MATHEMATICS · GRADES 10-12

Factoring quadratics

Difficulty level: Advanced

Mathematics: Grades 10-12

This document was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

Overview of the concept

This is how you break a curving equation into brackets so you can solve it. A thrown ball hits the ground at a moment you can find by factoring, and any curved path that crosses zero works the same way. The brackets tell you the two points where the curve meets the ground. It is the main tool for solving the equations that describe arcs, throws, and falls.



Rule

Factoring quadratics: to factor $ax^2 + bx + c$, find two numbers that multiply to $a \times c$ and add to b, then use them to split the middle term and factor by grouping.

© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q Factor $x^2 + 8x + 15$

SOLUTION

___ × ___ = 15

___ + ___ = 8

3 × 5 = 15 and 3 + 5 = 8, so the numbers are 3 and 5

Write the brackets: $(x + 3)(x + 5)$

Check by expanding: $x^2 + 5x + 3x + 15 = x^2 + 8x + 15$

EXAMPLE 2

Q Factor $2x^2 + 7x + 3$

SOLUTION

Multiply a by c: 2 × 3 = 6

___ × ___ = 6

___ + ___ = 7

6 × 1 = 6 and 6 + 1 = 7, so the numbers are 6 and 1

Split the middle term: $2x^2 + 6x + x + 3$

Group: $2x(x + 3) + (x + 3) = (2x + 1)(x + 3)$

© 2026 Brett Robbins. All Rights Reserved.

Practice questions

1 Factor $x^2 + 6x + 8$.

- **A** (x + 2)(x - 4)
- **B** (x + 1)(x + 8)
- **C** (x + 2)(x + 4)
- **D** (x - 2)(x - 4)

Understand It with Pulse | Flag a mistake

2 Factor $x^2 - 4x + 3$.

- **A** (x - 1)(x - 3)
- **B** (x + 1)(x + 3)
- **C** (x - 1)(x + 3)
- **D** (x + 1)(x - 3)

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

3 Write $3x^2 + 14x + 8$ as a product of two brackets.

- **A** $(3x + 4)(x + 2)$
- **B** $(3x + 2)(x + 4)$
- **C** $(3x - 2)(x - 4)$
- **D** $(3x + 2)(x - 4)$

Understand It with Pulse | Flag a mistake

4 Factor $2x^2 + 5x + 2$.

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

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

5 Factor $3x^2 - 5x + 2$.

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

Understand It with Pulse | Flag a mistake

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

- **A** $(x + 7)(x - 2)$
- **B** $(x - 7)(x + 2)$
- **C** $(x + 5)(x - 2)$
- **D** $(x + 7)(x + 2)$

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

7 Factor $x^2 - 2x - 15$

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

Understand It with Pulse | Flag a mistake

8 The product of two brackets is $x^2 + 9x + 18$. One bracket is $(x + 3)$. What is the other?

- **A** $(x + 6)$
- **B** $(x + 3)$
- **C** $(x + 9)$
- **D** $(x - 6)$

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

9 Which pair of numbers multiplies to 16 and adds to 10?

- **A** 2 and 8
- **B** 4 and 4
- **C** 1 and 16
- **D** 2 and 6

Understand It with Pulse | Flag a mistake

10 Write $2x^2 - 9x + 4$ as two brackets multiplied together.

- **A** (2x - 1)(x - 4)
- **B** (2x + 1)(x + 4)
- **C** (2x - 4)(x - 1)
- **D** (2x - 1)(x + 4)

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. (x + 2)(x + 4)

2. (x - 1)(x - 3)

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

4. (2x + 1)(x + 2)

5. (3x - 2)(x - 1)

6. (x + 7)(x - 2)

7. (x - 5)(x + 3)

8. (x + 6)

9. 2 and 8

10. (2x - 1)(x - 4)

© 2026 Brett Robbins. All Rights Reserved.