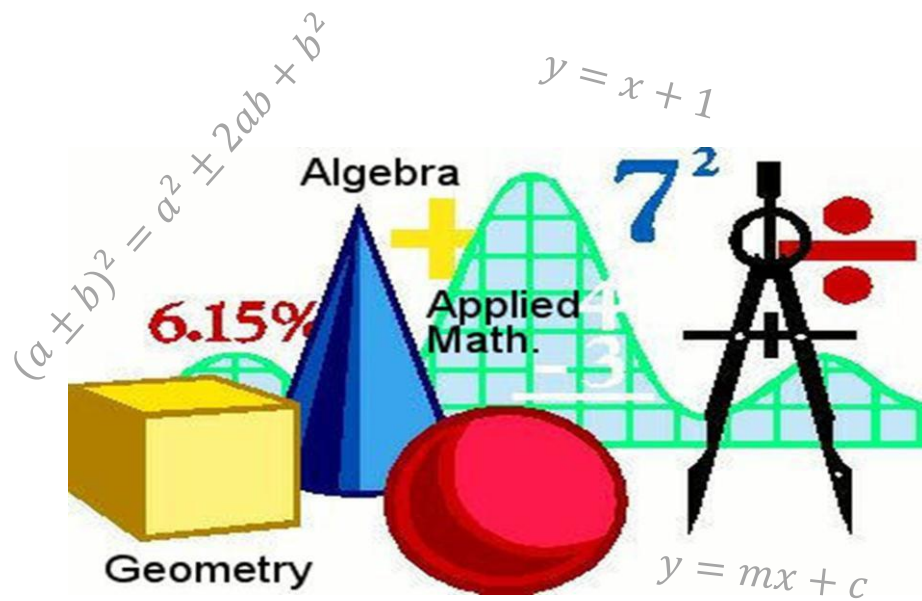


SINDH CURRICULUM FOR  
**MATHEMATICS**  
2023-24

**Grade I - VIII**



**by:**

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GOVERNMENT OF SINDH



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# Sindh Curriculum for Mathematics 2023-24


## Introduction

The Sindh curriculum of Mathematics is based on the notion that mathematics promotes logical reasoning and intellectual rigour and is essential for understanding the content of other academic disciplines. This viewpoint emphasises active interaction between the teacher and the students, between the students and the learning, and between the students and mathematical concepts. Active interactions place a stronger emphasis on investigations and problem solving, which leads to learners developing mathematical comprehension, critical thinking, invention, and logic abilities. Mathematics, in nature, provides science and other disciplines with interesting problems to investigate and tools to discover and analyse the data.

This curriculum must be viewed as a rigorously constructed educational plan that covers the dimensions of mathematics, learning outcomes, and activities for Grades I through VIII. It acts as a road map for students and teachers, assuring a planned, sequenced, and comprehensive learning experience with outcomes that encourage critical thinking, skill development, and a thorough comprehension of the subject. It is conceptualized on changing educational demands, cultural realities, and a dynamic and engaging learning environment, which results in students being informed, skillful and adaptable individuals.

The curriculum emphasises that mathematics learning is much more than simply delivering a set of rules and proofs; it must be meaningful to be remembered, coherent to be understood, planned to be continuous, and enjoyable to be sustained for the rest of one's life. According to the curriculum, mathematics teachers' responsibility is to ensure that pupils study mathematics in meaningful ways while also developing logical, rational, and independent learning skills. Since mathematics is an exploratory and investigative discipline, a mathematics teacher's role is to facilitate and stimulate student learning by planning rich mathematical tasks, posing interesting questions, providing situations for encouraging justifications, and challenging students' ideas to help them develop conceptual understanding and logical thinking skills. Mathematics teachers must actively consider students' affective (emotional) and cognitive (intellectual) development by establishing a social, dynamic environment for studying mathematics rather than simply giving them with a fixed set of facts.

**Note:** The benchmarks and student leaning outcomes adapted in the Sindh Curriculum are aligned with the domains and standards of National Curriculum of Mathematics 2022-23.



## Domain & Standards: Grade-wise (I-VIII)

### Grade-I

**Domain: Number and Operations**

**Standard:** Students will be able to count, read, write, compare, order, add, subtract, multiply and divide numbers. They will be able to recognize fractions as part of the whole represent fractions, order and add and subtract fractions. They will be able to solve problems in contexts using appropriate number operations.

**Domain: Algebra**

**Standard:** Students will be able to explore patterns in a variety of ways.

**Domain: Measurement**

**Standard:** Students will be able to measure, compare and order lengths mass, capacity and time using non-standard units and mathematical language. They will also be able to solve problems in context, involving lengths, mass/weight and capacity.

**Domain: Geometry**

**Standard:** Students will be able to use properties to describe two dimensional and three-dimensional shapes and describe positions, movement, directions and turns using appropriate vocabulary.

**Domain: Statistics and Probability**

**Standard:** Students will be able to read and interpret data using a variety of data management techniques. They would also be able to explore probability to find likelihood of an event occurrence.

### Grade-II

**Domain: Number and Operations**

Students will be able to count, read, write, compare, order, round and make estimate to the nearest tens, add, subtract, multiply and divide numbers. They will be able to recognize fractions as part of the whole, represent fractions, order and add and subtract fractions. They will be able to solve problems in contexts, using appropriate number operations.

**Domain: Algebra**

Students will be able to explore patterns in a variety of ways.

**Domain: Measurement**

**Standard:** Students will be able to measure, compare and order lengths, mass, and capacity using standard units such as meters/centimeters, kilograms/grams and liters/ milliliters; read, write and compare time (hours and minutes). They will also be able to solve problems in context involving lengths, mass/weight, capacity and time.

**Domain: Geometry**

**Standard:** Students will be able to use properties to describe two dimensional and three-dimensional shapes and describe positions, movement, directions, turns using appropriate vocabulary.

**Domain: Statistics and Probability**

**Standard:** Students will be able to read and interpret data using a variety of data management techniques. They will also be able to explore probability to find the likelihood of an event occurrence.



## Grade-III

### **Domain: Number and Operations**

**Standard 1:** Students will be able to identify numbers, ways of representing numbers and comparing numbers.

#### **Sub-Domain: Addition and Subtraction**

**Standard:** Students will be able to add and subtract (up to 4-digit numbers), including computation in simple contextual problems.

#### **Sub-Domain: Multiplication and Division**

**Standard:** Students will be able to multiply (up to 4-digit by 1-digit) and divide (up to 4-digit by 1-digit numbers), including computation in simple contextual problems.

#### **Sub-Domain: Fractions**

**Standard:** Students will be able to recognize fractions as parts of wholes or collections; find equivalent fractions and represent final result in simplest form; compare and order unlike fractions; add and subtract unlike fractions

### **Domain: Measurement**

**Standard:** Students will be able to measure lengths, mass and capacity; solve problems involving lengths (centimeter, meters, kilometers), mass (gram and kilogram), volume (milliliter and liter), and time (minutes and hours); identify appropriate types and sizes of units and read scales.

### **Domain: Geometry**

**Standard:** Students will be able to analyze characteristics and properties of 2D and 3D shapes; use elementary properties to compare two-dimensional shapes (circles, triangles, squares, rectangles, and other polygons); identify line, line segment and reflective symmetry.

### **Domain: Algebra**

**Standard:** Students will be able to analyze a well-defined pattern (e.g., describe the relationship between adjacent terms and generate pairs of whole numbers given a rule); identify or write expressions or number sentences to represent problem situations that may involve unknowns

### **Domain: Statistics and Probability**

**Standard:** Read and interpret data from Carroll diagram. Organize and represent data to help answer questions. Identify chance in daily events.

## Grade-IV

### **Domain: Number and Operations**

#### **Sub-Domain: Numbers and Place Value**

**Standard:** Count, read and write numbers; identify place value of numbers up to 99,999, compare and order numbers up to 99,999; round off numbers to the nearest tens, hundreds, thousands and ten thousand; read and write Roman numbers up to 100

#### **Sub-Domain: Addition and Subtraction**

**Standard:** Students will be able to add and subtract (up to 5-digit numbers), including computation in simple contextual problems; estimate the sums and differences.

#### **Sub-Domain: Multiplication and Division of Whole Numbers, Factors and Multiples**

**Standard:** Multiply up to 4-digit numbers by 2-digit numbers (with and without regrouping) and divide 4-digit numbers by 2-digit numbers (with and without regrouping). Solve real world scenarios involving multiplication and division and further involving all four operations. Test the divisibility up to 4-digit number by 2, 3, 5 & 10. Identify, differentiate, and find factors (factor pairs) and multiples. Find common factors and common multiples. Also identify and differentiate prime and composite numbers.



### **Sub-Domain: Fractions**

**Standard:** Differentiate among different forms of fractions. Interconvert improper and mixed fractions. Compare and order like and unlike fractions. Add and subtract fractions with same and different denominators. Multiply different forms of fractions with whole numbers and two fractions. Solve real life scenarios related to fractions.

### **Sub-Domain: Decimals**

**Standard:** Recognize, read, write, compare and order decimal numbers up to three decimal places along with their place value and rounding off. Also interconvert fractions and decimals. Add, subtract, multiply and divide decimal numbers. Solve real life scenarios involving decimals using appropriate operation. Recognize percent symbol and its relevance to parts per hundred and fractional form.

### **Domain: Algebra**

**Standard:** Identify, describe and complete patterns of numbers; identify and use relationships in a well-defined pattern

### **Domain: Geometry**

**Standard:** Students will be able to understand lines, angles, parts of circle and symmetrical shapes with line of symmetry.

### **Domain: Measurement**

**Standard:** Students will be able to understand length, mass, capacity; perform basic operations to solve word problems, time intervals using analogue and digital clocks and area and perimeter of 2D shapes.

### **Domain: Statistics and Probability**

**Standard:** Draw, read and interpret horizontal and vertical single and double bar graphs; describe the outcome of a simple probability experiment using mathematical language.

## **Grade-V**

### **Domain: Number and Operations**

#### **Sub-Domain: Numbers and Place Value**

**Standard:** Count, read, and write numbers up to 9,999,999 and identifies the place value of the digits in (up to) 7-digit numbers

#### **Sub-Domain: Addition and Subtraction**

**Standard 1:** Students will be able to add and subtract numbers up to 6-digit numbers (with and without regrouping) and solve related real-world word problems.

#### **Sub-Domain: Multiplication and Division**

**Standard:** Students will be able to multiply 5-digit numbers with 3-digit numbers and divide up to 5-digit numbers with up to 2-digit numbers, and solve related real-world word problems

#### **Sub-Domain: Factors and Multiples**

**Standard 1:** Students will be able to identify and differentiate between 2-digit prime and composite numbers, find H.C.F and L.C.M of two numbers (up to 2-digits) using various methods.

#### **Sub-Domain: Fractions**

**Standard:** Students will be able to compare, order, add, subtract, multiply and divide fractions and solve related real-world word problems.

#### **Sub-Domain: Decimal Numbers**

**Standard:** Students will be able to compare, order, round off, add, subtract, multiply and divide decimal numbers and solve related real-world problems. Students will be able to use the correct order of operations to solve mathematical expressions.

#### **Sub-Domain: Percentage**

**Standard:** Students will be able to recognize percentages and express them as fractions and decimal numbers and solve related real-world word problems.



**Sub-Domain: Unitary Method**

**Standard:** Students will be able to use unitary method to calculate the value of object(s) in different cases and to solve related real-world word problems.

**Domain: Algebra**

**Standard:** Students will be able to recognize and use square numbers and cube numbers, and the notation for squared (<sup>2</sup>) and cubed (<sup>3</sup>), identify pattern rules and use them to describe a pattern, extend it and determine its missing elements.

**Domain: Measurement**

**Standard:** Students will be able to convert, add and subtract measures of length, mass, capacity and time and solve related real-world word problems.

**Sub-Domain: Area and Perimeter**

**Standard:** Students will be able to differentiate between and find the area and perimeter of square and rectangular regions and solve related real-world problems

**Domain: Geometry**

**Sub-Domain: Prisms**

**Standard:** Students will be able to recognize and classify quadrilaterals and their characteristics, prisms, pyramids and their nets.

**Sub-Domain: Angles**

**Standard:** Students will be able to identify, measure, construct (using a protractor) different types of angles and calculate supplementary and complementary angles.

**Sub-Domain: Types of Triangles**

**Standard:** Students will be able to identify and describe different types of triangles and measure and calculate unknown angles in a triangle.

**Domain: Statistics and Probability**

**Standard:** Students will be able to draw, read and interpret bar graphs and line graphs; and interpret data represented in pie charts.

**Sub-Domain: Averages**

**Standard:** Students will be able to calculate the average of given quantities and solve related real-world word problems.

**Sub-Domain: Probability**

**Standard:** Students will be able to explain experiments and outcomes; and represent the probability (using a fraction) that an event will occur, in simple games and probability experiments (including real-world word problems).

## **Grade-VI**

**Domain: Number and Operations**

**Sub-Domain: Multiple and Factors**

**Standard:** Students will be able to recognize factors, multiples, H.C.F and L.C.M

**Sub-Domain: Integers**

**Standard:** Students will be able to recognize and identify integers, their absolute values and compare and arrange in different order.

**Sub-Domain: Laws of Integers**

**Standard:** Students will be able to apply four operations (+, −, ×, ÷ BODMAS), commutative, associative and distributive laws on integers



**Sub-Domain: Rate, Ratio and Percentage**

**Standard:** Students will be able to define and calculate ratio, rate, and percentage and apply these in real life context.

**Sub-Domain: Sets**

**Standard:** Students will be able to use language notation and Venn diagrams to represent sets

**Domain: Algebra**

**Sub-Domain: Algebraic Expression**

**Standard:** Students will be able to recognize simple number patterns, use letters to represent numbers, evaluate, add, subtract and simplify linear expressions.

**Sub-Domain: Linear Expressions & Equations**

**Standard:** Students will be able to identify and differentiate between linear expressions and linear equations, solve linear equations and apply them in real life context.

**Domain: Measurement**

**Sub-Domain: Surface Area and Volume**

**Standard:** Students will be able to calculate area and perimeter, surface area, volume of different 2D and 3D shapes by applying suitable formulae and units.

**Domain: Geometry**

**Sub-Domain: Symmetry**

**Standard:** Students will be able to identify 2D, 3D shapes, parallel lines and related angles and rotational symmetry.

**Sub-Domain: Geometrical Constructions**

**Standard:** Students will be able to construct angles of different measure (with compass), bisectors of angles and bisector and perpendicular bisectors of line segments.

**Domain: Statistics and Probability**

**Sub-Domain: Data Management**

**Standard:** Students will be able to recognize graphs, grouped, ungrouped data continuous and discrete variables. Calculate mean, median and mode.

**Sub-Domain: Probability**

**Standard:** Students will be able to understand the concepts relating to probability.

**Grade-VII**

**Domain: Number and Operations**

**Sub-Domain: Rational Numbers**

**Standard:** Identify, recognize, compare, arrange and round Integers, whole numbers, rational numbers and decimal numbers

**Sub-Domain: Laws of Operation (rethink)**

**Standard:** Use vocabulary and symbols related to addition, subtraction, multiplication and division for integers, whole numbers, rational numbers and decimal numbers.

**Sub-Domain: Square and Square Root**

**Standard:** Use prime factorization to calculate square root of perfect square numbers.

**Sub-Domain: Rate, Ratio and Percentage**

**Standard:** Perform appropriate operations on fractions and percentages in various problem-solving contexts.

**Sub-Domain: Financial Mathematics**

**Standard:** Use the concept of rate, ratio and proportion in various problem-solving contexts.

**Sub-Domain: Set**

**Standard:** Use language, notation (tabular and descriptive form) and Venn diagrams to describe sets and their elements, and solve word problems.



## **Domain: Algebra**

### **Sub-Domain: Algebraic Expression**

**Student Learning Outcomes:** Recognize Muhammad bin Musa Al-Khwarizmi as the father of Algebra. Develop an understanding of algebraic terms, monomial, trinomial and polynomial. Add, subtract, multiply, simplify and factorize algebraic expressions

### **Sub-Domain: Algebraic Equations and Inequalities**

**Standard:** Students will be able to identify and differentiate between linear expressions and linear equations, solve linear equations and apply them in real life context.

### **Sub-Domain: Algebraic Equations and Inequalities**

**Standard:** Manipulate Algebraic Equations and Inequalities.

### **Sub-Domain: Coordinate Geometry**

**Standard:** Use the concept of Linear functions to solve problems pertaining to Coordinate Geometry.

## **Domain: Geometry**

### **Sub-Domain: Quadrilaterals**

**Standard:** Develop an understanding of the properties of Quadrilaterals, polygons and circles.

### **Sub-Domain: Polygons**

**Standard:** Construct lines, angles and various polygons

### **Sub-Domain: Properties of lines, angles and polygons.**

**Standard:** Solve various problems related to properties of lines, angles and polygons.

## **Domain: Measurement**

**Standard:** Solve problems pertaining to Distance, Time and Speed.

### **Sub-Domain: Surface Area and Volume**

**Standard:** Use the concepts of Perimeter, Circumference, Area, Volume and Surface Area in problem solving

## **Domain: Statistics and Probability**

**Standard:** Use the concepts of Data Handling, Frequency Distribution and Statistical graphs in problem solving

**Standard:** Calculate and interpret Measures of Central tendency in various problem-solving contexts

**Standard:** Solve problems using various concepts pertaining to Probability.

## **Grade-VIII**

### **Domain: Number and Operations**

#### **Sub-Domain: Real Numbers**

**Standard:** Students will be able to demonstrate understanding of real numbers, operate with real numbers (with and without number line) and identify the absolute value of real numbers.

#### **Sub-Domain: Estimation and Approximation**

**Standard:** Students will be able to round numbers and measures to an appropriate/required degree of accuracy and use approximation through rounding to estimate answers.

#### **Sub-Domain: Factors and Multiples**

**Standard:** Students will be able to evaluate square roots and cube roots and solve problems involving square roots and cube roots.

#### **Sub-Domain: Ratio, Rate and Proportion**

**Standard:** Students will be able to extend and formalize their knowledge of ratio and proportion in working word problems, and in expressing proportional relations algebraically.

#### **Sub-Domain: Percentage and Financial Arithmetic**

**Standard:** Students will be able to deal with currency conversion and solve problems involving profit, loss, discount, Insurance, Partnership and Inheritance.



**Sub-Domain: Set**

**Standard:** Students will be able use language, notation and Venn diagrams to describe sets and their elements, and solve word problems

**Domain: Algebra**

**Sub-Domain: Number Sequence and Pattern**

**Standard:** Students will be able to solve problems involving numbers sequences and patterns.

**Sub-Domain: Expansion and Factorization**

**Standard:** Students will be able to simplify and factories algebraic expressions and apply algebraic identities to solve problems.

**Sub-Domain: Linear Equations and Inequalities**

**Standard:** Students will be able to interpret and plot graphs of linear equations, solve linear and simultaneous linear equations and linear inequalities.

**Domain: Measurement**

**Sub Domain: Mensuration**

**Standard:** Students will be able to recognize various parts of a circle, solve problems involving surface area and volume of 3D shapes and apply the Pythagorean theorem.

**Sub-Domain: Surface Area and Volume**

**Standard:** Use the concepts of Perimeter, Circumference, Area, Volume and Surface Area in problem solving

**Domain: Geometry**

**Sub-Domain: Congruency & Similarity, Construction of Triangles and Transformations**

**Standard:** Students will be able to apply facts of congruency and similarity, construct triangles and understand transformations from a two-dimensional perspective.

**Domain: Statistics and Probability**

**Sub Domain: Information Handling**

**Standard:** Students will be able to collect, classify and tabulate statistical data, represent data graphically, construct and use cumulative frequency diagrams and calculate and interpret measures of central tendency in various problem-solving contexts.

**Sub-Domain: Probability**

**Standard:** Students will be to solve problems pertaining to Experimental and Theoretical Probability.

## Mathematics Progression Grid (1-8)

### Domain A: Numbers and Operations

Grade I to III	Grade IV to V	Grade VI to VIII
<p><b>Benchmarks:</b> Students will be able to count, demonstrate knowledge of place value (up to 4- digit numbers) and represent whole numbers with words and diagrams.</p> <p>They will add and subtract numbers up to 4-digit numbers; multiply (up to 3-digit numbers with 1-digit) and divide (3-digit by 1-digit number). Solve problems, using the four operations, including odd and even numbers, (involving missing numbers, money, quantities and measures), round numbers to nearest tens, hundreds and thousands and make estimates.</p> <p>They will recognize fractions as part of a whole or collection; represent fractions using words, numbers, equivalent fractions in simplest form; compare and order simple fractions; add and subtract simple like and unlike fractions, including those set-in problem situations. Demonstrate knowledge of decimal place value to the tenth.</p>	<p><b>Benchmarks:</b> Students will be able to demonstrate knowledge of place value (5-digit to 7-digit numbers); represent whole numbers with words, diagrams, number lines, or symbols; Identify and differentiate prime and composite numbers up to 100; order and compare numbers.</p> <p>They will add and subtract numbers up to 6-digit numbers; multiply (up to 5-digit numbers with 3-digit) and divide (up to 5-digit up to 2-digit number). Solve problems, using the four operations, including odd and even numbers (involving missing numbers, money, quantities and measures), round numbers to nearest tens, hundreds and thousands and make estimates.</p> <p>They will represent fractions using words, numbers; compare and order simple fractions; add and subtract simple like, unlike fractions, including those set-in problem situations.</p> <p>They will demonstrate knowledge of decimal place value (up to three decimal place) compare, order, and round decimals (to the nearest whole number and up to two decimal place); add, subtract, multiply and divide decimals, including those set-in real-world problems (including money, quantities or measures).</p>	<p><b>Benchmarks:</b> Students will be able to use language, notation and Venn diagrams to describe sets and their elements, operate with real numbers including positive and negative integers, their properties and identify absolute value of real numbers, apply commutative, associative, and distributive laws on real numbers, compare, arrange and round off real numbers to required degree of accuracy, calculate factors, multiples, HCF and LCM, square roots and cube roots, ratio, rate, proportion, percentages, profit, loss, discount, Zakat, Ushr, commission, Taxes, insurance, partnership and inheritance and apply all of these concepts in solving real life problems.</p>

**STUDENT LEARNING OUTCOMES (SLOs)**

<b>Grade-I</b>	<b>Grade -II</b>	<b>Grade -III</b>	<b>Grade -IV</b>	<b>Grade -V</b>	<b>Grade -VI</b>	<b>Grade -VII</b>	<b>Grade -VIII</b>
<b>[SLO:M-01-A-01]</b> Count objects and numbers to and across 99 (2-digit numbers) forwards and backwards, beginning from zero, one, or any given number.	<b>[SLO:M-02-A-01]</b> Count numbers up to and across 999 (3- digit numbers) forwards and backwards, beginning from zero, one, or any given number.	<b>[SLO:M-03-A-01]</b> Count up to 9999 (4- digit numbers).	<b>[SLO:M-04-A-01]</b> Count up to 99,999 (5-digit numbs).	<b>[SLO:M-05-A-01]</b> Count up to 9,999,999 (7-digit numbers).			
<b>[SLO:M-01-A-02]</b> Read and write numbers up to 99 (2-digit numbers) in numerals and up to 10 in words.	<b>[SLO:M-02-A-02]</b> Read and write numbers up to 999 in numerals and up to 50 in words.	<b>[SLO:M-03-A-02]</b> Read and write up to 999 in numerals and up to 100 in words.	<b>[SLO:M-04-A-02]</b> Read and write up to 99,999 (5-digit numbers) in numerals and in words up to 1000.	<b>[SLO:M-05-A-02]</b> Read and write up to 9,999,999 (6 and 7-digit numbers) in numerals and words.			
<b>[SLO:M-01-A-03]</b> Recognize the place value of each digit in 2-digit numbers (tens, ones/units).	<b>[SLO:M-02-A-03]</b> Recognize the place value of each digit in 3-digit numbers (hundreds, tens, ones/units).	<b>[SLO:M-03-A-03]</b> Recognize the place value of each digit in 4- digit numbers.	<b>[SLO:M-04-A-03]</b> Recognize the place value of each digit in 5-digit numbers.	<b>[SLO:M-05-A-03]</b> Recognize the place value of each digit in 6 and 7- digit numbers.		<b>[SLO:M-07-A-01]</b> With increasing degree of challenge, use the concept of place value for whole numbers, integers, rational numbers and decimal numbers.	
<b>[SLO:M-01-A-04]</b> Compare and order numbers up to 99 using appropriate language (for instance: more and less, greater, smaller, equal to, same as, increasing, decreasing, smallest to largest and vice versa etc.)	<b>[SLO:M-02-A-04]</b> Compare and order numbers up to 999 using appropriate language (for instance: more and less, greater, smaller, equal to, same as, increasing, decreasing, smallest to largest and vice versa etc.)	<b>[SLO:M-03-A-04]</b> Compare numbers using symbols (<, >, =) and arrange numbers up to 9999.	<b>[SLO:M-04-A-04]</b> Compare numbers using symbols and arrange numbers up to 99,999				
<b>[SLO:M-01-A-05]</b> Identify numbers before, after and between two numbers.							

### STUDENT LEARNING OUTCOMES (SLOs)

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
	<b>[SLO:M-02-A-05]</b> Round numbers to the nearest tens using different concrete objects and pictorial representations.	<b>[SLO:M-03-A-05]</b> Round numbers to the nearest tens and hundreds using different concrete and pictorial representations.	<b>[SLO:M-04-A-05]</b> Reinforce/recall round off numbers to the nearest tens, hundreds, thousands.			<b>[SLO:M-07-A-02]</b> Round off whole numbers, integers, rational numbers and decimal numbers to a required degree of accuracy, significance or decimal places (up to 3 decimal places).	<b>[SLO:M-08-A-01]</b> Round off numbers up to 5 significant figures.
			<b>[SLO:M-04-A-06]</b> Round numbers to the nearest ten thousand.				
<b>[SLO:M-01-A-06]</b> Recognize the position of objects and write it using ordinal numbers up to 10.	<b>[SLO:M-02-A-06]</b> Recognize the position of objects and write it using ordinal numbers up to 20.						
	<b>[SLO:M-02-A-07]</b> Read and write Roman numbers up to 12	<b>[SLO:M-03-A-06]</b> Read and write Roman numbers up to 20.	<b>[SLO:M-04-A-07]</b> Read and write Roman numbers up to 100.				
<b>[SLO:M-01-A-07]</b> Find, recall and use addition and subtraction facts to 20.	<b>[SLO:M-02-A-08]</b> Find, recall and use addition and subtraction facts to 100.						
<b>[SLO:M-01-A-08]</b> Compare numbers to find how many more and how many less	<b>[SLO:M-02-A-09]</b> Add and subtract numbers mentally and in written form (with and without regrouping) including: 3-digit number and a 1- digit number. 3-digit number and tens.	<b>[SLO:M-03-A-07]</b> Add and subtract numbers mentally and in written form (with and without regrouping) including: 4-digit numbers with 1-digit, 2- digits, 3- digit and 4-digit numbers.	<b>[SLO:M-04-A-08]</b> Add and subtract up to 5-digit numbers mentally and in written form (with and without regrouping) including: 5-digit numbers with 1-digit, 2-digit, 3-digit, 4- digit and 5-digit numbers.	<b>[SLO:M-05-A-04]</b> Add and subtract up to 6-digit numbers mentally and in written form (with and without regrouping) including: 6-digit numbers with 1-digit, 2- digit, 3-digit, 4-			

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
	3-digit number and a 2-digit number. Two 3-digit numbers.			digit, 5-digit and 6-digit numbers.			
<b>[SLO:M-01-A-09]</b> Add and subtract numbers mentally and in written form including: up to three 1-digit numbers 2-digit numbers and tens.							
<b>[SLO:M-01-A-10]</b> Add and subtract numbers mentally and in written form including: 2-digit numbers and 1-digit numbers (without regrouping) Two 2-digit numbers (without regrouping)							
<b>[SLO:M-01-A-11]</b> Solve real-life word problems with addition and subtraction using concrete objects and pictorial representations (involving missing numbers, money, quantities and measures)	<b>[SLO:M-02-A-10]</b> Solve real-life word problems with addition and subtraction (involving missing numbers, money, quantities and measures)	<b>[SLO:M-03-A-08]</b> Solve real-life word problems (including missing numbers and money) involving addition and subtraction.	<b>[SLO:M-04-A-09]</b> Solve real-life word problems (including multi step) involving addition and subtraction.	<b>[SLO:M-05-A-05]</b> Solve real-life word problems (including multi step) involving addition and subtraction.			
<b>[SLO:M-01-A-12]</b> Estimate the answer to an addition and subtraction question. (using	<b>[SLO:M-02-A-11]</b> Estimate the answer to an addition and subtraction question. (using	<b>[SLO:M-03-A-09]</b> Estimate the answer to an addition and subtraction question. (using various approaches)	<b>[SLO:M-04-A-10]</b> Estimate the answer to an addition and subtraction question. (using		<b>[SLO:M-06-A-01]</b> Use knowledge of rounding off to give an estimate to a calculation; to check the	<b>[SLO:M-07-A-02]</b> Analyze approximation error when numbers are rounded off.	

### STUDENT LEARNING OUTCOMES (SLOs)

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
various approaches)	various approaches)		various approaches)		reasonableness of the solution.		
	<b>[SLO:M-02-A-12]</b> Recognize even and odd numbers	<b>[SLO:M-03-A-10]</b> Recognize and differentiate between even and odd numbers.				<b>[SLO:M-07-A-03]</b> Solve real-life word problems involving approximation	
<b>[SLO:M-01-A-13]</b> Identify Pakistani coins (Rs. 1, 2, 5 and 10) and notes (Rs.10,20,50,100, and 500	<b>[SLO:M-02-A-13]</b> Identify international currency and denominations (for instance dollars, Yen, Riyal)						<b>[SLO:M-08-02]</b> Convert Pakistani currency to well-known international currencies and vice versa.
<b>[SLO:M-01-A-14]</b> Solve money problems involving addition and subtraction of Pakistani money.	<b>[SLO:M-02-A-14]</b> Solve money problems involving addition and subtraction of Pakistani money and a few selected international currency notes. (for instance, dollar Yen, Riyal)						
<b>[SLO:M-01-A-15]</b> Count and write in 2's, 5s & 10s using concrete objects (such as counters, pebbles, popsicle sticks etc.) and pictorial representations (such as number line, hundred square grid)	<b>[SLO:M-02-A-15]</b> Count and write in 3s, 4s, 5s, 10s and 100s.	<b>[SLO:M-03-A-11]</b> Count and write in multiple steps. Develop times tables for 6, 7, 8, and 9 and write multiplication sentences using concrete & pictorial representations.					
<b>[SLO:M-01-A-16]</b> Recognize counting in 2s, 5s and 10s as multiplication tables of two, five and ten.	<b>[SLO:M-02-A-16]</b> Recognize counting in 3s, 4s as multiplication tables of three and four.						

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
[SLO:M-01-A-17] Recognize multiplication as repeated addition using concrete objects and pictorial representations (for instance materials, groups and arrays)	[SLO:M-02-A-17] Recognize multiplication as repeated addition and develop multiplication tables (times tables) for 2, 3, 4, 5 and 10.						
	[SLO:M-02-A-18] Write multiplication statements (i.e., sentences) using concrete and pictorial representations.						
[SLO:M-01-A-18] Recognize using concrete objects and pictorial representations that the multiplication of any two numbers can be done in any order.	[SLO:M-02-A-19] Recognize using concrete and pictorial representations that the multiplication of any two numbers can be done in any order.	[SLO:M-03-A-12] Reinforce through concrete and pictorial representations that the multiplication of any two numbers can be done in any order.					
	[SLO:M-02-A-20] Multiply mentally and in written form using the multiplication tables that they know: 1-digit number by another 1-digit number.	[SLO:M-03-A-13] Multiply mentally and in written form: 2-digit numbers by 1-digit numbers. 3- digit numbers by 1-digit numbers.	[SLO:M-04-A-11] Multiply up to 4-digit numbers with 1-digit and 2-digit numbers mentally and in written form.	[SLO:M-05-A-06] Multiply up to 5-digit numbers with 1- digit, 2-digit and 3- digit numbers in written form.			
	[SLO:M-02-A-21] Multiply mentally and in written form using the multiplication tables that they know: 2-digit number by a 1-digit number						

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
	using a multiplication grid.						
	<b>[SLO:M-02-A-22]</b> Multiply a number with 0 and 1.						
	<b>[SLO:M-02-A-23]</b> Solve real-life word problems involving multiplication.	<b>[SLO:M-03-A-14]</b> Solve real-life word problems involving multiplication.	<b>[SLO:M-04-A-12]</b> Solve real-life word problems involving multiplication.	<b>[SLO:M-05-A-07]</b> Solve real-life word problems involving multiplication.			
<b>[SLO:M-01-A-19]</b> Recognize division as repeated subtraction using concrete objects and pictorial representation. (groups, arrays and sharing)	<b>[SLO:M-02-A-24]</b> Recognize division as repeated subtraction through concrete and pictorial representation.						
	<b>[SLO:M-02-A-25]</b> Write division statements (i.e., sentences) using concrete and pictorial representations.						
<b>[SLO:M-01-A-20]</b> Recognize using concrete objects and pictorial representation that the division of one number by another number cannot be done in any order.	<b>[SLO:M-02-A-26]</b> Recognize using concrete and pictorial representation that the division of one number by another number cannot be done in any order.	<b>[SLO:M-03-A-15]</b> Reinforce through concrete and pictorial representation that the division of any two numbers cannot be done in any order(Commutative).					
	<b>[SLO:M-02-A-27]</b> Divide mentally and in written form: I-digit number by another I-digit number (without remainder)	<b>[SLO:M-03-A-16]</b> Divide mentally and in written form: 2-digit numbers by 1 digit number (with and without remainder) 3-digit numbers with I-digit numbers	<b>[SLO:M-04-A-13]</b> Divide up to 4-digit numbers by I -digit and 2-digit numbers in written form.	<b>[SLO:M-05-A-08]</b> Divide up to 5-digit numbers by I -digit and 2-digit numbers in written form.			

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
	2-digit number by a 1-digit number (without remainder)	(with and without remainder)					
		[SLO:M-03-A-17] Divide a number by 1 and itself.					
[SLO:M-01-A-21] Solve simple real-life word problems involving multiplication and division using any method (for instance materials, repeated addition, groups and arrays, mental methods, and known multiplication tables).	[SLO:M-02-A-28] Solve real-life word problems involving multiplication and division using any method (for instance materials, repeated addition/subtraction, groups, arrays, mental and or written methods).	[SLO:M-03-A-18] Solve real-life word problems involving division.	[SLO:M-04-A-14] Solve real-life word problems involving division.	[SLO:M-05-A-09] Solve real-life word problems involving division.			
	[SLO:M-02-A-29] Solve real-life word problems (including Pakistani currency) involving addition, subtraction, multiplication and division.	[SLO:M-03-A-19] Solve real-life word problems involving addition, subtraction, multiplication and division.	[SLO:M-04-A-15] Use appropriate operations to solve real-life word problems involving addition, subtraction, multiplication and division.	[SLO:M-05-A-10] Use appropriate operations to solve real-life word problems involving addition, subtraction, multiplication and division.			
			[SLO:M-04-A-16] Identify divisibility rules for 2, 3, 5 and 10 and use them on up to 4-digit numbers.	[SLO:M-05-A-11] Identify divisibility rules for 7 and 11 and use them on up to 5-digit numbers.			
			[SLO:M-04-A-17] Identify and differentiate between multiples and factors and find: all factor pairs of a number		[SLO:M-06-A-02] Identify: •Factors of up to 3-digit numbers •Multiples of up to 2-digit numbers Prime factors of up to 4-digit numbers		

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
			common factors of two numbers		and express m index notation		
			<b>[SLO:M-04-A-18]</b> Identify and differentiate between multiples and factors and find: common multiples of two or more than 2-digit numbers.				
					<b>[SLO:M-06-A-02]</b> Identify base and exponent and express numbers given in expanded form in index notation and vice versa.		
			<b>[SLO:M-04-A-19]</b> Identify and differentiate between 2-digit prime and composite numbers up to 50.	<b>[SLO:M-05-A-12]</b> Find H.C.F and L.C.M of two numbers (up to 2-digits) using various methods. (For instance, prime factorization, division method etc.)	<b>[SLO:M-06-A- 03]</b> Find H.C.F and L.C.M of two or three numbers (up to 3-digits) using various methods (for instance prime factorization and division method).	<b>[SLO:M-07-A-04]</b> Recall H.C.F and L.C.M.	
				<b>[SLO: M-05-A-13]</b> Find H.C.F and L.C.M of two numbers (up to 2-digits) using various methods. (For instance, prime factorization, division method etc.)	<b>[SLO: M-06-A-04]</b> Find H.C.F and L.C.M of two or three numbers (up to 3-digits) using various methods (for instance prime factorization and division method).	<b>[SLO: M-07-A-05]</b> Recall H.C.F and L.C.M.	
				<b>[SLO:M-05-A-14]</b> Solve real-life word problems involving H.C.F and L.C.M.	<b>[SLO:M-06-A-05]</b> Solve real-life word problems involving H.C.F and L.C.M.		

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
					[SLO:M-06-A-06] Recognize, identify and represent integers and their absolute or numerical value.	[SLO:M-07-A-06] Recall - Recognize, identify and represent integers and their absolute or numerical value.	
					[SLO:M-06-A-07] Arrange a given list of integers and their absolute value in ascending and descending order.		
					[SLO:M-06-A-08] Add and subtract upto-2-digit like and unlike integers and verify commutative and associative laws (where applicable).		
					[SLO:M-06-A-09] Multiply up to 2-digit like and unlike integers and verify commutative, associative and distributive laws.		
					[SLO:M-06-A-10] Divide like and unlike integers.		
[SLO:M-01-A-22] Recognize, find, name and write fractions: half ( $\frac{1}{2}$ ) quarter ( $\frac{1}{4}$ ) two-quarters ( $\frac{2}{4}$ ) three-quarters ( $\frac{3}{4}$ ) of a length, shape, set of objects or quantity using	[SLO:M-02-A-30] Identify, name and write; -unit fractions -non-unit fractions -like fractions -unlike fractions of a discrete set of objects using pictorial representations.	[SLO:M-03-A-20] Recognize among: - proper fractions -improper fractions. -mixed numbers	[SLO:M-04-A-20] Differentiate among: -proper fractions -improper fractions -mixed numbers.			[SLO:M-07-A-07] Identify and represent (on a number line) rational numbers.	[SLO:M-08-A-03] Differentiate between rational and irrational numbers.

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
pictorial representations.							
						[SLO:M-07-A-08] Represent whole numbers, integers and decimal numbers on a number line.	[SLO:M-08-A-04] Represent real numbers on a number line and recognize the absolute value of a real number.
[SLO:M-01-A-23] Add and subtract simple fractions		[SLO:M-03-A-21] Identify equivalent fractions and show families of equivalent fractions.	[SLO:M-04-A-21] Convert improper fractions to mixed numbers and vice versa.				
		[SLO:M-03-A-22] Simplify fractions to the lowest term.					
	[SLO:M-02-A-31] Compare and order unit fractions and like fractions (with denominators up to 10) using greater than, less than, equal to	[SLO:M-03-A-23] Compare and order like fractions using symbols (<,>and=).	[SLO:M-04-A-22] Compare and order unlike fractions.	[SLO:M-05-A-15] Compare and order proper, improper fractions and mixed numbers in ascending and descending order.		[SLO:M-07-A-09] Compare using symbols (<, >, =, ≤, ≥) and arrange (in ascending or descending order) whole numbers, integers, rational numbers and decimal numbers.	[SLO:M-08-A-05] Demonstrate the ordering properties of real numbers.
	[SLO:M-02-A-32] Add and subtract like fractions within one whole (e.g., $\frac{1}{4} + \frac{3}{4} = \frac{4}{4}$ ).	[SLO:M-03-A-24] Add and subtract like and unlike fractions (with denominators that are multiples of the same number).	[SLO:M-04-A-23] Add and subtract like and unlike fractions (with denominators that are multiples of the same number) and write the answer in mixed numbers (if applicable).	[SLO:M-05-A-16] Add and subtract; two or three unlike fractions and mixed numbers.		[SLO:M-07-A-10] Verify commutative, associative and distributive properties of rational numbers.	
			[SLO:M-04-A-24] Multiply proper, improper fractions and mixed numbers by a whole number.	[SLO:M-05-A-17] Multiply and divide proper, improper fractions and mixed numbers and express the answer			[SLO:M-08-A-06] Explain and verify closure property, associative property, commutative

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
				in its simplest form (if applicable).			property,distributive property.
			[SLO:M-04-A-25] Multiply two fractions and/or mixed numbers				
			[SLO:M-04-A-26] Solve real-life word problems involving fractions by identifying appropriate operations.	[SLO:M-05-A-18] Solve real-life word problems involving fractions.		[SLO:M-07-A-11] Solve real-life word problems involving operations on rational numbers.	[SLO:M-08-A-07] Solve real-life word problems involving calculation with decimals and fractions.
	[SLO:M-02-A-33] Know and recognize that tenths arise by dividing an object into ten equal parts and in dividing single digit numbers and quantities by ten (using concrete and pictorial representations).	[SLO:M-03-A-25] Know and recognize that hundredths arise by dividing an object, single digit numbers and quantities into hundred equal parts.	[SLO:M-04-A-27] Recognize, read, write decimal numbers and identify the place value of decimal numbers with up to three decimal places.				[SLO:M-08-A-08] Identify and differentiate between decimal numbers as terminating (non-recurring) and non-terminating (recurring).
		[SLO:M-03-A-26] Identify that tenths arise by dividing an object, single digit number and quantities into ten equal parts (e.g., $2/10 = 0.2$ )*	[SLO:M-04-A-28] Recognize the result of dividing 1 or 2- digit number by 10 and 100 and identifying the value of digits in the answer as ones, tenths and hundredths (e.g., $24/100 = 0.24$ )				
			[SLO:M-04-A-29] Express -a decimal number (up to three decimal places) as a fraction whose denominator is 10, 100 and 1000.	[SLO:M-05-A-19] Convert fractions to decimals and vice versa.			

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
			-a given fraction in its decimal equivalent (tenths, hundredths or thousandths) when the denominator of the fraction is 10, 100 or 1000. denominator of a fraction is not 10, 100, or 1000 but can be converted to 10, 100 or a 1000.				
			[SLO:M-04-A-30] Recognize and write a quarter, a half and three quarters (i.e., $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{3}{4}$ ) to its decimal equivalents.				
			[SLO:M-04-A-31] Compare and order decimal numbers with up to two decimal places.	[SLO:M-05-A-20] Compare and order numbers up to three decimal places using signs >, < and = sign and in ascending and descending order.			
			[SLO:M-04-A-32] Round decimal numbers (with up to three decimal places) to the nearest whole number and to one and two decimal places.	[SLO:M-05-A-21] Reinforce rounding decimal numbers (with up to three decimal places) to the nearest whole number and to tenth and hundredth.			
			[SLO:M-04-A-33] Add and subtract 3-digit numbers with up to two decimal places.	[SLO:M-05-A-22] Add and subtract numbers up to three decimal places.			
			[SLO:M-04-A-34]	[SLO:M-05-A-23]			

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
			Multiply and divide a 2-digit number with one decimal place by: a 1-digit number. a 2- digit number	Multiply numbers up to two decimal places by: •up to 2-digit whole numbers •3-digit numbers with up to two decimal places.			
				[SLO:M-05-A-24] Divide numbers up to two decimal places by up to 2-digit whole numbers 2-digit numbers with one decimal place.			
			[SLO:M-04-A-35] Multiply and divide a 2-digit number with one decimal place by 10 and 100.	[SLO:M-05-A-25] Multiply and divide a number up to two decimal places by 10, 100 and 1000.			
			[SLO:M-04-A-36] Use appropriate operations to solve real-life word problems including 2- digit numbers with one decimal place (including money, quantities and measures).	[SLO:M-05-A-26] Use appropriate operations to solve real-life word problems including numbers up to two decimal places (including money, quantities and measures).			
			[SLO:M-04-A-37] Recognize the order of operations and use it to solve mathematical expressions involving whole numbers, decimals and fractions.	[SLO:M-05-A-27] Recognize the order of operations and use it to solve mathematical expressions involving whole numbers, decimals and fractions.	[SLO:M-06-A-11] Recognize the order of operations and use it to solve mathematical expressions involving whole numbers, decimals, fractions and integers.	[SLO:M-07-A-12] Recognize the order of operations and use it to solve mathematical expressions involving whole numbers, decimals, fractions and integers.	

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
			[SLO:M-04-A-38] Recognize the percent symbol (%) and understand that percent is the 'number of parts per hundred'.				
				[SLO:M-05-A-28] Express percentages as a fraction with denominator 100 and as a decimal number.	[SLO:M-06-A-12] Express one quantity as a percentage of another, compare two quantities by percentage and increase or decrease a quantity by a given percentage.		
				[SLO:M-05-A-29] Use equivalences between simple fractions, decimals and percentages in real world contexts.			
				[SLO:M-05-A-30] Solve real-life word problems involving conversion of percentage, fraction and decimal numbers.	[SLO:M-06-A-13] Solve real-life word problems involving percentage.		
				[SLO:M-05-A-31] Solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{1}{5}$ , $\frac{2}{5}$ , $\frac{4}{5}$ and those fractions with a denominator of a multiple of 25			
				[SLO:M-05-A-32]	[SLO:M-06-A-14]	[SLO:M-07-A-13]	

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
				Use unitary method to calculate; the value of many objects of the same kind when the value of one is given, the value of one object when value of many is given and value of many objects when value of some is given (including related real-world problems).	Explain rate as a comparison of two quantities where one quantity is 1.	Calculate rate and average rate of quantities.	
					[SLO:M-06-A-15] Calculate ratio of two numbers (up to 3-digit) and simplify ratios.	[SLO:M-07-A-14] Calculate increase and decrease in a ratio based on change in quantities.	
					[SLO:M-06-A-16] Explain and calculate continued ratio.		
					[SLO:M-06-A-17] Solve real-life word problems involving ratio and rate.		
						[SLO:M-07-A-15] Explain and calculate direct and inverse proportion and solve real-life word problems related to direct and inverse proportion.	[SLO:M-08-A-09] Calculate direct and inverse and compound proportion and solve real-life word problems related to direct, inverse and compound proportion. (using table, equation and graph)
						[SLO:M-07-A-16]	[SLO:M-08-A-10]

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
						Identify and differentiate between selling price, cost price, loss, discount, profit percentage and loss percentage.	Explain and calculate profit percentage, loss percentage and discount.
						[SLO:M-07-A-17] Define and calculate selling price, cost price, loss, discount, profit percentage and loss percentage.	[SLO:M-08-A-11] Explain and calculate profit/markup, principal amount and markup rate
							[SLO:M-08-A-12] Identify and calculate insurance, partnership and inheritance.
						[SLO:M-07-A-18] Define and calculate income tax, property tax, general sales tax, value-added tax, zakat and usher.	[SLO:M-08-A-13] Solve real-life word problems involving profit %, loss%, discount, profit, markup, insurance, partnership and inheritance.
					[SLO:M-06-A-18] Recognize and calculate squares of up to 2-digit numbers.	[SLO:M-07-A-19] Recognize and calculate squares of numbers up to 3-digits.	
						[SLO:M-07-A-20] Find the square roots of perfect squares of (up to 3-digit) natural numbers, fractions and decimals.	[SLO:M-08-A-14] Find the square root of natural numbers, common fractions and decimal numbers (up to 6-digit).
						[SLO:M-07-A-21] Solve real-life word problems involving	[SLO:M-08-A-15] Solve real-life word problems involving

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
						squares and square roots.	squares and square roots.
							<b>[SLO:M-08-A-16]</b> Recognize perfect cubes and find: -cubes of up to 2-digit numbers - cube roots of up to 5-digit numbers which are perfect cubes
							<b>[SLO:M-08-A-17]</b> Solve real-world word problems involving cubes and cube roots.
					<b>[SLO:M-06-A-19]</b> Use language, notation and Venn Diagrams to represent different types of sets and their elements. (finite, infinite, empty, singleton and universal set)	<b>[SLO:M-07-A-22]</b> Use language, notation and Venn Diagrams to represent different sets and their elements. (natural numbers, whole numbers, integers, even numbers, odd numbers, prime numbers)	<b>[SLO:M-08-A-18]</b> Represent sets using language (tabular, descriptive and set-builder notation) and Venn diagrams
						<b>[SLO:M-07-A-23]</b> Identify and differentiate between: subset and Superset proper and improper equal and equivalent disjoint and overlapping	<b>[SLO:M-08-A-19]</b> Find the power set (P) of set A where A has up to four elements.
						<b>[SLO:M-07-A-24]</b> Describe and perform operations on sets (union, intersection,	<b>[SLO:M-08-A-20]</b> Describe operations on sets and verify commutative, associative, distributive laws

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade-I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
						difference and complement).	with respect to union and intersection.
						[SLO:M-07-A-25] Verify the following: $A \cap AC = \emptyset$ $A \cup AC = U$ $(A \cup B)C = AC \cup BC$ $(A \cap B)C = AC \cap BC$	
							[SLO:M-08-A-21] Verify De-Morgan's laws and represent through Venn Diagram.
							[SLO:M-08-A-22] Apply sets in real-life word problems.

**Domain B: Algebra**

Grade I to III	Grade IV to V	Grade VI to VIII
<p><b>Benchmarks:</b> Students will be able to observe, identify, and extend patterns in size, color, shape, and numbers.</p> <p>They will explain and extend patterns by using positional language (after, between, besides, before, next), and attributes (color, size, shape, letter).</p>	<p><b>Benchmarks:</b> Students will be able to recognize, and extend the relationship/rule that exist in number patterns as well as examine the rationale behind the construction of numbers such as square and cube numbers.</p>	<p><b>Benchmarks:</b> Students will be able to investigate number patterns (term to term rule and position to term rule) to establish generalizations; and analyze the fact that algebra is a symbolic representation of number patterns.</p> <p>They will evaluate and manipulate algebraic expressions and identities, simplify and factorize them, manipulate and solve linear equations (including linear simultaneous equations) and linear inequalities; and solve real life problems through graphs, and other formal techniques.</p>





**STUDENT LEARNING OUTCOMES (SLOs)**

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
			16, 12, 8, 4 (Rule of -4 to get the next term, $4-4=0$ )				
					[SLO:M-06-B- 04] Explain the term algebra as an extension of arithmetic, where letters, numbers and symbols are used to construct algebraic expressions.	[SLO:M-07-B- 05] Recognize variables as a quantity which can take various numerical values. $x + 3 = 5$ , in which $x = 2$ $x + 6 =9$ , when $x =3$	[SLO:M-08-B-05] Explain the difference between: open and close sentences, expression and equation and inequality.
						[SLO:M-07-B-06] Recognize open and close sentences, like and unlike terms, variable, constant, expression, equation and inequality.	
						[SLO:M-07-B-07] Recognize polynomials as algebraic expressions in which the powers of variables are whole numbers	[SLO:M-08-B-06] Solve problems using the addition and subtraction of polynomials
					[SLO:M-06-B-05] Evaluate algebraic expressions by substitution of variables with numerical values.	[SLO:M-07-B-08] Identify a monomial, binomial and trinomial as a polynomial.	[SLO:M-08-B-07] Solve problems using the multiplication of polynomials
						[SLO:M-07-B-09] Add and subtract two or more polynomials.	[SLO:M-08-B-08] Divide a polynomial of degree up to 3 by monomial and binomial

STUDENT LEARNING OUTCOMES (SLOs)							
Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
					[SLO:M-06-B-06] Manipulate simple algebraic expressions using addition and subtraction.	[SLO:M-07-B-10] Find the product of monomial with monomial, monomial with binomial/trinomial binomials with binomial/trinomial	[SLO:M-08-B-09] Simplify algebraic expressions involving addition, subtraction, multiplication and division.
					[SLO:M-06-B-07] Simplify algebraic expressions	[SLO:M-07-B-11] Simplify algebraic expressions (by expanding products of algebraic expressions by a number, a variable or an algebraic expression) involving addition, subtraction, and multiplication division.	[SLO:M-08-B-10] Recognize the following algebraic identities and use them to expand expressions: $(a \pm b)^2$ $= a^2 \pm 2ab + b^2$ $a^2 - b^2$ $= (a - b)(a + b)$
						[SLO:M-07-B-12] Explore the following algebraic identities and use them to expand expressions: $a^2 + b^2 + 2ab$ $= (a + b)^2$ $a^2 + b^2 - 2ab$ $= (a - b)^2$ $(a + b)(a - b)$ $= a^2 - b^2$	[SLO:M-08-B-11] Apply algebraic identities to solve problems like $(103)^2$ , $(99)^2$ , $(1.03)^2$ , $101 \times 99$ .
							[SLO:M-08-B-12] Factorize the following types of expressions: $ka \pm kb \pm kc$ $ac \pm ad \pm bc \pm bd$ $a^2 \pm 2ab + b^2$ $a^2 - b^2$

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
						<p><b>[SLO:M-07-B-13]</b> Factorize algebraic expressions (by taking out common terms and by regrouping)</p>	<p><b>[SLO:M-08-B-13]</b> Manipulation of algebraic expressions  <math>(a + b)^3 = a^3 + 3a^2 b + 3ab^2 + b^3</math>   <math>(a - b)^3 = a^3 - 3a^2 b + 3ab^2 - b^3</math></p>
						<p><b>[SLO:M-07-B-14]</b> Factorize quadratic expressions (by middle term breaking method)</p>	<p><b>[SLO:M-08-B-14]</b> Construct simultaneous linear equations in two variables.</p>
							<p><b>[SLO:M-08-B-15]</b> Solve simultaneous linear equations in two variables using: elimination method substitution method graphical method division and factorization method.</p>
						<p><b>[SLO:M-07- B-15]</b> Construct linear equations in two variables such as; <math>ax + by = c</math>, where a and b are not zero.</p>	<p><b>[SLO:M-08-B-16]</b> Solve real-world word problems involving two simultaneous linear equations in two variables.</p>
						<p><b>[SLO:M-07-B-16]</b> Solve linear equation in one variable by using previous knowledge.</p>	<p><b>[SLO:M-08-B-17]</b> Identify base, index/ exponent and its value.</p>

STUDENT LEARNING OUTCOMES (SLOs)							
Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
							[SLO:M-08-B-18] Deduce and apply the following laws of Exponents/Indices: -Product Law -Quotient Law -Power Law
							[SLO:M-08-B-19] Solve simple linear inequalities i.e. $ax > b$ $ax < b$ $ax + b > c$ $ax + b < c$
							[SLO:M-08-B-20] Represent the solution of linear inequality on the number line.
						[SLO:M-07- B-17] Explain the basic concept of Cartesian coordinate system.	[SLO:M-08-B-21] Recognize the gradient of a straight line and the equation of horizontal and vertical lines i.e., $y = c$ and $x = a$
						[SLO:M-07- B-18] Plot the graph of the linear equation $ax + b = 0$ , where $a \neq 0$ and of linear equations in two variables.	[SLO:M-08-B-22] Find the value of 'y' when 'x' is given from the equation and vice versa.
						[SLO:M-07- B-19] Recognize and state the equation of a horizontal line and a vertical line.	[SLO:M-08-B-23] Plot graphs of linear equations in two variables i.e., $y = mx$

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
							and $y = mx + c$
						[SLO:M-07-B-20] Find values of 'x' and 'y' from the graph.	[SLO:M-08-B-24] Interpret the gradient/ slope of the straight line.
							[SLO:M-08-B-25] Determine the y-intercept of a straight line.

## Domain C: Measurement

Grade I to III	Grade IV to V	Grade VI to VIII
<p><b>Benchmarks:</b> Students will be able to measure, compare and order length (kilometers/meters/centimeters), mass/weight (kilograms/grams), capacity/volume (liters/ milliliters); read, write and compare time (hours and minutes)</p> <p>They will solve real life problems involving length, weight/mass, capacity/volume, and time (including addition and subtraction in same units); measure perimeter (total length/ boundary) and area (enclosed surface) of regular and irregular shapes using square grid.</p>	<p><b>Benchmarks:</b> Students will be able to measure, compare and convert length (kilometers, meters, centimeters), mass/weight (kilograms, grams, milligrams), capacity (liters, milliliters) and time (hours, minutes).</p> <p>They will add and subtract measures of length, mass/weight, capacity and time with same units and solve real life problems.</p> <p>They will read and write the intervals using analogue and digital clocks; convert time in 24 hours and 12 hours notations.</p> <p>They will solve problems involving perimeter, area of 2-D shapes (parallelogram, triangle, square and rectangle).</p>	<p><b>Benchmarks:</b> Students will be able to calculate area and perimeter of 2D shapes; surface area and volume of 3D shapes and solve real life problems.</p> <p>They will solve real life problems involving speed, time, and distance.</p> <p>They will state Pythagorean Theorem and use to solve right angled triangles.</p>

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
<p><b>[SLO:M-01-C-01]</b> Use mathematical language to compare the height/length of two or more objects.</p> <p><b>[SLO:M-01-C-02]</b> Measure and compare the length of objects using non-standard units.</p>	<p><b>[SLO:M-02 C-01]</b> Compare the length of different objects using standard units of length (meter and centimeter) using greater than, less than and equal to.</p>	<p><b>[SLO:M-03-C-01]</b> Use standard units (kilometer, meter and centimeter) to measure the length, width, height and compare using symbol (&lt;, &gt;, =)</p>					
	<p><b>[SLO:M-02-C- 02]</b> Recognize and use the standard units of length (meter and centimeter) to measure and record the length of different objects.</p>						
			<p><b>[SLO:M-04-C-01]</b> Convert units of length from larger to smaller units (kilometer, meter, centimeter and millimeter).</p>	<p><b>[SLO:M-05-C-01]</b> Convert units of length from larger to smaller and vice versa.</p>			
	<p><b>[SLO:M-02-C-03]</b> Add and subtract lengths, given in the same units to solve real-life word problems.</p>	<p><b>[SLO:M-03-C-02]</b> Add and subtract lengths, given in the same units to solve real- life word problems.</p>	<p><b>[SLO:M-04-C-02]</b> Solve real life word problems related to addition and subtraction of length of the objects.</p>	<p><b>[SLO:M-05-C-02]</b> Solve real life word problems related to addition and subtraction of length of the objects.</p>			
<p><b>[SLO:M-01-C-03]</b> Use mathematical language to compare the mass of two or more objects.</p>	<p><b>[SLO:M-02 C-04]</b> Compare the mass of different objects using standard units of mass (kilogram and gram) using greater than, less than and equal to.</p>						

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
[SLO:M-01-C-04] Measure and compare the mass of objects using non-standard units.							
	[SLO:M-02-C-05] Recognize and use the standard units of mass (kilograms and grams) to measure and record the mass of different objects.	[SLO:M-03-C-03] Recognize and use the standard units of mass (kilograms, grams and milligrams) to measure and record the mass of different objects.					
			[SLO:M-04-C-03] Convert units of mass from larger to smaller units (kilogram and gram).	[SLO:M-05-C-03] Convert units of mass from larger to smaller and vice versa.			
	[SLO:M-02-C-06] Add and subtract mass given in the same units to solve real- life word problems.	[SLO:M-03-C-04] Add and subtract mass, given in the same units to solve real life word problems.	[SLO:M-04-C-04] Solve real life word problems related to addition and subtraction of mass of the objects.	[SLO:M-05-C-04] Add and subtract mass to solve real life word problems.			
[SLO:M-01-C-05] Use mathematical language to compare the capacity of two or more objects.	[SLO:M-02 C-07] Compare the capacity of different objects using standard units of capacity (liter and milliliter) using greater than, less than and equal to.						
[SLO:M-01-C-06] Measure and compare the capacity of objects using non-standard units.	[SLO:M-02 C-08] Recognize and use the standard units of capacity (liter and milliliter) to measure and record the capacity of different objects.	[SLO:M-03-C-05] Recognize and use the standard units of capacity (liter and milliliter) to measure and record the capacity of different objects.	[SLO:M-04-C-05] Convert units of capacity from larger to smaller units (liter and milliliter).	[SLO:M-05-C-05] Convert units of capacity from larger to smaller and vice versa.			

### STUDENT LEARNING OUTCOMES (SLOs)

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
	<b>[SLO:M-02-C-09]</b> Add and subtract capacities given in the same units to solve real-life word problems.	<b>[SLO:M-03-C-06]</b> Add and subtract capacities given in the same units to solve real-life word problems.	<b>[SLO:M-04-C-06]</b> Convert, add and subtract capacities to solve real-life word problems.	<b>[SLO:M-05-C-06]</b> Convert, add and subtract capacities to solve real-life word problems.			
<b>[SLO:M-01-C-07]</b> Relate temperature to experiences of the seasons.	<b>[SLO:M-02-C-10]</b> Read and write temperature to the nearest appropriate unit i.e. (°C) using pictorial representation and relating temperature scale to number line.	<b>[SLO:M-03-C-07]</b> Read and write temperature to the nearest appropriate unit i.e. (°C) using pictorial representation and relating temperature scale to number line.  <b>[SLO:M-03-C-08]</b> Compare and order temperature using greater than, less than and equal to.	<b>[SLO:M-04-C-07]</b> Read and write temperature to the nearest appropriate unit i.e. (°C) using pictorial representation and relating temperature scale to number line.  <b>[SLO:M-04-C-08]</b> Compare and order temperature using symbols like >, < and =.				
<b>[SLO:M-01-C-08]</b> Read time in hours (o'clock).  <b>[SLO:M-01-C-09]</b> Show time in hours (o'clock).	<b>[SLO:M-02-C-11]</b> Show time in hours and minutes on an analogue clock.	<b>[SLO:M-03-C-09]</b> Read and write time in hours and minutes.  <b>[SLO:M-03-C-10]</b> Recognize and use a.m. and p.m.	<b>[SLO:M-04-C-09]</b> Read and write time from analog and digital clocks in 12-hour (a.m. and p.m.) and 24-hour format.				
	<b>[SLO:M-02-C-12]</b> Recognize interval (duration) of time (for instance to estimate/give a rough calculation of the time taken by particular events or tasks)		<b>[SLO:M-04-C-10]</b> Convert larger units to smaller units of time (hours, minutes, seconds, years, months, weeks and days).	<b>[SLO:M-05-C-07]</b> Convert larger units to smaller units of time and vice versa.		<b>[SLO:M-07-C-01]</b> Differentiate units of time, distance and speed as well as convert the unit eg. km/h into m/sec...	

STUDENT LEARNING OUTCOMES (SLOs)							
Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
			[SLO:M-04-C-11] Calculate duration of different events using start time and end time.				
		[SLO:M-03-C-11] Add and subtract measures of time given in the same units to solve real-life word problems.	[SLO:M-04-C-12] Add, subtract and convert measures of time to solve real-life word problems.	[SLO:M-05-C-08] Add, subtract and convert measures and intervals of time to solve real-life word problems.		[SLO:M-07-C-02] Solve real-life word problems involving distance, time and average speed.	
[SLO:M-01-C-10] Name days of the week and month in a calendar.	[SLO:M-02-C-13] Use calendar to find a particular day/date (of a week/month) in real life situation.	[SLO:M-03-C-12] Read and write days and dates from the Calendar.					
		[SLO:M-03-C-13] Use square grid to show the total length (boundary) of the regular and irregular 2D shapes.  [SLO:M-03-C-14] Use square grid to show the enclosed surface (in square units) of the regular and irregular 2D shapes.	[SLO:M-04-C-13] Identify and use appropriate units of measurement for perimeter and area. [SLO:M-04-C-14] Differentiate between the perimeter and area of a square and rectangular shapes. [SLO:M-04-C-15] Justify and use the formula to find the perimeter and area of squares, and rectangles.	[SLO:M-05-C-09] Recognize that the shapes (eg. square and rectangle) with the same area can have different perimeters and vice versa.  [SLO:M-05-C-10] Justify and use the formula to find the area of parallelogram and triangles.	[SLO:M-06-C-01] Calculate the area of trapezium.	[SLO:M-07-C-03] Calculate the area and perimeter of the shaded/unshaded region in composite shapes.  [SLO:M-07-C-04] Calculate the circumference and area of a circle.	[SLO:M-08-C-01] solve right angled triangles using Pythagoras theorem.  [SLO:M-08-C-02] Calculate the arc length and the area of the sector of a circle.
				[SLO:M-05-C-11] Solve real life word problems involving perimeter and area of square and rectangular regions.	[SLO:M-06-C-02] Solve real life word problems involving perimeter and area of 2D shapes.		[SLO:M-08-C-03] Solve real life word problems using Pythagoras theorem.

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
					[SLO:M-06-C-03] Calculate the surface area and volume of cube and cuboids.	[SLO:M-07-C-05] Calculate the surface area and volume of 3-D shapes (cube and cuboid, prisms and cylinders).	[SLO:M-08 C-04] Calculate the surface area and volume of the pyramid, sphere, hemisphere and cone.
						[SLO:M-07-C-06] Convert between standard units of area (m <sup>2</sup> , cm <sup>2</sup> , mm <sup>2</sup> and vice versa) and volume (m <sup>3</sup> , cm <sup>3</sup> and mm <sup>3</sup> and vice versa)	
					[SLO:M-06-C-04] Solve real life word problems involving the surface area and volume of cubes and cuboids.	[SLO:M-07-C-07] Solve real life word problems involving the surface area and volume of right prisms and cylinders.	[SLO:M-08-C-05] Solve real life word problems involving the surface area and volume of pyramid, sphere, hemisphere and cone.

## Domain D: Geometry

Grade I to III	Grade IV to V	Grade VI to VIII
<p><b>Benchmarks:</b> Students will be able to use properties to describe and compare two- dimensional shapes (square, rectangle, triangle, circle, semi-circle quarter circle and other polygons) and three-dimensional shapes (cube, cuboid, cone, cylinder and sphere).</p> <p>They will describe position, movement, direction and turn using appropriate vocabulary.</p> <p>They will identify line, line segments and reflective symmetry.</p>	<p><b>Benchmarks:</b> Students will be able to use properties to describe and compare triangles, quadrilaterals and their types and parts of a circle; identify prism and pyramid and their nets.</p> <p>They will identify, measure and construct (using a protractor) different types of angles and calculate supplementary and complementary angles and unknown angle(s) of a triangle.</p> <p>They will identify lines of symmetry in 2-D shapes</p>	<p><b>Benchmarks:</b> Students will be able to construct lines, angles of different measures, bisectors of angles and line segments, triangles and quadrilaterals and use the properties of polygons (triangles, quadrilaterals etc.) to calculate unknown angles and lengths; and properties of a circle.</p> <p>They will apply properties of congruence and similarity; analyze and apply concepts of symmetry and transformations from two dimensional perspectives.</p>

### STUDENT LEARNING OUTCOMES (SLOs)

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
<b>[SLO:M-01-D-01]</b> Recognize and identify 2-D shapes (Rectangle, square, circle and triangle) with respect to their characteristics.	<b>[SLO:M-02-D-01]</b> Recognize, identify and draw 2-D shapes (Rectangle, square, circle, triangle, semi- circle and quarter- circle) with respect to their characteristics.	<b>[SLO:M-03-D-01]</b> Differentiate and classify polygons with respect to their attributes (pentagon, hexagon, octagon and decagon).		<b>[SLO:M-05-D-01]</b> Recognize, compare and classify types of triangles with respect to their sides and angles; quadrilaterals and their characteristics (parallel sides, equal sides, equal angles, right angles, lines of symmetry etc. & square, rectangle, parallelogram, rhombus, trapezium and kite).	<b>[SLO:M-06-D-01]</b> Recall quadrilaterals and their characteristics (parallel sides, equal sides, equal angles, right angles, lines of symmetry etc. & square, rectangle, parallelogram, rhombus, trapezium and kite)	<b>[SLO:M-07-D-01]</b> Differentiate between convex and concave and regular and irregular polygons.	
<b>[SLO:M-01-D-02]</b> Recognize and identify 3-D Shapes (cube, cuboid, cone, cylinder and sphere) with respect to their characteristics .	<b>[SLO:M-02-D-02]</b> Recognize and identify 3-D shapes (cube, cuboid, cone, cylinder and sphere) in different orientations.			<b>[SLO:M-05-D-02]</b> Recognize and draw nets of prisms and pyramids.	<b>[SLO:M-06-D-02]</b> Recognize and describe 3-D shapes (cube, cuboid, cone, cylinder, sphere, hemisphere and cone) with respect to their characteristics.		
<b>[SLO:M-01-D-03]</b> Describe the position, movement and direction of an object including moving in a straight line using positional language (for instance: inside, outside, above, below, over, under, far, near, before, after, straight, backward, right and left).	<b>[SLO:M-02-D-03]</b> Describe the position, direction and movement of an object including moving clockwise, anti-clockwise, quarter, half and three quarters turns using appropriate positional language (for instance: inside, outside, above, below, over, under, far, near, before, after,	<b>[SLO:M-03-D-02]</b> Describe the movement of objects (slide and rotation).			<b>[SLO:M-06-D-03]</b> Represent an object using grid paper and compass and draw line of reflection.	<b>[SLO:M-07-D-02]</b> Translate an object and give precise description of transformation	<b>[SLO:M-08-D-01]</b> Rotate an object and find the centre of rotation by construction.  <b>[SLO:M-08-D-02]</b> Enlarge a figure (with the given scale factor) and find the centre and scale factor of enlargement.

### STUDENT LEARNING OUTCOMES (SLOs)

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
	besides, between, left, right and in front of, quarter turn, half turn, three quarter turns, clockwise, anti-clockwise, behind etc.)						
		<b>[SLO:M-03-D-03]</b> Recognize point, line, ray and line segment; and draw and measure line segments.	<b>[SLO:M-04-D-01]</b> Identify parallel and non-parallel/ intersecting lines.		<b>[SLO:M-06-D-04]</b> Identify and differentiate between parallel lines, perpendicular lines and transversal.	<b>[SLO:M-07-D-03]</b> Recognize that the perpendicular distance from a point to a line is the shortest distance to the line.	
		<b>[SLO:M-03-D-04]</b> Recognize and visually represent angle as a description of turn.	<b>[SLO:M-04-D-02]</b> Identify and describe the centre, radius, radial segment, diameter and circumference of circle.			<b>[SLO:M-07-D-04]</b> Describe the Components of a circle; centre, radius, diameter, chord, arcs, major and minor arc, semi-circle and segment of a circle.	<b>[SLO:M-08-D-03]</b> Describe chord, arcs, major and minor arc, semi-circle, segment of a circle, sector, central angle, secant, tangent and concentric circles.
		<b>[SLO:M-03-D-05]</b> Recognize quarter turns (clockwise and anti-clockwise) as a right angle.  <b>[SLO:M-03-D-06]</b> Identify half and 3-quarter turns (clockwise and anti-clockwise) as two and three right angles respectively.	<b>[SLO:M-04-D-03]</b> Recognize and identify acute, right and obtuse angles.  <b>[SLO:M-04-D-04]</b> Compare and order angles up to 180 degrees by size.  <b>[SLO:M-04-D-05]</b> Measure and draw angles (using a protractor) up to 180 degrees.	<b>[SLO:M-05-D-03]</b> Identify angles at a point on a straight line and half a turn (180 degrees). angles at a point and 1 whole turn (360 degrees).  <b>[SLO:M-05-D-04]</b> Describe and calculate complementary and supplementary angles.	<b>[SLO:M-06-D-05]</b> Identify adjacent angles and find unknown angles related to parallel lines and transversals. (Corresponding, alternate and vertically opposite angles)	<b>[SLO:M-07-D-05]</b> Calculate unknown angles in quadrilaterals using the properties of quadrilaterals. (Square, rectangle, parallelogram, rhombus, trapezium and kite).	
		<b>[SLO:M-03-D-07]</b> Identify horizontal and vertical line.				<b>[SLO:M-07-D-06]</b> Understand the relationship	

### STUDENT LEARNING OUTCOMES (SLOs)

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
		[SLO:M-03-D-08] Identify pair of parallel and perpendicular lines.				between interior and exterior angles of polygons and between opposite interior and exterior angles in a triangle.  [SLO:M-07-D-07] Calculate the interior and exterior angles of a polygon and the sum of interior angles of a polygon.	
		[SLO:M-03-D-09] Identify reflective symmetry in 2-D shapes.	[SLO:M-04-D-06] Recognize and draw lines of symmetry in 2-D shapes and complete symmetrical figures with respect to a given line of symmetry.	[SLO:M-05-D-05] Explore, identify and draw lines of symmetry in 2-D shapes and complete symmetrical figures with respect to a given line of symmetry.	[SLO:M-06-D-06] Recognize rotational symmetry, find the point of rotation and order of rotational symmetry.	[SLO:M-07-D-08] Recognize identity and draw lines of symmetry in 2-D shapes and rotate objects using rotational symmetry; and find the order of rotational symmetry.	
			[SLO:M-04-D-07] Identify 2-D shapes on the surface of 3-D shapes, (for example, a circle on a cylinder and a triangle on a pyramid)	[SLO:M-05-D-06] Calculate and measure unknown angles in a triangle.		[SLO:M-07-D-09] Calculate unknown angles in a triangle.	
					[SLO:M-06-D-07] Construct angles of specific measures in degrees (for example, 30, 45, 60, 75, 90, 105 and 120) and bisect angles using a compass.	[SLO:M-07-D-10] Construct different types of triangles. (equilateral, isosceles, scalene, acute- angled, right-angled and obtuse-angled)	[SLO:M-08-D-04] Construct a triangle when: -three sides -two sides and included angle -two angles and included side - hypotenuse and one side are given.

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
					<p><b>[SLO:M-06-D-08]</b> Construct a perpendicular from a point on the line and outside the line and a perpendicular bisector.</p>		<p><b>[SLO:M-08-D-05]</b> Construct different types of quadrilaterals (square, rectangle, parallelogram, trapezium, rhombus and kite).</p> <p><b>[SLO:M-08-D-06]</b> Draw angle and line bisectors to divide angles and sides of triangles and quadrilaterals</p>
							<p><b>SLO:M-08-D-07]</b> Identify congruent and similar figures and use postulate for congruence between triangles in solving problems.</p>

## Domain E: Statistics and Probability

Grade I to III	Grade IV to V	Grade VI to VIII
<p><b>Benchmarks:</b> Students will be able to read and interpret data from pictographs, block graphs and Carroll diagrams.</p> <p>They will organize and represent the data using pictographs, block graphs and Carroll diagrams and use information to answer questions.</p>	<p><b>Benchmarks:</b> Students will be able to read and interpret the data using bar graph, line graphs and pie-charts.</p> <p>They will organize and represent the data using tables, bar graphs, line graphs, pie-charts and use information to answer questions.</p> <p>They will solve real world problems in relation to simple averages of quantities, measures and numbers.</p> <p>They will describe the probability of an event; represent the probability of an event including real world problems</p>	<p><b>Benchmarks:</b> Students will be able to collect, classify and tabulate statistical data, interpret, construct and use statistical graphs, calculate and interpret measures of central tendency (arithmetic mean, mode and median), and solve problems using various concepts pertaining to experimental and theoretical probability</p>

**STUDENT LEARNING OUTCOMES (SLOs)**

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
[SLO:M-01-E-01] Read the data using pictographs (including real life problem).	[SLO:M-02-E-01] Read and interpret the data using pictographs and block graphs (including real life problems).	[SLO:M-03-E-01] Read and interpret the data using Carroll diagrams (including real life problems).	[SLO:M-04-E-01] Read and interpret single bar graph using horizontal and vertical orientation.  [SLO:M-04-E-02] Represent the data on bar graph using horizontal and vertical orientation (including real life problems).	[SLO:M-05-E-01] Read, interpret and draw bar graph and line graphs.  [SLO:M-05-E-02] Read and interpret pie-charts (including real life problems).	[SLO:M-06-E-01] Read, interpret and draw multiple bar graphs and pie-charts (including real life problems).	[SLO:M-07-E-01] Construct and compare histograms for both discrete and continuous data with equal interval range.  [SLO:M-07-E-02] Select and justify the most appropriate graph(s) for a given data set and draw simple conclusions based on the shape of the graph.	[SLO:M-08-E-01] Select and justify the most appropriate graphs (bar graphs, line graphs, pie charts, histograms) for given data and draw simple conclusion based on shape of the graph.
					[SLO:M-06-E-02] Identify and organize different types of data (discrete, continuous, grouped and ungrouped).	[SLO:M-07-E-03] Recognize the difference between discrete, continuous, grouped and ungrouped data.	[SLO:M-08-E-02] Recognize the difference between discrete, continuous grouped and ungrouped data.
				[SLO:M-05-E-03] Find the average of number, quantities and measures (length, mass, volume, and scores)  [SLO:M-05-E-04] Solve real life word problems related to averages involving quantities, measures and numbers.	[SLO:M-06-E-03] Calculate the mean, median and mode for ungrouped data and solve related real-life problems.	[SLO:M-07-E-04] Calculate the arithmetic mean, median and mode for ungrouped and grouped data and, solve related real-life problems; compare, choose and justify the appropriate measures of central tendency (arithmetic mean, mode and median) for given set of data.	

### STUDENT LEARNING OUTCOMES (SLOs)

Grade -I	Grade -II	Grade -III	Grade -IV	Grade -V	Grade -VI	Grade -VII	Grade -VIII
						<p><b>[SLO:M-07-E-05]</b> Construct frequency distribution tables for given data (frequency, lower class limit, upper class limit, class interval and mid-point) and solve related real- life word problems.</p>	<p><b>[SLO:M-08-E-03]</b> Construct frequency distribution tables, histograms (of equal widths) and frequency polygon, solve related real-life word problems.</p>
<p><b>[SLO:M-01-E-02]</b> Describe the likelihood that every day events will occur, using mathematical language (less, likely and more likely).</p>	<p><b>[SLO:M-02-E-02]</b> Describe the likelihood that everyday events will occur, using mathematical language (impossible, less, likely, more likely, unlikely and certain).</p>	<p><b>[SLO:M-03-E-02]</b> Describe the likelihood that everyday events will occur, using mathematical language (impossible, possible, less likely, more likely, equally likely, unlikely and certain).</p>	<p><b>[SLO:M-04-E-03]</b> Describe the outcome of a simple probability experiment (spinner and dice), using mathematical language (impossible, less likely, more likely, equally likely, unlikely and certain).</p>	<p><b>[SLO:M-05-E-05]</b> Explain experiments and outcomes; and represent the probability (using a fraction) that an event will occur, in simple games and probability experiments (including real-life word problems).</p>	<p><b>[SLO:M-06-E-04]</b> Explain experiments, outcomes, sample space, events, equally likely events and probability of a single event. Differentiate the outcomes that are equally likely and not equally likely to occur. (including real-life word problems).</p>	<p><b>[SLO:M-07-E-06]</b> Explain and compute the probability of; certain events, impossible events and complement of an event. (including real-life word problems).</p>	<p><b>[SLO:M-08-E-04]</b> Explain and compute the probability of; mutually exclusive, independent, simple combined and equally likely events. (including real-life word problems).</p> <p><b>[SLO:M-08-E-05]</b> Perform probability experiments (for example tossing a coin, rolling a die, spinning a spinner etc. for certain number of times) to estimate probability of a simple event.</p> <p><b>[SLO:M-08-E-06]</b> Compare experimental and theoretical probability in simple events.</p>





## Mathematics Teaching: Role & Responsibilities

The role of an effective mathematics teacher, as reflected in this curriculum, is interpreted from a social constructivist learning perspective, which holds that knowledge is created as students adapt to and make sense of their own experiences in an interactive and dialogical environment. These viewpoints are based on Piaget's and Vygotsky work, which states that pupils develop or understand mathematical concepts when they are relevant to their real-world experiences.

This curriculum implies that mathematics teaching is not just a vocation but also a moral responsibility. To engage students in the discovery and production of knowledge, a teacher must listen to them, grasp their level of thinking, assign relevant and rich tasks, and assess the results, using alternative assessment methods, of those tasks to understand how students construct meanings. Hence, a mathematics teacher transitions from dispensing information to planning investigative tasks, managing a cooperative learning environment, and encouraging students' creativity in the construction of mathematical knowledge and achieving a common, agreed-upon mathematical interpretation through a variety of methods.

Teaching in a Mathematics classroom requires listening to the students, understanding their level of thinking, setting a task and analyzing outcomes of the task in order to understand how students construct meanings -this is contrary to a traditional way of teaching. The teachers' role shifts from dispensing information to planning investigative tasks, managing a cooperative learning environment and supporting students' creativity in developing rational understanding of the concepts. This improved teaching practice should include the following aspects of a teacher's role.

- A planner of practical tasks for the students to consolidate and organize their informal knowledge.
- An organizer of the establishment of mathematical tasks in the classroom so that the students can work in a social setting and develop rational understanding.
- An encourager who asks questions, supports and develops students' mathematical thinking and communication.
- A negotiator helping students to discuss various meanings/solutions of a concept/question and to achieve a common agreement.
- A mediator supporting the establishment of an environment where students express opinions and experiences in the classroom equally.
- Thus, a teacher's primary responsibilities are to assist learners' cognitive reconstruction and conceptual re-organization through providing them the opportunities for interaction in mathematical tasks that encourage discussion and negotiation of ideas to help them to develop conceptual understanding.

### Teaching Strategies in Mathematics

Students learn things in different ways. They do not always learn best by sitting and listening to the teacher. Students can learn by presentation and explanation by the teacher, consolidation and practice, games, practical work, problems and puzzles, and investigating Mathematics.

### Investigating Mathematics

Teachers may set students a challenge, matched to their ability, which leads them to discover and practice some new Mathematics for themselves. The key point about investigations is that students are encouraged to make their own decisions about:

- where to start,
- how to deal with challenges,
- what Mathematics they need to use,
- how they can communicate this Mathematics,
- How to describe what they have discovered.



## **Problem Solving**

A problem is a statement or proposition requiring an algebraic, geometric, or other mathematical solution. A widespread opinion that problem solving should be the central focus of the curriculum for Mathematics strengthens the fact that ‘learning to solve problems is the principal reason for studying Mathematics’.

A problem exists when there is a situation a learner wants to resolve but no solution is readily apparent. For example, Shahzaib counted 19 cycle-wheels, run by 7 cycle-riders, going past his house. How many tricycles were there? Working on this problem offers a good practice in addition, multiplication and division skills. But the important goal of this problem is to help students think systematically about possibilities and record thinking.

Research suggests that a problem solver needs to become better acquainted with a problem and works for a clearer understanding of it before progressing towards solution. The path from understanding the problem to devising a plan may sometimes be long but experience and practice are the best teachers to contrive. The plan gives a general outline of direction to solve the problem. Having arrived at a result, it is verified by referring back to the original problem.



## Assessment and Evaluation

Assessment mainly serves two purposes: firstly, to support and provide feedback to learners and improve their ongoing learning, and secondly to report on what they had already achieved. In essence the first is formative assessment and the second is summative assessment. Assessment and evaluation should be based on curriculum expectations and the achievement levels outlined in this curriculum. To ensure that assessment and evaluation lead to the improvement of student learning, teachers must use specific assessment and evaluation strategies that

- Address both what students learn and how well they learn.
- Are administered over a period of time and designed to provide opportunities for students to demonstrate full range of their learning.
- Ensure that each student is given clear directions for improvement.
- Promote students' ability to assess their own learning.
- Are communicated clearly to students and parents in advance.

It should be kept in mind that in mathematics a single type of assessment can frustrate students, diminish their self-confidence and make them feel anxious about the subject. In reality the understanding of mathematical concepts encompasses a broad range of abilities. Examples of various templates to assess different abilities are mentioned below.

Assessment must include by focusing on a student's ability to:

- Communicate mathematically.
- Reason and analyze, and to think and act in positive ways.
- Comprehend the key concepts.
- Evaluate the effectiveness of using different strategies to address the same problem.
- Use a variety of strategies to problem solving and to make mathematical connections.
- Discriminate between relevant and irrelevant attributes of a concept in selecting examples.
- Integrate and to make sense of mathematical concept and procedure.
- Examine real life situations by reasoning mathematically.

Learning of mathematics, being a cumulative process, occurs as experiences contribute to understanding. Suggested below are the assessment strategies to obtain valid and reliable picture of students' understanding and achievement.

1. Classroom-based assessments that include anecdotal records, checklists, rating scales, portfolios peer- and self-assessment.
2. Teacher-designed test formats that include oral examination, assignments, short answers, matching, multiple-choice, fill-in and true-false items.



## The Traditional Examinations

For assessment and evaluation of grade levels I-VIII the institutions adopt their own criteria. The means by which each institution achieves quality should differ according to the circumstances in which it operates, but each must give priority to meeting students' expectations in terms of learning outcomes they can legitimately expect to achieve. In essence an effective learning-outcomes-oriented quality assurance system must be based on constant monitoring and effective feedback loops.

## Unit Wise Weightages

Following tables explain weightages of specified topics with respect to different grade levels in accordance with the curriculum. Bar charts drawn alongside the tables hence reflect weightages of fundamental disciplines in the field of Mathematics

### UNIT WISE WEIGHTAGES - GRADE- I

Unit #	Title	Weightage
1	NUMBERS	15%
2	NUMBER AND OPERATIONS	31%
3	MONEY	5%
4	FRACTIONS	8%
5	ALGEBRA	5%
6	MEASUREMENT	26%
7	GEOMETRY	5%
8	STATISTICS AND PROBABILITY	5%
	<b>TOTAL</b>	<b>100%</b>

### UNIT WISE WEIGHTAGES - GRADE- II

Unit #	Title	Weightage
1	NUMBERS	13%
2	NUMBER AND OPERATIONS	37%
3	MONEY	4%
4	FRACTIONS	7%
5	ALGEBRA	6%
6	MEASUREMENT	23%
7	GEOMETRY	6%
8	STATISTICS AND PROBABILITY	4%
	<b>Total</b>	<b>100%</b>

### UNIT WISE WEIGHTAGES - GRADE- III

Unit #	Title	Weightage
1	NUMBERS	11%
2	NUMBER AND OPERATIONS	22%
3	FRACTIONS	11%
4	ALGEBRA	7%
5	MEASUREMENT	26%
6	GEOMETRY	19%
7	STATISTICS AND PROBABILITY	4%
	<b>Total</b>	<b>100%</b>

### UNIT WISE WEIGHTAGES – GRADE- IV

Unit #	Title	Weightage
1	NUMBERS	11%
2	NUMBER AND OPERATIONS	14%
3	FACTORS & MULTIPLES	5%
4	FRACTIONS	11%
5	DECIMALS	18%
6	PERCENTAGE	2%
7	ALGEBRA	5%
8	MEASUREMENT	23%
9	GEOMETRY	11%
10	STATISTICS AND PROBABILITY	5%
	<b>Total</b>	<b>100%</b>

### UNIT WISE WEIGHTAGES - GRADE- V

Unit #	Title	Weightage
1	NUMBERS	10%
2	NUMBER AND OPERATIONS	10%
3	FACTORS & MULTIPLES	10%
4	FRACTIONS	07%
5	DECIMALS	10%
6	PERCENTAGE	15%
7	ALGEBRA	20%

<b>8</b>	MEASUREMENT	10%
<b>9</b>	GEOMETRY	08%
	STATISTICS AND PROBABILITY	
	<b>Total</b>	<b>100%</b>

### UNIT WISE WEIGHTAGES - GRADE- VI

Unit #	Title	Weightage
<b>1</b>	FACTORS & MULTIPLES	10%
<b>2</b>	INTEGERS	15%
<b>3</b>	PERCENTAGE	7%
<b>4</b>	RATIO	10%
<b>5</b>	SET	2%
<b>6</b>	ALGEBRA	20%
<b>7</b>	MEASUREMENT	10%
<b>8</b>	GEOMETRY	17%
<b>9</b>	STATISTICS AND PROBABILITY	9%
	<b>Total</b>	<b>100%</b>

### UNIT WISE WEIGHTAGES - GRADE- VII

Unit #	Title	Weightage
<b>1</b>	NUMBERS	4%
<b>2</b>	FACTORS, LCM, HCF	2%
<b>3</b>	INTEGERS	2%
<b>4</b>	TYPES OF NUMBERS	10%
<b>5</b>	RATIO & PROPORTION	3%
<b>6</b>	PERCENTAGE	3%
<b>7</b>	TAX	2%
<b>8</b>	SQUARE ROOT	4%
<b>9</b>	SET	6%
<b>10</b>	ALGEBRA	29%
<b>11</b>	MEASUREMENT	10%
<b>12</b>	GEOMETRY	16%
<b>13</b>	STATISTICS AND PROBABILITY	9%
	<b>Total</b>	<b>100%</b>



## UNIT WISE WEIGHTAGES - GRADE- VIII

Unit #	Title	Weightage
1	NUMBERS	4%
2	TYPES OF NUMBERS	9%
3	MONEY	2%
4	RATIO & PROPORTION	2%
5	PERCENTAGE	6%
6	SQUARE & CUBE ROOTS	7%
7	SETS	7%
8	ALGEBRA	37%
9	MEASUREMENT	7%
10	GEOMETRY	10%
11	STATISTICS AND PROBABILITY	9%
	<b>Total</b>	<b>100%</b>



## Teaching and Learning Resources

### Introduction

Government prescribed textbook is the only teaching and learning tool used in most of the schools. Though many other resources are also available, accessible and affordable teachers rarely use them to support the learning. In addition to the textbook, the teaching and learning resources include teacher's manual, workbook and electronic resources.

### The Textbook

There are many important entities involved to revamp the entire education system. The school has to play its own role, parents have to contribute their share and teachers have to assume a significant place in fostering education. Print materials, particularly the textbooks, have to play a key role towards providing quality education at all levels. Although there are many stakeholders that contribute towards the overall learning of the child yet the importance of textbook as a reservoir of information/ knowledge cannot be ignored. Textbook writers have a vital role to play in penetrating the young minds through their writing. A textbook

- whose content as well as presentation is thoughtfully planned,
- which is written by qualified and competent subject expert(s), and
- Which is attractive and engaging, must stimulate the interest of teacher and the taught.

### Guidelines for Textbook Authors

Textbooks aimed at lower level tend to include more learning features than those at higher level. However, in textbook writing generally the following aspects may be taken into consideration.

- The textbook should be in line with the objectives of Curriculum.
- The author should continuously focus on standards and benchmarks.
- The author should bring himself to the mental level of students he is writing for.
- The span of the textbook should be fairly reasonable.
- The material should not be cramped. To make it more digestible, it may be chunked into smaller parts with headings.
- The textbook is expected to provide accurate and up-to-date information.
- The text material should be arranged in a logical manner; simple to complex, familiar to unfamiliar and concrete to abstract.
- The text material must be free from ambiguities and errors (both mathematical and typographical).
- The content provided in the textbook should not develop wrong concepts.
- The text should be clear and concise. It should not give any other meaning than the one intended.
- Special attention should be paid to geometrical portions. Every table, line drawing and graph should be labeled appropriately.
- Include plenty of examples to illustrate each concept. Work through solutions step by step.
- Provide a variety of practice problems with varying levels of difficulty to reinforce understanding.
- Footnotes and side notes may be inserted wherever necessary.

## Textbook Style and Structure

To make a textbook an effective teaching and learning tool its style and structure is given due importance. The material needs to be structured in a coherent and logical way, and that writing style should be reader friendly.

Unit Opening	
<b>Unit Outline</b>	Include list of headings.
<b>Student Learning Outcomes (SLOs)</b>	One SLO for each heading may be included. If they are numerous then a reasonable number is acceptable.
<b>Real Life Relevance</b>	Illustrate the real-life relevance of the unit.
<b>Short Introduction</b>	Explain what this unit covers and why.
<b>Key Terms</b>	Use italics for emphasis and bold for key terms. Define key terms when first introduced and collate them with their definitions for the glossary.
<b>Running Glossary</b>	Key terms and definitions may be pulled out from the main body of text so that students spot them easily in the unit body (e.g. in the margins).
<b>Feature Boxes</b>	Regular feature boxes may include various contents such as a mathematical formula, a working rule or a statement of theorem.
<b>Illustrative Examples</b>	Include illustrative examples to develop conceptual understanding of the topic.
<b>Problem Sets</b>	Special attention should be paid on preparation of Problem Sets. Correlate Mathematics with real life situations and include sufficient exercises on real life problems almost in every problem set, if appropriate. The questions on the application of Mathematics in other fields of study are also very useful.
<b>Learning Review Points</b>	Include bulleted questions for students to check their understanding at regular intervals. Possible labels include 'self-test point' or 'checkpoint'.
<b>Tips or Hints</b>	Separated from the main body of text, they allow the author to speak directly to the student, offering useful advice or flagging important points.
<b>Visuals</b>	Tables, graphs, line drawings and lists may be used to break up the text.
<b>Problem Set (Review)</b>	Include multiple-choice questions, interpretive exercises and fill-in items. Students may also be asked to label diagrams or write a one word answer to short question.
<b>Summary</b>	Include a review of the main concepts. This can relate to the SLOs by covering each in turn (bullet points work well). The summary should not include any new information.

End of Textbook	
<b>Glossary</b>	Include only the key terms in the glossary.
<b>Answers to Problems</b>	Include answers to the problem sets unit wise.
<b>Appendices</b>	Include extra information the student needs such as list of mathematical formulas, log tables and relevant websites.
<b>Bibliography</b>	Include bibliography and list of books for suggested reading where appropriate.
<b>Index</b>	Include index for the key terms used in the book.

### Teacher's Manual

Ideally the teacher's manual should come with the textbook. The manual is aimed at informing teachers how the textbook is written and how best to use it to facilitate student learning. It can be seen as a means of helping teachers develop professionally. It provides detailed explanation of key concepts and the way to teach a particular topic. Its basic features are as below.

The teacher's manual should

- Be easy to understand and use.
- Help teachers teach text and extend activities.
- Give sequenced instructions for each activity.
- Include teaching learning resources.
- Establish a question bank (having questions different from text) and suggest interactive quizzes corresponding to each unit.
- Involve various up-to-date and relevant teaching strategies and rationale for suggested teaching.
- Explain how to implement each teaching strategy.
- Identify constraints and strengths of each strategy or activity.
- Identify resources needed for teaching strategies and extension of activities.
- Expand and develop teacher's repertoire of knowledge and skills.
- Identify assessment strategies.

### The Work Book

Workbooks contain writing activities and exercises that are related to each unit in the textbook. Workbook exercises help to develop students' conceptual understanding of the topics dealt with in the text. They assist students in developing skills by applying knowledge to new situations. A workbook has the following basic features.

A workbook should:

- Be easy for students to understand and follow.
- Involve clear and explicit instructions.
- Be stimulating, challenging and innovative.
- Correspond to knowledge and skill developed in the textbook.
- Consists of many exercises and activities for each unit, topic and subtopic.
- Be non-repetitive in style and structure.
- Avoid using too many activities for one topic or skill.
- Include exercises and activities which are different from those in textbook or teacher's manual.
- Suggest accessible and affordable materials/resources for the proposed activities.

There are a number of teaching and learning materials available for effective teaching. Following are a few examples of easily accessible and affordable materials which can be suggested for the activities corresponding to basic concepts of Mathematics.

Materials	Purpose
<b>Mirror</b>	Symmetry
<b>Cards, coins, dice and marbles</b>	Probability
<b>Food, paper or something that can be divided into fractions</b>	Fraction
<b>Ruler, set squares, protractor, string, thermometer and weights</b>	Measurements
<b>3-dimensional objects; ball, cube, cylinder, prism and pyramid</b>	Volume and surface area
<b>Graphs, pie charts and multiplication tables</b>	Visual aids

### The Web-based Resources

The use of World Wide Web (www) is growing very fast to access an immense volume of rapidly evolving information. It is acting as a driving force since its ease of use makes the internet trivially accessible to the students even with a little knowledge of computer. Through web-based links as mentioned along with the learning outcomes will provide:

- Access to various sites of Mathematics around the world
- View three-dimensional figures, graphics, lesson plans, activities and various books of interest.

Domain	Websites/links
Number and Operation	<a href="#">Mathshub</a> <a href="#">Cuemath</a> <a href="#">Math Drills</a> <a href="#">MrBartonMaths</a> <a href="#">mrbartonmathsworksheets</a> <a href="#">superteacherworksheets</a>

	<a href="#">kutasoftware</a> <a href="#">math-aids</a> <a href="#">math-drills</a> <a href="#">commoncoresheets</a> <a href="#">mathantics</a>  <a href="http://www.crickweb.co.uk/ks1numeracy.html">http://www.crickweb.co.uk/ks1numeracy.html</a>
Algebra	<a href="#">Mathshub</a> <a href="#">Cuemath</a> <a href="#">Math Drills</a> <a href="#">MrBartonMaths</a> <a href="#">mrbartonmathsworksheets</a> <a href="#">superteacherworksheets</a> <a href="#">kutasoftware</a> <a href="#">math-aids</a> <a href="#">math-drills</a> <a href="#">commoncoresheets</a> <a href="#">mathantics</a>
Measurement	<a href="#">Mathshub</a> <a href="#">Cuemath</a> <a href="#">Math Drills</a> <a href="#">MrBartonMaths</a> <a href="#">mrbartonmathsworksheets</a> <a href="#">superteacherworksheets</a> <a href="#">kutasoftware</a> <a href="#">math-aid</a> <a href="#">math-drills</a> <a href="#">commoncoresheets</a> <a href="#">mathantics</a>
Geometry	<a href="#">Mathshub</a> <a href="#">Cuemath</a> <a href="#">Math Drills</a> <a href="#">MrBartonMaths</a> <a href="#">mrbartonmathsworksheets</a> <a href="#">superteacherworksheets</a> <a href="#">kutasoftware</a> <a href="#">math-aids</a> <a href="#">math-drills</a> <a href="#">commoncoresheets</a> <a href="#">mathantics</a>
Statistics and Probability	<a href="#">Mathshub</a> <a href="#">Cuemath</a> <a href="#">Math Drills</a> <a href="#">MrBartonMaths</a> <a href="#">mrbartonmathsworksheets</a> <a href="#">superteacherworksheets</a> <a href="#">kutasoftware</a> <a href="https://www.math-aids.com/">https://www.math-aids.com/</a> <a href="https://math-drills.com/">https://math-drills.com/</a>

<https://www.commoncoresheets.com/mathantics>

Topic	Websites/links
<b>Number stories in math</b>	<a href="http://www.mathcats.com/explor e/numberstories.html">http://www.mathcats.com/explor e/numberstories.html</a>
<b>Multiplication Worksheets link on multiplication</b>	<a href="http://www.tlbooks.com/thirdgrade-multiplication-division.htm">http://www.tlbooks.com/thirdgrade-multiplication-division.htm</a> <a href="http://www.tlbooks.com/thirdgrade-multiplication-division.htm">http://www.tlbooks.com/thirdgrade-multiplication-division.htm</a> <a href="https://www.tes.co.uk/teachingresource/recognise-multiples-of-25-and-10-worksheet-6372812">https://www.tes.co.uk/teachingresource/recognise-multiples-of-25-and-10-worksheet-6372812</a> <a href="https://www.tes.co.uk/teachin g-resource/recognisemultiples-of-2-5-and-10worksheet-6372812">https://www.tes.co.uk/teachin g-resource/recognisemultiples-of-2-5-and-10worksheet-6372812</a>
<b>Geometry</b>	<a href="http://www.instantdisplay.co.uk">www.instantdisplay.co.uk</a> <a href="http://www.mathsisfun.com/geometry/symmetrylineplanesapes.html">http://www.mathsisfun.com/geometry/symmetrylineplanesapes.html</a>
<b>Numbers</b>	<a href="http://www.amblesideprimary.com/ambleweb/mentalmaths/supers equencer.html">http://www.amblesideprimary.com/ambleweb/mentalmaths/supers equencer.html</a> <a href="http://www.ixl.com/math/grade-4/place-values">http://www.ixl.com/math/grade-4/place-values</a> <a href="http://www.whoinventedit.net/wh o-invented-numbers.html">http://www.whoinventedit.net/wh o-invented-numbers.html</a> <a href="http://www.free-trainingtutorial.com/placevalue/collectthships.html">http://www.free-trainingtutorial.com/placevalue/collectthships.html</a> <a href="http://www.free-trainingtutorial.com/placevalue/airplanes.html">http://www.free-trainingtutorial.com/placevalue/airplanes.html</a> <a href="http://www.free-trainingtutorial.com/placevalue/createnumber.html">http://www.free-trainingtutorial.com/placevalue/createnumber.html</a>
<b>Time</b>	<a href="http://www.math-aids.com/Time/">http://www.math-aids.com/Time/</a> <a href="https://www.superteacherworksheets.com/time.html">https://www.superteacherworksheets.com/time.html</a>
<b>Data Handling</b>	<a href="http://www.wmnet.org.uk/wmnet/custom/files_uploaded/uploaded_resources/850/carrollv4.swf">http://www.wmnet.org.uk/wmnet/custom/files_uploaded/uploaded_resources/850/carrollv4.swf</a> (Carroll Diagram)
<b>Numbers and Arithmetic operations</b>	<a href="http://www.k5learning.com/freemath-worksheets/fourthgrade4/addition">http://www.k5learning.com/freemath-worksheets/fourthgrade4/addition</a> <a href="http://www.k5learning.com/freemath-worksheets/fourthgrade4/subtraction">http://www.k5learning.com/freemath-worksheets/fourthgrade4/subtraction</a> Online resources / worksheets <a href="http://www.k5learning.com/freemath-worksheets/fourthgrade4/mental-multiplication">http://www.k5learning.com/freemath-worksheets/fourthgrade4/mental-multiplication</a> <a href="http://www.k5learning.com/freemath-worksheets/fourth-grade-4">http://www.k5learning.com/freemath-worksheets/fourth-grade-4</a> <a href="http://www.k5learning.com/freemath-worksheets/fourthgrade4/long-division">http://www.k5learning.com/freemath-worksheets/fourthgrade4/long-division</a>
<b>Fraction</b>	<a href="http://edhelper.com/Comparing_Fractions.htm">http://edhelper.com/Comparing_Fractions.htm</a> <a href="https://www.superteacherworksheets.com/fractions-advanced.html">https://www.superteacherworksheets.com/fractions-advanced.html</a>
<b>Angles</b>	<a href="http://www.turtlediary.com/grade -3-games/math-games/angles.html">http://www.turtlediary.com/grade -3-games/math-games/angles.html</a> <a href="http://www.bbc.co.uk/bitesize/ks2/maths/shape_space/">http://www.bbc.co.uk/bitesize/ks2/maths/shape_space/</a>
<b>Lines</b>	<a href="http://www.turtlediary.com/grade3-games/math-games/lines.html">http://www.turtlediary.com/grade3-games/math-games/lines.html</a>
<b>Bar Graph</b>	<a href="http://www.bbc.co.uk/bite size/ks2/maths/data/frequency_diagrams/play/">http://www.bbc.co.uk/bite size/ks2/maths/data/frequency_diagrams/play/</a>
<b>Line graph</b>	<a href="https://www.tes.co.uk/te achingresource/carrolldiagramsworksheets-6181717">https://www.tes.co.uk/te achingresource/carrolldiagramsworksheets-6181717</a>
<b>Pie Chart</b>	<a href="http://www.mathaids.com/Graph/">http://www.mathaids.com/Graph/</a>
<b>Triangles</b>	<a href="http://www.mathworksheets4kids.com/triangles.html">http://www.mathworksheets4kids.com/triangles.html</a> <a href="https://www.ixl.com/math/grade5/types-of-triangles">https://www.ixl.com/math/grade5/types-of-triangles</a> <a href="http://www.mathsisfun.com/geo metry/triangles-interactive.html">http://www.mathsisfun.com/geo metry/triangles-interactive.html</a> <a href="http://www.bbc.co.uk/schools/te achers/ks2_activities/maths/angle.shtml">http://www.bbc.co.uk/schools/te achers/ks2_activities/maths/angle.shtml</a>
<b>Symmetry</b>	<a href="http://www.icteachers.co.uk/child ren/sats/symmetry.htm">http://www.icteachers.co.uk/child ren/sats/symmetry.htm</a> <a href="http://www.icteachers.co.uk/child ren/sats/rotation.htm">http://www.icteachers.co.uk/child ren/sats/rotation.htm</a>



**GOVERNMENT OF SINDH  
SCHOOL EDUCATION & LITERACY DEPARTMENT**

Karachi, dated: 04<sup>th</sup> October 2023

**NO.SO(C)SELD/ERC/18/2023:** School Education & Literacy Department, Government of Sindh, is pleased to notify the Provincial Review Committees to review the Curriculum and Textbook of **Mathematics Grade I-XII** with the following composition and TORs:

1	Professor Dr. Asif Ali Shaikh Mehran University of Engineering & Technology Jamshoro.	Chairman
2	Dr. Zain-ul-Abdin Khairo Prof., Institute of Maths & Comp. Science, University of Sindh, Jamshoro	Member
3	Dr. Rahim Bux Khokhar Mehran University of Engineering & Technology Jamshoro.	Member
4	Dr. Muneera AKU, IED Karachi	Member
5	Dr. Razia Faqeer Muhammad Professor/Expert IQRA University Karachi	Member
6	Dr. Shah Nawaz Sahito Additional Director, Curriculum Assessment & Research Sindh Jamshoro.	Member
7	Mr. Bandah Ali Talpur Assistant Professor Govt. Higher Secondary School Moosa Khatlan Tando Jam Hyderabad.	Member
8	Mr. Zaheer Hussain Abbasi Assistant Professor, DCAR Sindh Jamshoro	Member
9	Mr. Zohaib Haseeb Assistant Professor DETRC Latifabad Hyderabad	Member
10	Two working Teacher from Public & Private Sector	Member
11	One Representative from STBB Jamshoro	Member
12	Mr. Ahmed Khan Zaur Deputy Director DCAR Sindh Jamshoro	Member/Secretary

**TORs**

- Review, analyze the National Curriculum Standards in the light of adaptations, compare the National Curriculum Standards with Provincial Curriculum Standards to identify missing gaps and segments and prepare recommendations accordingly.
- To design, develop, update and finalize the Curriculum of Mathematics for the Grade I to XII focusing on local, National and global needs.
- The Curriculum promote, knowledge for creative, constructive, communicative and reflective individuals.
- The Curriculum support in creating just civil society that respect diversity through disciplined enlightened citizens.
- The Curriculum promote inclusive, quality Education and continuous learning through modern technology base environment.
- The Curriculum/ Textbook promote local, regional & national folk and cultural values and norms.
- The Textbook should be free from linguistic typographical, logical mistakes and reflect quality layout and design according to age relevance of learners.
- Review/ Quality Assurance of the Textbooks aligned with Curriculum, promotes creativity and innovation.
- The Textbook caters the social, cultural, psychological, physical and emotional needs of the learners.
- The Textbook free from hatred, biases (Gender, Ethics, Cultural occupational and Socio-economic status) ensure respect for diversity and promote harmony among masses/community.

**DR. SHEREEN MUSTAFA  
SECRETARY TO GOVERNMENT OF SINDH**

Karachi, dated: 04<sup>th</sup> October 2023

**NO.SO(C)SELD/ERC/18/2023**

A copy is forwarded for information & necessary action to:

- Principal Secretary to Chief Minister Sindh.
- Chairman Sindh Text Book Board Jamshoro.
- Executive Director Sindh Teacher Education Development Authority (STEDA)
- Deputy Secretary (Staff) to Chief Secretary Sindh @ Karachi.
- Chairperson and member concerned.
- Director Directorate of Curriculum, Assessment and Research Sindh @ Jamshoro
- PS to Minister Education and Literacy Department, Govt. of Sindh @ Karachi.
- PS to Secretary School Education and Literacy Department, Govt. of Sindh @ Karachi.
- PA to Chief Advisor Curriculum Wing, School Education and Literacy Department, Govt. of Sindh @ Karachi
- Office order file
- Official Web site



**SECTION OFFICER (C)**



**GOVERNMENT OF SINDH  
SCHOOL EDUCATION & LITERACY DEPARTMENT**

Karachi, dated the 1<sup>st</sup>, February 2024.

**NOTIFICATION**

**NO. SELD/HCW/18/2018:** In compliance with the Section 3, sub-section (4), (e) of Sindh School Education Standards & Curriculum Act 2014, Sindh Act No. IX of 2015. School Education & Literacy Department, Government of Sindh is pleased to accord **No Objection Certificate** for approval of **Mathematics Curriculum for Grade I to VIII and developing & printing of Textual Material as per the approved Curriculum**, after review by the review committee for Mathematics.

**DR. SHEREEN MUSTAFA  
SECRETARY TO GOVERNMENT OF SINDH**

**NO. SELD/HCW/18/2018:**

**Karachi, dated the 1<sup>st</sup>, February 2024.**

**A copy for information and necessary action to:**

1. The Chairman, Sindh Textbook Board, Jamshoro.
2. The Chief Advisor Curriculum Wing, School Education & Literacy Department, Government: of Sindh, Karachi.
3. The Director, Directorate of Curriculum, Assessment & Research, Jamshoro.
4. The P.S to Secretary School Education & Literacy Department, Government: of Sindh, Karachi.
5. The official website.
6. The office file.

  
(ZULFIKAR ALI MIRANI)  
**SECTION OFFICER (CURRICULUM-A&T)  
For SECRETARY TO GOVERNMENT OF SINDH.**

