

Factor:

$$d) \underbrace{(b-4)(b+2)}_{1^{\text{st}} \text{ term}} + \underbrace{(b-5)(b+2)}_{2^{\text{nd}} \text{ term}}$$

$$\text{GCF} = (b+2)$$

$$\frac{(b-4)(b+2) + (b-5)(b+2)}{(b+2)}$$

$$\text{Answer: } \underline{\underline{(b+2)(2b-9)}}$$

$$[(b-4) + (b-5)] = \underline{\underline{(2b-9)}}$$

$$80a^2b^2c^2 - 64a^3b^4c^3 + 48a^5b^{12}c^2$$

$$\underline{\underline{16a^2b^2c^2}}$$

$$16a^2b^2c^2(5 - 4abc^2 + 3a^3b^{10})$$

$$8a^2b^2c^2(10 - 8abc^2 + 6a^3b^{10})$$

$$8a^2b^2c^2[2(5 - 4abc^2 + 3a^3b^{10})]$$

$$16a^2b^2c^2(5 - 4abc^2 + 3a^3b^{10})$$

## b) Factoring by Grouping

Example: Factor  $6ab + 3b - 4a - 2$

There is no common factor among all the terms, but some of the terms do share a common factor.

i) Group the terms that have the same common factor.

$$\underbrace{3b}_{\text{GCF}} \quad \frac{6ab+3b}{3b} \quad \underbrace{6ab+3b}_{\text{Group 1}} - \underbrace{4a-2}_{\text{Group 2}} \Rightarrow \text{GCF: } -2 \quad \frac{-4a-2}{-2}$$

ii) Remove the common factor from each group.

$$3b(2a+1) - 2(2a+1) \quad \underline{\underline{2 \text{ terms}}}$$

$$\text{GCF} = (2a+1)$$

iii) Remove the common factor from both terms

$$(2a+1)(3b-2)$$

Example: Factor  $16y^2z - x^2z - 16y^2 + x^2$

$$\begin{array}{l}
 \underbrace{16y^2z - 16y^2}_{16y^2 = \text{GCF}} - \underbrace{x^2z + x^2}_{-x^2 = \text{GCF}} \\
 \frac{16y^2z - 16y^2}{16y^2} = \underline{\underline{(z-1)}} \quad \xrightarrow{\text{match}} \quad \frac{-x^2z + x^2}{-x^2} = \underline{\underline{(z-1)}} \\
 16y^2(z-1) \qquad \qquad \qquad -x^2(z-1)
 \end{array}$$

$$(z-1)(16y^2 - x^2)$$

$$\begin{array}{l}
 16y^2(z-1) - x^2(z-1) \\
 (z-1)(16y^2 - x^2)
 \end{array}$$

\*This one can actually be factored further.

Factor

a)  $\underline{xy} - \underline{x} + \underline{3y} - \underline{3}$

①  $x(y-1) + 3(y-1) = (y-1)(x+3)$

②  $y(x+3) - 1(x+3) = (x+3)(y-1)$

b)  $\underline{2a^3b + 3a^3} + \underline{2b^2 + 3b}$

GCF:  $a^3$        $b = \text{GCF}$

$a^3(2b+3) + b(2b+3)$   
 $(2b+3)(a^3 + b)$

c)  $\underline{ax + ay + az} + \underline{bx + by + bz} = (x+y+z)(a+b)$

GCF:  $a$       GCF:  $b$

$a(x+y+z) + b(x+y+z)$

d)  $12a^2 - 6ab - 8ab + 4b^2 = 2 \left( \frac{6a^2 - 3ab}{\text{GCF: } 3a} - \frac{4ab + 2b^2}{\text{GCF: } 2b} \right)$

$= 2 [3a(2a-b) - 2b(2a-b)]$

$= 2(2a-b)(3a-2b)$