Factorisation by Regrouping Terms

Understanding of Factorisation by Regrouping Terms

- Regrouping means rearranging or grouping terms of an expression in such a way that common factors can be identified.
- After grouping, factorize each group separately and then find a common binomial factor if possible.
- This method is useful when no single common factor is found across all terms.

Important Points

- Rearrange terms carefully to make factoring easier
- Group the terms in pairs or sets that show common factors
- Factor out the common factor from each group
- After factoring, look for a common binomial factor
- Always verify by expanding the factors to check correctness

Examples with Solutions

Example: Simple Grouping

➢ **Factorize $x^3 + x^2 + x + 1$.**

Solution: Group: $(x^3 + x^2) + (x + 1)$

$= x^2(x + 1) + 1(x + 1)$

$= (x + 1)(x^2 + 1)$

Example: Rearranging Needed

➢ **Factorize $ab + b^2 + a + b$.**

Solution: Group: $(ab + b^2) + (a + b)$

$= b(a + b) + 1(a + b)$

$= (a + b)(b + 1)$

Example: Three Terms Grouped in Two Sets

➢ **Factorize xy – 2y + 2 – x.**

Solution: Group: (xy – x) + (–2y + 2)

= x(y – 1) – 2(y – 1)

= (y – 1)(x – 2)

Example: Factorizing with Same Binomial Appearing

➢ **Factorize $p^2 + pq + p + q$.**

Solution: Group: $(p^2 + pq) + (p + q)$

= p(p + q) + 1(p + q)

= (p + q) (p + 1)

Example: Grouping with Four Terms

➢ **Factorize 3a – 3b – 2a + 2b.**

Solution: Group: (3a – 3b) + (–2a + 2b)

= 3(a – b) – 2(a – b)

= (a – b) (3 – 2)

= (a – b) (1)

Summary Points

- Regroup terms to find common factors easily.
- Group in such a way that a common binomial factor appears.
- Always factor out the GCF from each group.
- After factoring, multiply to verify your answer.
- Regrouping is a powerful tool when direct factoring is not obvious.