**ECD Curriculum**

Mathematical Knowledge

Objectives

* To develop positive attitude towards mathematics
* To develop the ability to observe, to find out and to draw conclusion on his own standard
* To raise interest and eagerness on practical mathematical activities and discovering works eg. Measuring, weighing, etc.
* To develop counting number, measuring and comparing skills
* To develop the concepts of many/more, big/small objects available surrounding of the children on the basis of number and size
* To encourage to develop concepts understanding the relations between number of concrete objects and their counting
* To express mathematical terms shape, size and measurement of materials used in the daily life situation

**Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| **Area** | **Three years old** | **Four years old** |
| Number and counting | * Counting concrete objects one-one * States the needs of counting for number concept * States 1,2,...,5 sequential order | * Counting up to 15 * Asks to try counting more than 15 * Counting by using concrete objects so as to make habitual to represent objects by number |
|  | * Developing concepts before, after and up/under * Remembering sequential counting up to 10 * Concepts of first and second * Concepts of many/less objects in groups * Concepts of more and less objects when taken out some * When something is added in equal groups, show the additional objects * Estimating many/few, more/less looking the shape of groups | * Writing numerals and symbols * Counting objects of the group and comparing many and few * Establishing relation between groups observing them with finding out more, less and equal groups * Stating how much more with adding and how much less with taking out * In equal groups finding out-added objects by counting * Finding out more and few comparing objects in the groups |
| Measurement | * Concepts of big/small, long/short, high/low, thick/thin and their comparison by looking them * Estimation of different shapes of objects and their comparison | * Concepts of big/small, long/short, tall/short, thick/thin and comparing with the use of objects as the given direction * Distinguish the difference among organs like finger, fist, hand, feet * Weighing, measuring objects |
| Time | * Familiar with time, day, name of days, holiday related to school activities | * Encourage to read clock and calendar * Develop the concept of time learning at clock * Try to get information from the calendar |
| Geometrical shapes | * Recognize the shape of ball or box and compare with other similar objects * Classify the objects shaped as square, triangle and round and state their shape | * Draw different shapes and size and recognize the big and small ones * Observe shapes in various places (schools, home…) and differentiate big and small by guessing |
| Explain the charts | * Distinguish holiday and names of the day looking at calendar * Mark the month and day of student’s own birthday on the calendar * State the changes in height and length according to time * Mark on the calendar the birthday of classmates in each month | * Record the changed events at different times |
| Relationships | * Develop the concepts of qualitative and quantitative as long/short and many/few * Concepts of more/less, equal, near, time and place * Concepts of matching, sets, all, some, like and unlike | * Concepts of whole part and partial * Concepts of greater than, less than, farther, faster and much more |

MATHEMATICS CURRICULUM (GRADE 1 TO 3)

**Introduction**

Mathematics is used in all our activities. It is not possible to define in a few words what mathematics itself is, but the following facts clearly state its usefulness/importance/necessity in our daily life.

* It is hot today. How much is it different from yesterday?
* How far is your school from home? Can it be reached in an hour?
* Is 2 kilograms of rice enough for your family for a day?
* How much milk does your cow give?
* What is the date today?
* How much manure is needed for 2 ropanis of a farm?

Mathematical knowledge and skills are compulsory in today’s changing context. It is needed to use different things, instruments, resources etc. that are being developed and used in our every day life. Besides, mathematics is the basic tool for scientific exploration, research and proving issues scientifically. In short, mathematical knowledge and skills are necessary to study about social science, economics, political science, science, geography, history and all the subjects related to every aspects of human life.

Education is one of the principal factors of mediums of change that arises in the society or state. Further, it also takes the responsibility of making an individual integrate himself /herself in the changing society. The fundamental responsibility of school is to prepare such human resources that could accomplish the needs and desires of the society. Considering this, it is indispensable to offer mathematics as a compulsory subject in schools so as to maintain relation with every aspect of social life.

In our context, it is found that some of the children enrolled at the primary level drop school without completing this level and among those who complete it some do not get themselves enrolled to the lower secondary level to continue their studies. There may be several reasons behind this. Therefore, it would be more appropriate to formulate policy on what to include in the curriculum by keeping in mind the actual cause of dropouts. In order to give continuity in studies and make education realistic, curriculum should be developed according to the need and interest of the students.

If a student cannot build a strong base at the primary level of education or if there is no stability of subjects taught at primary level and lower secondary level, a student will find it quite difficult to cover the course albeit he/she has passed the primary level. Keeping this in kind this mathematics curriculum contain the following two strategies.

* Develop minimum mathematical knowledge, skill and attitude to solve the problems that arises while carrying out the daily activities even for the students who leave the school after completing Grade 5.
* Develop necessary mathematical knowledge and skill needed as the bases for the students joining grade 6 after completing grade 5.

In this subject, the following nine learning areas have been included Geometry, Concept of number. Basic operations of mathematical time, Currencies, Measurements and weight, fractions, decimals, unitary method and interest, Bills and budget, Statistics, sets and algebra.

2. **Level wise General Objectives.**

On completion of primary level, the students will ne anle to do following activities in mathematics.

|  |  |
| --- | --- |
| **Scope** | **Level wise General Objectives** |
| 1. Geometry | 1. Classify and the following objects on the basis of their geometrical feature (shape, type, angle, measurement) and also explore other geometrical features with measurements   * Solid Objects: sphere, cylinder, cube, cuboid, cone, prism and its parts(side, angle, surfaces, edges…………) |
| 2. Concept of numbers | 2. Count read and write and write in numerals and words the numbers above one ctore in Devnagari and Hindu Arabic numerals and also read the numbers upto 10 lakh(one million) in English. Read and write the numbers 1 to 12 in Roman numerals. |
| 3. Basic operations of mathematics | 3. Solve the mathematical problems of daily life by using addition, subtraction, multiplication and division. |
| 4. Time, currency and measurement | 4. Apply in daily life even by approximation Time, currency, Measurement(distance, perimeter, capacity, temperature, area and volume and Weight). |
| 5. Fraction, decimal percentage, unitary method and interest | 5. Solve simple problems in fractions, decimals, percentage, unitary method and interest(by unitary method) |
| 6. Bill and Budget | 6. Prepare an account of household expenses and income, receive and provide information by reading bills and meter as well. |
| 7. Statistics | 7. Receive and provide information by reading graph, chart , table and diagram and present given information in bar graphs as well. |
| 8. Sets | 8. Prepare a list of elements using set notations{ } and write them in words and classify objects in sets on the basis of different characteristics. |
| 9. Algebra | 9. Solve simple problems on algebraic expressions and equations using algebraic skills. |

**3.** Scope **and sequence**

|  |  |  |  |
| --- | --- | --- | --- |
| **Scope** | **Grade 1** | **Grade 2** | **Grade 3** |
| 1. Geometry | 1. trace the external boundary of solid objects.  2. Straight and curved lines .  3. Simple geometrical shapes (triangular, quadrangular, circular) and their construction. | 1. Shapes of triangle, quadrilateral and circle using instructions.  2. surfaces of different solid objects and geometrical shape.  3. Figures of triangle and quadrilateral. | 1. Measurements of line segment.  2. Comparison of angles( larger and smaller).  3. Triangles of different measurements.  4. Parts of triangles and quadrilaterals.  5. Line segments, sides and angles of triangles and quadrilaterals. |
| **2. Concept of numbers** | 1. Numbers from 1 to 100( in Devnagari and Hindu Arabic Numerals)  2. Place value of digits of the numbers from 1 to 100( in both)  3. Ascending and descending order of the numbers from 1 to 99.  4. Even numbers of two digits up to 100.  5. Ordinal numbers up to tenth place. | 1. Numbers from 1 to 1000(in Devnagari and Hindu Arabic Numerals in words)  2. Place value and its table of three digit numbers.  3. Ascending and descending order of three digit numbers.  4. Even numbers of with three digits.  5. I to XII in roman number system. | 1. Counting of numbers up to six digits(in devnagari and Hindu Arabic Numerals and words)  2. Place value and its table up to six digit numbers.  3. Ascending and descending order of six digits numbers.  4. Rounding off of the numbers from 1 to 99 to the nearest 10.  5. Even and odd numbers. |
| **3. Basic Operations in Mathematics**  3(a) Addition | 1. Addition of two digit numbers without carryover(up to two addends)  2. Simple verbal problems on addition. | 1. Addition of two digit numbers with carryover(up to two addends)  2. Addition of three digit numbers without carryover(up to three addends)  3. Simple verbal problems. | 1. Addition of four digit numbers.  2. Simple verbal problems. |
| 3(b) Subtraction | 1. Subtraction of two digit numbers(without borrowing)  2. Simple verbal problems on subtraction. | 1. Subtraction of three digit numbers(with borrowing)  2. Simple verbal problems on subtraction  3. Relation of Addition and Subtraction(concept of reversible operations to each other) | 1. Subtraction of four digit numbers (with borrowing from any three places) and simple verbal problems related to them. |
| 3(c) Multiplication | 1. Relation between Multiplication and Addition.  2. Mathematical sentences involving multiplication.  3. Problems on Multiplication by figures.  4. Multiplication tables of 2 to 5. | 1. Multiplication tables of 2 to 10.  2. Mathematical sentences involving multiplication.  3. Multiplication of two digit numbers by one digit number(with out carryover only)  4. Simple verbal problems on multiplication. | 1. Multiplication tables of 2 to 12.  2. Mathematical sentences involving multiplication.  3. Multiplication of two or more than two digit numbers by two digit numbers.  4. Simple verbal problems on multiplication. |
| 3(d) Division | 1. Problems of grouping a maximum of 20 objects into an equal group of 2 to 5 | 1. Meaning of division by grouping of objects and mathematical sentence.  2. Division as the form of repeated subtraction.  3. Division of two digit numbers by one digit number(without remainder) | 1. Division of three digit numbers by two digit numbers and verification.  2. Simple verbal problems on division.  3. Relation between division and multiplication. |
| **4. Time, Currency, Measurements and Weight**  4. (a) Time | 1. Time in hours.  2. Seven days of a week.  3. Name of twelve months. | 1.Time of 15-15 minutes difference on the watch.  2. Relation between hours and day, days and week, days and months and years.  3. Month, date and day on the calendar. | 1. Time in hours and minutes on the watch.  2. Conversion of days into hours, weeks and months into days.  3. Addition and subtraction of the following units of time without conversion.  -Days and hours  -Hours and minutes  - Weeks and days  - Months and days. |
| 4(b) Currency | 1. Money in use up to Rs. 100(coins and notes)  2. Addition and subtraction of money (without carryover)  3. Simple verbal problems on addition and subtraction relating to money. | 1. Notes up to Rs. 1000.  2. Conversion of rupees in to paisa.  3. Addition and subtraction of rupees and paisa without conversion.  4. Simple verbal problems o addition and subtraction relating to money. | 1.Converssion of rupees in to paisa and paisa into rupees.  2. Addition of rupees and paisa(with conversion) and subtraction of rupees and paisa(Without conversion).  3. Simple verbal problems on addition and subtraction relating to money. |
| 4(c) Distance | 1. Problems on comparison of lengths of objects by estimation | 1. Relation between centimeter and meter.  2. Measurement of the given object in centimeter(simple cases only) | 1. Measurement length using meter and centimeter.  2. Conversion of meter in to centimeter.  3. Addition and subtraction of centimeter and meter without conversion. |
| 4(d)Area | ……………….. | 1. Comparison of area. | 1. Area of figures on the basis of unit squares. |
| 4(e) Capacity | 1. Comparison of the capacities of given two containers. | 1. Use of standard measuring containers of 100 ml, 200 ml, 500 ml and 1 liter(1000 ml) | 1. Capacity of various containers by using standard measuring containers of 25 ml to 1 liter.  2. Estimating the capacity of containers up to 1 liter in the nearest 100 ml.  3. Conversion of 1 liter in to ml.  4. Addition and subtraction of liter and milliliter without conversion. |
| 4(f) Volume |  |  | 1. Volume of solid objects by counting 1 cubic centimeter blocks. |
| 4(g) Weight | 1. Comparison of two objects by estimation of their weights(lighter of heavier) | 1. Use of 100 gram, 200 gram, 500 gram and 1000gram weight. | 1. Weights of various things by using 50 gram to 1 kg standard weights.  2. Estimation of weights of objects weighing up to 1 kg in nearest 100 grams.  3. Conversion of kilogram into grams. |
| **5. Fraction, Decimal, Percentage, unitary method and interest**  5(a) Fraction | 1. Concept and use of and | 1. Concept and use of the fractions ,,and and ,,,,and.  2. Shaded part of the figures(half, one fourth, three fourth, one third) in mathematical language. | 1. Order of the fractions with equal denominators.  2. Addition and subtraction of fraction with equal denominators(excluding mixed numbers) |
| 5(b)Decimal |  |  | 1. Introduction of tenths and hundredths. |
| 5(c) Unitary method and interest | 1. |  | 1. Total value of similar set of objects on the basis of units value. |
| **6. Bills and budgets** |  |  | 1. Information from bills (simple cases only) |
| **7. Statistics** | 1. Simple pictographs.  2. Reading simple pictographs.  Information through simple pictographs. | 1. Study and obtain information from bar graphs(simple case only) | 1. Obtain comparative information from bar graphs by counting the units.  2. Numbers and scales of data.  3. Comparison of distance of things on the map. |
| **8. Sets** | 1. Problems on identifying similar types of objects (Simple case only)  2. Problems of identifying odd ones from the given objects (Simple cases only) | 1. Identifying objects on the basis of similar character.  2. Identifying odd ones from the given objects. . | 1. Set notations of the elements of the given in words(simple cases only) |
| **9. Algebra** |  | 1. Problems of addition with box notation solved through inspection method. | 1. Problems of addition and subtraction with box notation solved through inspection or hit and trail methods. |

**4. Weight distribution table:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SN** | **Area** | **Grade 1** | | **Grade 2** | | **Grade 3** | |
| Weight | Period | Weight | Period | Weight | Period |
| **1** | Geometry | **17** | **10** | **15** | **8** | **13** | **7** |
| **2** | Concept of numbers | **52** | **27** | **45** | **23** | **37** | **19** |
| **3** | Basic operation of math | **44** | **23** | **48** | **25** | **44** | **23** |
| **4** | Time, currency, measurement and weight | **40** | **20** | **31** | **16** | **37** | **19** |
| **5** | Fraction, decimal, percentage, unitary method and interest | **19** | **10** | **25** | **14** | **25** | **23** |
| **6** | Bill and budget |  |  |  |  | **7** | **4** |
| **7** | Statistics | **12** | **6** | **10** | **5** | **11** | **6** |
| **8** | Sets | **8** | **4** | **8** | **4** | **10** | **5** |
| **9** | Algebra |  |  | **10** | **5** | **8** | **4** |
| **Total period** | | **192** | **100** | **192** | **100** | **192** | **100** |

**5. Teaching learning process.**

This curriculum has mainly laid special focus on demonstration, experimental, question answer and discussion inductive and research methods to teach the contents of any area or inculcate any of the mathematical skills in students. Besides the above mentioned teaching methods this curriculum aims to use the following techniques in resenting the subject matters of mathematics.

1. Inductive method
2. Simple to complex
3. Concrete to abstract
4. Mathematical thinking

The use of learning materials is the very important to simplify the learning process and inculcate the mathematical concept in students. Learning materials means textbooks, exercise books and all the materials the students use while learning. Generally the following learning materials can be used in achieving the learning outcomes set by the curriculum

1. Base ten blocks
2. Models
3. Real objects
4. Standard units of weight and measurement etc.

Teaching method and activities to ne adopted while teaching this subject have been given in the learning outcome elaboration matrix. However these are only the central guidelines. Appropriate techniques suitable to the local context can also be used to enhance the learning**.**

MATHEMATICS CURRICULUM (GRADE 4 and 5)

**Introduction:**

All our activities need the knowledge and skills of Mathematics. However, it is not possible to define it in a few words. It is obvious that we can explain its usefulness in our daily life in terms of the following facts.

* It is very hot today. How hotter is it today than yesterday?
* How far is your school from home? Can we reach there in an hour?
* Is 2 kilograms of rice enough for your family for two days?
* How much milk does your cow give in a day?
* What is the date today?
* How much manure is needed for 2 ropanis of farm?

New technologies in the world have even made mathematical knowledge and skills mere essential. It is true that there will be no use of using different things and instruments in the absence of mathematical knowledge and skills. Apart from this, mathematics is one of the basic tools for proving scientific exploration and research issues scientifically. Finally, mathematical knowledge and skills and necessary to study about social science, economics, political science, science, geography, history and all other subjects related to everyday life of human beings.

One of the major factors to initiate change in our society or state is education because it helps individuals to integrate themselves in the changing context of the society. As everyone is aware of the fact that a fundamental responsibility of a school is to develop and prepare well qualified and competent human resources who can easily accomplish the deeds and expectations of the present society. Considering this, it is indispensable to offer mathematics as a compulsory subject in schools so as to maintain relation with every aspect of social life.

In our context, it is found that some of the children enrolled a primary level often drop out school.

Even more interesting is that the children who complete this level do not continue lower secondary level education, and there could be several reasons of these situations. Therefore, it would be more appropriate to formulate policy on what to include in the curriculum by keeping these facets of peoples’ life in mind. In order to give continuity in studies, and make education more practical, realistic, curriculum should be developed according to needs and interests if students.

It is often argued tat if a student cannot build a strong base at primary level or if there is no linkage between subjects taught at primary and lower secondary level, a students will find it quite difficult to cover the course. Keeping this in mind, this mathematics curriculum contains the following two strategies.

* Develop required minimum mathematical knowledge, skills and attitude to solve the problems that arise while carrying out daily activities even for students who drop out school after completing grade five.
* Develop necessary mathematical knowledge and skills needed as the foundation for lower secondary level i.e. grade 6 after completing grade 5.

Keeping all these in view, the following nine learning areas have been including in this subject:

* Geometry
* Concept of number
* Basic operation of mathematics
* Time
* Currency
* Measurement and weight
* Fractions
* Decimals
* Unitary method an simple interest
* Bills and budget
* Statistics
* Sets and Algebra

**2. Level wise General Objectives:**

**On the completion of primary level education , students will be able to:**

|  |  |
| --- | --- |
| **Scope** | **Level wise General Objectives** |
| 1. Geometry | 1. Classify and name the following objects on the basis if their geometrical features(shape, type, angle, measurement) and also explore other geometrical features with measurements  \* Solid objects sphere, cylinder, cube, cuboid, cone, prism and its parts(side, angle, surfaces, edges……) |
| 2. Concept of numbers | 2. Count, read and write in numerals and words the numbers above one crore in Devnagari and Hindu Arabic numerals and also read the umbers up to 10 lakhs. Read and write the numbers 1 to 12 in Roman numbers, |
| 3. Basic Operation of mathematics | 3.Solve the mathematical problems of daily life by using addition, subtraction, multiplication and division, |
| 4. Time, currency, measurement, and Weight | 4. ‘apply in daily life even by approximation Time, currency, Measurement (distance, perimeter, capacity, temperature, area and volume) and weight |
| 5. Fraction Decimal, Percentage, Unitary method and simple interest | 5. Solve simple problems on fractions, decimals, Percentage, unitary method and simple interest(by unitary method) |
| 6. Bill and budget | 6. Prepare an account of household expenses and income, receive and provide information by reading bills and meter as well. |
| 7. Statistics | 7. receive and provide information by reading graph, chart, table and diagram and present the given information in bar graphs as will. |
| 8. sets | 8. Classify objects in sets on the basis of different characteristics. Write set notation in listing method and write them in words |
| 9. Algebra | 9. solve simple problems on algebraic expressions and equations using algebraic skills. |

**3. Scope and sequence**

|  |  |  |
| --- | --- | --- |
| **Scope** | **Grade 4** | **Grade 5** |
| 1. Geometry | 1. Vertex, edges and faces in solid objects.  2. Angles of 0° - 180°(in the different of 10)  3. Acute angle and obtuse angle on the basis of right angle. | 1. Angles of 0° - 180° (in the interval of 15)  2. Angles and arms of given triangles and quadrilaterals.  3. Classification of triangles on the basis of angels and arms. |
| **2**. Concept of numbers | 1. Count numbers up to crore in Hindu Arabic Numerals (numbers and number name)  2. Rounding off of the numbers from 1 to 999 to the nearest 100  3. Prime and composite numbers from 1 to 50.  Factorization of numbers from 1 to 99 with prime factor method. | 1. Count numbers more than crore in Hindu Arabic Numerals ( number and number names) and place value of the digits in these numbers.  2. Numbers up to million.  3. Prime and composite numbers from 1 to 100.  4. Rounding off the numbers as needed.  5. Square number from 1 to 10 and cube numbers from 1 to 5 and their roots (square and cube)  6. Prime factors up to three digit numbers. |
| 3. Basic Operations in Mathematics.  3(a) Subtraction | 1. Subtraction of six digit numbers and verbal problems related to them. |  |
| 3(b) Multiplication | 1. Multiplication of three and more digit numbers by the numbers up to three digits.  2. Simple verbal problems on multiplication. |  |
| 3(c) Division | 1. Division of the numbers up to five digits by the numbers up to three digits.  2. Simple verbal problems on division. |  |
| 3(d) Other | 1. Mixed simple verbal problems addition and subtraction (using + , - and () but problems with the positive results in ()) | 1. Numbers and word problems with two operations among +, - ×, and ÷ and two brackets{()} |
| 4. Time, currency, Measurement and Weight  4(a) Time | 1. Conversion of unit of time   * Conversion of year in to days * Relation between second an minute * Verbal problems with addition and subtraction of minute and hour, hour and day, day and month, month and year. | 1. Multiplication and division of the units of time and verbal problems related to then. |
| 4(b) Currency | 1. Addition and subtraction of rupees and paisa  2. Multiplication and division of rupees and paisa (without remainder)  3. Simple verbal problems on addition, subtraction, multiplication and division relating to rupees and paisa | 1. Simple verbal problems on addition, subtraction, multiplication and division relating to rupees and paisa. |
| 4(c) Distance | 1. Conversion of meter into millimeter, millimeter in to centimeter, kilometer in to meter  2. Verbal problems on centimeter and meter, meter and kilometer ( addition and subtraction only)  3. Estimation of length and distance of the objects near to the school. | 1. Multiplication and division of units of distance and simple verbal problems.  2. Estimation of length, breadth, height of various objects and distance between home, school and other places. |
| 4(d) Perimeter | 1. Perimeter of rectangles from its length and breadth. | 1. Perimeter of rectangles (using formula) |
| 4(e) Area | 1. relation of area with the length and breadth of rectangles shapes (using the block counting method) | 1. Calculate the area of rectangular shapes by using formula and simple verbal problems related to them. |
| 4(f) capacity | 1. Conversion of liter and milliliter  2. Addition and subtraction of liter and milliliter and their verbal problems.  3. Estimation of capacity of vessels. | 1. Multiplication and division on liter and milliliter and verbal problems related to them. |
| 4(g) Volume | 1. Relation of volume with length, breadth and height of cuboids (by counting) | 1. Calculate the volume of cuboids by using formula. |
| 4(h) Weight | 1. Conversion of kilogram an grams.  2. Addition and subtraction of gram and kilogram  3. Simple verbal problems with addition and subtraction | 1. Multiplication and division of gram and kilogram  2. Simple verbal problems with multiplication and division  3. Estimation of weight of different objects.  4. Relation between kilogram and quintal. |
| **5. fraction, Decimal, percentage. Unitary method and simple interest**  5(a) Fraction | 1. Addition and subtraction of mixed numbers(like fractions)  2. Convert the fractions unlike fractions into like fractions and compare big fraction and small fraction(Problems with two fractions only) | 1. Conversion of mixed numbers and improper fractions to each other.  2. Addition and subtraction of mixed numbers(with two fractions only)  3. Multiplication of fraction(with two fractions only)  4. Simple verbal problems with addition and subtraction of fraction(with two fractions only) |
| 5(b) Decimal | 1. conversion of decimal and fraction into each other.  2. Addition and subtraction up to two decimal places. | 1. Conversion of decimal and fraction(up to three decimal place)  2. Addition and subtraction of decimal numbers up to three decimal places.  3. Simple verbal problems in addition and subtraction of decimal numbers.  4. Rounding off of the decimal numbers in the given position. |
| 5(c) Percentage | 1. Introduction of percentage.  2. Conversion of fraction in to percentage. | 1. Conversion of fraction and percentage.  2. Simple verbal problems on percentage. |
| 5(d)Unitary method and Simple interest | 1. Unit value on the basis of total value of similar set of objects.  2. simple verbal problems unitary method | 1. Calculation of simple interest with the help of unitary method.  2. Solution of simple problems on simple interest with the help of unitary method. |
| **6. Bills and budget** | 1. Information from bills | 1. Bill  2. Information from budget. |
| **7. Statistics** | 1. Get information by reading thermometer  2. Calculation of data like age, height, number of animals, pages of a book etc. and their sequential tabulation.  3. information form table  4. Drawing bar graph using graph paper.  5. Given ordered pairs in graph paper( first quadrant only) | 1. conclusion from tabulation information.  2. Presentation of given simple information on graph.  3. Plot ordered pairs in graph (first quadrant only) |
| **8.Sets** | 1. Set notations of the elements of the sets given in sentences | 1. Presentation of set notation of the given sets in sentences. |
| **9. Algebra** | 1. Simple equation of addition, subtraction, multiplication and division with box notation solved through inspection method, hit and trail(using variable too)  2. Addition and subtraction of link terms (without using negation terms) | 1. Write simple verbal problems in algebraic equations(only two terms equations used in addition and subtraction)  2. Equality axiom.  3. Solution of linear equation with one variable using equality axiom. |

**4. Weight distribution table:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SN | Area | Grade 4 | | Grade 5 | |
|  |  | Weightage | | Weightage | |
|  |  | Period | Percentage | Period | Percentage |
| 1. | Geometry | 17 | 9 | 17 | 9 |
| 2 | Concept of numbers | 34 | 18 | 35 | 18 |
| 3 | Basic operation of mathematics | 26 | 14 | 27 | 14 |
| 4 | Time, Currency, Measurement and weight | 39 | 20 | 36 | 16 |
| 5 | Fraction, Decimal, Percentage, Unitary and simple interest | 32 | 17 | 32 | 18 |
| 6. | Bill and Budget | 7 | 4 | 9 | 5 |
| 7 | Statistics | 9 | 5 | 9 | 5 |
| 8 | Sets | 9 | 5 | 9 | 5 |
| 9 | Algebra | 19 | 10 | 18 | 10 |
| Total | | 192 | 100 | 192 | 100 |

**5. Teaching Learning Process:**

This curriculum has mainly laid special focus on demonstration, experimental, question answer and discussion, inductive and research methods to teach the contents of any area or inculcate any of the mathematical skills in students. Besides the above maintained teaching methods, this curriculum aims to use the following techniques in presenting the subject matters of mathematics.

1. Inductive method
2. Simple to complex
3. Concrete to abstract
4. Problem solving method
5. Mathematical thinking

The use of learning materials is the very important to simplify the teaching learning process and inculcate the mathematical concept in students. Learning materials means textbooks, exercise books and all the materials the students use while learning. Generally the following learning materials can be used in achieving the learning outcomes set by curriculum.

1. Base ten blocks
2. Models
3. Real objects
4. Standard units of weight and measurement, etc.

Teaching methods and activities to be adopted while teaching this subject have been given in the learning outcome elaboration matrix. However, these are only the general guidelines. Appropriate techniques suitable to the local context can also be used to enhance the learning**.**

**6. Student assessment:**

Like other subjects, in mathematics also student assessment is generally carried out the following objectives.

* Find out whether the students achieved the learning outcomes or not,
* Find out whether the students have prerequisite knowledge to learn a new lesson .
* Give feedback to students about what they have learnt
* Give feedback to teachers about the effectiveness of their teaching.
* Grade students by assessing their achievement.

Teaching learning process should continue until students achieve the intended learning outcomes. Teachers should find out the weaknesses of students through continuous assessment and take necessary corrective measures. Thus continuous assessment should be adopted as an integral part of teaching and learning. However, in student assessment , the following measures should be adopted in grading students.

* It is assumed that teaching learning can only be meaning full when a teacher presents himself/ herself as a co learner, facilitator, promoter and motivator.
* The process of solving mathematical problems by associating them with local ones has been considered as the best teaching methods.
* Personal teaching in consultation with parents, teachers and students in meaningful so this should be given appropriate place in teaching mathematics.

Therefore, the main basis of student assessment in teaching mathematics is to find out whether students have achieved the specified learning outcomes, and how far students have learnt the mathematical concepts and skills

At the end of these grades the learner will be able to:-

Grade: 6

* Identify the element of sets.
* Write the number of element of a set.
* Identify finite and infinite sets.
* Differentiate equivalent and equal sets.
* Identify null set.
* Identify whole numbers.
* Write the properties of Hindu Arabic numeration system.
* Convert Hindu Arabic to Roman numeration system and vise versa.
* Distinguish prime and composite numbers.
* Simplify the problems involving brackets.
* Find the prime factors of the numbers.
* Test the divisibility of 2, 3, 5, 7.
* Find the square and cube of given number.
* Find the square and cube root of given numbers.
* Find the HCF and LCM of given numbers.
* Identify the pattern of the numbers.
* Perform four fundamental operation of fractions.
* Simplify the problems of fractions.
* Convert decimal into fraction and vice versa.
* Perform addition, subtraction and multiplication of decimals.
* Divide decimal numbers by an integer.
* To round off the nearest given places.
* Solve the practical problems of time, money, length and weight.
* Solve the problems related to percentage.
* Define ratio and proportion.
* Solve the problems related to ratio and proportion.
* Change fraction, percentage and decimal into each other.
* Identify cost price and selling price.
* Solve simple verbal problems on profit and loss.
* Solve the problems of unitary method related to direct and indirect variation.
* Find the simple interest by using unitary method.
* Find the simple interest using formula.
* Construct frequency distribution table.
* Construct bar graph.
* Find the average of individual observation.
* Identify constant and variable.
* Identify like and unlike terms.
* Identify coefficient, base and index in an algebraic term.
* Classify the algebraic expression on the basis of number of terms.
* Find the numerical value of algebraic expression on substituting the values of variables.
* Perform the four fundamental operations on algebraic expressions.
* Identify the true, false and open statements.
* Represent the inequality in number line.
* Use the correct trichotomy symbol.
* Solve the linear equation of one variable.
* Identify the co-ordinate axes and origin.
* Plot the given point in the graph.
* Write the co-ordinates of the given point in the graph.
* Identify and draw parallel lines and perpendicular lines.
* Construct the angles of different sizes using protractor.
* Classify and construct the triangle.
* Find the sum of the interior angles of the polygons.
* Construct the regular polygon.
* Identify faces. Surfaces, edges and corners of solid objects and construct the net of solid objects.
* Find the perimeter of closed plane figures.
* Find the area of rectangle and square.
* Find the surface area of cuboid and cube.
* Find the volume of cuboid and cube.
* Draw the lines of symmetry.
* Tessellate by regular polygons such as equilateral triangles, squares and hexagons.

**Contents:**

* **Sets:-**Introduction,symbols, representation of sets, member of a set, finite and infinite sets, equivalent sets, equal sets and empty(null sets).
* **Arithmetic:**-Whole numbers, integers, fraction and decimal, measurements, profit and loss, unitary method, simple interest.
* **Statistics:**-frequency distribution table with tally bar, bar graph.
* **Algebra:**- Algebraic expression, equation, inequality and graph.
* **Geometry:**- Line and line segment, angles, triangle, quadrilateral, polygons, solids shapes, area and perimeter, transformation, symmetry, and tessellation.

Grade: 7

* Recognize universal set
* Find the subset of the given set.
* Differentiate between overlapping and disjoint sets
* Find the union and intersection of two sets.
* Represent the operation of sets in Venn diagram.
* Review the Hindu Arabic, local and international numeration system.
* Write the numbers in International and Local system with commas.
* Find the square root and cube root of the given numbers.
* Find the HCF and LCM of the given numbers by different methods.
* Perform four fundamental operations of integers.
* Perform simplifications of integers using “BODMAS” rule.
* Verify the properties of rational numbers for addition and multiplication.
* Compare rational numbers.
* Perform the four fundamental operations of rational numbers.
* Perform the verbal problems on fraction related to multiplication.
* Convert fraction in to decimals.
* Performs operations on decimals.
* Change percentage, fraction and decimal to each other.
* Solve the problem of percentage .
* Solve the problems of ratio and proportion.
* Solve the verbal problems related to profit and loss.
* Solve the problems related to simple interest.
* Identify the direct and indirect variation.
* Solve the problems related to direct and indirect variation.
* Prepare frequency distribution table.
* Represent the data in bar graph.
* Find the arithmetic mean of ungrouped dada.
* Find the median of individual observation.
* Evaluate the algebraic expression.
* Use basic laws of indices,
* Add and subtract algebraic expressions.
* Solve simple verbal problems on addition and subtraction of algebraic expressions.
* Multiply polynomials and monomials.
* Factorize the expression of the form a2 – b2.
* Divide and multiply the polynomials of different degrees
* Solve the linear equation of one variable.
* Solve the verbal problems of linear equation.
* Represent the inequality in number line.
* Plot the given point in the co-ordinate axes.
* Find the image of object point under reflection and rotation using co- ordinates.
* Identify the different types of angles made by the parallel lines and transversal and the problems related to them.
* Classify and construct the triangle and quadrilaterals.
* Identify the facts of congruent and similar triangles.
* Recognize the surfaces, edges and vertices of solid objects.
* Identify circle and its components.
* Find the area of triangle and quadrilateral.
* Find the total surface area of cuboid and cube.
* Find the volume of cuboid and cube.
* Illustrate the line symmetry.
* Give the meaning of rotational symmetry.
* Prepare the designs of polygons.
* Prepare the models of regular, semi regular and irregular tessellation.
* Find the compass direction by means of angle.
* Draw the simple map using given scale.
* Find the direction of any place from the given place.

**Contents:**

* **Sets:-**Introduction,symbols, representation of sets, member of a set, finite and infinite sets, equivalent sets, equal sets and empty(null sets).
* **Arithmetic:**-Whole numbers, integers, fraction and decimal, measurements, profit and loss, unitary method, simple interest.
* **Statistics:**-frequency distribution table with tally bar, bar graph.
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* **Geometry:**- Line and line segment, angles, triangle, quadrilateral, polygons, solids shapes, area and perimeter, transformation, symmetry, and tessellation.

Grade: 8

* Find the number of subsets the given set.
* Identify proper and improper subsets of a set.
* Perform set operations.
* Represent the set operation in the Venn diagram.
* Convert decimal number to binary numbers and vice versa.
* Convert decimal number to quinary numbers and vice versa.
* Perform the addition and subtraction of binary and quinary numbers.
* Find the square root and cube root of the number.
* Round off the numbers to one, two, three and four significant figures.
* Establish the relation between rational and irrational numbers.
* Write number in scientific notation.
* Explain and solve the direct and indirect variations.
* Link ratio and proportion with unitary method.
* Solve the problems related to unitary method.
* Solve the problems related to percentage.
* Solve the problems of profit and loss.
* Solve the problems related to simple interest.
* Construct the cumulative frequency table with tally bars.
* Find the mean of individual, discrete and continuous series.
* Find the median of individual and discrete series.
* Find the mode of given data.
* Find the quartiles of the given data.
* Construct the pi chart with help of given information.
* Classify the polynomials according to the number of terms.
* Multiply the algebraic expressions.
* Factorise the algebraic expression of different types.
* Find the HCF and LCM of the algebraic expressions.
* Reduce the rational expression to their lowest term.
* Define the different trichotomy signs.
* Solve the linear inequalities .
* Solve the linear equations of two variables.
* Solve the verbal problems based on two variables.
* Identify the quadratic equation.
* Solve the quadratic equation by factorization method.
* Find x-intercept y-intercept and slope of the line.
* Identify the properties of alternate angles, corresponding angles.
* Solve the problems related to these angles.
* Identify the properties of vertically opposite angles, supplementary angles.
* Construct the angles of 75°. 105°, 135°. 150°. 165° etc. with the help of compasses.
* Find the interior and exterior angles of regular polygon.
* Identify the properties of different types of quadrilateral.
* Solve the problems related to triangle.
* Verify the relation between angles, triangles and quadrilateral.
* Establish the relation of Pythagoras theorem.
* Find the corresponding angles and corresponding sides of congruent triangles.
* Solve the problems related to congruent triangles and similar triangles.
* Identify SAS, ASA, RHS, SSS axioms in congruency of triangles.
* Find the perimeter and area of triangle, parallelogram. Trapezium and quadrilateral.
* Find the circumference and area of circle.
* Find the surface area and volume of the solid objects such as triangular prism and cylinder.
* Find the image of any object under reflection by actual drawing and using formula.
* Find the image of any object under the rotation through the angle 90°, 180° and 270° about the origin.
* Find the bearing .
* Find the distance between two places and prepare the simple map using the given data.

**Contents:**

* **Sets:-** Operation of sets, Venn diagram.
* **Arithmetic:-** Whole numbers, integer, square root and cube root, rationalization, rational and irrational numbers, ratio and proportion, unitary method, percentage, profit and loss and simple interest.
* **Statistics:-** Measure of central tendency, graph.
* **Algebra:-** Algebraic expression, indices, factorization, HCF and LCM, rational expression, linear and quadratic equations, co-ordinate geometry.
* **Geometry:-** Angle and parallel lines, triangle and polygons, construction, congruency and similarity, verification, measurement(perimeter, area and volume), transformation, bearing and scale drawing.

Grade: 9

* Find the relation between the sets.
* Perform the relation between the sets using Venn diagram.
* Represent the cardinality of sets in Venn diagram.
* Solve the simple verbal problems related to two sets using Venn diagram.
* Solve the problems of unitary method.
* Solve the problems of mixture with the help of ratio and proportion.
* Solve the various problems related to percentages.
* Solve the various problems related to commission and taxation.
* Solve the problems of bonus.
* Solve the problems of simple interest.
* Solve the problems of house hold arithmetic such as electricity bill, water bill, telephone bill etc .
* Solve the problems of currencies from the given exchange rate.
* Find the simple problems related to area , estimate the cost of carpeting, painting , plastering etc.
* Find the area of rectangular, circular path inside and outside the rectangular and circular field.
* Find the area of cross section, curved surface area and total surface area of cuboid and volume of the cuboid and cylinder.
* Estimate the number of bricks required for a wall and their costing.
* Find the algebraic expression in the different form.
* Simplify the expression by using laws of indices.
* Solve the exponential equations.
* Verify the identities by using the concept of proportion and continued proportion.
* Solve the simultaneous linear equations by different method.
* Find the root of quadratic equations.
* Solve the inequalities on single /double variable and represent them in the given graph.
* Prove the theorem related to triangle and also verify them experimentally.
* Prove the theorems of parallelogram and also verify them experimentally.
* Solve the problems of similar triangle.
* Prove Pythagoras theorem using the facts of similar triangles.
* Prove the theorems on circle experimentally and theoretically.
* Solve the problems of circle related to radius and chord.
* Construct triangle and quadrilateral.
* Introduce the fundamental trigonometric ratios and to solve the right angled triangle using these ratio.
* Find the trigonometric ratio of some standard angles.
* Construct the cumulative frequency distribution table and pie chart.
* Construct histogram and ogive.
* Find the arithmetic mean, median, mode and quartiles of ungrouped data.
* Introduce probability, probability scale and also solve the simple problems related to probability.

**Contents:**

* **Sets:-**operation of sets, Venn diagram.
* **Arithmetic:-**Unitary method, problems on mixture, problems on percentage, commission, tax, bonus, simple interest, home arithmetic.
* **Mensuration:**-Area of room, area of 4 walls, area of path, estimation of cost for painting, plastering construction of wall, area and volume of cube/cuboid.
* **Algebra:-**Factorization, problems on indices, exponential equations, ratio and proportion, simultaneous linear equations, quadratic equations, problems on inequalities.
* **Geometry:**-Triangle, theorem related to triangle, Pythagoras theorem, parallelogram, theorems related to parallelograms, similarity, theorems related to similarity, circle, theorems related to circle, construction.
* **Trigonometry:-**Trigonometric ratios of sine, cosine, tangent and problems related to them, trigonometric ratio of different angles such as 0°, 30°, 45°, 60°, 90°.
* **Statistics**: Frequency distribution curve, pie chart, histogram, ogive, calculation of mean, median and quartiles.
* **Probability:-** Introduction, probability scale, use of formula.

Grade: 10

**Objectives**

* Find the cardinality of the different sets.
* Solve the word problems of two and three sets using Venn- diagram.
* Solve the practical problems of time and work.
* Solve the problems of profit and loss including marked price, discount and tax.
* Find the compound interest on the basis of yearly system and half yearly system.
* Solve the problems on population growth and compound depreciation.
* Find the area of triangles.
* Find the surface area and volume of triangular prism.
* Find the surface area and volume of cylinder, sphere, cone and pyramid.
* Find the surface area and volume of combined solids.
* Find the HCF and LCM of three algebraic expressions by factorization method.
* Simplify the expression involving radicals.
* Simplify and solve the exponential equations.
* Simplify the problems involving algebraic fractions.
* Solve the word problems of linear simultaneous equation and quadratic equations.
* Prove the theorems related to area and quadrilateral and triangle.
* Solve and manipulate the problems involving the theorems of area of triangle and quadrilateral.
* Verify the theorem s of circle experimentally.
* Prove the theorem of circle.
* Solve the problems related to the tangent to the circle.
* Construct quadrilateral and triangle of equal area.
* Find the area of triangle and quadrilateral using trigonometric formula.
* Find the height and distance.
* Find the mean median and quartiles of grouped data.
* Find the probability of mutually exclusive events by additive and multiplicative law.
* Illustrate the probability in tree diagram.

**Contents:**

* **Sets:-** Use of Venn-diagram.
* **Arithmetic:-** Time and work, profit and loss, compound interest, population growth and compound depreciation.
* **Mensuration:**-Area of triangle and verbal problems, total surface area and volume of a triangle prism, problems on area and volume of cylinder, sphere, hemisphere, cone and combined solid made by two of them, problems on area and volume of pyramid (square base and equilateral triangle base).
* **Algebra:-** Highest Common Factor and Lowest common multiple, simplification of algebraic fractions, indices, equations involving indices, roots and surds, radical equations, verbal problems on simultaneous equations, verbal problems on quadratic equations.
* **Geometry:-**Area of triangle and quadrilateral, circles, theorems on circle and their applications, tangent, construction of triangle and quadrilaterals with equal area, experimental verification.
* **Trigonometry:-** Area of triangle, height and distance.
* **Statistics:-** Mean, median and quartiles of grouped data.
* **Probability:-** Multiplicative law for independent events, problems on dependent event and probability tree diagram.