

## 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 1<sup>st</sup> and 3<sup>rd</sup> 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

$$1, 6 \quad 2, 3 \\ -1, -6 \quad -2, -3$$

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

$$x^3 + 2x^2 \quad + \quad 3x + 6 \quad \text{or}$$

GCF  $x^2(x + 2) + 3(x + 2)$   
 $(x^2 + 3)(x + 2)$

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

GCF  $x(x^2 + 3) + 2(x^2 + 3)$   
 $(x + 2)(x^2 + 3)$

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

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

$$4x + 1 = 0$$

$$4x = -1$$

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

$$4x - 1 = 0$$

$$4x = 1$$

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