Factoring Methods Checklist

1. Greatest Common Factor (GCF)

Example $14x^4 - 21x^2$ $14x^4 = 2 \cdot 7 \cdot x \cdot x \cdot x \cdot x$
$= 7x^2(2x^2 - 3)$ $21x^2 = 3 \cdot 7 \cdot x \cdot x$
GCF $= 7x^2$

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

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

Pattern (+)(-)

Examples $x^2 - 64$ $(x + 8)(x - 8)$
$9x^2 - 49$ $(3x + 7)(3x - 7)$

Note: Find the square root of each term

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

Pattern $(\ +\ )^2$ or $(\ -\ )^2$

Examples $16x^2 + 24x + 9$ $(4x + 3)^2$
$x^2 - 4x + 4$ $(x - 2)^2$

Note: Find the square root of the 1st and 3rd term - Be sure to check middle term $4x \cdot 3 \cdot \mathbf{2} = 24x$
$x \cdot -2 \cdot \mathbf{2} = -4x$

4. Trinomial Factoring

8.1 $x^2 + bx + c$ 8.2 $ax^2 + bx + c$

Examples $x^2 - 5x + 6$ $3x^2 - 4x - 7$

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

Factors of 6	Factors of 3	Factors of -7
1, 6 2, 3	1, 3	1, -7
-1, -6 -2, -3		-1, 7

$(x - 2)(x - 3)$ $(3x - 7)(x + 1)$

Note: FOIL to check correct factorization

5. Grouping (typically 4 or 5 terms)

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

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

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

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

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

6. Sum/Difference of Cubes

Example $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Solving a Factored Equation

Set each quantity equal to zero and solve for the variable

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

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

$4x = -1$ $4x = 1$

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