Notes & Steps

Key idea

To expand double brackets, multiply every term in the first bracket by every term in the second bracket. Use FOIL: **F**irst, **O**uter, **I**nner, **L**ast. Then collect like terms.

Steps

1. Multiply the First terms: $x \times x = x^2$.
2. Multiply the Outer terms: $x \times b = bx$.
3. Multiply the Inner terms: $a \times x = ax$.
4. Multiply the Last terms: $a \times b = ab$.
5. Add them up: $x^2 + bx + ax + ab$, then simplify: $x^2 + (a + b)x + ab$.

FOIL diagram

$$(x + a)(x + b)$$

- **F**: $x \times x = x^2$
- **O**: $x \times b = bx$ (outer terms)
- **I**: $a \times x = ax$ (inner terms)
- **L**: $a \times b = ab$

So $(x + a)(x + b) = x^2 + (a + b)x + ab$.

Common mistake

Only doing First and Last (FO), skipping Outer and Inner. $(x+3)(x+4) = x^2+3x+4x+12 = x^2 + 7x + 12$, **not** $x^2 + 12$.

Notes & Steps

Example 1: both positive

Expand $(x+2)(x+5)$. F: x^2, O: $5x$, I: $2x$, L: 10. Sum: $x^2+5x+2x+10 = x^2+7x+10$.

Example 2: one negative

Expand $(x+6)(x-3)$. F: x^2, O: $-3x$, I: $6x$, L: -18. Sum: $x^2-3x+6x-18 = x^2+3x-18$.

Example 3: both negative

Expand $(x-4)(x-2)$. F: x^2, O: $-2x$, I: $-4x$, L: 8. Sum: $x^2-2x-4x+8 = x^2-6x+8$.

Example 4: with coefficients

Expand $(2x+1)(x+3)$. F: $2x^2$, O: $6x$, I: x, L: 3. Sum: $2x^2+6x+x+3 = 2x^2+7x+3$.

Try these

1. $(x+3)(x+7)$
2. $(x-5)(x+2)$
3. $(2x+1)(x+4)$

Common mistake

Forgetting to collect like terms. Always combine the Outer and Inner terms (bx and ax) before writing your final answer.