Factorisation using identities

Understanding of Factorisation using Identities

- Identities are standard algebraic formulas that help quickly factorize expressions.
- Common identities used for factorisation are $(a + b)^2 = a^2 + 2ab + b^2$, $(a – b)^2 = a^2 – 2ab + b^2$, and $(a + b)(a – b) = a^2 – b^2$.
- Recognizing the correct identity helps factorize without lengthy calculations.

Important Points

- Identify the correct pattern matching the expression.
- Use $(a + b)^2$ when the middle term is positive.
- Use $(a – b)^2$ when the middle term is negative.
- Use $(a + b)(a – b)$ when the expression is a difference of squares.
- Always expand and verify to check correctness.

Examples with Solutions

Example: Perfect Square Identity

- **Factorize $x^2 + 6x + 9$.**

Solution: $x^2 + 6x + 9 = (x + 3)^2$

Example: Perfect Square Identity with Negative Sign

- **Factorize $a^2 – 8a + 16$.**

Solution: $a^2 – 8a + 16 = (a – 4)^2$

Example: Difference of Squares Identity

- **Factorize $p^2 – 49$.**

Solution: $p^2 – 49 = (p + 7)(p – 7)$

Example: Application with Coefficients

- **Factorize $4x^2 + 12x + 9$.**

Solution: $4x^2 + 12x + 9 = (2x + 3)^2$

Example: Complicated Difference of Squares

- **Factorize $25x^2 - 36y^2$.**

Solution: $25x^2 - 36y^2 = (5x + 6y)(5x - 6y)$

Summary Points

- Recognize patterns matching standard identities.
- Use $(a + b)^2$, $(a - b)^2$, or $(a + b)(a - b)$ for quick factorization.
- Simplify by identifying squares and middle terms.
- Verify by expanding the factored expression.
- Identities save time and reduce calculation errors.