

Name: _____

Date: _____ Class: _____

Factoring Polynomials Worksheet

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Factor each polynomial completely. Show your work if needed.

Example:Factor: $x^2 - 5x + 6$

- Find two numbers that multiply to 6 and add to -5.
-2 and -3 (because $-2 \times -3 = 6$ and $-2 + -3 = -5$)
- Write the factors: $(x - 2)(x - 3)$

Key Factoring Methods:

- Greatest Common Factor (GCF) – factor out the common term.
- Difference of Two Squares – $a^2 - b^2 = (a - b)(a + b)$.
- Trinomial ($ax^2 + bx + c$) – find two numbers that multiply to ac and add to b .
- Grouping – factor by grouping terms.

1. Factor out the greatest common factor (GCF).

- $6x^3 + 9x^2$ _____
- $12a^2b - 8ab^2$ _____
- $15x^4 - 10x^3$ _____
- $21m^3n + 14m^2n^2$ _____
- $4p^3 - 16p$ _____
- $18x^2y - 12xy^2$ _____

2. Factor trinomials ($a = 1$).

- $x^2 + 7x + 12$ _____
- $x^2 - 4x - 21$ _____
- $x^2 + 5x - 14$ _____
- $x^2 - 6x + 9$ _____
- $x^2 + 8x + 15$ _____
- $x^2 - 3x - 10$ _____

3. Factor trinomials ($a \neq 1$).

- $2x^2 + 7x + 3$ _____
- $3x^2 - 11x + 6$ _____
- $4x^2 + 12x + 9$ _____
- $5x^2 - 8x - 4$ _____
- $6x^2 + x - 2$ _____
- $8x^2 - 20x + 12$ _____

4. Factor using the difference of two squares.

- $x^2 - 25$ _____
- $9y^2 - 16$ _____
- $4a^2 - b^2$ _____
- $49m^2 - 36n^2$ _____
- $81x^2 - 121$ _____
- $16p^2 - 9q^2$ _____

5. Factor by grouping.

- $x^2 + 5x + 6x + 30$ _____
- $2x^2 + 7x + 3x + 10$ _____
- $3a^2 + 9a + 2ab + 6b$ _____
- $4x^2 - 12x - x + 3$ _____
- $5m^2 + 15m + 4mn + 12n$ _____
- $6p^2 - 9p + 2pq - 3q$ _____

6. Factor completely.

- $x^2 - 9x + 18$ _____
- $x^2 + 12x + 36$ _____
- $x^2 - 8x - 20$ _____
- $x^2 + 6x - 7$ _____
- $2x^2 + 5x - 3$ _____
- $3x^2 - 12x - 15$ _____

7. Factor each expression.

- $a^2 - 4ab + 4b^2$ _____
- $9x^2 - 6x + 1$ _____
- $25x^2 - 20x + 4$ _____
- $x^2 + 2xy + y^2$ _____
- $4a^2 - 12ab + 9b^2$ _____
- $16x^2 + 8x + 1$ _____

8. Factor the quadratic expression.

- $x^2 + 13x + 42$ _____
- $x^2 - 9x + 20$ _____
- $x^2 + 6x - 27$ _____
- $x^2 - 11x + 24$ _____
- $x^2 + 4x - 12$ _____
- $x^2 - 5x - 14$ _____

9. What is the greatest common factor?

- $12x^2y$ and $18xy^2$ _____
- $20a^3b^2$ and $15a^2b$ _____
- $28m^4n$ and $14m^2n^3$ _____
- $9x^5$ and $21x^3$ _____
- $16p^2q$ and $24pq^2$ _____

10. Challenge: Factor the polynomial completely.

- $x^3 - 7x^2 + 14x - 8$ _____
- $x^3 + 3x^2 - 4x - 12$ _____
- $2x^3 - 5x^2 - 4x + 10$ _____
- $x^4 - 16$ _____