

Factoring By Grouping



LEVEL 1: The Basics

Factor each polynomial by grouping. These problems have simple coefficients and clear groupings.

$$\diamond x^2 + 2x + 3x + 6$$

$$\diamond x^2 + 4x + 3x + 12$$

$$\diamond x^2 + 4x + 5x + 20$$

$$\diamond 5x^2 + 10x + x + 2$$

$$\diamond 2x^2 + 6x + x + 3$$

$$\diamond x^2 + 2x + 5x + 10$$

$$\diamond 3x^2 + 9x + 2x + 6$$

$$\diamond 3x^2 + 6x + 2x + 4$$

$$\diamond x^2 + 7x + 2x + 14$$

$$\diamond x^2 + 9x + x + 9$$

$$\diamond x^2 + 3x + 4x + 12$$

$$\diamond 2x^2 + 8x + x + 4$$

$$\diamond 2x^2 + 4x + 3x + 6$$

$$\diamond 4x^2 + 16x + 3x + 12$$

$$\diamond x^2 + 5x + x + 5$$

$$\diamond x^2 + 3x + 6x + 18$$

$$\diamond 4x^2 + 12x + x + 3$$

$$\diamond 2x^2 + 4x + 5x + 10$$

$$\diamond x^2 + 6x + 2x + 12$$

$$\diamond x^2 + 7x + 3x + 21$$

$$\diamond 3x^2 + 15x + 2x + 10$$

$$\diamond 3x^2 + 12x + x + 4$$

$$\diamond x^2 + 8x + x + 8$$

$$\diamond x^2 + 5x + 4x + 20$$

$$\diamond 2x^2 + 10x + 3x + 15$$

$$\diamond 6x^3 + 2x^2 + 9x + 3$$

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LEVEL 2: Dive Deeper

Factor each polynomial by grouping. These problems include negative coefficients and slightly more complex terms.

$$\diamond 2x^2 - 4x + 3x - 6$$

$$\diamond 2x^2 - 6x - 4x + 12$$

$$\diamond x^2 - 5x + 2x - 10$$

$$\diamond -3x^2 - 6x - 2x - 4$$

$$\diamond 3x^2 - 9x - x + 3$$

$$\diamond x^2 - 9x + x - 9$$

$$\diamond x^2 - 6x + 4x - 24$$

$$\diamond 4x^2 - 16x - 3x + 12$$

$$\diamond 2x^2 - 8x - x + 4$$

$$\diamond 2x^2 - 4x + 5x - 10$$

$$\diamond x^2 - 3x - 2x + 6$$

$$\diamond x^2 - 5x - 3x + 15$$

$$\diamond 4x^2 - 12x + x - 3$$

$$\diamond -x^2 - 2x - 4x - 8$$

$$\diamond -x^2 - 4x - 3x - 12$$

$$\diamond 3x^2 - 12x + x - 4$$

$$\diamond 2x^2 - 10x - x + 5$$

$$\diamond 2x^2 - 8x - 5x + 20$$

$$\diamond 3x^2 - 15x + 2x - 10$$

$$\diamond x^2 - 6x - x + 6$$

$$\diamond x^2 - 7x - 2x + 14$$

$$\diamond 4x^2 - 20x + x - 5$$

$$\diamond 5x^2 - 10x - x + 2$$

$$\diamond -2x^2 - 6x + x + 3$$

$$\diamond x^2 - 8x + 3x - 24$$

$$\diamond x^2y - 5xy + 3x - 15$$

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LEVEL 3: Mastering the Concept

Factor each polynomial by grouping. These problems include higher-degree terms, negative coefficients, and may require rearranging terms.

$$\diamond 2x^3 - 4x^2 + 3x - 6$$

$$\diamond -3x^3 - 6x^2 + x + 2$$

$$\diamond x^3 + 5x^2 + 2x + 10$$

$$\diamond x^3 + 7x^2 - 2x - 14$$

$$\diamond 4x^3 - 12x^2 - x + 3$$

$$\diamond 5x^3 - 15x^2 + x - 3$$

$$\diamond -2x^3 - 4x^2 - 3x - 6$$

$$\diamond 2x^3 + 4x^2 - 5x - 10$$

$$\diamond x^3 - 3x^2 + 4x - 12$$

$$\diamond -x^3 - 4x^2 + 3x + 12$$

$$\diamond 5x^3 + 10x^2 + x + 2$$

$$\diamond 3x^3 - 12x^2 - x + 4$$

$$\diamond 3x^3 - 9x^2 - 2x + 6$$

$$\diamond x^3 + 8x^2 - x - 8$$

$$\diamond -x^3 - 5x^2 - x - 5$$

$$\diamond 4x^3 - 8x^2 + 5x - 10$$

$$\diamond 2x^3 + 8x^2 - x - 4$$

$$\diamond -2x^3 - 10x^2 + x + 5$$

$$\diamond x^3 - 6x^2 + 3x - 18$$

$$\diamond x^3 - 9x^2 + 2x - 18$$

$$\diamond 4x^3 + 16x^2 + x + 4$$

$$\diamond 3x^3 + 9x^2 - x - 3$$

$$\diamond 2x^3 - 10x^2 - 3x + 15$$

$$\diamond -5x^3 - 10x^2 - 2x - 4$$

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Real-Life / Word Problems

1. A factory produces $2x^3 + 6x^2 + x + 3$ items daily. Factor the expression by grouping to simplify production planning.
2. A garden has $3x^2 + 9x + 2x + 6$ plants. Factor by grouping to organize into equal sections.
3. A machine's output is $x^3 + 5x^2 + 2x + 10$ units. Factor by grouping to plan production.
4. A park has $2x^2 - 6x + 4x - 12$ trees. Factor by grouping to divide into equal groups.
5. A company's revenue is $3x^3 - 9x^2 - 2x + 6$ dollars. Factor by grouping to analyze revenue streams.

Challenge Problem 1

Factor this expression completely:

$$4x^3 + 6x^2 - 2x - 3$$

Challenge Problem 2

Factor the following polynomial completely: $x^4 - 3x^3 - 2x^2 + 6x$.