

Algebra I

Factoring Methods Checklist

1. Greatest Common Factor (GCF)

$$\begin{array}{l} \text{Example} \quad 14x^4 - 21x^2 \\ \quad \quad = 7x^2(2x^2 - 3) \end{array} \qquad \begin{array}{l} 14x^4 = 2 \cdot 7 \cdot x \cdot x \cdot x \cdot x \\ 21x^2 = 3 \cdot 7 \cdot x \cdot x \\ \text{GCF} = 7x^2 \end{array}$$

Note: Divide each term by the GCF- check by distributing

2. Difference of Squares (2 terms, sign is always negative)

$$\text{Pattern} \quad (\quad + \quad)(\quad - \quad)$$

$$\begin{array}{l} \text{Examples} \quad x^2 - 64 \\ \quad \quad \quad 9x^2 - 49 \end{array} \qquad \begin{array}{l} (x + 8)(x - 8) \\ (3x + 7)(3x - 7) \end{array}$$

Note: Find the square root of each term

3. Perfect Square Trinomials (PST) (3 terms, constant is positive)

$$\text{Pattern} \quad (\quad + \quad)^2 \quad \text{or} \quad (\quad - \quad)^2$$

$$\begin{array}{l} \text{Examples} \quad 16x^2 + 24x + 9 \\ \quad \quad \quad x^2 - 4x + 4 \end{array} \qquad \begin{array}{l} (4x + 3)^2 \\ (x - 2)^2 \end{array}$$

Note: Find the square root of the 1st and 3rd term - Be sure to check middle term

$$\begin{array}{l} 4x \cdot 3 \cdot 2 = 24x \\ x \cdot -2 \cdot 2 = -4x \end{array}$$

4. Trinomial Factoring

$$10.5 \quad x^2 + bx + c$$

$$10.6 \quad ax^2 + bx + c$$

Examples $x^2 - 5x + 6$

$$3x^2 - 4x - 7$$

$$(x \quad)(x \quad)$$

$$(3x \quad)(x \quad)$$

Factors of 6

1, 6 2, 3

-1, -6 -2, -3

Factors of 3

1, 3

Factors of -7

1, -7

-1, 7

$$(x - 2)(x - 3)$$

$$(3x - 7)(x + 1)$$

Note: FOIL to check correct factorization

5. Grouping (typically 4 or 5 terms)

Example $x^3 + 2x^2 + 3x + 6$

$$\begin{array}{l} x^3 + 2x^2 \quad + \quad 3x + 6 \\ \text{GCF} \quad x^2(x + 2) + 3(x + 2) \\ \quad \quad \quad (x^2 + 3)(x + 2) \end{array}$$

or

$$\begin{array}{l} x^3 + 3x \quad + \quad 2x^2 + 6 \\ \text{GCF} \quad x(x^2 + 3) + 2(x^2 + 3) \\ \quad \quad \quad (x + 2)(x^2 + 3) \end{array}$$

Note: Use a pattern to group terms together and find the GCF of each "group" – several patterns may work for a given expression

Solving a Factored Equation

Set each quantity equal to zero and solve for the variable

$$(4x + 1)(4x - 1) = 0$$

$$4x + 1 = 0$$

$$4x = -1$$

$$x = -\frac{1}{4}$$

$$4x - 1 = 0$$

$$4x = 1$$

$$x = \frac{1}{4}$$