MATHEMATICS · GRADES 10-12

Solving by factoring

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 solve an equation by splitting it into two simpler pieces, like working out the length and width of a garden bed from its area, one piece at a time. A factored equation is really two smaller questions joined together, and each one gives you a possible answer. Splitting it this way turns a hard equation into two easy ones you already know how to solve. Gardeners, builders, and anyone working with areas use this whenever a length and a width have to be found from the space they enclose.



Rule

Solving by factoring: if a product equals zero, at least one factor equals zero.

Factor the equation, set each factor equal to zero, and solve each one.

© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q Solve $x^2 + 6x + 8 = 0$

SOLUTION

Factor: $(x + 2)(x + 4) = 0$

Set each bracket to zero: $x + 2 = 0$ or $x + 4 = 0$.

Solve: $x = -2$ or $x = -4$

EXAMPLE 2

Q Solve $x^2 - 5x + 4 = 0$

SOLUTION

Factor: $(x - 1)(x - 4) = 0$

Set each bracket to zero: $x - 1 = 0$ or $x - 4 = 0$.

Solve: $x = 1$ or $x = 4$

© 2026 Brett Robbins. All Rights Reserved.

Practice questions

1 Factor $x^2 + 3x + 2 = 0$ and find x.

- **A** x = -1 or x = -2
- **B** x = 1 or x = 2
- **C** x = -1 or x = 2
- **D** x = 1 or x = -2

Understand It with Pulse | Flag a mistake

2 Solve $x^2 - 7x + 10 = 0$ for x.

- **A** x = 2 or x = -5
- **B** x = 2 or x = 5
- **C** x = -2 or x = -5
- **D** x = 5 or x = -2

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

3 Factor $x^2 + 9x + 14$.

A (x + 2)(x + 7)

B (x - 2)(x - 7)

C (x + 9)(x + 14)

D (x + 1)(x + 14)

Understand It with Pulse | Flag a mistake

4 Find the solutions of $x^2 - 4x - 12 = 0$

A x = 6 or x = 2

B x = -6 or x = -2

C x = -6 or x = 2

D x = 6 or x = -2

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

5 The equation $x^2 + 5x + c = 0$ has solutions $x = 2$ and $x = -7$. What is c?

- A -14
- B 14
- C -5
- D 5

Understand It with Pulse | Flag a mistake

6 Solve $(x - 5)(x + 2) = 0$ for x.

- A x = 5 or x = -2
- B x = -5 or x = 2
- C x = 5 or x = 2
- D x = -5 or x = -2

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

7 **An equation has solutions $x = -4$ and $x = -6$. Which one is it?**

A $x^2 + 10x + 24 = 0$

B $x^2 + 10x + 16 = 0$

C $x^2 - 10x + 24 = 0$

Understand It with Pulse | Flag a mistake

8 **Kim factors $x^2 + 4x + 3 = 0$ to $(x + 1)(x + 3) = 0$, then writes $x = 1$ or $x = 3$. What is Kim's mistake?**

A She should have written $x = 1$ and $x = 3$, because the factors are $(x + 1)$ and $(x + 3)$.

B She factored $x^2 + 4x + 3$ wrong: it is not $(x + 1)(x + 3)$.

C She forgot the minus signs: $x = -1$ and $x = -3$.

D She should have divided both sides by x first.

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

9 Solve $x^2 + 8x + 7 = 0$, then add the two solutions. What is the total?

- **A** -8
- **B** 8
- **C** -7
- **D** 7

Understand It with Pulse | Flag a mistake

10 Which one does NOT have $x = -1$ as a solution:

- **A** $x^2 + 3x + 2 = 0$
- **B** $x^2 + 4x + 3 = 0$
- **C** $x^2 + 5x + 6 = 0$
- **D** $x^2 + 6x + 5 = 0$

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. $x = -1$ or $x = -2$

2. $x = 2$ or $x = 5$

3. $(x + 2)(x + 7)$

4. $x = 6$ or $x = -2$

5. -14

6. $x = 5$ or $x = -2$

7. $x^2 + 10x + 24 = 0$

8. She forgot the minus signs: $x = -1$ and $x = -3$.

9. -8

10. $x^2 + 5x + 6 = 0$

© 2026 Brett Robbins. All Rights Reserved.