Factoring Summary

TYPE 1: Common Factors

HOW TO IDENTIFY: a} Two or more terms.
b} All terms must have at least one factor in common.

HOW TO FACTOR: Use the distributive property in reverse.

Example: $4xy + 8x^2$

$= 4x\,(y + 2x)$

TYPE 2: Difference of Squares

HOW TO IDENTIFY: a} Two terms
b} Minus sign [-] between terms
c} Both terms are perfect squares.

HOW TO FACTOR: $A^2 - B^2 = (A + B)\,(A - B)$

Example: $X^2 - 16$

$= (X + 4)\,(X - 4)$

TYPE 3: Sum and Difference of Cubes

HOW TO IDENTIFY: a} Two terms
b} Plus sign [+] or Minus sign [-] between terms
c} Both terms are perfect cubes.

HOW TO FACTOR: $1^{st}\}$ $X^3 + Y^3$

$= (X + Y)\,(X^2 - XY + Y^2)$

$2^{nd}\}$ $X^3 - Y^3$

$= (X - Y)\,(X^2 + XY + Y^2)$

Example: $X^3 + 8$

$= X^3 + 2^3 = (X + 2)\,(X^2 - 2X + 4)$

Example: $27A^3 + 64$

$= (3A)^3 + 4^3$

$= (3A + 4)(9A^2 - 12A + 16)$

Example: $8Y^3 - 125B^3$

$= (2Y)^3 - (5B)^3$

$= (2Y - 5B)(4Y^2 + 10YB + 25B^2)$

Example: $8Y^3 - 125B^3$

$= (2Y)^3 - (5B)^3$

$= (2Y - 5B)(4Y^2 + 10YB + 25B^2)$

TYPE 4: Trinomials

HOW TO IDENTIFY:
a} Three terms
b} Has the Quadratic Form $AX^2 + BX + C$

HOW TO FACTOR: (See Example)

Example: $X^2 + 3X - 10$

$= (X + 5)(X - 2)$

TYPE 5: Grouping

HOW TO IDENTIFY:
a} Usually four terms (possible 6,8, …)
b} Terms do not all have common factors

HOW TO FACTOR:
1st} Group terms together that have common factors (rearrange).
2nd} Factor out the common factor of the 1st two Terms
3rd} Factor out the common factor of the 2nd two terms

Example: $3AX + 2AY - 12BX - 8BY$

(1st … rearrange): = 3AX – 12BX + 2AY – 8BY
(2nd … factor term 1): = 3X (A - 4B) + 2AY – 8BY
(3rd … factor term 2): = 3X (A - 4B) + 2Y (A – 4B)
(ANSWER) = (A – 4B) (3X + 2Y)