MATHEMATICS · GRADES 10-12

Multiplying binomials

Difficulty level: Advanced

Mathematics: Grades 10-12

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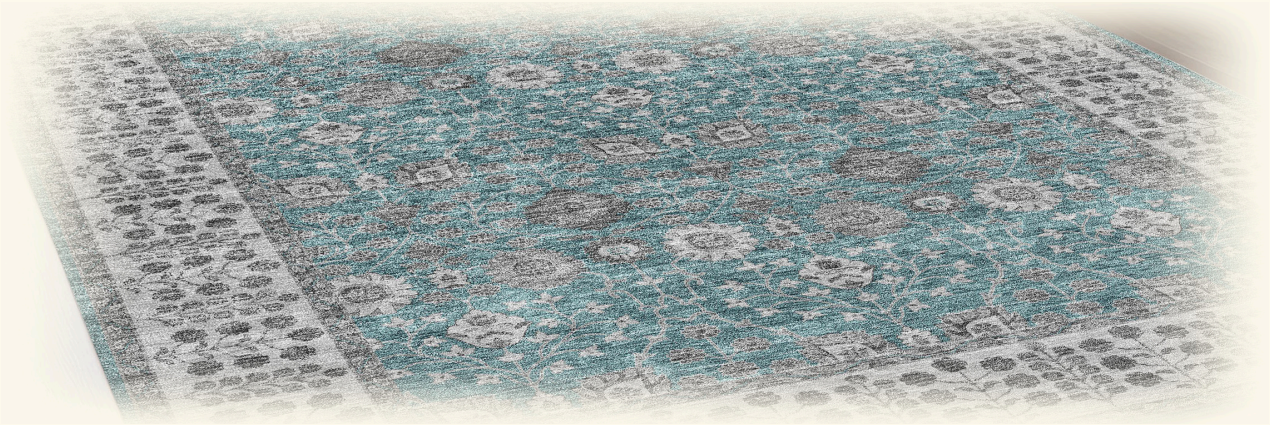
Overview of the concept

This is how you multiply two brackets together, like working out the area of a rectangle whose sides are each written as a sum. Each part of the first bracket has to multiply each part of the second, which is why the answer has four parts before it simplifies. You use it to work out the area of a garden or a room, to expand expressions in algebra, and to model real situations where two quantities are each made of two parts.



Rule

Multiply every term in the first bracket by every term in the second bracket, then combine like terms.

Each pair gives one product, so two binomials give four products before simplifying.

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Worked examples

EXAMPLE 1

Q Multiply $(x + 2)(x + 5)$

SOLUTION

First: $x \times x = x^2$. Outer: $x \times 5 = 5x$

Inner: $2 \times x = 2x$. Last: $2 \times 5 = 10$

Add: $x^2 + 5x + 2x + 10 = x^2 + 7x + 10$

EXAMPLE 2

Q Multiply $(2x - 3)(x + 4)$

SOLUTION

First: $2x \times x = 2x^2$. Outer: $2x \times 4 = 8x$

Inner: $-3 \times x = -3x$. Last: $-3 \times 4 = -12$

Add: $2x^2 + 8x - 3x - 12 = 2x^2 + 5x - 12$

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Practice questions

1 A garden bed is $(x + 1)$ m by $(x + 6)$ m. The four partial products are:

x^2

$6x$

x

6

Add them to find the area.

- **A** $x^2 + 7x + 6$
- **B** $x^2 + 6x + 6$
- **C** $x^2 + 7x + 5$
- **D** $x^2 + 5x + 6$

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2 A photo frame is (x - 2) cm by (x + 7) cm. Multiply to find its area.

- **A** $x^2 + 5x + 14$
- **B** $x^2 + 5x - 14$
- **C** $x^2 - 5x - 14$
- **D** $x^2 + 9x - 14$

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3 A rug is (x + 3) m by (x - 4) m. What is the x term of the area?

- **A** x
- **B** -x
- **C** 7x
- **D** -7x

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4 A box lid is (2x + 3) cm by (x + 2) cm. Multiply to find its area.

- **A** $2x^2 + 5x + 6$
- **B** $2x^2 + 7x + 5$
- **C** $2x^2 + 6x + 6$
- **D** $2x^2 + 7x + 6$

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5 A poster is (3x - 2) cm by (x + 5) cm. Multiply to find its area.

- **A** $3x^2 + 11x - 10$
- **B** $3x^2 + 13x - 10$
- **C** $3x^2 + 13x + 10$
- **D** $3x^2 + 17x - 10$

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6 **Which multiplication gives $2x^2 - 5x - 3$?**

- **A** $(2x + 1)(x - 3)$
- **B** $(2x - 1)(x + 3)$
- **C** $(2x + 3)(x - 1)$

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7 **A window is $(x - 5)$ m by $(x - 3)$ m. Multiply to find its area.**

- **A** $x^2 - 8x + 15$
- **B** $x^2 + 8x + 15$
- **C** $x^2 - 8x - 15$
- **D** $x^2 - 2x + 15$

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8 A classroom floor is $(x + 7)$ m long and $(x + 2)$ m wide. What is its area?

- **A** $x^2 + 5x + 14$
- **B** $x^2 + 9x + 14$
- **C** $x^2 + 9x + 16$
- **D** $x^2 + 7x + 14$

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9 Which multiplication gives $x^2 + 8x + 15$?

- **A** $(x + 3)(x + 5)$
- **B** $(x + 2)(x + 7)$
- **C** $(x + 1)(x + 15)$

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10 A garden bed is (3x + 1) m by (x + 5) m. What is its area when x = 2?

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ANSWER KEY

1. $x^2 + 7x + 6$

2. $x^2 + 5x - 14$

3. $-x$

4. $2x^2 + 7x + 6$

5. $3x^2 + 13x - 10$

6. $(2x + 1)(x - 3)$

7. $x^2 - 8x + 15$

8. $x^2 + 9x + 14$

9. $(x + 3)(x + 5)$

10. 49

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