Some Special Products (Special Identities)

Understanding of Some Special Products (Special Identities)

- Special products or identities are standard algebraic formulas that make calculations faster and easier.
- These identities help to expand and simplify algebraic expressions quickly.
- Memorizing these identities saves time during multiplication and factorization.

Important Points

- $(a + b)^2 = a^2 + 2ab + b^2$
- $(a-b)^2 = a^2 2ab + b^2$
- $(a + b) (a b) = a^2 b^2$
- These identities are used in many problems like expansions, simplifications, and solving equations.
- Always identify which identity is applicable before expanding the expression.

Examples with Solutions

Example: Using (a + b)² Identity

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\succ Expand: (x + 4)^2
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Solution: Apply (a + b)^2 = a^2 + 2ab + b^2
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= x^2 + 2 \times x \times 4 + 4^2
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= x^2 + 8x + 16
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Example: Using $(a - b)^2$ Identity

Expand: (5p – 2q)²

Solution: Apply $(a - b)^2 = a^2 - 2ab + b^2$ = $(5p)^2 - 2 \times 5p \times 2q + (2q)^2$ = $25p^2 - 20pq + 4q^2$

Example: Using (a + b)(a – b) Identity

➢ Simplify: (7x + 5y)(7x − 5y)

Solution: Apply $(a + b)(a - b) = a^2 - b^2$

 $=(7x)^2-(5y)^2$

 $= 49x^2 - 25y^2$

Example: Using (x + a)(x + b) Expansion

> Expand: (x + 3)(x + 7)

Solution: Use distributive property:

$$x \times x + x \times 7 + 3 \times x + 3 \times 7$$

= $x^{2} + 7x + 3x + 21$
= $x^{2} + 10x + 21$

Example: Application in Finding Product Quickly

Solution: Write 98 = 100 - 2 and 102 = 100 + 2Now use $(a + b)(a - b) = a^2 - b^2$ $= 100^2 - 2^2$ = 10000 - 4= 9996

Summary Points

- $(a + b)^2 = a^2 + 2ab + b^2$
- $(a-b)^2 = a^2 2ab + b^2$
- $(a + b) (a b) = a^2 b^2$
- Recognize which identity fits the given expression.
- Special products make expansion and simplification quicker and easier.