

# West Bengal Board Class 9 Mathematics Syllabus

## Mathematics

### Class IX

#### Syllabus

##### 1. Real Numbers :

- (i) Concept of natural numbers, whole numbers, Integers, Rational Numbers, Algebraic numbers.
- (ii) Conversion of rational numbers to decimal number
- (iii) Representing real numbers on the number line.
- (iv) Addition, Subtraction, Multiplication, Division of real numbers.
- (v) Concept of the axioms on real numbers and solution of simple practical problems using that axioms.

##### 2. Laws of Indices

- (i) Concept of base, index, root, power.
- (ii) Concept of index as integers, fractions.
- (iii) Fundamental laws of indices and their applications.
- (iv) Equation and Identity on indices

##### 3. (i) Concept of right angular cartesian plane and co-ordinates.

- (ii) Concept of co-ordinates of point and represent it on cartesian plane.
- (iii) Concept of linear equations with one variable and two variables and the drawing of their graphs.
- (iv) Solution of linear simultaneous equations by graph. Concept of one solution, many solutions and no solution.

##### 4. Co-ordinate geometry (Distance formula)

- (i) Concept of the formula of distance between two points on a cartesian plane and its application.

##### 5. Linear simultaneous equations (with two variables)

- (i) Solution of linear simultaneous equations (Elimination, Comparison, Substitutions and cross-multiplication method.
- (ii) Solution of practical problems of linear simultaneous equation.

##### 6. Properties of parallelogram

- (i) Concept of quadrilateral, trapezium, parallelogram, rectangle, square and rhombus.
- (ii) Opposite sides and opposite angles of a parallelogram are equal and each diagonal divides it into two congruent triangles.—proof
- (iii) The diagonals of a parallelogram bisect each other. —proof
- (iv) If the opposite sides of a quadrilateral are equal then the quadrilateral is a parallelogram—proof.
- (v) If the opposite angles of quadrilateral are equal then the quadrilateral is a parallelogram—proof.
- (vi) If a pair of opposite sides of a quadrilateral are equal and parallel then the quadrilateral is a parallelogram—proof.
- (vii) If the diagonals of a quadrilateral bisect each other then the quadrilateral is a parallelogram—proof
- (viii) Applications of the above statements.

##### 7. Polynomials:

- (i) Concept of polynomials of one or more than one variables
- (ii) Concept of addition, subtraction, multiplication and division of polynomials
- (iii) Concept of functions from polynomial
- (iv) Concept of zero of polynomials
- (v) Remainder theorem

- (vi) Factor theorem
  - (vii) Concept of zero polynomial
  - (viii) Application of each of the above concepts
- 8. Factorisation :**  $a^2 - b^2$ ,  $a^3 + b^3$ ,  $a^3 - b^3$ ,  $a^3 + b^3 + c^3 - 3abc$ , vanishing method
- 9. Theorems on transversal and mid-point :**
- (i) The line-segment joining the mid-points of any two sides of a triangle is parallel to and half of the third side—proof.
  - (ii) The straight line drawn through the mid-point of a side of a triangle parallel to second side bisects the third side and the intercept thus obtained from the parallel straight line by two sides of the triangle is half of the second side—proof.
  - (iii) If the lengths of the intercepts made by three or more parallel straight lines on a transversal are equal, then the lengths of the intercepts made by them on any other transversal will also be equal—No proof is required, only verification
  - (iv) Application of the above statements
- 10. Profit & Loss :** Concept and application of Cost-price, selling-price, Profit, Loss, Marked price, percentage of profit and loss on selling-price, Discount, Equivalent discount etc.
- 11. Statistics :**
- (i) Concept of tabulation of data.
  - (ii) Concept of formation of frequency distribution table.
  - (iii) Concept of cumulative frequency.
  - (iv) Construction of Histogram.
  - (v) Construction of frequency Polygon.
- 12. Theorems involving area**
- Concept of the Axiom : Area of a rectangle = length  $\times$  breadth
- (i) “Parallelograms on the same base and between the same parallel are equal in area”—proof
  - (ii) Parallelograms on the equal bases and between the same parallels are equal in area. [Corollary]
  - (iii) Area of a parallelogram = Base of the parallelogram  $\times$  Height [Corollary]
  - (iv) If a triangle and a parallelogram are on the same base and between the same parallels, the area of the triangle is half that of the parallelogram. — Proof
  - (v) Area of a triangle =  $\frac{1}{2} \times$  Base  $\times$  Height [Corollary]
  - (vi) Triangles on the same base and between the same parallels are equal in area — Proof.
  - (vii) Triangles on equal bases and between the same parallels are equal in area. [Corollary]
- 13. Construction :** Construction of a parallelogram whose measurement of one angle is given and equal in area to a triangle and its application.
- 14. Construction :** Construction of a triangle equal in area to a quadrilateral and its application.
- 15. Determination of the perimeter and area of a triangle and quadrilateral :**
- (i) Determination of the perimeter and area of a triangle. Concept of Heron’s formula. Application in practical problems.
  - (ii) Determination of the perimeter and area of Rectangle, Square, Parallelogram, Rhombus, Trapezium and application in practical problems.
- 16. Circumference of Circle :** Determination of the circumference of circle. Concept of  $\pi$  and solution of practical problems using the formula of circumference of circle.

**17. Concurrent : Theorems on Concurrence.**

- (i) The perpendicular bisectors of the sides of a triangle are concurrent. — Proof. concept of Circum centre, Circum radius, Circum circle.
- (ii) The perpendiculars on the sides of a triangle from its opposite vertices are concurrent – Proof.
- (iii) The internal bisectors of the angles of a triangle are concurrent. — Proof. Concept of in-centre, in-radius and in-circle.
- (iv) The medians of a triangle are concurrent. Proof. Concept of centroid and centroid divides each median in the ratio 2 : 1.
- (v) Applications of the above Statements.

**18. Area of circular region :** Concept of the formula of the area of a circular region, concept of the formula of the area of Sector of a Circle and Solution of practical problems.

**19. Co-ordinate Geometry :** Concept of the determination of formula of coordinates of a point when a Straight line Segment is divided internally or externally in a given ratio.

**20. Co-ordinate Geometry :**

- (i) Area of triangular region formed by three points.
- (ii) Area of quadrilateral shaped region formed by four point.
- (iii) Condition of collinearity of three points.
- (iv) Determination of the centroid of a triangle.

**21. Logarithm :**

- (i) Necessity
- (ii) Definition
- (iii) Concept of Common Logarithm and Natural Logarithm.
- (iv) Properties of Logarithm
- (v) Application of Common Logarithm

**Addenda : (Not for Evaluation)**

- 22.** Concept of Set theory.
- 23.** Concept of Probability theory.

### **Summative - I (40 Marks) (Time : April) and Formative (10 Marks)**

- 1 Real Numbers
- 2 Laws of Indices
- 3 Graph
- 4 Co-ordinate Geometry : Distance Formula
- 5 Linear Simultaneous Equations
- 6 Properties of Parallelogram
- 7 Polynomial
- 8 Factorisation

### **Summative - II (40 Marks) (Time : August) and Formative (10 Marks)**

- 4 Co-ordinate Geometry : Distance Formula
- 5 Linear Simultaneous Equations
- 6 Properties of Parallelogram
- 9 Transversal & Mid-Point Theorem
- 10 Profit and Loss
- 11 Statistics
- 12 Theorems on Area
- 13 Construction: (Construction of a Parallelogram whose measurement of one angle is given and equal in area of a Triangle)
- 14 Construction : (Construction of a Triangle equal in area of a quadrilateral)
- 15 Area & Perimeter of Triangle & Quadrilateral shaped region.
- 16 Circumference of Circle

### **Summative - III (90 Marks) (Time : December) and Formative (10 Marks)**

- 17 Theorems on concurrence
- 18 Area of circular region
- 19 Co-ordinate Geometry: Internal and External Division of Straight Line Segment
- 20 Co-ordinate Geometry: Area of Triangular Region
- 21 Logarithm

**N.B.- Lessons included in the first two summative evaluations are to be included in the third summative evaluation.**

## Question Pattern & Allotment of Marks for 1st Summative Evaluation

### [Summative-I (Chapters 1 to 8)]

Subjects	Very short answer type questions	Short answer type questions	Long answer type questions	Total Marks	Chapters
Arithmetic	1 (1×1)	2 (2×1)	3 (3×1)	6	1
Algebra	3 (1×3)	8 (2×4)	9 (3×3)	20	2,3,5,7,8
Geometry	1 (1×1)	2 (2×1)	7 (4×1 + 3×1)	10	6
Coordinate geometry	1 (1×1)	-	3 (3×1)	4	4
<b>Total Marks</b>	<b>6</b>	<b>12</b>	<b>22</b>	<b>40</b>	
	<b>6 + 12 = 18</b>				

Internal formative Evaluation : 10 Marks

Very short answer type questions 1. Multiple choice questions 2. True/False 3. Fill in the blanks		
<b>Arithmetic :</b>	Real Number	One question = 1 Mark
<b>Algebra :</b>	(i) Laws of indices	One question = 1 Mark
	(ii) Polynomial	One question = 1 Mark
	(iii) Graph	One question = 1 Mark
<b>Geometry :</b>	Properties of Parallelogram	One question = 1 Mark
<b>Coordinate Geometry :</b>	Distance Formula	One question = 1 Mark

short answer type questions		
<b>Arithmetic :</b>	Real Number	One question = 2 Marks
<b>Algebra :</b>	(i) Laws of indices/Polynomial	One question = 2 Marks
	(ii) Graph	One question = 2 Marks
	(iii) Linear Simultaneous equations	One question = 2 Marks
	(iv) Factorisation	One question = 2 Marks
<b>Geometry :</b>	Properties of Parallelogram	One question = 2 Marks

Long answer type questions		
<b>Arithmetic :</b>	Real Number	One question = 3 Marks
<b>Algebra :</b>	(i) Graph	One question = 3 Marks
	(ii) Linear Simultaneous equations	One question = 3 Marks
	(iii) Factorisation	One question = 3 Marks
<b>Geometry :</b>	Properties of Parallelogram	One out of two Theorems = 4 Marks
	Application of theorems in solving geometrical problems	= 3 Marks
<b>Coordinate Geometry :</b>	Distance Formula	One question = 3 Marks

**Question Pattern & Allotment of Marks for 2nd Summative Evaluation**  
**[Summative-II (Chapters 4, 5, 6, 9 to 16)]**

Subjects	Very short answer type questions	Short answer type questions	Long answer type questions	Total Marks	Chapters
Arithmetic	1 (1×1)	2 (2×1)	3 (3×1)	6	10
Algebra	-	-	3 (3×1)	3	5
Geometry	1 (1×1)	2 (2×1)	11 (4×1+3×1+4×1)	14	6,9,12,13,14
Coordinate Geometry	1 (1×1)	2 (2×1)	-	3	4
Mensuration	1 (1×1)	2 (2×1)	6 (3×2)	9	15, 16
Statistics	-	2 (2×1)	3 (3×1)	5	11
<b>Total Marks</b>	<b>4</b>	<b>10</b>	<b>26</b>	<b>40</b>	
		<b>4 + 10 = 14</b>			

Internal formative Evaluation : 10 Marks

<b>Very short answer type questions 1. Multiple choice questions 2. True/False 3. Fill in the blanks</b>		
<b>Arithmetic :</b>	Profit and loss	One question = 1 Mark
<b>Geometry :</b>	Properties of Parallelogram	One question = 1 Mark
<b>Coordinate Geometry :</b>	Distance Formula	One question = 1 Mark
<b>Mensuration :</b>	Perimeter and Area of Triangle and Quadrilateral	One question = 1 Mark

<b>short answer type questions</b>		
<b>Arithmetic :</b>	Profit and loss	One question = 2 Marks
<b>Geometry :</b>	Transversal and mid point theorems /theorems of Area	One question = 2 Marks
<b>Coordinate Geometry :</b>	Distance Formula	One question = 2 Marks
<b>Mensuration :</b>	Circumference of Circle	One question = 2 Marks
<b>Statistics :</b>		One question = 2 Marks

<b>Long answer type questions</b>		
<b>Arithmetic :</b>	Profit and loss	One question = 3 Marks
<b>Algebra :</b>	Linear Simultaneous equations (Method of elimination/substitution)	One question = 3 Marks
<b>Geometry :</b>	One out of two Theorems = 4 Marks Application of theorems in solving geometrical problems = 3 Marks Construction	One Question = 4 Marks
<b>Mensuration :</b>	(i) Perimeter and Area of Triangle and Quadrilateral	One question = 3 Marks
	(ii) Circumference of Circle	One question = 3 Marks
<b>Statistics :</b>		One question = 3 Marks