

# Factoring Types:

## Remove Common Factor (GCF)

### 2 TERMS

Difference of Squares

$$a^2 - b^2 \\ = (a+b)(a-b)$$

Difference of Cubes

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

Sum of Cubes

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

### 3 TERMS

m & n Method

$$x^2 + Bx + C$$

OR

$$Ax^2 + Bx + C$$

where

$$(m)(n) = AC \\ m+n = B$$

Example: 1

$$x^2 - 5x + 6 \\ (x-3)(x+2)$$

Example: 2

$$5x^2 + x - 6 \\ A=5 \quad B=1 \quad C=-6$$

$$\text{Let } m = -5 \\ n = 6$$

$$(m)(n) = -30 \quad (A)(C) \\ \text{and} \\ m+n = 1 \quad (B)$$

$$5x^2 + x - 6$$

$$\begin{array}{c} \swarrow \quad \searrow \\ 5x^2 - 5x + 6x - 6 \end{array}$$

$$5x(x-1) + 6(x-1)$$

$$(x-1)(5x+6)$$

### 4 TERMS

Group to Get GCF

$$ax + ay + bx + by \\ = a(x+y) + b(x+y) \\ = (x+y)(a+b)$$

Group to Get Difference of Squares

Example:

$$\underbrace{x^2 + 6x + 9}_{(x+3)(x+3)} - y^2 \\ (x+3)^2 - y^2 \\ (x+3+y)(x+3-y)$$

## Review Questions: Factoring

### ① Common Factor

a)  $8x - 16$

b)  $7m^5 + 7m^6$

c)  $6m^4 + 21m^3 + 15m^2$

d)  $9(x+5) + 3(x-3)(x+5)$

e)  $(x-6)^2 + (x-6)$

### ② Grouping

a)  $3x+6+xy+2y$

b)  $10x-2ay+2a-10y$

c)  $9y-x^2y^2-9w+x^2wy$

### ③ Factoring Trinomials

a)  $x^2-10x+24$

b)  $x^2+22x+121$

c)  $-4x-x^2-3$

d)  $x^2-2xy+y^2$

e)  $20x^2-21x-5$

f)  $48x^2+8x-96$

④ Difference of Squares

a)  $x^2 - 4$

b)  $2x^2 - 2y^2$

c)  $4x^2 - 9$

d)  $(a+b)^2 - c^2$

e)  $x^2 - (y+z)^2$

f)  $x^2 + 6x + 9 - y^2$

g)  $m^2 - n^2 + 2n - 1$

⑤ Difference of Cubes / Sum of Cubes

a)  $x^3 - 8$

b)  $8x^3 - 27$

c)  $2 - 2a^3b^3$

d)  $(x+2)^3 - y^3$

e)  $x^{36} + 1$

f)  $27m^3 - 64$