CBSE NCERT · Class 11 · Mathematics

Mathematics

ORIGINAL STUDY COMPANION
PADIKAM
CLASS 11 | SCIENCE / COMMERCE OPTION
Mathematics
CBSE / NCERT core lessons | Academic year 2026-27
15 chapter lessons
Quick explanations, core points, exam practice and chapter-specific notation in one consistent format.
Padikam explanations are independently written. Official textbooks are used as the coverage map, chapter sequence and terminology reference.

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Study rhythm
Read the quick explanation, recall the core points aloud, then answer the prompts without looking back. Use the official textbook links for full prescribed readings, activities and diagrams.
Textbook and verification links
1. https://cbseacademic.nic.in/web_material/CurriculumMain27/SecPart2/Maths_SecP2_2026-27.pdf
2. https://ncert.nic.in/textbook.php
3. https://cbseacademic.nic.in/curriculum_2027.html

CHAPTER 01
Sets
Quick understanding
Represent collections precisely and use operations, intervals and Venn diagrams.
Core points Check your learning
Distinguish subset, proper subset and element. Prove a set identity.
De Morgan’s laws connect union, intersection and complement. Solve a three-set counting problem.
For finite sets, inclusion-exclusion avoids double counting.
Equation and notation
$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
SYMBOLS AND UNITS
A, B: sets n(X): number of elements in finite set X
Union and intersection are count operations, so no SI unit applies

One-line recall Distinguish subset, proper subset and element.
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CHAPTER 02
Relations and Functions
Quick understanding
View a relation as ordered pairs and a function as a relation with exactly one output for each input.
Core points Check your learning
Domain, codomain and range are not Test whether a relation is a function.
interchangeable.
Find domain, range and composition.
One-one and onto describe different mapping
properties.
Composition order matters.
Equation and notation
$(f \circ g)(x) = f(g(x))$
SYMBOLS AND UNITS
f, g: functions x: input value
f o g: composition, with g applied first
One-line recall Domain, codomain and range are not interchangeable.
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CHAPTER 03
Trigonometric Functions
Quick understanding
Extend trigonometry to real angles using the unit circle, identities and graphs.
Core points Check your learning
Use radians in calculus and arc-length problems. Prove an identity using one side only.
Signs depend on quadrant. Solve a trigonometric equation over a
stated interval.
General solutions include all coterminal angles.
Equation and notation
$\sin^2 x + \cos^2 x = 1$
$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
$s = r\theta$
SYMBOLS AND UNITS
θ: angle in radians s: arc length
One-line recall Use radians in calculus and arc-length problems.
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CHAPTER 04
Complex Numbers and Quadratic Equations
Quick understanding
Use $i^2 = -1$ to represent non-real roots and locate complex numbers in a plane.
Core points Check your learning
Add and multiply using algebraic rules. Express a quotient in a + ib form.
Conjugates help simplify division and modulus. Find roots of a quadratic with negative
discriminant.
The discriminant classifies quadratic roots.
Equation and notation
$z = a + ib$
$|z| = \sqrt{(a^2+b^2)}$
$x = (-b \pm \sqrt{(b^2-4ac)})/2a$
SYMBOLS AND UNITS
z: complex number a, b, c: real numbers; in the quadratic formula a is not

zero
i: imaginary unit, $i^2 = -1$ x: root of the quadratic equation
One-line recall Add and multiply using algebraic rules.
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CHAPTER 05
Linear Inequalities
Quick understanding
Solve inequalities while preserving order and represent solution sets on number lines or planes.
Core points Check your learning
Reverse the inequality when multiplying or dividing Solve a rational inequality.
by a negative number.
Graph a system of two linear
Asystem requires the common region. inequalities.
Boundary inclusion depends on ≤ or ≥.
One-line recall Reverse the inequality when multiplying or dividing by a negative number.
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CHAPTER 06
Permutations and Combinations
Quick understanding
Count arrangements and selections without listing every possibility.
Core points Check your learning
Permutation cares about order; combination does Count arrangements with repeated
not. letters.
Break a problem into disjoint cases before adding. Choose a committee with stated
restrictions.
Use complementary counting when direct restrictions
are awkward.
Equation and notation
$^nP_r = n!/(n-r)!$
$^nC_r = n!/[r!(n-r)!]$
SYMBOLS AND UNITS
n: total available objects r: objects selected or arranged
!: factorial; counts are dimensionless
One-line recall Permutation cares about order; combination does not.
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CHAPTER 07
Binomial Theorem
Quick understanding
Expand powers and locate any term through binomial coefficients.
Core points Check your learning
The expansion has n + 1 terms. Find a specified coefficient.
Powers of the first term decrease while powers of the Determine the term independent of x.
second increase.
Middle term depends on whether n is even or odd.
Equation and notation
$(a+b)^n = \Sigma\ ^nC_r\ a^{n-r}b^r$
$T_{r+1} = {}^nC_r\ a^{n-r}b^r$
SYMBOLS AND UNITS
a, b: terms of the binomial n: non-negative integer power
r: term index from 0 to n T(r+1): general term
One-line recall The expansion has n + 1 terms.
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CHAPTER 08

Sequences and Series

Quick understanding

Describe ordered patterns and sum arithmetic or geometric progressions.

Core points Check your learning

An AP has constant difference; a GP has constant Find unknown terms from AP conditions.
ratio.

Sum a finite or convergent infinite GP.

The nth term and sum answer different questions.

An infinite GP converges only when $|r| < 1$.

Equation and notation

AP: $a_n = a+(n-1)d$

$S_n(AP)=n[2a+(n-1)d]/2$

$S_n(GP)=a(1-r^n)/(1-r)$

$S\infty=a/(1-r)$

SYMBOLS AND UNITS

a: first term d: common difference of an AP

r: common ratio of a GP n: number of terms

S(n): sum of n terms

One-line recall An AP has constant difference; a GP has constant ratio.

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CHAPTER 09

Straight Lines

Quick understanding

Translate line geometry into slope, angle, distance and equation forms.

Core points Check your learning

Slope measures change in y per change in x. Find a line through a point parallel to a
given line.

Parallel lines have equal slopes; perpendicular
slopes multiply to −1 when defined. Find distance from a point to a line.

Choose the equation form that uses the given data
directly.

Equation and notation

$m = (y_2-y_1)/(x_2-x_1)$

$y-y_1 = m(x-x_1)$

Distance $= |Ax_1+By_1+C|/\sqrt{(A^2+B^2)}$

SYMBOLS AND UNITS

m: slope, dimensionless when both axes use the (x1, y1), (x2, y2): points on the coordinate plane
same unit

A, B, C: coefficients in Ax + By + C = 0 Distance uses the unit chosen on the axes

One-line recall Slope measures change in y per change in x.

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CHAPTER 10

Conic Sections

Quick understanding

Understand circle, parabola, ellipse and hyperbola as loci and recognise standard equations.

Core points Check your learning

Focus-directrix definitions explain the shapes. Identify a conic and its key parameters.

Standard form reveals centre, vertices, foci and Form an equation from geometric data.
axes.

Eccentricity distinguishes conics.

Equation and notation

Parabola: $y^2 = 4ax$
Ellipse: $x^2/a^2 + y^2/b^2 = 1$
Hyperbola: $x^2/a^2 - y^2/b^2 = 1$
SYMBOLS AND UNITS
x, y: coordinates a, b: positive conic parameters in the same unit as x and y
Equations shown are standard forms centred at the origin
One-line recall Focus-directrix definitions explain the shapes.
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CHAPTER 11
Introduction to Three-dimensional Geometry
Quick understanding
Locate points in space and calculate distance or section coordinates.
Core points Check your learning
Coordinates are ordered (x,y,z). Find distance between two 3D points.
Distance extends the planar Pythagorean formula. Find a point dividing a segment in ratio m:n.
Internal division uses weighted averages.
Equation and notation
$d = \sqrt{[(x_2-x_1)^2+(y_2-y_1)^2+(z_2-z_1)^2]}$
SYMBOLS AND UNITS
(x1, y1, z1), (x2, y2, z2): points in space d: distance, in the coordinate unit
One-line recall Coordinates are ordered (x,y,z).
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CHAPTER 12
Limits and Derivatives
Quick understanding
Use limits to describe approaching behaviour and derivatives to measure instantaneous change.
Core points Check your learning
A limit concerns nearby values, not necessarily the Evaluate a limit by factorisation.
value at the point.
Differentiate a polynomial or
Derivative is the limit of an average rate of change. trigonometric function from rules.
Geometrically, the derivative is tangent slope.
Equation and notation
$f'(x)=\lim(h\to0)[f(x+h)-f(x)]/h$
$d(x^n)/dx = nx^{n-1}$
SYMBOLS AND UNITS
f(x): function value h: small change in x
f'(x): derivative or instantaneous rate of change n: constant exponent
One-line recall A limit concerns nearby values, not necessarily the value at the point.
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CHAPTER 13
Statistics
Quick understanding
Measure spread around a central value using range, mean deviation, variance and standard deviation.
Core points Check your learning
Dispersion complements an average. Calculate standard deviation from a frequency table.
Variance uses squared deviations; standard

deviation returns to original units. Compare two data sets using coefficient of variation.

Grouped-data calculations use class marks.

Equation and notation

$\sigma^2 = \Sigma f_i(x_i-\bar{x})^2/\Sigma f_i$

$CV = (\sigma/\bar{x})\times 100$

SYMBOLS AND UNITS

fi: frequency of the ith value or class xi: observation or class mark

x-bar: arithmetic mean sigma: standard deviation, in the data unit

CV: coefficient of variation (%)

One-line recall Dispersion complements an average.

CHAPTER 14

Probability

Quick understanding

Assign probability through a sample space and combine events with set operations.

Core points Check your learning

Events are subsets of the sample space. Use cards or dice to calculate a compound event.

Mutually exclusive and exhaustive describe different relationships. Apply the addition rule to overlapping events.

Complementary probability often simplifies counting.

Equation and notation

$P(A')=1-P(A)$

$P(A\cup B)=P(A)+P(B)-P(A\cap B)$

SYMBOLS AND UNITS

A, B: events A': complement of event A

P(A): probability of A; probabilities are dimensionless

One-line recall Events are subsets of the sample space.

CHAPTER 15

Formative Reading: Principle of Mathematical Induction and Enrichment

Quick understanding

Use a base case and an inductive step to establish statements for all natural numbers, then connect the method with selected enrichment ideas.

Core points Check your learning

Verify the first permitted value before assuming the statement at n = k.

Prove a simple sum formula by induction.

Identify the missing step in an incorrect proof.

Use the assumption only to prove the next case n = k + 1.

Enrichment practice may revisit composition of functions, general solutions and geometric constructions without changing the core examination map.

Equation and notation

$P(1)$ true; $P(k) \Rightarrow P(k+1)$

SYMBOLS AND UNITS

P(n): proposition indexed by natural number n k: arbitrary natural-number step; no SI unit

One-line recall Verify the first permitted value before assuming the statement at n = k.