MATHEMATICS · GRADES 7-9

Simplifying expressions

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you tidy up a long maths expression into its shortest form, the way you would simplify a shopping list by grouping the same items together. A long expression with the same letters scattered through it is hard to read and easy to get wrong. Grouping the matching parts together leaves a shorter version that means exactly the same thing. That shorter version is also much easier to work with when the expression shows up again in a bigger problem.



Rule

Simplifying expressions: only like terms can be combined.

Expand the brackets first, then add or subtract the terms that match, and leave unlike terms alone.

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Worked examples

EXAMPLE 1

Q Simplify 2(x + 3) + 4x.

SOLUTION

This is an expanding and collecting question, so do the brackets first. Two times x is 2x, and 2 times 3 is 6, so 2(x + 3) is 2x + 6.

Now the expression is 2x + 6 + 4x. The like terms are 2x and 4x, and 2x + 4x is 6x.

So the simplified expression is 6x + 6. The 6 stays on its own, because it has no x to join.

EXAMPLE 2

Q Simplify 3x + 2y - x + 5y.

SOLUTION

This is a collecting-like-terms question, so start with the one rule to remember: only like terms can be combined, and terms with different letters stay separate.

The x terms are 3x and -x, and 3x - x is 2x. The y terms are 2y and 5y, and 2y + 5y is 7y.

So the simplified expression is 2x + 7y.

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Practice questions

1 Are 3x and 7x like terms?

- A Yes
- B No

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2 Which pair are like terms?

- A $2y$ and $3y^2$
- B $4x$ and $5x$
- C $3a$ and $3b$
- D $2x^2$ and $2x$

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3 Simplify $5x + 3x$.

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

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4 Simplify $4a + 3b - 2a + b$.

- **A** $2a + 4b$
- **B** $2a + 2b$
- **C** $6a + 4b$
- **D** $2a + 3b$

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5 Expand and simplify $3(x + 4)$.

- **A** $3x + 12$
- **B** $3x + 4$
- **C** $3x + 7$
- **D** $x + 12$

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

- **A** $7x - 2$
- **B** $7x + 2$
- **C** $6x - 2$
- **D** $7x - 1$

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7 Simplify $5m - 2m + 3$

A 3m + 3

B 3m

C 7m + 3

D 3m - 3

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8 Simplify $4x^2 + 3x - x^2$

A $3x^2 + 3x$

B $5x^2 + 3x$

C $3x^2 + 2x$

D $4x^2 + 3x$

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9 Simplify $2x - (x + 4)$.

- **A** $x - 4$
- **B** $x + 4$
- **C** $3x - 4$
- **D** $3x + 4$

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10 Expand $-2(x - 3)$.

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

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ANSWER KEY

1. Yes

2. 4x and 5x

3. 8x

4. 2a + 4b

5. 3x + 12

6. 7x - 2

7. 3m + 3

8. $3x^2 + 3x$

9. x - 4

10. -2x + 6

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