MATHEMATICS · GRADES 7-9

Multiplying a monomial by a polynomial

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you expand a single term across a bracket, the step that shows up when you work out the area of a garden with a length given as a sum. One term times a bracket means that term has to multiply every part inside, and missing one part is the most common mistake. You use it to work out areas and volumes, to expand expressions in algebra, and to set up equations for real problems where a measurement is given as a sum.



Rule

Multiply the monomial by every term inside the bracket.

Miss one term and the answer is wrong. Add the exponents of the same letter when you multiply.

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Worked examples

EXAMPLE 1

Q Multiply $3x(2x + 5)$

SOLUTION

Multiply $3x(2x + 5)$

Work it one step at a time, top to bottom.

Multiply $3x$ by the first term: $3x \times 2x = 6x^2$

Multiply $3x$ by the second term: $3x \times 5 = 15x$

So $3x(2x + 5) = 6x^2 + 15x$

EXAMPLE 2

Q Multiply $2a(a - 4)$

SOLUTION

Multiply $2a(a - 4)$

Work it one step at a time, top to bottom.

Multiply $2a$ by the first term: $2a \times a = 2a^2$

Multiply $2a$ by the second term: $2a \times (-4) = -8a$

So $2a(a - 4) = 2a^2 - 8a$

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Practice questions

1 Multiply $2x(x + 3)$.

- **A** $2x^2 + 6x$
- **B** $2x^2 + 3x$
- **C** $2x^2 + 6$
- **D** $6x^2 + 2x$

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2 Multiply $4a(a - 2)$.

- **A** $4a^2 + 8a$
- **B** $4a^2 - 8a$
- **C** $4a^2 - 2a$
- **D** $8a^2 - 8a$

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3 Multiply $3m(2m + 1)$ to write its area.

- A $6m^2 + m$
- B $5m^2 + 3m$
- C $6m^2 + 3m$
- D $6m^2 - 3m$

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4 Multiply $x(x^2 + 4)$ to write its volume.

- A $x^3 + 4$
- B $x^3 + 4x$
- C $x^3 + 4x^2$
- D $2x^3 + 4x$

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5 Multiply $5t(2t - 3)$ to write its area.

- A $10t^2 - 15t$
- B $10t^2 + 15t$
- C $10t^2 - 3t$
- D $7t^2 - 15t$

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6 Multiply $-2y(y + 5)$ to write the total change in temperature.

- A $-2y^2 + 10y$
- B $2y^2 - 10y$
- C $-2y^2 - 10y$
- D $-2y^2 - 5y$

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7 Which multiplication gives $12x^2 - 3x$?

A $3x(4x - 1)$

B $3x(4x + 1)$

C $4x(3x - 1)$

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8 Multiply $2p(p^2 - p + 1)$ to write its volume.

A $2p^3 + 2p^2 + 2p$

B $2p^3 - 2p^2$

C $2p^3 - p^2 + 2p$

D $2p^3 - 2p^2 + 2p$

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9 6a times a bracket gives $12a^2 + 18a$. Which bracket is it?

- **A** (2a + 3)
- **B** (2a - 3)
- **C** (a + 3)

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10 Multiply -x(x - 2) to write the total change in litres.

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

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ANSWER KEY

1. $2x^2 + 6x$

2. $4a^2 - 8a$

3. $6m^2 + 3m$

4. $x^3 + 4x$

5. $10t^2 - 15t$

6. $-2y^2 - 10y$

7. $3x(4x - 1)$

8. $2p^3 - 2p^2 + 2p$

9. $(2a + 3)$

10. $-x^2 + 2x$

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