Expanding Brackets

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Single Bracket (Distributive Law)

Multiply the **outside term** by **every** term inside.

$$a(b+c) = ab + ac$$

- $4(x+7) = 4x + 28$
- $-6(2a+5) = -12a - 30$
- $3a(2a-5b+4) = 6a^2 - 15ab + 12a$

Then: Collect like terms if multiple brackets.

Double Brackets (FOIL)

Multiply **every** term in the 1st by **every** term in the 2nd.

$$(a+b)(c+d) = ac + ad + bc + bd$$

First · **O**uter · **I**nner · **L**ast → Simplify

- $(x+4)(x+7) = x^2 + 11x + 28$
- $(3x-2)(5x+4) = 15x^2 + 2x - 8$

Grid method works too—especially for 3+ terms.

The Three Special Identities (Memorise These!)

Perfect Square (+)	Perfect Square (−)	Difference of Squares
$(a+b)^2 = a^2 + 2ab + b^2$	$(a-b)^2 = a^2 - 2ab + b^2$	$(a+b)(a-b) = a^2 - b^2$
$(x+8)^2 = x^2 + 16x + 64$	$(5x-3)^2 = 25x^2 - 30x + 9$	$(x+9)(x-9) = x^2 - 81$

Triple Brackets & Beyond

Never expand all three at once!

1. Expand the first two brackets (FOIL).
2. Simplify (collect like terms).
3. Multiply the result by the third bracket.
4. Collect like terms again.

Tip: Use a **grid** for the 2nd step (trinomial × binomial = 6 terms before simplifying).

Complex Expressions

For expressions like $A(...)^2 - B(...)(...)$:

1. Expand each product **separately**.
2. Apply any multiplier **after** expanding.
3. Combine everything, **distribute the minus sign** carefully.
4. Collect like terms.

Key: Subtracting a bracket flips **every sign** inside it.

Common Traps & Pitfalls

1. **Missing Middle Term:** $(x+5)^2 \neq x^2 + 25 \rightarrow x^2 + 10x + 25$
2. **Partial Multiplication:** $4(x+7) \neq 4x + 7 \rightarrow 4x + 28$
3. **FOIL—Only First & Last:** $(x+4)(x+7) \neq x^2 + 28 \rightarrow x^2 + 11x + 28$
4. **Negative Outside Bracket:** $-3(x-4) \neq -3x - 12 \rightarrow -3x + 12$
   Remember: $(-) \times (-) = (+)$
5. **Subtracting a Bracket:** $-(x^2+2x-3) = -x^2-2x+3$
   Every sign flips!

Exam Keywords & Quick Strategies

Spot the question type:

- "Expand" → Remove brackets
- "Expand and simplify" → Remove brackets + collect like terms
- "Show that" / "Prove" → Start from LHS, expand to reach RHS
- "Find the area" → Multiply expressions, then expand

Quick checks:

- **Substitution test:** Plug in $x = 1$ into original and expanded form—they must match.
- **Term count:** 2 binomials → 4 terms before simplifying; trinomial × binomial → 6.
- **Highest power:** Two linear brackets → x^2; three → x^3.

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