Algebraic Identities Example

An algebraic identity is true for every permitted value. The perfect-square identities expand binomials without repeatedly multiplying every term.

WORKED EXAMPLE

Expand $(x + 3)^2$.

$$(a + b)^2 = a^2 + 2ab + b^2;\ (a - b)^2 = a^2 - 2ab + b^2$$

Step-by-step solution

Step 1: Choose the identity

This is a sum squared, so use the first perfect-square identity.

$$(a + b)^2 = a^2 + 2ab + b^2$$

Step 2: Substitute

Set a = x and b = 3.

$$(x + 3)^2 = x^2 + 2(x)(3) + 3^2$$

Step 3: Simplify

Evaluate the middle product and the square of 3.

$$x^2 + 6x + 9$$

ANSWER

$$x^2 + 6x + 9$$

Check

Multiply directly: $(x + 3)(x + 3) = x^2 + 3x + 3x + 9 = x^2 + 6x + 9$.