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FOR CBSE CLASS 9 EXAM PREPARATION

CBSE Class 9 2027 Syllabus · Mathematics

EXAM	YEAR	TYPE	SUBJECT
CBSE Class 9	2027	Syllabus	Mathematics

Mathematics

Class IX (2026 – 27)

Introduction:

The Mathematics curriculum for the Secondary stage has been redesigned in alignment with the National Education Policy 2020 and the National Curriculum Framework for School Education (NCF – SE) 2023, prioritizing deep conceptual understanding and logical reasoning. The revised syllabus places strong emphasis on developing core mathematical competencies, including problem-solving, visualisation, mathematical modelling, mathematical communication, computational thinking, and data analytics. The syllabus integrate Indian Knowledge System with contemporary mathematical knowledge, highlighting the rich contributions of Indian mathematicians to foster a sense of pride and historical context. A deliberate shift from rote learning to competency-based education ensures that students build deep conceptual understanding and logical reasoning rather than mere procedural fluency. Greater emphasis has been laid on the integration of real-life applications and experiential learning, encouraging students to connect mathematical concepts with everyday situations and cross-disciplinary contexts. Greater emphasis has been laid on competency based learning outcomes encouraging students to connect mathematical concepts with everyday situations and inter-disciplinary contexts. Continuous and holistic assessment through projects, activities, and investigations forms an integral part of the learning process, moving beyond summative examinations.

At the secondary stage, the curriculum focuses on developing essential global mathematical competencies, including mathematical representation through quantities and relations, mathematical modelling and algorithm building, and effective mathematical communication. The study of the number system, algebra, geometry, mensuration, statistics and probability is designed to build a strong foundation for higher education while enhancing functional life skills. The curriculum thus aims to build rich mathematical learning frameworks not only for higher academic pursuits but also for the practical demands of life in a rapidly changing, data-driven world.

Objectives: The broad objectives of teaching Mathematics at the secondary stage are to help the learners to:

- develop logical thinking, critical reasoning, and a structured approach to problem-solving;
- build the ability to recognise, analyse, and solve diverse problems with confidence and adaptability;
- communicate mathematical ideas effectively using appropriate language, symbols, and representations;
- appreciate the beauty, history, and real-life relevance of Mathematics as a discipline;
- connect mathematical concepts to fields such as Science, Technology, Engineering, and Economics;
- engage in both collaborative and independent mathematical exploration and learning;
- develop habits of precision, accuracy, and logical consistency in mathematical work;
- build confidence to explore, experiment, and grow in mathematical understanding without fear of failure.

Curricular Goals (CGs) and Competencies (Cs) from the NCF-SE 2023

CG-1: Understands numbers (natural, whole, integer, rational, irrational, and real), ways of representing numbers, relationships amongst numbers, and number sets.

C-1.1 Develops understanding of numbers, including the set of real numbers and its properties.

CG-2: Builds deductive and inductive logic to prove theorems related to numbers and their relationships (such as '2 is an irrational number', a recursion relation for *Virahanka* numbers, a formula for the sum of the first *n* square numbers).

C-2.1 Understanding of powers (radical powers) and exponents.

CG-3: Discovers and proves algebraic identities and models real-life situations in the form of equations to solve them.

C-3.1 States and proves remainder theorem, factor theorem, and division algorithm.

C-3.2 Models and solves contextualised problems using equations (for example, simultaneous linear equations in two variables or single polynomial equations), and draws conclusions about a situation being modelled.

C-3.3 Learns Brahmagupta's quadratic formula (in both symbolic and poetic form) and its derivation, and uses it to solve some of the poetic puzzles of Bhaskara as well as modern-day problems.

CG-4: Analyses characteristics and properties of two-dimensional geometric shapes, and develops mathematical arguments to explain geometric relationships.

C-4.1 Describes relationships including congruence of two-dimensional geometric shapes (such as lines, angles, triangles) to make and test conjectures and solve problems.

C-4.2 Proves theorems using Euclid's axioms and postulates for triangles and quadrilaterals, and applies them to solve geometric problems.

C-4.3 Proves theorems about the geometry of a circle, including its chords, subtended angles, inscribed polygons, and area in terms of pi.

C-4.4 Understands the irrationality of pi, the best approximations to be discovered over human history, and the first exact formula (infinite series) for pi given by Madhava.

C-4.5 Specifies locations and describes spatial relationships using coordinate geometry, for example, plotting a pair of linear equations and graphically finding the solution, or finding the area of triangle with given coordinates as vertices.

C-4.6 Understands the definitions of the basic trigonometric functions, their history and motivation (including the introduction of the sin and cos functions by Aryabhata using chords), and their utility across the sciences.

CG-5: Derives and uses formulae to calculate areas of plane figures, surface area, and volumes of solid objects.

C-5.1 Visualises, represents, and calculates the area of a triangle using Heron's formula and its generalisation to cyclic quadrilaterals given by Brahmagupta's formula.

C-5.2 Visualises and uses mathematical thinking to discover formulae to calculate surface areas and volumes of solid objects (cubes, cuboids, spheres, hemispheres, right circular cylinders or cones, and their combinations).

CG-6: Analyses and interprets data using statistical concepts (such as measures of central tendency, standard deviations) and probability.

C-6.1 Applies measures of central tendencies, such as mean, median, and mode.

C-6.2 Applies concepts from probability to solve problems on the likelihood of everyday events.

CG-7: Begins to perceive and appreciate the axiomatic and deductive structure of Mathematics.

C-7.1 Proves mathematical statements and carries out geometric constructions using stated assumptions, axioms, postulates, definitions, and mathematics vocabulary.

C-7.2 Visualises and appreciates geometric proofs for algebraic identities and other 'proofs without words'.

C-7.3 Proves theorems using Euclid's axioms and postulates for angles, triangles, quadrilaterals, circles, area-related theorems for triangles, and parallelograms.

C-7.4 Constructs different geometrical shapes like bisectors of line segments, angles and their bisectors, triangles, and other polygons, satisfying given constraints.

CG-8: Builds skills, such as visualisation, optimisation, representation, and mathematical modelling along with their application in daily life.

C-8.1 Models daily-life phenomena and uses representations, such as graphs, tables, and equations to draw conclusions.

C-8.2 Uses two-dimensional representations of three-dimensional objects to visualise and solve problems, such as those involving surface area and volume.

C-8.3 Employs optimisation strategies to maximise desired quantities (such as area, volume, or other output) under given constraints.

CG-9: Develops computational thinking, i.e., deals with complex problems and is able to break them down into a series of simple problems that can then be solved by suitable procedures/algorithms.

C-9.1 Decomposes a problem into sub-problems.

C-9.2 Describes and analyses a sequence of instructions being followed.

C-9.3 Analyses similarities and differences among problems to make one solution or procedure work for multiple problems.

C-9.4 Engages in algorithmic problem-solving to design such solutions.

CG-10: Knows and appreciates important contributions of mathematicians from India and around the world.

C-10.1 Recognises the important contributions made by mathematicians (Indian and others) in the field of Mathematics (such as the evolution of numbers, geometry, and algebra).

C-10.2 Recognises modern contributions to Mathematics made in both India and abroad, and understands the next frontiers and next major open questions in the field of Mathematics.

CG-11: Explores connections of Mathematics with other subjects.

C-11.1 Applies mathematical knowledge and tools to analyse problems or situations in multiple subjects across Science, Social Science, Visual Arts, Music, Vocational Education, and Sports.

COURSE STRUCTURE CLASS – IX

Units	Unit Name	Chapter Name	Marks
I	Number System	• Number System	07
II	Algebra	• Introduction to Polynomials • Sequences and Progressions • Exploring Algebraic Identities • Linear Equations in Two Variables	20
III	Coordinate Geometry	• Coordinate Geometry	04
IV	Geometry	• Introduction to Euclid's Geometry: Axioms and Postulates • Lines and Angles • Triangles – Congruence Theorems • 4-gons (Quadrilaterals) • Circles	25
V	Mensuration	• Area and Perimeter • Surface Area and Volume	14
VI	Statistics and Probability	• Statistics • Introduction to Probability	10
	Total		**80**

Chapter Name	Key Concepts	Relevant CGs	Competencies
	Unit 1: Number System		**No. of periods : 12**
Number System	• Introduction to rational numbers • Representation of rational numbers on the number line • Density of rational numbers and its proof • Finding rational numbers between any two rational numbers • Decimal representation of rational numbers • Introduction to irrational numbers • Proof of irrationality of $\sqrt{2}$ and $\sqrt{3}$ • The square root spiral	CG-1, C-1.1, CG-9	The student will be able to: • Understand the concept of a rational number. • Represent rational numbers on the number line. • Understand the properties of rational numbers. • Explain the concept of density of rational numbers. • Compute decimal representation of rational numbers. • Understand the concept of irrational numbers. • Prove the irrationality. • Construct the square root spiral. • Apply computational thinking to represent rational and irrational

			numbers through algorithms and visual models, generate decimal expansions systematically, and reason about numbers using step-by-step logical procedures.
	UNIT II: ALGEBRA		**No. of periods : 66**
Introduction to Polynomials	• Algebraic expressions • Definition of a polynomial. • Degree of a polynomial • Introduction to linear polynomials and applications • Exploring linear patterns • Modelling linear growth and linear decay • Linear relationships • Visualising linear relationships • Slope and y-intercept of a line y = ax + b	CG-3, C-3.2, CG-9	The student will be able to: • Understand the meaning of an algebraic expression. • Define a polynomial. • Identify the degree, terms and coefficients of terms in a polynomial. • Model linear growth and decay using linear polynomials. • Explain and identify patterns in linear relationships. • Identify the slope and y-intercept of a linear equation in two variables. • Graph a linear equation in two variables. • Use computational thinking to identify patterns, construct linear expressions, and systematically represent and analyse linear relationships using equations and graphs.
Sequences and Progressions	• Introduction to sequences • Explicit or general rule of a sequence • Recursive rule of a sequence • Arithmetic Progressions • (AP): nth term, visualising an AP, and practical contexts leading to Aps • Sum of the first n natural numbers • Geometric Progressions (GP): nth term, visualising a GP, and practical contexts leading to GPs • Applications of GP in fractals • Tower of Hanoi puzzle	CG-11, C-8.1, CG-9	The student will be able to: • Understand the concept of a sequence of numbers. • Identify the pattern in a sequence and predict the next few terms. • Determine the recursive and explicit rules for different sequences. • Obtain the terms of sequence given its recursive and explicit rule. • Identify Arithmetic Progressions (AP). • Determine the nth term of an AP. • Visualise an AP graphically. • Identify Geometric Progressions (GP). • Determine the nth term of a GP. • Visualise a GP graphically. • Analyse attributes of fractals using GP. • Solve the Tower of Hanoi puzzle. • Use computational thinking to identify patterns, write step-by-step rules, and model patterns in sequences and progressions.

Exploring Algebraic Identities	• Revisiting algebraic identities • Visualising identities using geometrical models • Factorisation of algebraic expressions using identities • More identities and their applications • Visualising factorisation of quadratic expressions through algebra tiles and without using algebra tiles • Finding new identities • Simplifying rational expressions	CG-7, C-7.2, CG-9	The student will be able to: • Visualise algebraic identities using geometric models. • Determine the factors of algebraic expressions using identities. • Interpret factors of quadratic expressions through geometric models. • Find simplified versions of rational expressions. • Use computational thinking strategies, such as decomposition and step-by-step procedures to visualise algebraic identities, factor expressions, and simplify rational expressions.
Linear Equations in Two Variables	• Introduction to linear equations in two variables through practical examples • Solution of linear equation in two variables: graphical representation • Slope-intercept form of linear equation in two variables • Drawing graphs of linear equations when x and y assume only certain values • Pair of linear equations in two variables • Graphical method for solving a pair of linear equations in two variables • Nature of solutions: consistency and inconsistency • Algebraic methods of solving a pair of linear equations: substitution and elimination method	CG-3, C-3.2, C-8.1, CG-9	The student will be able to: • Understand the concept of a linear equation in two variables. • Graph a pair of linear equations. • Solve a pair of linear equations graphically. • Solve a pair of linear equations through the methods of substitution and elimination. • Determine the nature of solutions of a pair of linear equations. • Model and solve contextualised problems using a pair of linear equations and draw conclusions. • Model daily-life phenomena using representations, such as graphs, tables, and equations. • Use computational thinking to systematically represent, solve, and interpret pairs of linear equations through graphs, tables, and step-by-step procedures.

	UNIT III: COORDINATE GEOMETRY		**No. of periods : 6**
Coordinate Geometry	• Brief history of coordinate geometry • The 2-D Cartesian coordinate system • Distance between two points in the 2-D plane • Midpoint of the line-segment between two points in the 2-D plane	CG-4, C-4.5, CG-9	The student will be able to: • Specify locations and the position of one point relative to another point using coordinates. • Represent a floor plan on a grid using coordinates. • Compute the distance between two points using coordinates. • Determine whether three points lie in a straight line using coordinates. • Compute the position of the midpoint of a line segment using coordinates. • Check whether a triangle is right-angled using coordinates. • Apply computational thinking to model situations on the coordinate plane and verify geometric properties through systematic reasoning.
	UNIT IV: GEOMETRY		**No. of periods : 69**
Introduction to Euclid's Geometry: Axioms and Postulates	• History of geometry • Constructing a square with a given side as described in the Baudhayana's Sulbasutras • Discovering Euclid's definitions • Axioms: Axioms of measurement and rules for geometric objects	CG-7, C-7.1, C-7.3	The student will be able to: • Describe how geometry grew from the practical needs ancient civilisations. • Describe contributions of India, Egypt and Greece to the development of geometric ideas. • Understand the role of definitions, axioms, and postulates. • Explain that there are elements of plane geometry (point, line, surface) for which we have an intuitive sense. • State the 5 postulates of Euclidean geometry. • Define parallelism of straight lines. • Explain the construction of a square as given in the Sulbasutras. • Justify simple constructions using the axioms.
Lines and Angles	• Rays and angles • Measures of angles • Intersecting lines and angles • Pairs of angles • Theorems and examples on intersecting lines • Theorems and examples on parallel lines	CG-7, C-7.1, C-7.3, CG-9	The student will be able to: • Explain the notion of an angle. • Explain the notion of a ray. • Explain that angles are formed between two rays with a common starting point. • State that a straight angle equals two right angles and measures 180° while a right angle measures 90°.

			• Classify angles as acute, right, obtuse, or reflex. • Define parallelism. • State and apply the linear pair theorem and its converse. • Follow proof by contradiction in geometry. • Prove that vertically opposite angles are equal. • Identify corresponding, alternate, and interior angles. • Explain transitivity of parallelism. • Explain why a triangle must have at least two acute angles; why it cannot have two obtuse angles, or all three angles less than 60° • Apply computational thinking to analyse geometric ideas by breaking constructions into ordered steps, using axioms and postulates as rules, and justifying geometric results through logical step-by-step reasoning.
Triangles: Congruence Theorems	• Practical applications of triangles • Proofs of conditions of congruence of triangles • Theorems on triangles • Propositions and their converse • Problems based on applications of theorems on triangles	CG-4, C 4.1, C-7.3	The student will be able to: • Explain that a triangle is rigid, unlike a quadrilateral. • Identify uses of triangle rigidity. • Explain why triangles give strength and stability to structures. • Describe what it means for two triangles to be congruent. • Identify correspondence between the vertices, sides, and angles of two congruent triangles. • Use the SAS congruence axiom. • Use the SSS congruence condition. • Use the ASA congruence condition. • Use the RHS congruence condition. • Use the AAS congruence condition. • Prove the basic properties of isosceles triangles. • Explain the notion of a proposition. • Explain the notion of converse of a proposition. • Identify the converse of a given proposition. • Explain that not all converses are true; use counter examples to show that some converses are false. • Explain why SSA is not, in general, a valid congruence condition.

			• Identify the situations where SSA is a valid congruence condition. • Justify the role of diagram accuracy.
4-gons (Quadrilaterals)	• Properties of parallelograms • Important theorems related to parallelograms and their proof • Midpoint theorem and its applications • Understanding the notion of central symmetry in the context of parallelograms	CG-4, C-4.2, C-7.3	The student will be able to: • Frame a precise definition of a 4-gon. • Prove various characterisations of a parallelogram. • Prove the midpoint theorem. • Prove a converse of the midpoint theorem. • Prove that the medians of a triangle are concurrent and each median is divided in the ratio 2:1 at the point of concurrence. • Prove that the 4-gon formed by joining the midpoints of a given 4-gon is a parallelogram. • Find the coordinates of the midpoint of a line segment given its end points and find the coordinates of the fourth vertex of a parallelogram given the other three. • Understand reflection and rotation symmetries of 4-gons. • Understand how any 4-gon can tile a plane. • Practice forming logical converses of statements and asking questions guided by converses of theorems. • Engage in drawing, measurement and paper manipulation activities to discover geometric patterns involving triangles and 4-gons.
Circles	• Practical applications and uses of circles • Definitions related to a circle — centre, diameter, and radius • Chords and the angles they subtend • Midpoints and perpendicular bisectors of chords • Distance of chords from the centre • Subtended angles by an arc • Cyclicity of points	CG-4, C-7.3, CG-9	The student will be able to: • State the definition of a circle. • Explain the meanings of the terms ‘chord’, ‘diameter’, ‘radius’, ‘arc’, ‘segment’, and ‘sector’. • Explain why there exists a unique circle through three non-collinear points. • Construct the circumcircle and circumcentre of a triangle. • Describe the location of the circumcentre for acute, obtuse, and right-angled triangles. • Explain what ‘angle subtended by an arc at the centre’ means. • Explain why ‘equal chords subtend equal angles at the centre’.

			• Explain why 'chords that subtend equal angles at the centre are equal'. • Explain why 'the line from the centre of a circle to the midpoint of a chord is perpendicular to the chord'. • Explain why 'a perpendicular from the centre to a chord bisects the chord'. • State the relationship between length of a chord and its distance from the centre of the circle. • Explain why 'equal chords are equidistant from the centre (and conversely)'. • Explain why 'among unequal chords, the longer chord is closer to the centre'. • Explain why 'the diameter is the longest chord'. • Explain why 'the angle subtended by an arc at the centre is double the angle subtended by the arc at any point on the remaining part of the circle'. • Explain why 'angles in the same segment of a circle are equal'. • Explain why 'the angle in a semicircle is a right angle'. • Determine when four given points are concyclic. • Explain why 'a quadrilateral with supplementary opposite angles is cyclic, and conversely'. • Explain how circular wheels have influenced transport, farming, building, and technology. • Identify cultural motifs involving circles, for example, the Dharmachakra, Ashoka Chakra, Sudarshan Chakra. • Use computational thinking to break down circle-related problems, apply geometric rules step-by-step, and verify properties of figures, such as chords, angles, and cyclic quadrilaterals through systematic reasoning.
	UNIT V: MENSURATION		**No. of periods : 27**
Mensuration : Area and Perimeter	• Perimeter of shapes • Perimeter of a circle: Introduction to Pi and its irrationality • Length of an arc	CG-5, C-5.1, CG-9	The student will be able to: • Define perimeter as the length around the boundary of any shape. • Explain that the circumference-to-diameter ratio is constant for all circles.

	• Area of shapes: rectangles, parallelograms, and triangles • Heron's formula • Squaring a rectangle: Proof from Baudhayana's Sulbasutras • Area of a circle: derivation • Area of the sector of a circle • Brahmagupta's formula for area of a cyclic 4-gon • Heron's formula as a special case of Brahmagupta's formula		• List historical approximations to π (from Archimedes, Aryabhata, and Zu Chongzhi). • Compute the circumference of a circle and the length of an arc. • Apply ideas of circle perimeter and arc-length to real-world contexts. • Explain why a median of a triangle divides it into two triangles of equal area. • Use Heron's formula to compute the area of a triangle from its sides. • Explain the classical problem of 'squaring' a given shape. • Explain how ancient civilisations approximated the area of a circle. • Compute the area of a circle using the formula. • Explain and use the formula for area of a sector of a circle. • Solve problems on areas of sectors and segments of circles. • State Brahmagupta's formula for the area of a cyclic quadrilateral in terms of its sides. • Explain why Heron's formula is a 'special case' of Brahmagupta's formula. • Explain the notion of 'special case' and 'generalisation' in mathematics. • Use computational thinking to break down shapes, apply step-by-step methods to calculate perimeter and area, recognise patterns across formulae, and understand generalisation and special cases in geometry.
Mensuration : Surface Area and Volume	• Surface areas and volumes of spheres (including hemispheres) and right circular cones	CG-5, C-5.1, CG-9	The student will be able to: • Recognise cuboids and cubes in real-life situations. • Compute the surface area and volume of a cuboid. • Explain how a cube is a 'special case' of a cuboid. • Describe a right circular cylinder using its radius and height. • Compute the surface area and volume of a cylinder. • Recognise cones in daily life, and describe them using radius and height.

			• Compute the surface area and volume of a cone. • Recognise a pyramid, and identify its base and apex. • Compute the surface area and volume of a pyramid. • Recognise spheres in real-life situations. • Compute the surface area and volume of a sphere. • Use computational thinking to systematically calculate, and compare surface areas and volumes of 3-D shapes by varying dimensions and analysing patterns.
	UNIT VI: STATISTICS AND PROBABILITY No. of periods : 24		
Statistics	• Graphical representation of data • Measures of central tendency	CG-6, C-6.1, CG–9	The student will be able to: • Collect, organise, visualise and interpret data to answer a statistical investigative question. • Compute and apply weighted average in different settings. • Read and interpret stacked bar graphs and 100% stacked bar graphs. • Apply computational thinking strategies to analyse real-life data, create appropriate graphical representations, and interpret mean, median and mode for decision-making.
Introduction to Probability	• Concept of probability and randomness • The probability scale • Empirical probability: analysing statistical data and performing experiments • Theoretical probability: sample space and events • Representing probability through tree diagrams and tables	CG-6, C-6.2, CG-9	The student will be able to: • Understand the concept of randomness. • Describe the likelihood of an event using the probability scale. • Estimate the empirical probability of the occurrence of an event by analysing statistical data. • Define theoretical probability of an event. • Apply the definition of theoretical probability to compute the probability of an event. • Compute probability of events with the help of tree diagrams and tables. • Use computational thinking strategies, such as pattern recognition and simulation, to model random experiments and estimate probabilities.

MATHEMATICS QUESTION PAPER DESIGN
CLASS – IX (2026-27)

Time: 3 Hrs. **Max. Marks: 80**

S. No.	Typology of Questions	Total Marks	% Weightage (approx.)
1	**Remembering:** Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers. **Understanding:** Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas	43	54
2	**Applying:** Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	19	24
3	**Analysing:** Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations **Evaluating:** Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria. **Creating:** Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions	18	22
	Total	80	100

INTERNAL ASSESSMENT	**20 MARKS**
Pen Paper Test and Multiple Assessment (5+5)	10 Marks
Portfolio	05 Marks
Lab Practical (Lab activities to be done from the prescribed books)	05 Marks

Prescribed Books:

1. Mathematics - Textbook for class IX - NCERT Publication
2. Guidelines for Mathematics Laboratory in Schools, class IX - CBSE Publication
3. Laboratory Manual - Mathematics, secondary stage - NCERT Publication
4. Mathematics exemplar problems for class IX, NCERT publication