

Exploring Algebraic Identities

CBSE Class 9 Maths · Knowledge organiser

KEY DEFINITIONS

Identity

An equality that is true for every value of the variables.

Expansion

Multiplying out brackets to write an expression as a sum of terms.

Factorisation

Writing an expression as a product of factors, the reverse of expanding.

KEY FORMULAS

Squares	$(a \pm b)^2 = a^2 \pm 2ab + b^2$, $(a + b)(a - b) = a^2 - b^2$
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Product	$(x + a)(x + b) = x^2 + (a + b)x + ab$
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Three terms:	$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
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Cubes	$(a \pm b)^3 = a^3 \pm b^3 \pm 3ab(a \pm b)$
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Sum/difference of cubes	$a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$
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YOU SHOULD BE ABLE TO...

- Pick the right identity to expand a square, a product or a cube, and use one for quick arithmetic.
- Factorise with identities and find values such as $a^2 + b^2$ or $a^3 - b^3$ from given sums and products.
- Expand, evaluate and factorise in multi-part questions and use identities for areas and volumes.
- Chain identities, such as from $x - 1/x$ to $x^4 + 1/x^4$, and set up identity-based models.

WORKED EXAMPLE

If $a + b = 9$ and $ab = 14$, find $a^2 + b^2$.

$$a^2 + b^2 = 81 - 28 = 53.$$

COMMON MISTAKES

- ✗ $(a + b)^2 = a^2 + b^2$: the middle term $2ab$ is missing.
- ✗ $(2x)^2 = 2x^2$: the whole term is squared, $4x^2$.
- ✗ Sign of the middle term in $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$.
- ✗ In $(a + b - c)^2$, the terms $2bc$ and $2ca$ become $-2bc$ and $-2ca$.