

Class 10 - Mathematics

Mathematics

Quadratic Equations

CBSE NOTES

Quadratic Equations - Revision Guide

Revise faster with structured summaries, key points, and important ideas.



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1. Quadratic equation definition

A quadratic equation in one variable is any equation reducible to $ax^2 + bx + c = 0$ with a, b, c real and $a \neq 0$.

2. Meaning of coefficients

In $ax^2+bx+c=0$: a is coefficient of x^2 , b of x , and c is the constant term.

3. Standard form is essential

Expand and simplify, then bring all terms to one side so RHS becomes 0; then identify a, b, c correctly.

4. Roots / solutions

Roots are values of x that make the equation true (LHS becomes 0). A quadratic can have 0, 1, or 2 real roots.

5. Zeros of polynomial connection

Roots of $ax^2+bx+c=0$ are the same as zeros of $p(x)=ax^2+bx+c$ because solving means finding x where $p(x)=0$.



6. Modelling from situations

Choose a variable for an unknown, express other quantities in terms of it, use the given condition (area/product/etc.), and simplify to a quadratic.

7. Area-based quadratics

Rectangle area $L \times B$ often becomes (expression)(expression)=given value, leading to a quadratic after expansion.

8. Example structure (hall/plot)

If breadth= x and length= $(2x+1)$, area condition $x(2x+1)=300$ gives $2x^2+x-300=0$.

9. Context constraints

For lengths and many physical quantities, $x > 0$. After solving, reject roots that violate the context.

10. Factorisation method overview

Convert ax^2+bx+c to a product of two linear factors and then solve using the zero product rule.



11. Zero product rule

If $AB=0$, then $A=0$ or $B=0$. This converts one quadratic equation into two linear equations.

12. Factorising when $a=1$

For x^2+bx+c , find m,n such that $m+n=b$ and $mn=c$, then write $(x+m)(x+n)=0$.

13. Factorising when $a \neq 1$

Use splitting the middle term: find two numbers with product $a \cdot c$ and sum b ; split bx and factor by grouping.

14. Factor by grouping steps

After splitting: group terms in pairs, take common factors, then factor out the common binomial to get two factors.

15. Checking roots

Substitute each root back into the original equation (or situation) to confirm the LHS becomes 0 and conditions hold.



16. Discriminant definition

For $ax^2+bx+c=0$, discriminant $D=b^2-4ac$. It predicts the nature of roots.

17. Nature of roots by D

$D>0$: two distinct real roots; $D=0$: one real repeated root; $D<0$: no real roots.

18. Graph interpretation

$D>0$ means parabola cuts x-axis twice; $D=0$ touches x-axis once; $D<0$ does not intersect x-axis.

19. Perfect square discriminant

If D is a perfect square (and a,b,c are integers), then $\sqrt{D}$ is rational and roots are rational numbers.

20. Quadratic formula (for completeness)

$x=(-b\pm\sqrt{D})/(2a)$. It works for every quadratic with $a\neq 0$ and uses the same discriminant D .

21. Common errors in D

Square b correctly (sign disappears), and remember D has minus $4ac$; be careful when c is negative.



22. Common factor special case

If $c=0$, then $ax^2+bx = x(ax+b)=0$, giving one root $x=0$ immediately.

23. Difference of squares

x^2-k^2 factors as $(x-k)(x+k)$, a frequent quick factorisation pattern.

24. Perfect square trinomials

$x^2\pm 2kx+k^2$ factors as $(x\pm k)^2$ and has equal roots because $D=0$.

25. Method selection in exams

Use factorisation when factors are simple; use discriminant when asked about nature; use formula when factorisation is hard.

26. Answer-writing checklist

Write standard form, show factorisation/steps, state both roots clearly, and verify roots (and context, if given).



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