

NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations | 2026-27

🚩 Quick Revision Box — Chapter 4 Quadratic Equations

- **Standard Form:** A quadratic equation is written as $(ax^2 + bx + c = 0)$, where $(a \neq 0)$.
- **Degree:** The highest power of the variable must be exactly 2.
- **Roots / Zeroes:** A quadratic equation has at most two roots.
- **Discriminant:** $(D = b^2 - 4ac)$. If $(D \geq 0)$, roots are real.
- **Exercise 4.1 Focus:** Identifying quadratic equations and forming them from word problems — no solving required here.
- **Word Problem Strategy:** Assign variable \rightarrow form equation \rightarrow simplify to $(ax^2 + bx + c = 0)$.
- **Syllabus Status:** Chapter 4 is fully included in the 2026-27 CBSE rationalised syllabus.

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The **NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations** on this page are fully updated for the **2026-27** CBSE board exam. These solutions cover Exercise 4.1 in complete detail, with step-by-step working for all 2 questions and their sub-parts. You can find all [NCERT Solutions for Class 10](#) on our sub-hub, and the complete collection of [NCERT Solutions](#) for all classes on our main hub. The official textbook is available on the [NCERT official website](#).

NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations — Chapter Overview

Chapter 4 of the NCERT Class 10 Mathematics textbook (published by the [NCERT](#)) introduces **Quadratic Equations** — one of the most important algebra topics in secondary school mathematics. You will learn to identify quadratic equations, form them from real-life situations, and solve them using three methods: factorisation, completing the square, and the quadratic formula.

For CBSE board exams, this chapter typically carries **6–8 marks** and appears in both the short-answer (2–3 mark) and long-answer (4–5 mark) sections. Word problems and the quadratic formula are the most frequently tested areas. Students who have studied *Chapter 2 (Polynomials)* and *Chapter 3 (Linear Equations)* will find the transition to quadratic equations straightforward.

Detail	Information
Class	10
Subject	Mathematics
Chapter	Chapter 4
Chapter Name	Quadratic Equations
Textbook	NCERT Mathematics (Class 10)
Exercise Covered	Exercise 4.1 (2 Questions, 12 Sub-parts)
Marks Weightage	6–8 marks (approx.)
Difficulty Level	Easy to Medium
Academic Year	2026-27

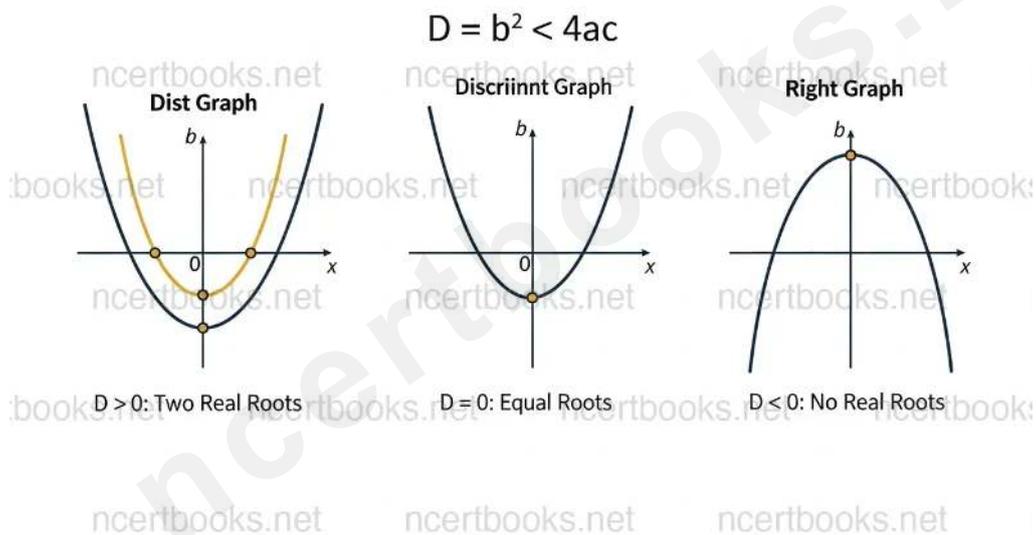


Fig 4.1: Nature of roots based on discriminant $D = b^2 - 4ac$

Key Concepts and Theorems — Quadratic Equations

Standard Form of a Quadratic Equation

A **quadratic equation** (द्विघात समीकरण) in variable x is any equation that can be written in the form:

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

where a, b, c are real numbers and $a \neq 0$. The condition $a \neq 0$ is critical — if $a = 0$, the equation becomes linear, not quadratic.

Roots / Zeroes of a Quadratic Equation

A real number α is a **root** (मूल) of $(ax^2 + bx + c = 0)$ if substituting $(x = \alpha)$ satisfies the equation, i.e., $(a\alpha^2 + b\alpha + c = 0)$. Every quadratic equation has **at most two roots**.

Discriminant and Nature of Roots

The **discriminant** (विवेककर) is defined as $(D = b^2 - 4ac)$. It tells you the nature of the roots without fully solving the equation:

- If $(D > 0)$: two distinct real roots
- If $(D = 0)$: two equal real roots
- If $(D < 0)$: no real roots (roots are imaginary)

How to Identify a Quadratic Equation

Expand both sides of the equation fully. Bring all terms to one side. If the resulting polynomial has degree exactly 2 (i.e., (x^2) term is present with a non-zero coefficient), it is quadratic. If (x^2) cancels out or the degree is 3 or more, it is *not* quadratic.

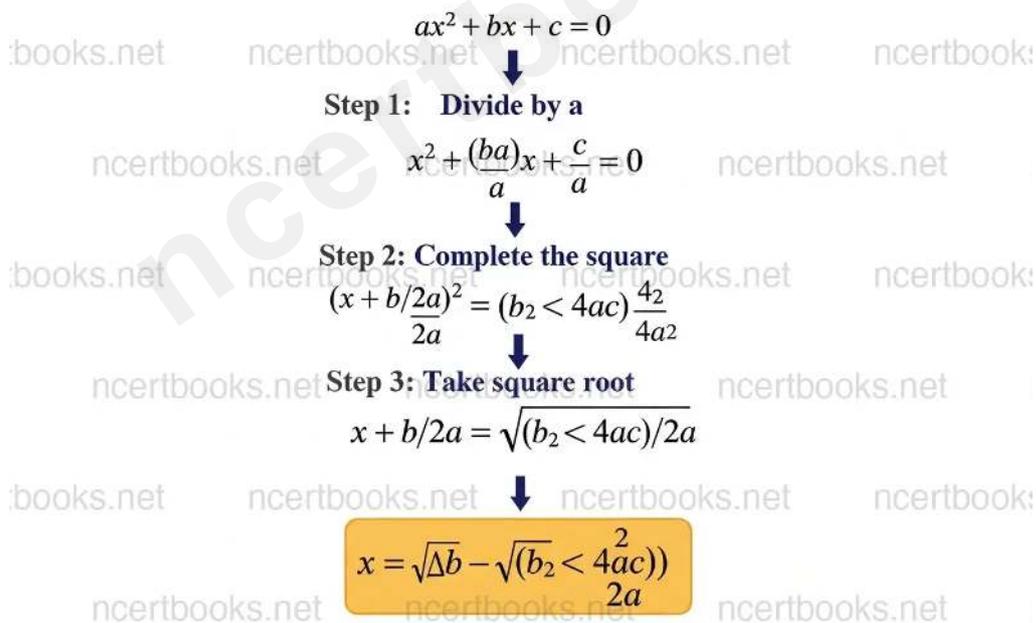


Fig 4.2: Step-by-step derivation of the quadratic formula

Formula Reference Table — Quadratic Equations

Formula Name	Formula	Variables Defined
Standard Form	$(ax^2 + bx + c = 0)$	

Formula Name	Formula	Variables Defined
		$(a \neq 0)$; a, b, c are real numbers
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	Gives both roots directly
Discriminant	$(D = b^2 - 4ac)$	Determines nature of roots
Sum of Roots	$(\alpha + \beta = \frac{-b}{a})$	(α, β) are the two roots
Product of Roots	$(\alpha \cdot \beta = \frac{c}{a})$	(α, β) are the two roots

Exercise 4.1 Solutions — Step by Step (2026-27)

Below are the complete NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations Exercise 4.1. Every sub-part is solved with full working. These answers are aligned with the CBSE 2026-27 marking scheme. You can also explore related chapters in our [NCERT Solutions for Class 10](#) section.

Question 1

Medium

Check whether the following are quadratic equations:

(i) $(x + 1)^2 = 2(x - 3)$

Step 1: Expand the left-hand side:

$$x^2 + 2x + 1 = 2x - 6$$

Step 2: Bring all terms to one side:

$$x^2 + 2x + 1 - 2x + 6 = 0$$

$$x^2 + 7 = 0$$

Step 3: Check the degree. The highest power of (x) is 2, and the coefficient of (x^2) is $1 (\neq 0)$.

(\therefore) **Yes, this is a quadratic equation.** Standard form: $(x^2 + 0 \cdot x + 7 = 0)$

(ii) $(x^2 - 2x = (-2)(3 - x))$

Step 1: Expand the right-hand side:

$$x^2 - 2x = -6 + 2x$$

Step 2: Bring all terms to one side:

$$x^2 - 2x - 2x + 6 = 0$$

$$x^2 - 4x + 6 = 0$$

Step 3: The highest power is 2 and coefficient of (x^2) is 1 ($\neq 0$).

(\therefore) **Yes, this is a quadratic equation.** Standard form: $(x^2 - 4x + 6 = 0)$

(iii) $(x - 2)(x + 1) = (x - 1)(x + 3)$

Step 1: Expand both sides:

$$x^2 + x - 2x - 2 = x^2 + 3x - x - 3$$

$$x^2 - x - 2 = x^2 + 2x - 3$$

Step 2: Bring all terms to one side:

$$x^2 - x - 2 - x^2 - 2x + 3 = 0$$

$$-3x + 1 = 0$$

Why does this happen? The (x^2) terms cancel out on both sides, leaving a linear equation.

Step 3: The highest power of (x) is 1, not 2.

(\therefore) **No, this is NOT a quadratic equation.** It is a linear equation: $(-3x + 1 = 0)$

(iv) $(x - 3)(2x + 1) = x(x + 5)$

Step 1: Expand the left-hand side:

$$2x^2 + x - 6x - 3 = x^2 + 5x$$

$$2x^2 - 5x - 3 = x^2 + 5x$$

Step 2: Bring all terms to one side:

$$2x^2 - 5x - 3 - x^2 - 5x = 0$$

$$x^2 - 10x - 3 = 0$$

Step 3: Highest power is 2, coefficient of (x^2) is 1 ($\neq 0$).

(\therefore) **Yes, this is a quadratic equation.** Standard form: $(x^2 - 10x - 3 = 0)$

$$(v) \ (2x - 1)(x - 3) = (x + 5)(x - 1)$$

Step 1: Expand both sides:

$$2x^2 - 6x - x + 3 = x^2 - x + 5x - 5$$

$$2x^2 - 7x + 3 = x^2 + 4x - 5$$

Step 2: Bring all terms to one side:

$$2x^2 - 7x + 3 - x^2 - 4x + 5 = 0$$

$$x^2 - 11x + 8 = 0$$

(\therefore) **Yes, this is a quadratic equation.** Standard form: $(x^2 - 11x + 8 = 0)$

$$(vi) \ (x^2 + 3x + 1 = (x - 2)^2)$$

Step 1: Expand the right-hand side:

$$x^2 + 3x + 1 = x^2 - 4x + 4$$

Step 2: Bring all terms to one side:

$$x^2 + 3x + 1 - x^2 + 4x - 4 = 0$$

$$7x - 3 = 0$$

Why does this happen? The (x^2) terms cancel, leaving a linear equation.

(\therefore) **No, this is NOT a quadratic equation.** It simplifies to a linear equation: $(7x - 3 = 0)$

$$(vii) \ (x + 2)^3 = 2x(x^2 - 1)$$

Step 1: Expand the left-hand side using the identity $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$:

$$x^3 + 6x^2 + 12x + 8 = 2x^3 - 2x$$

Step 2: Bring all terms to one side:

$$x^3 + 6x^2 + 12x + 8 - 2x^3 + 2x = 0$$

$$-x^3 + 6x^2 + 14x + 8 = 0$$

Why is this not quadratic? The term $(-x^3)$ means the highest degree is 3, making this a cubic equation.

Step 3: Highest power is 3, not 2.

\ (\therefore \) **No, this is NOT a quadratic equation.** It is a cubic equation of degree 3.

$$\text{(viii) } x^3 - 4x^2 - x + 1 = (x - 2)^3$$

Step 1: Expand the right-hand side:

$$(x-2)^3 = x^3 - 6x^2 + 12x - 8$$

Step 2: Set up the equation:

$$x^3 - 4x^2 - x + 1 = x^3 - 6x^2 + 12x - 8$$

Step 3: Bring all terms to one side:

$$x^3 - 4x^2 - x + 1 - x^3 + 6x^2 - 12x + 8 = 0$$

$$2x^2 - 13x + 9 = 0$$

Why does this work? The x^3 terms cancel, and we are left with a degree-2 polynomial.

Step 4: Highest power is 2, coefficient of x^2 is 2 ($\neq 0$).

\ (\therefore \) **Yes, this is a quadratic equation.** Standard form: $2x^2 - 13x + 9 = 0$

Board Exam Note: This type of question typically appears in 2–3 mark sections of CBSE board papers. Always show the expansion and simplification steps clearly — do not skip working.

Question 2

Medium

Represent the following situations in the form of quadratic equations:

(i) Area of a Rectangular Plot — 528 m²

Given: Area of rectangular plot = 528 m². Length is one more than twice the breadth.

Step 1: Let the breadth of the plot be x metres.

Step 2: Then the length = $(2x + 1)$ metres (one more than twice the breadth).

Step 3: Use the area formula: Area = Length \times Breadth

$$(2x + 1) \times x = 528$$

$$2x^2 + x = 528$$

Step 4: Bring all terms to one side:

$$2x^2 + x - 528 = 0$$

\ (\therefore \) **The required quadratic equation is \ (2x^2 + x - 528 = 0 \),** where \ (x \) is the breadth in metres.

(ii) Product of Two Consecutive Positive Integers = 306

Given: The product of two consecutive positive integers is 306.

Step 1: Let the first (smaller) integer be \ (x \).

Step 2: Then the next consecutive integer is \ (x + 1 \).

Step 3: Set up the product equation:

$$x(x + 1) = 306$$

$$x^2 + x = 306$$

Step 4: Bring all terms to one side:

$$x^2 + x - 306 = 0$$

\ (\therefore \) **The required quadratic equation is \ (x^2 + x - 306 = 0 \),** where \ (x \) is the smaller integer.

(iii) Rohan's Age — Product of Ages 3 Years from Now = 360

Given: Rohan's mother is 26 years older than Rohan. The product of their ages 3 years from now will be 360.

Step 1: Let Rohan's present age be \ (x \) years.

Step 2: Then his mother's present age = \ (x + 26 \) years.

Step 3: Three years from now: Rohan's age = \ (x + 3 \), Mother's age = \ (x + 29 \).

Step 4: Set up the product equation:

$$(x + 3)(x + 29) = 360$$

$$x^2 + 29x + 3x + 87 = 360$$

$$x^2 + 32x + 87 = 360$$

Step 5: Bring all terms to one side:

$$x^2 + 32x + 87 - 360 = 0$$

$$x^2 + 32x - 273 = 0$$

\(\therefore\) **The required quadratic equation is \(\mathbf{x^2 + 32x - 273 = 0}\), where \(\mathbf{x}\) is Rohan's present age in years.**

(iv) Train Speed — Distance 480 km, 3 Hours More if Speed Reduced by 8 km/h

Given: A train travels 480 km at uniform speed. If speed were 8 km/h less, it would take 3 hours more.

Step 1: Let the original speed of the train be \(\mathbf{x}\) km/h.

Step 2: Time at original speed = \(\mathbf{\frac{480}{x}} hours.

Step 3: Reduced speed = \(\mathbf{(x - 8)} km/h. Time at reduced speed = \(\mathbf{\frac{480}{x - 8}} hours.

Step 4: The reduced-speed journey takes 3 hours more, so:

$$\frac{480}{x - 8} - \frac{480}{x} = 3$$

Step 5: Multiply throughout by \(\mathbf{x(x - 8)}:

$$480x - 480(x - 8) = 3x(x - 8)$$

$$480x - 480x + 3840 = 3x^2 - 24x$$

$$3840 = 3x^2 - 24x$$

Step 6: Divide throughout by 3 and rearrange:

$$1280 = x^2 - 8x$$

$$x^2 - 8x - 1280 = 0$$

\(\therefore\) **The required quadratic equation is \(\mathbf{x^2 - 8x - 1280 = 0}\), where \(\mathbf{x}\) is the original speed of the train in km/h.**

Board Exam Note: Word problem formulation questions typically appear in 2–3 mark sections of CBSE board papers. Always define your variable clearly at the start and end with the equation in standard form.

Solved Examples Beyond NCERT — Extra Practice

These extra examples help you prepare for NCERT Exemplar Class 10 Maths solutions and higher-difficulty CBSE questions.

Extra Example 1

Easy

Is $(x + 1)(x - 1) = x^2 + 3$ a quadratic equation?

Step 1: Expand the left side: $x^2 - 1 = x^2 + 3$

Step 2: Subtract x^2 from both sides: $-1 = 3$, which gives $0 = 4$.

Why is this not quadratic? The x^2 terms cancel completely, leaving no variable at all — this is a contradiction, not an equation in x .

No, this is not a quadratic equation.

Extra Example 2

Medium

A rectangular garden has a perimeter of 40 m and an area of 96 m². Form a quadratic equation in terms of its length.

Step 1: Let length = l metres. Perimeter = $2(l + b) = 40$, so $l + b = 20$, giving $b = 20 - l$.

Step 2: Use area: $l \times b = 96$

$$l(20 - l) = 96$$

$$20l - l^2 = 96$$

$$l^2 - 20l + 96 = 0$$

Therefore Quadratic equation: $l^2 - 20l + 96 = 0$

Extra Example 3

Hard

A boat goes 30 km upstream and 44 km downstream in 10 hours. If the speed of the stream is 3 km/h, form a quadratic equation for the speed of the boat in still water.

Step 1: Let speed of boat in still water = x km/h.

Step 2: Upstream speed = $(x - 3)$ km/h; Downstream speed = $(x + 3)$ km/h.

Step 3: Total time = 10 hours:

$$(30)/(x - 3) + (44)/(x + 3) = 10$$

Step 4: Multiply through by $(x-3)(x+3)$:

$$30(x + 3) + 44(x - 3) = 10(x^2 - 9)$$

$$30x + 90 + 44x - 132 = 10x^2 - 90$$

$$74x - 42 = 10x^2 - 90$$

$$10x^2 - 74x - 48 = 0$$

$$5x^2 - 37x - 24 = 0$$

\ (\therefore \) **Quadratic equation:** \ ($5x^2 - 37x - 24 = 0$ \)

Topic-wise Important Questions for Board Exam — Quadratic Equations Class 10

1-Mark Questions (Definition / Recall)

1. Define a quadratic equation. Give one example.

Answer: An equation of the form \ ($ax^2 + bx + c = 0$ \), where \ ($a \neq 0$ \), is called a quadratic equation. Example: \ ($2x^2 - 3x + 1 = 0$ \).

2. What is the degree of a quadratic equation?

Answer: The degree of a quadratic equation is 2.

3. How many roots can a quadratic equation have at most?

Answer: At most two roots.

3-Mark Questions (Application)

1. Check whether \ ($(x + 2)^3 = 2x(x^2 - 1)$ \) is a quadratic equation. Show full working.

Answer: Expanding LHS: \ ($x^3 + 6x^2 + 12x + 8$ \). RHS: \ ($2x^3 - 2x$ \).

Subtracting: \ ($-x^3 + 6x^2 + 14x + 8 = 0$ \). Degree is 3, so it is NOT a quadratic equation.

2. The sum of two natural numbers is 8 and their product is 15. Form a quadratic equation.

Answer: Let one number be \ (x \). Then the other is \ ($8 - x$ \). Product: \ ($x(8 - x) = 15$ \) $\Rightarrow 8x - x^2 = 15$ $\Rightarrow x^2 - 8x + 15 = 0$ \).

5-Mark Questions (Long Answer)

1. A train covers a distance of 360 km at a uniform speed. Had the speed been 5 km/h more, it would have taken 1 hour less. Form a quadratic equation for the speed of the train.

Answer: Let speed = \ (x \) km/h. Time at original speed = \ ($\frac{360}{x}$ \). Time at increased speed = \ ($\frac{360}{x+5}$ \). Difference = 1 hour: \ ($\frac{360}{x} - \frac{360}{x+5} = 1$ \). Multiply by \ ($x(x+5)$ \): \ ($360(x+5) - 360x = x(x+5)$ \)

$\rightarrow 1800 = x^2 + 5x \rightarrow x^2 + 5x - 1800 = 0$). This is the required quadratic equation.

Common Mistakes Students Make in Quadratic Equations

Mistake 1: Forgetting to check whether x^2 cancels out

Why it's wrong: If (x^2) terms cancel, the equation is linear, not quadratic. Many students assume an equation is quadratic just because it has (x^2) on both sides.

Correct approach: Always simplify fully and check the degree of the final polynomial.

Mistake 2: Not defining the variable clearly in word problems

Why it's wrong: CBSE examiners award 1 mark specifically for defining the variable. Skipping this loses marks.

Correct approach: Always write "Let $(x) = [\text{quantity}]$ " before forming the equation.

Mistake 3: Leaving the equation in factored form instead of standard form

Why it's wrong: The question asks you to represent the situation as a quadratic equation in standard form $(ax^2 + bx + c = 0)$.

Correct approach: Always expand and collect all terms on one side.

Mistake 4: Treating $(x+2)^3$ as a quadratic expression

Why it's wrong: Cubic expansions produce degree-3 terms that must be checked after simplification.

Correct approach: Expand completely before judging the degree.

Mistake 5: Sign errors when bringing terms to one side

Why it's wrong: A sign error changes the entire equation and leads to the wrong standard form.

Correct approach: Write each step carefully; use brackets when subtracting entire expressions.

Exam Tips for 2026-27 CBSE Board Exams — Quadratic Equations

- **Show all expansion steps:** CBSE 2026-27 marking scheme awards step marks. Even if your final answer is wrong, you earn marks for correct working.
- **Word problems — always define the variable:** Write "Let $(x) = \dots$ " as your very first line. This is worth 1 mark in most CBSE papers.
- **End in standard form:** Every word problem answer must conclude with $(ax^2 + bx + c = 0)$. Do not leave it in factored or rearranged form.
- **Discriminant questions are common:** Expect at least one question asking you to find the nature of roots using $(D = b^2 - 4ac)$ — this comes from Exercise 4.4.

- **Chapter weightage:** Quadratic Equations typically carries 6–8 marks in CBSE Class 10 Maths board papers. It is part of the Algebra unit, which carries the highest weightage.
- **Revision checklist for 2026-27:** (a) Standard form identification ✓ (b) Word problem formulation ✓ (c) Factorisation method ✓ (d) Quadratic formula ✓ (e) Nature of roots using discriminant ✓

Key Points to Remember — Quadratic Equations Class 10

- A quadratic equation must have degree exactly 2 — the (x^2) coefficient must be non-zero.
- Always expand and simplify fully before deciding whether an equation is quadratic.
- The discriminant $(D = b^2 - 4ac)$ determines the nature of roots without solving.
- A quadratic equation has at most 2 roots — it can have 0, 1, or 2 real roots.
- In word problems, let the unknown be (x) , translate conditions into algebra, and simplify to standard form.
- Exercise 4.1 only requires identification and formation of quadratic equations — no solving required.
- For the CBSE 2026-27 exam, practice all four word problems in Q2 as they are frequently repeated.

For more practice, check out our related pages: [NCERT Solutions for Class 10 Maths](#) covering all chapters, and explore the full [NCERT Solutions](#) library for all classes and subjects.

Frequently Asked Questions — Quadratic Equations Class 10 NCERT

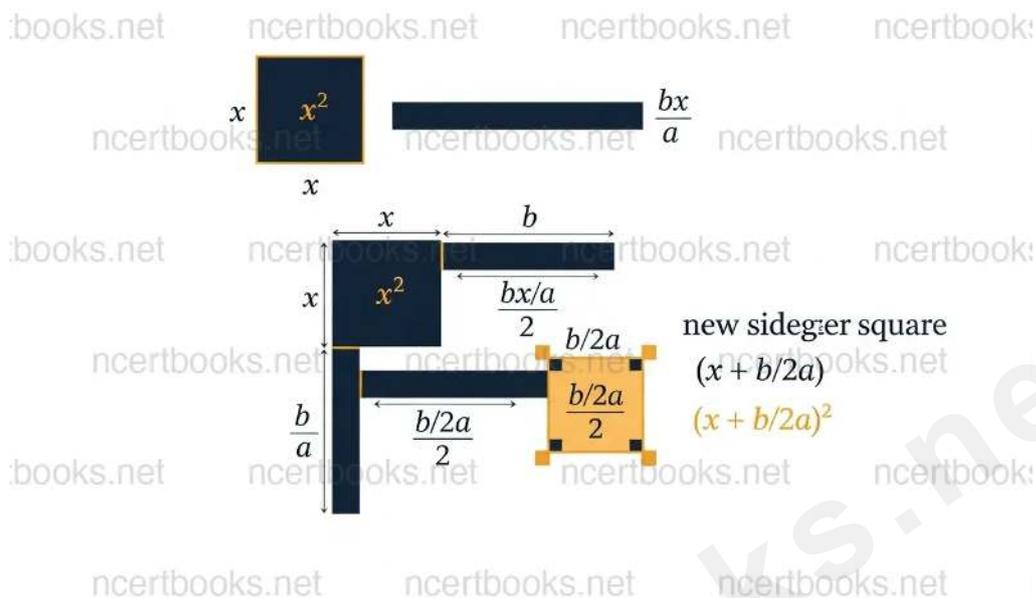


Fig 4.3: Geometric interpretation of completing the square

How do you check if an equation is quadratic in Class 10?

Expand and simplify the equation to bring all terms to one side. If the resulting polynomial has degree exactly 2 (i.e., the highest power of the variable is 2 and its coefficient is non-zero), the equation is quadratic. If the (x^2) terms cancel out or the degree becomes 3 or more, it is not a quadratic equation. Always check after full simplification, not before.

How to represent word problems as quadratic equations in Class 10?

Start by assigning a variable (x) to the unknown quantity. Translate the given conditions into algebraic expressions using (x) . Set up an equation based on the relationship described (area, product, time, etc.). Expand and simplify until you reach the standard form $(ax^2 + bx + c = 0)$. Always verify that the coefficient of (x^2) is non-zero.

How many questions are in NCERT Class 10 Maths Chapter 4 Exercise 4.1?

Exercise 4.1 of NCERT Class 10 Maths Chapter 4 Quadratic Equations has exactly 2 questions. Question 1 contains 8 sub-parts where you check whether given expressions are quadratic equations. Question 2 contains 4 sub-parts where you model real-life situations as quadratic equations. Total: 12 sub-parts across 2 main questions.

What is the NCERT Maths book Class 10 solutions PDF free download for Chapter 4?

You can download the NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations as a free PDF from ncertbooks.net. The PDF includes complete step-by-step solutions for all exercises (4.1, 4.2, 4.3, and 4.4), updated for the 2026-27 CBSE syllabus. Click the Download button at the top of this page to get the latest version.

What are the methods to solve quadratic equations in CBSE Class 10 NCERT?

NCERT Class 10 Maths Chapter 4 teaches three methods to solve quadratic equations: (1) Factorisation — splitting the middle term and equating factors to zero; (2) Completing the Square — converting the equation to a perfect square form; (3) Quadratic Formula — using $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. Exercise 4.1 only covers identification and formation; solving methods are covered in Exercises 4.2 and 4.3.

Source: ncertbooks.net — Updated for CBSE Academic Year 2026-27