trinomials Sum or Difference of Cubes ▪ Factor by Grouping

START.

Is there anything common to all terms?

YES → Factor out what is common.

NOTE: This flowchart process assumes the polynomial to be factorable. If you find none of these methods apply, write ***prime***.

NO

Are there 2, 3, or 4 terms in the expression?

2 → Is it a difference of squares $a^2 - b^2$ pattern?

NO → Is it a sum or difference of cubes $a^3 + b^3$ or $a^3 - b^3$ pattern?

YES → Factor according to the pattern $(a+b)(a-b)$. *"the parentheses match, except one's a plus and one's a minus."*

3 → Is it a perfect square trinomial $a^2 + 2ab + b^2$ or $a^2 - 2ab + b^2$ pattern?

YES → Factor according to the pattern $(a+b)(a+b) \to (a+b)^2$ or $(a-b)(a-b) \to (a-b)^2$. Check for any further patterns, like difference of squares.

NO → Does the leading x^2 term have any number in front of it, other than possibly a one?

NO → If the trinomial has the form $x^2 \pm bx + c$, you should find two same-signed numbers that multiply to make *c* and add to make *b*, using a guess-and-check method.

Or, if the trinomial has the form $x^2 \pm bx - c$, you should find two opposite-signed numbers that multiply to make *c* and add to make *b*, using a guess-and-check method.

YES → If it is a general trinomial of the form $ax^2 \pm bx \pm c$, then you use the guess-and-check method to find factors of *a* and *c* that when multiplied together will make values that add or subtract to *b*.

4 → Is it a 2/2 grouping or a 3/1 grouping?

2/2 → Factor by what is common in groups of twos. *For example:*

$$\underline{ax + ay} + \underline{bx + by}$$
$$= a(x+y) + b(x+y)$$
$$= (a+b)(x+y)$$

Check for any further patterns, like difference of squares.

3/1 → Factor by a perfect square trinomial rule, and then by a difference of squares rule. *For example:*

$$\underline{x^2 + 2xy + y^2} - \underline{z^2}$$
$$= (x+y)(x+y) - z^2$$
$$= (x+y)^2 - z^2$$
$$= ((x+y)+z)((x+y)-z)$$

STOP.

Neither

YES → Factor according to the pattern $(a+b)(a^2 - ab + b^2)$ or $(a-b)(a^2 + ab + b^2)$. *"little parentheses, big parentheses" and check the signs: "alternating +,-,+ or minus with matching plusses -,+,+"*

STOP.

Check the "OI" or FOIL your factors together to make sure that your work is correct. It is very important to DOUBLE CHECK YOUR SIGNS!

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