

Name: _____

Date: _____ Class: _____

Factoring Quadratics Worksheet

Factor each quadratic expression. Show your work where needed. Write your answer in factored form.

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Key Concepts

- A quadratic expression has the form $ax^2 + bx + c$.
- Factoring means writing the expression as a product of two binomials (or a perfect square).
- Methods:
 - Factor out the GCF (if possible).
 - Find two numbers that multiply to ac and add to b (for trinomials).
 - Use special patterns (difference of squares, perfect square trinomials).

Examples

- Factor $x^2 + 5x + 6$.
Numbers: 2 and 3 ($2 \cdot 3 = 6$, $2 + 3 = 5$).
 $x^2 + 5x + 6 = (x + 2)(x + 3)$
- Factor $4x^2 - 9$.
 $4x^2 - 9 = (2x)^2 - 3^2$
 $= (2x - 3)(2x + 3)$
- Factor $2x^2 - 8x$.
 $2x^2 - 8x = 2x(x - 4)$
- Factor $x^2 - 16$.
 $x^2 - 16 = (x - 4)(x + 4)$

1. Factor the quadratic trinomials.

- $x^2 + 7x + 12 =$ _____
- $x^2 - 5x + 6 =$ _____
- $x^2 + 3x - 10 =$ _____
- $x^2 - 8x + 15 =$ _____
- $2x^2 + 7x + 3 =$ _____
- $3x^2 - 5x - 2 =$ _____

2. Factor the quadratic trinomials (with leading coefficient $\neq 1$).

- $2x^2 + 7x + 3 =$ _____
- $3x^2 - 11x - 4 =$ _____
- $4x^2 + 4x - 3 =$ _____
- $5x^2 - 13x + 6 =$ _____
- $6x^2 + 11x - 10 =$ _____
- $7x^2 - 17x + 10 =$ _____

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

- $6x^2 + 9x =$ _____
- $8x^2 - 12x =$ _____
- $14x^2 + 7x - 21 =$ _____
- $3x^2 - 15x =$ _____
- $18x^2 + 24x + 6 =$ _____
- $12x^2 - 5x - 4 =$ _____

4. Factor the difference of squares.

- $x^2 - 25 =$ _____
- $9x^2 - 16 =$ _____
- $4x^2 - 81 =$ _____
- $49 - 16x^2 =$ _____
- $25x^2 - 100 =$ _____
- $36y^2 - 64 =$ _____

5. Factor the perfect square trinomials.

- $x^2 + 10x + 25 =$ _____
- $x^2 - 12x + 36 =$ _____
- $9x^2 + 30x + 25 =$ _____
- $16x^2 - 8x + 1 =$ _____
- $4x^2 + 12x + 9 =$ _____
- $25x^2 - 20x + 4 =$ _____

6. Factor completely.

- $2x^2 + 4x =$ _____
- $x^2 - 9x + 18 =$ _____
- $5x^2 + 10x + 5 =$ _____
- $6x^2 - 3x - 9 =$ _____
- $x^2 + 6x =$ _____
- $12x^2 - 48 =$ _____

7. Solve the quadratic equations by factoring.

- $x^2 - 4x - 12 = 0 \rightarrow x =$ _____
- $x^2 + 9x + 20 = 0 \rightarrow x =$ _____
- $2x^2 - 7x - 4 = 0 \rightarrow x =$ _____
- $3x^2 + 12x = 0 \rightarrow x =$ _____
- $x^2 + 5x - 14 = 0 \rightarrow x =$ _____
- $4x^2 - 12x + 9 = 0 \rightarrow x =$ _____

8. Challenge Problems

- Factor $x^2 + 4x + 5$. Why can't it be factored over the real numbers?

- Factor $2x^2 + 4x - 6$ completely.

- Find the values of x for which $x^2 - 3x - 4 = 0$.

- Factor $6x^2 + 11x + 4$ in two different ways (if possible).

