The Panda Math Tutor

Solving Quadratic Equations Using Factorisation

IGCSE Mathematics

The Panda Math Tutor

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1 Introduction

Note

Solving quadratic equations is one of the most important skills in IGCSE Mathematics. Factorisation provides a powerful algebraic method for finding exact solutions without relying on a calculator. This topic builds directly on your knowledge of factorising quadratic expressions.

In this chapter, we will explore:

- What quadratic equations are and what it means to solve them — Section 2
- The zero product property — Section 3
- Solving equations where $a = 1$ (monic quadratics) — Section 4
- Solving equations where $a \neq 1$ (non-monic quadratics) — Section 5
- Equations involving the difference of two squares — Section 6
- Equations involving perfect square trinomials — Section 7
- Setting up and solving problems from non-standard forms — Section 8
- Applied problems that lead to quadratic equations — Section 9
- Common mistakes and pitfalls — Section 10

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2 What is a Quadratic Equation?

Definition

A **quadratic equation** is an equation of the form:

$$ax^2 + bx + c = 0$$

where:

- a, b, and c are constants (numbers)
- $a \neq 0$ (there must be an x^2 term)
- x is the unknown variable we want to find

This is called the **standard form** of a quadratic equation.
Examples:

- $x^2 + 9x + 14 = 0 \quad (a = 1,\ b = 9,\ c = 14)$
- $4x^2 - 7x + 3 = 0 \quad (a = 4,\ b = -7,\ c = 3)$
- $x^2 - 36 = 0 \quad (a = 1,\ b = 0,\ c = -36)$

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Definition

Solving a quadratic equation means finding the values of x that make the equation true. These values are called the **solutions** or **roots** of the equation.
A quadratic equation can have:

- **Two distinct solutions** (most common)
- **One repeated solution** (when the expression is a perfect square)
- **No real solutions** (when the equation cannot be factorised over real numbers)

Warning

Common Mistake: Confusing expressions with equations!

- $x^2+9x+14$ is a quadratic **expression** — you can factorise it, but you cannot solve it
- $x^2 + 9x + 14 = 0$ is a quadratic **equation** — you can solve it to find values

Preview ends here

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