# MATHEMATICS

## 9TH GRADE (SSC-I)

Unit-wise Heading, Sub-heading, SLO & Teaching-Method Plan | Based on National Curriculum of Pakistan 2022-23 (NBF Model Textbook)

| Unit No | Content (Heading / Sub-heading) | SLO | Method (How to Teach) | Response | Date | Present | Test | Pass/Fail |
|---|---|---|---|---|---|---|---|---|
| 1 | Explain, with examples, that civilizations throughout history have systematically studied numbers and their development to the present Arabic system. | 01 | Number Line Activity + Concept Map + Guided Examples | | | | | |
| | Describe the set of real numbers as a combination of rational and irrational numbers. | 02 | Number Line Activity + Concept Map + Guided Examples | | | | | |
| | Demonstrate and verify the properties of equality and inequality of real numbers. | 03 | Number Line Activity + Concept Map + Guided Examples | | | | | |
| | Apply laws of indices to simplify radical expressions. | 04 | Number Line Activity + Concept Map + Guided Examples | | | | | |
| | Express a number in scientific notation and vice versa. | 05 | Number Line Activity + Concept Map + Guided Examples | | | | | |
| 2 | Describe logarithm of a number. | 01 | Teacher Explanation + Worked Examples + Real Life Examples | | | | | |
| | Differentiate between common and natural logarithms. | 02 | Teacher Explanation + Worked Examples + Real Life Examples | | | | | |
| | Apply laws of logarithms to real-life situations such as growth, decay and loudness of sound. | 03 | Teacher Explanation + Worked Examples + Real Life Examples | | | | | |
| 3 | Apply concepts of rational numbers to real-world problems such as inventory, temperature, banking, gain/loss and income/expenditure. | 01 | Real Life Problems + Guided Practice | | | | | |
| 4 | Describe mathematics as the study of pattern, structure and relationships. | 01 | Discussion + Pattern Finding + Pair Work | | | | | |
| 5 | Identify sets and apply operations on three sets using Venn diagrams. | 01 | Venn Diagram Activity + Group Sorting | | | | | |
| | Solve classification and cataloguing problems using Venn diagrams for two-set and three-set scenarios. | 02 | Venn Diagram Activity + Group Sorting | | | | | |
| | Verify and apply properties/laws of union and intersection of three sets through analytical and Venn diagram methods. | 03 | Venn Diagram Activity + Group Sorting | | | | | |
| | Apply concepts from set theory to real-world problems such as demographic classification and categorization. | 04 | Venn Diagram Activity + Group Sorting | | | | | |

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| 6 | Explain product, binary relations, domain and range. | 01 | Table → ordered Pairs → graph Activity | | | | | |
| | Recognize that a relation can be represented by a table, ordered pairs and graphs. | 02 | Table → ordered Pairs → graph Activity | | | | | |
| 7 | Identify common factors and trinomial factors concretely, pictorially and symbolically. | 01 | Algebra / Area Model + Worked Examples + Practice | | | | | |
| | Factorize quadratic and cubic algebraic expressions using appropriate methods. | 02 | Algebra / Area Model + Worked Examples + Practice | | | | | |
| | Find HCF and LCM of algebraic expressions and understand their relationship. | 03 | Algebra / Area Model + Worked Examples + Practice | | | | | |
| | Find the square root of an algebraic expression by factorization and division. | 04 | Algebra / Area Model + Worked Examples + Practice | | | | | |
| | Apply factorization of quadratic and cubic algebraic expressions to real-world problems. | 05 | Algebra / Area Model + Worked Examples + Practice | | | | | |
| 8 | Solve linear equations and inequalities with rational coefficients and represent the solution set on a real line. | 01 | Balance Model + Step By Step Practice | | | | | |
| 9 | Solve two linear inequalities with two unknowns simultaneously. | 01 | Number Line / Graph Activity + Practice | | | | | |
| 10 | Derive the distance formula by locating the position of two points in the coordinate plane. | 01 | Coordinate Plotting + Discovery Activity + Practice | | | | | |
| | Calculate the midpoint of a line segment. | 02 | Coordinate Plotting + Discovery Activity + Practice | | | | | |
| | Find the gradient of a straight line when coordinates of two points are given. | 03 | Coordinate Plotting + Discovery Activity + Practice | | | | | |
| | Find the equation of a straight line in the required form. | 04 | Coordinate Plotting + Discovery Activity + Practice | | | | | |
| | Find the gradient of parallel and perpendicular lines. | 05 | Coordinate Plotting + Discovery Activity + Practice | | | | | |
| | Apply distance and midpoint formulas to real-life situations. | 06 | Coordinate Plotting + Discovery Activity + Practice | | | | | |
| | Apply coordinate geometry to real-world problems such as aviation, navigation, landscaping, map reading, longitude and latitude. | 07 | Coordinate Plotting + Discovery Activity + Practice | | | | | |

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| 11 | Derive equations of a straight line in slope-intercept, point-slope, two-point, intercept, symmetric and normal forms. | 01 | Graphing + Formula Derivation + Guided Practice | | | | | |
| | Apply the concept of angle between lines. | 02 | Graphing + Formula Derivation + Guided Practice | | | | | |
| | Show that a linear equation in two variables represents a straight line and reduce its general form to other standard forms. | 03 | Graphing + Formula Derivation + Guided Practice | | | | | |
| | Find the equation of the family of lines passing through the point of intersection of two given lines. | 04 | Graphing + Formula Derivation + Guided Practice | | | | | |
| | Calculate angles of a triangle when slopes of its sides are given. | 05 | Graphing + Formula Derivation + Guided Practice | | | | | |
| 12 | Differentiate between a mathematical statement and its proof. | 01 | Statement Sorting + Discussion + Guided Proof | | | | | |
| | Differentiate between an axiom, conjecture and theorem. | 02 | Statement Sorting + Discussion + Guided Proof | | | | | |
| | Formulate simple deductive/algebraic proofs by showing LHS equals RHS. | 03 | Statement Sorting + Discussion + Guided Proof | | | | | |
| 13 | Identify similarity of polygons. | 01 | Visual Comparison + Scale Factor Activity | | | | | |
| | Solve problems using relationships between areas of similar figures and volumes of different solids. | 02 | Visual Comparison + Scale Factor Activity | | | | | |
| 14 | Solve real-life problems involving regular polygons, triangles and parallelograms. | 01 | Hands On Diagrams + Problem Solving | | | | | |
| 15 | Solve real-life problems using loci and intersecting loci in two dimensions. | 01 | Compass / Ruler Activity + Real Life Examples | | | | | |
| 16 | Identify angles in standard position expressed in degrees and radians. | 01 | Diagram Based Explanation + Worked Examples + Applications | | | | | |
| | Apply Pythagoras' theorem and sine, cosine and tangent ratios to find sides or angles of right-angled triangles. | 02 | Diagram Based Explanation + Worked Examples + Applications | | | | | |
| | Solve real-life trigonometric problems involving angles of elevation and depression. | 03 | Diagram Based Explanation + Worked Examples + Applications | | | | | |
| 17 | Prove trigonometric identities and apply them to show different trigonometric relations. | 01 | Pattern Finding + Algebraic Steps + Guided Proof | | | | | |
| | Solve real-life problems involving trigonometric identities. | 02 | Pattern Finding + Algebraic Steps + Guided Proof | | | | | |

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| **18** | Interpret and use three-figure bearings. | 01 | Map / Navigation Activity + Diagrams | | | | | |
| | Solve problems involving bearings. | 02 | Map / Navigation Activity + Diagrams | | | | | |
| **19** | Apply the concepts of trigonometry. | 01 | Diagram Based Explanation + Worked Examples + Applications | | | | | |
| **20** | Construct a triangle having two given sides and the included angle. | 01 | Teacher Demonstration + Hands On Construction | | | | | |
| | Construct a triangle having one given side and two given angles. | 02 | Teacher Demonstration + Hands On Construction | | | | | |
| | Construct a triangle having two given sides and the angle opposite to one of them, considering all three possibilities. | 03 | Teacher Demonstration + Hands On Construction | | | | | |
| | Draw angle bisectors, perpendicular bisectors, medians and altitudes of a triangle and verify their concurrency. | 04 | Teacher Demonstration + Hands On Construction | | | | | |
| **21** | Construct a grouped frequency table, histogram with unequal class intervals and frequency polygon. | 01 | Data Collection + Table / Graph Activity | | | | | |
| **22** | Calculate mean, modal class and median of a grouped frequency distribution. | 01 | Data Set Activity + Guided Calculation | | | | | |
| | Solve real-life situations involving mean, weighted mean, median and mode. | 02 | Data Set Activity + Guided Calculation | | | | | |
| **23** | Calculate the probability of a single event and the probability of an event not occurring. | 01 | Experiment / Simulation + Diagrams + Practice | | | | | |
| | Solve real-life problems involving probability. | 02 | Experiment / Simulation + Diagrams + Practice | | | | | |
| **24** | Calculate relative frequency as an estimate of probability. | 01 | Coin / Dice Experiment + Data Analysis | | | | | |
| **25** | Calculate expected frequencies. | 01 | Prediction + Simulation + Comparison | | | | | |
| **26** | Solve real-life problems involving relative and expected frequencies. | 01 | Real Data Activity + Interpretation | | | | | |