

MATHEMATICS

UNIT I: NUMBER SYSTEMS

1. Real Numbers

Euclid's division lemma, Fundamental Theorem of Arithmetic - Statements after reviewing work done earlier and after illustrating and motivating through examples. Proofs of results
- Irrationality of $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$. Decimal expansions of rational numbers in terms of terminating/non - terminating recurring decimals.

Exercises: 1.1, 1.2 and 1.4

UNIT II: ALGEBRA

1. Polynomials

Zeros of a polynomial. Relationship between zeros and coefficients of a polynomial with particular reference to quadratic polynomials. Statement and simple problems on division algorithm for polynomials with real coefficients.

Exercises: 2.1, 2.2 and 2.3

2. Pair of Linear Equations In Two Variables

Pair of linear equations in two variables. Geometric representation of different possibilities of solution/inconsistency. Algebraic conditions for number of solutions. Solution of pair of linear equations in two variables algebraically - by substitution, by elimination and by cross - multiplication. Simple situational problems must be included. Simple problems on equations reducible to linear equations may be included.

Exercises: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.11, 3.12, 3.13, 3.14 and 3.20

3. Quadratic Equations

Standard form of a quadratic equation $ax^2 + bx + c = 0$, ($a \neq 0$). Solution of a quadratic equation (only real roots) by factorisation and completing the squares, i.e., by using quadratic formula. Relationship between the discriminant and nature of roots. Problems related to day - to - day activities to be incorporated.

Exercises: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.8, 4.9 and 4.15

4. Arithmetic Progressions

Motivation for studying Arithmetic Progression. Derivation of standard results of finding the n th term and sum of the first n terms.

Exercises: 5.1, 5.2, 5.3 and 5.5

UNIT III: TRIGONOMETRY

1. Trigonometric Ratios

Trigonometric ratios of an acute angle of a right - angled triangle. Proof of their existence (well defined); motivate the ratios, whichever are defined at 0° and 90° . Values (with proofs) of the trigonometric ratios of 30° , 45° and 60° . Relationships between the ratios.

Exercises: 8.1, 8.2, 8.3, 8.7, 8.8 and 8.10

2. Trigonometric Identities

Proof and applications of the identity $\sin^2 A + \cos^2 A = 1$, $\tan^2 A + 1 = \sec^2 A$, $\operatorname{Cosec}^2 A = 1 + \cot^2 A$. Only simple identities to be given. Trigonometric ratios of complementary angles.

Exercises: 8.11, 8.12, 8.13, 8.14, 8.15 and 8.17

3. Heights And Distances

Simple and believable problems on heights and distances. Problems should not involve more than two right triangles. Angles of elevation/depression should be only 30° , 45° , 60° .

Exercises: 9.1 and 9.2

UNIT IV: COORDINATE GEOMETRY**1. Lines (In two-dimensions)**

Review the concepts of coordinates done earlier including graphs of linear equations. Awareness of geometrical representation of quadratic polynomials. Distance between two points and section formula (internal), Area of a triangle.

Exercises: 7.1, 7.2, 7.3 and 7.5

UNIT V: GEOMETRY**1. Triangles**

Definitions, examples, counter examples of similar triangles.

- i) (Prove) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
- ii) (Motivate) If a line divides two sides of a triangle in the same ratio, the line is parallel to the third side.
- iii) (Motivate) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar.
- iv) (Motivate) If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar.
- v) (Motivate) If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional, the two triangles are similar.
- vi) (Motivate) If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse; the triangles on each side of the perpendicular are similar to the whole triangle and to each other.
- vii) (Prove) The ratio of the areas of two similar triangles is equal to the ratio of the squares on their corresponding sides.
- viii) (Prove) In a right triangle, the square on the hypotenuse is equal to the sum of the squares of the other two sides.
- ix) (Prove) In a triangle, if the square on one side is equal to the sum of the squares of the other two sides, the angle opposite to the first side is a right angle.

Exercises: 6.1 [Only Numerical Problems are included]

Exercises: 6.2, 6.3 [Only Numerical Problems are included] 6.4,

[Only Numerical Problems are included]

6.6, 6.7 and 6.8 [Both Numerical & Theoretical Problems are included]

2. Circles

Tangents to a circle motivated by chords drawn from points coming closer and closer to the point.

- i) (Prove) The tangent at any point of a circle is a perpendicular to the radius through the point of contact.
- ii) (Prove) The lengths of tangents drawn from an external point to a circle are equal.

Exercises: 10.1, 10.2 and 10.3

3. Constructions

- i) Division of a line segment in a given ratio (internally).
- ii) Tangent to a circle from a point outside it.
- iii) Construction of a triangle similar to a given triangle. Exercises: 11.1, 11.2 and 11.3

UNIT VI: MENSURATION**1. Areas Of Plane Figures**

Motivate the area of a circle; area of sectors and segments of a circle. Problems based on area and perimeter/circumference of the above said plane figures. (In calculating area of segment of a circle, problem should be restricted to central angles of 60° , 90° , and 120° only. Plane figures involving triangles, simple quadrilaterals and circles should be taken).

Exercises: 12.1, 12.2, 12.3 and 12.4

2. Surface Areas And Volumes

- i) Problems on finding surface areas and volumes of combinations of any two of the following: cubes, cuboids, spheres, hemispheres and right circular cylinders/cones. Frustum of a cone.
- ii) Problems involving converting one type of metallic solid into another and other mixed problems. (Problems with combination of not more than two different solids may be taken).

Exercises: 13.1, 13.2, 13.3 and 13.4

UNIT VII: STATISTICS AND PROBABILITY**1. Statistics**

Mean, median and mode of grouped data (bimodal situation to be avoided) Cumulative frequency graph.

Exercises: 14.1, 14.3, 14.4 and 14.5

2. Probability

Classical definition of Probability, Connection with probability has been given in class IX. Simple problems on single events not using set notation.

Exercises: 15.1, 15.2 and 15.5

PRESCRIBED TEXTBOOK:

- **Core Mathematics For Class 10**

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NOTE: Only the above mentioned exercises are to be studied and the rest may be omitted.