Factorization Example

Factoring writes a polynomial as a product of simpler factors. For $x^2 + bx + c$, find p and q with $p + q = b$ and $pq = c$.

WORKED EXAMPLE

Factor $x^2 + 7x + 12$. Find two integers whose sum is 7 and whose product is 12.

$$x^2 + bx + c = (x + p)(x + q),\ p + q = b,\ pq = c$$

Step-by-step solution

Step 1: Identify the coefficients

Here $b = 7$ and $c = 12$.

$$b = 7,\ c = 12$$

Step 2: Find the factor pair

The pair 3 and 4 multiplies to 12 and adds to 7.

$$3 \times 4 = 12,\ 3 + 4 = 7$$

Step 3: Write the factors

Place the pair in the binomial factors.

$$x^2 + 7x + 12 = (x + 3)(x + 4)$$

ANSWER

$$(x + 3)(x + 4)$$

Check

Expand to check: $(x + 3)(x + 4) = x^2 + 4x + 3x + 12 = x^2 + 7x + 12$.