

# West Bengal Board Class 10 Mathematics Syllabus

## Mathematics Class X

### Syllabus

#### 1. Quadratic equation in one variable

- i) Concept of quadratic equation in one variable
- ii) Concept of quadratic equation in one variable  $ax^2+bx+c=0$  ( $a, b, c$  are real numbers and  $a \neq 0$ )
- iii) Solution of quadratic equation with the help factorization. (Roots are rational numbers.)
- iv) Solution of quadratic equation by expressing perfect square.
- v) Concept of Sridhara Acharyya's formula.
- vi) Concept about the nature of roots.
- vii) Concept of construction of a quadratic equation in one variable if roots are known.
- viii) Solution of real problems of quadratic equation in one variable.

#### 2. Simple Interest

- i) Concept of principal, interest, rate of interest in percent per annum, amount, time.
- ii) Concept of the formula ( $I = \frac{prt}{100}$ )
- iii) Concept of solution of different real problems.

#### 3. Theorems related to circle.

- i) In the same circle or in equal circles, equal chords intercept equal arcs and subtend equal angles at the centre (Proof is not necessary)
- ii) In the same circle or in equal circles, the chords which subtend equal angles at the centre are equal (proof is not necessary).
- iii) One and only one circle can be drawn through three non-collinear points. (Proof is not necessary)
- iv) If a line drawn from the centre of any circle bisects the chord, which is not a diameter, will be a perpendicular on the chord— proof.
- v) A perpendicular drawn from the centre of a circle on a chord, which is not a diameter, bisects the chord - proof.
- vi) Application of above statements.

#### 4. Rectangular Parallelopiped or Cuboid

- i) Concept of the things of the shape of rectangular parallelopiped and cube which are seen in real life.
- ii) Concept of the number of the surfaces, edges, vertices and diagonals.
- iii) Concept of formation of formula of total surface area.
- iv) Concept of formation of formula of volume.
- v) Concept of formation of formula of the length of a diagonal.
- vi) Concept of solution of different real problems.

#### 5. Ratio and proportion

- i) Concept of ratio and proportion in Algebra.
- ii) Concept of different types of ratio and proportion
- iii) Concept of application of different proportional properties in the problems related to proportion

#### 6. Compound Interest (upto 3 years) and uniform rate of increase or decrease

- i) Concept of difference in simple interest and compound interest.
- ii) Concept of formation of formula if the compound interest is given yearly, half-yearly and quarterly.
- iii) Concept of solution of different real problems.

- iv) Concept of formula formation of uniform rate of increase or decrease from the formula of compound interest.
- v) Concept of solution of real problems.

**7. Theorems related to angles in a circle**

- i) Concept of angle subtended at the centre and in the circle
- ii) The angle subtended at the centre by an arc is twice that of an angle subtended in the circle— proof
- iii) In any circle, angles in the same segment are equal—proof.
- iv) Angle in a semicircle is a right-angle — proof.
- v) If a straight line segment makes equal angles at the two points situated on the same side of it, then the four points are concyclic. (proof is not necessary)
- vi) Application of above statements.

**8. Right Circular Cylinder**

- i) Concept of right circular cylinders which are seen in real life.
- ii) Concept of curved surface and plane surface of a right circular cylinder.
- iii) Concept of formula formation of curved surface area.
- iv) Concept of formula formation of total surface area.
- v) Concept of formula of volume.
- vi) Concept of solution of real problems of different types.

**9. Quadratic Surd**

- i) Concept of irrational numbers.
- ii) Concept of quadratic Surds.
- iii) Concept of pure, mixed, like and unlike quadratic Surds
- iv) Concept of rationalising factor
- v) Concept of rationalising factor of denominator.
- vi) Concept of addition, subtraction, multiplication and division of quadratic surds.
- vii) Concept of solution of different real problems of quadratic surds.

**10. Theorems related to cyclic quadrilateral**

- i) The opposite angles of a cyclic quadrilaterals are supplementary to each other— proof
- ii) If the opposite angles of a quadrilateral are supplementary to each other, then the vertices of quadrilateral are concyclic— (Proof is not necessary).
- iii) Application of above statements.

**11. Construction : Construction of circumcircle and incircle of a triangle.**

- i) Construction of circumcircle of a given triangle.
- ii) Construction of incircle of a given triangle.
- iii) Construction of a circle about a given triangle (proof is not included in Evaluation)

**12. Sphere**

- i) Concept of a solid with the shape of sphere and hemisphere which are seen in real life.
- ii) Concept of surfaces of sphere and hemisphere.
- iii) Concept of curved surface area of a sphere
- iv) Concept of curved surface area and total surface area of a hemisphere.
- v) Concept of volumes of sphere and hemisphere.
- vi) Concept of solution of different real problems.

**13. Variation**

- i) Concept of simple variation, inverse variation and compound variation.
- ii) Concept of different problems related to variation, inverse variation and solution of real problems.

#### **14. Partnership Business**

- i) Concept about partnership business
- ii) Concept of simple and mixed partnership business.
- iii) Concept about principal.
- iv) Concept of distribution of dividend
- v) Application of ratio in different real problems related to partnership business.

#### **15. Theorems related to Tangent to a circle.**

- i) Concept of tangent and transversal of a circle.
- ii) The tangent and the radius passing through the point of contact are perpendicular to each other — proof
- iii) If two tangents are drawn from an external point, then the two line segments joining external point and point of contact are equal and they make equal angles at the centre— proof.
- iv) Concept of direct common tangent and transverse common tangent.
- v) If two circles touch each other, then two centres of two circles and point of contact are collinear— proof.
- vi) Application of above statements.

#### **16. Right circular cone.**

- i) Concept of right circular conical solids which are seen in real life.
- ii) Concept of curved surface and plane surface of a right circular cone.
- iii) Concept of curved surface area of a right circular cone.
- iv) Concept of total surface area of a right circular cone.
- v) Concept of volume of a right circular cone.
- vi) Solution of different real problems.

#### **17. Construction : Construction of tangent to a circle.**

- i) Concept of construction of tangent of a circle to a point on the circle.
- ii) Concept of construction of two tangents to a circle from an external point.

#### **18. Similarity**

- i) Concept of similar geometric figures.
- ii) A line drawn parallel to any side of a triangle divides other two sides or extended two sides proportionally (proof is not, necessary.)
- iii) If any straight line divides two sides or extended two sides of a triangle proportionally, then the straight line will be parallel to third side. (proof is not necessary)
- iv) If two triangles are similar, their corresponding sides are proportional (proof is not necessary)
- v) If the sides of two triangles are proportional then their corresponding angles are equal. (proof is not necessary)
- vi) In two triangles, if an angle of one is equal to an angle of the other and the adjacent sides of the angles are proportional, then the two triangles are similar. (proof is not necessary)
- vii) If in a right angled triangle, a perpendicular is drawn from its angular point to its hypotenuse, then the two triangles obtained are similar with original triangle and they are similar to each other— proof
- viii) Applications of above statements.

#### **19. Problems related to different solid objects.**

- i) Solution of real problems related to different solid objects (rectangular parallelepiped, right circular cylinder, sphere, hemisphere, right circular cone)

**20. Trigonometry : concept of measurement of angle.**

- i) Evolution, growth and explanation of necessity of trigonometry in reality.
- ii) Concept of positive and negative angles.
- iii) Concept of measurement of angle.
- iv) Concept of sexagesimal system and circular system, concept of their relations and application in different problems.

**21. Construction : Determination of mean proportional.**

- i) Determination of mean proportional of two line segments in geometric method.
- ii) Construction of a square whose area is equal to a rectangle.
- iii) Construction of a square with area equal to a triangle.

**22. Pythagoras theorem**

- i) Pythagoras theorem – proof.
- ii) Converse of Pythagoras theorem – proof.
- iii) Applications of above theorem.

**23. Trigonometric Ratios and Trigonometric Identities.**

- i) Concept of different trigonometric ratios with respect to a right angled triangle.
- ii) Concept of relations among different trigonometric ratios.
- iii) Determination of the values of trigonometric ratios of some standard angles ( $0^\circ$ ,  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$ ,  $90^\circ$ ) and concept of applications in different problems.
- iv) Concept of applications of trigonometric ratios in different problems.
- v) Concept of elimination of an angle (viz.  $\theta$ ) from trigonometric ratios.

**24. Trigonometric Ratios of complementary angle**

- i) Concept of complementary angle.
- ii) Concept of trigonometric ratios of a complementary angle of an angle and concept of solution of different problems.

**25. Application of Trigonometric Ratios : Heights and Distances**

- i) Concept of angle of elevation and angle of depression.
- ii) Concept of solution of real problems by trigonometric method with the help of right angled triangle, angle of elevation and angle of depression.

**26. Statistics : Mean, Median, Ogive, Mode.**

- i) Concept of measures of central tendency.
- ii) Concept of average or mean.
- iii) Concept of three methods for determination of mean (a) direct method, (b) short method (c) standard deviation.
- iv) Concept of needs of determination of median.
- v) Concept of the formula require to determine median and concept of solution of different real problems.
- vi) Concept of cumulative frequency curved line or ogive.
- vii) Concept of determination of median from ogive.
- viii) Necessity for determination of mode.
- ix) Concept of determination of formula for mode and concept of solution of different real problems.
- x) Concept of relations among mean, median and mode.

**First summative Evaluation (40 Marks) (Month : April), Internal Formative Evaluation : (10 Marks)**

- 1 Quadratic Equations with one variable
- 2 Simple Interest
- 3 Theorems related to circle
- 4 Rectangular Parallelopiped or Cuboid
- 5 Ratio and Proportion
- 6 Compound Interest and Uniform Rate of Increase or Decrease
- 7 Theorems related to Angles in a Circle
- 8 Right Circular Cylinder
- 9 Quadratic Surd
- 10 Theorems related to Cyclic Quadrilateral

**Second summative Evaluation (40 Marks) (Month : August), Internal Formative Evaluation : (10 Marks)**

- 1 Quadratic Equations with one variable
- 11 Construction : Construction of circumcircle and incircle of a triangle
- 12 Sphere
- 13 Variation
- 14 Partnership Business
- 15 Theorems related to Tangent to a Circle
- 16 Right Circular Cone
- 18 Similarity

**Third summative Evaluation (40 Marks) (Month : December), Internal Formative Evaluation : (10 Marks)**

- 17 Construction : Construction of tangent to a circle.
- 19 Real life Problems related to different Solid Objects
- 20 Trigonometry : Concept of Measurement of Angle
- 21 Construction : Determination of Mean Proportional
- 22 Pythagoras Theorem
- 23 Trigonometric Ratios and Trigonometric Identities
- 24 Trigonometric Ratios of Complementary angle
- 25 Application of Trigonometric Ratios : Heights & Distances
- 26 Statistics : Mean , Median , Ogive , Mode

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

## Marks distribution of first summative Evaluation

(Summative-I)

| Subject     | MCQ         | SA      | LA**       | Total Marks |
|-------------|-------------|---------|------------|-------------|
| Arithmetic  | 2 (1×2)     | 2 (2×1) | 5 (5×1)    | 9           |
| Algebra     | 2 (1×2)     | 2 (2×1) | 10 (3+4+3) | 14          |
| Geometry    | 2 (1×2)     | 4 (2×2) | 5 (5×1)    | 11          |
| Mensuration | -           | 2 (2×1) | 4 (4×1)    | 6           |
| Total Marks | 6           | 10      | 24         | 40          |
|             | 6 + 10 = 16 |         |            |             |

\*\* L.A.

Internal Formative Evaluation : 10 Marks

### Arithmetic

- (i) Simple interest  
 (ii) Compound interest  
 (iii) Uniform rate of increase or decrease
- } ——— 1 out of 2 questions : 5×1 marks = 5 marks

### Algebra

- (i) Solution of Quadratic equation in one variable \_\_\_\_\_ 1 out of 2 questions : 3×1 marks = 3 marks  
 (ii) Application of quadratic equation in real problems  
 [Construction of equation and solution] \_\_\_\_\_ 1 out of 2 questions : 4×1 marks = 4 marks  
 (iii) Ratio and proportion }  
 (iv) Quadratic Surd } ——— 1 out of 2 questions : 3×1 marks = 3 marks

### Geometry

- (i) Theorem related to circle  
 (ii) Theorem related to angle on a circle  
 (iii) Theorems related to cyclic quadriateral
- } Theorem \_\_\_\_\_ 1 out of 2 questions :  
 5×1 marks = 5 marks

### Mensuration

- (i) Cuboid  
 (ii) Right circular cylinder
- } ——— 1 out of 2 questions : 4×1 marks = 4 marks

## Marks distribution of second summative Evaluation (Summative-II)

| Subject     | MCQ        | SA      | LA **      | Total Marks |
|-------------|------------|---------|------------|-------------|
| Arithmetic  | 1 (1×1)    | -       | 5 (5×1)    | 6           |
| Algebra     | 2 (1×2)    | 2 (2×1) | 3 (3×1)    | 7           |
| Geometry    | 2 (1×2)    | 2 (2×1) | 13 (5+5+3) | 17          |
| Mensuration | 2 (1×2)    | 4 (2×2) | 4 (4×1)    | 10          |
| Total Marks | 7          | 8       | 25         | 40          |
|             | 7 + 8 = 15 |         |            |             |

\*\* L.A.

Internal Formative Evaluation : 10 Marks

|                                                               |                                                                          |
|---------------------------------------------------------------|--------------------------------------------------------------------------|
| <b>Arithmetic</b>                                             |                                                                          |
| (i) Partnership business                                      | _____1 out of 2 questions : $5 \times 1$ marks = 5 marks                 |
| <b>Algebra</b>                                                |                                                                          |
| (i) Variation                                                 | } _____1 out of 2 questions : $3 \times 1$ marks = 3 marks               |
| (ii) Quadratic equation in one variable                       |                                                                          |
| <b>Geometry</b>                                               |                                                                          |
| (i) Theorems related to tangent to a circle                   | } Theorem _____1 out of 2 questions : $5 \times 1$ marks = 5 marks       |
| (ii) Theorems related to similarity                           |                                                                          |
| (iii) Construction of circumcircle and incircle of a triangle | } Construction _____ 1 out of 2 questions : $5 \times 1$ marks = 5 marks |
| (iv) Application                                              |                                                                          |
|                                                               | _____1 question : $3 \times 1$ marks = 3 marks                           |
| <b>Mensuration</b>                                            |                                                                          |
| (i) Sphere                                                    | } _____1 out of 2 questions : $4 \times 1$ marks = 4 marks               |
| (ii) Right circular cone                                      |                                                                          |

## Marks distribution of Third Summative Evaluation/Selection Test (Summative-III)

| Subject            | MCQ<br>(1×6) | V S A                                     |                                      | S A<br>10 out of 12<br>(2×10) | L A **     |           |
|--------------------|--------------|-------------------------------------------|--------------------------------------|-------------------------------|------------|-----------|
|                    |              | Fill in the blanks<br>5 out of 6<br>(1×5) | True or False<br>5 out of 6<br>(1×5) |                               |            |           |
| Arithmetic         | 1            | 1                                         | 1                                    | 4 (2×2)                       | 5 (5×1)    |           |
| Algebra            | 1            | 1                                         | 1                                    | 4 (2×2)                       | 9 (3+3+3)  |           |
| Geometry           | 1            | 1                                         | 1                                    | 6 (2×3)                       | 13 (5+3+5) |           |
| Trigonometry       | 1            | 1                                         | 1                                    | 4 (2×2)                       | 11 (3+3+5) |           |
| Mensuration        | 1            | 1                                         | 1                                    | 4 (2×2)                       | 8 (4+4)    |           |
| Statistics         | 1            | 1                                         | 1                                    | 2 (2×1)                       | 8 (4+4)    |           |
| <b>Total Marks</b> | <b>6</b>     | <b>5</b>                                  | <b>5</b>                             | <b>20</b>                     | <b>54</b>  | <b>90</b> |
|                    |              | <b>6 + 5 + 5 + 20 = 36</b>                |                                      |                               |            |           |

\*\* LA

Internal Formative Evaluation : 10 Marks

|                                                                                                                                                                                                                                            |  |                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Arithmetic</b><br>(i) Simple interest<br>(ii) Compound interest and uniform rate of increase or decrease<br>(iii) Partnership business                                                                                                  |  | 1 out of 2 questions : 5×1 marks = 5 marks                                                                                             |
| <b>Algebra</b><br>(i) Quadratic equation in one variable<br>(ii) Variation<br>(iii) Quadratic Surd<br>(iv) Ratio and proportion                                                                                                            |  | 1 out of 2 questions : 3×1 marks = 3 marks<br>1 out of 2 questions : 3×1 marks = 3 marks<br>1 out of 2 questions : 3×1 marks = 3 marks |
| <b>Geometry</b><br>Application of theorem for the solution of geometric problems–<br>Construction :                                                                                                                                        |  | 1 out of 2 theorems : 5×1 marks = 5 marks<br>1 out of 2 questions : 3×1 marks = 3 marks<br>1 out of 2 questions : 5×1 marks = 5 marks  |
| <b>Trigonometry</b><br>(i) Concept of measurement of angle<br>(ii) Trigonometric Ratio and Trigonometric Identities<br>(iii) Trigonometric Ratios of complementary angle<br>(iv) Application of Trigonometric Ratios: Heights & Distances– |  | 2 out of 3 questions : 3×2 marks = 6 marks<br>1 out of 2 questions : 5×1 marks = 5 marks                                               |
| <b>Mensuration</b><br>(i) Cuboid<br>(ii) Right circular cylinder<br>(iii) Sphere<br>(iv) Right circular cone<br>(v) Problems related to different solid objects                                                                            |  | 2 out of 3 questions : 4×2 marks = 8 marks                                                                                             |
| <b>Statistics</b><br>Mean, Median, Ogive, Mode                                                                                                                                                                                             |  | 2 out of 3 questions : 4×2 marks = 8 marks                                                                                             |

**N.B : This question pattern is indicative of Madhyamik Examination.**