Courses of Study

and

Scheme of Marking

Class – VIII

"2020-2021"

THINGS TO REMEMBER FOR A QUALITY LIVING

- सत्यं वद।
  Speak the truth
- धर्मं चर।
  Lead a religious life.
- मातृ देवो भव।
  Treat your Mother as God.
- पितृ देवो भव।
  Treat your father as God.
- आचार्य देवो भव।
  Treat your teacher as God.
- अतिथि देवो भव।
  Treat your Guest as God.
- ओ३म् असतो मा सद्गमय।
  तमसो मा ज्योतिर्गमय।
  मृत्योर्मामृतं गमय।
  O Lord! Lead me from Unreal
  to Real, from Darkness to Light,
  from Death to Immortality

TEN PRINCIPLES OF THE ARYA SAMAJ

1. God is the primary source of all true knowledge and of all that can be known through it.
2. God is Existent, Intelligent and Blissful. He is formless. Almighty, Just, Merciful, Urborn, Infinite, Unchallengeable, Beginningless, Incomparable, the Support and Lord of all, Omniscient, Imperishable, Immortal, Fearless, Eternal, Holy and the Maker of the universe. To Him alone worship is due.
3. The Vedas are scriptures of true knowledge. It is the duty of the Aryas to read them, hear them being read and recite them to others.
4. We should always be ready to accept the truth and give up untruth.
5. All actions should be performed in conformity with Dharma, that is, after due consideration of right and wrong.
6. The primary aim of the Arya Samaj is to do good for all, that is, to promote their physical, spiritual and social well-being.
7. We should treat all people with love, fairness and due regards for their merit.
8. One should aim at dispelling ignorance and promoting knowledge.
9. One should not only be content with one's own welfare, but should look for it in the welfare of others also.
10. One should regard oneself under restriction to follow altruistic rulings of the society, while all should be free in following the rules of individual welfare.

MATHEMATICS

General Instructions :-

1. Examination at the end of the year will be from the entire syllabus and will be of 80 marks.
2. Internal Assessment will be of 20 marks, for which the instructions are as follows :

S. No.	Tools of Internal Assessment	Total Weightage out of 20 Marks
1	**Periodic Tests - Pen and paper test** (Three periodic tests will be conducted at School level as per their own schedule and the average of the best two scores will be reduced to 5 marks for internal assessment.)	5
2	**Multiple Assessment** for each student to be done by using the tools of observation, oral test, individual/group work, field work, class discussion (Quiz, debates, role play, bulletin board etc.)	5
3	**Subject Enrichment Activities** Maths Lab Activity / Experiments	5
4	Portfolio 1. Journal 2. Notebooks (to display exemplary work) Assessing the Portfolio (Guidelines for teachers) • Organisation - Neatness & visual appeal • Completion of guided work focussed on specific curriculum objectives. • Evidence of students growth • Inclusion of relevant work (completeness)	5

Weightage to form of questions

Types of Questions	VSA / Objective 1 Mark	SA - I 2 Marks	SA - II 3 Marks	LA 4 Marks	Total
No. of Questions	20	6	8	6	40
Marks	20	12	24	24	80

DETAILED SYLLABUS

The details of syllabus, content, number of periods and marks allotted to each unit are given below :

	Unit	Topics	No. of Pds.	Marks allotted
Number System	1	Squares and Square Roots	14	05
	2	Cubes and Cube Roots	06	03
	3	Exponents and Radicals	08	06
Commercial Maths	4	Direct and Inverse Variation	10	04
	5	Profit, Loss & Discount	12	04
	6	Compound Interest	12	07
Algebra	7	Algebraic Identities	12	04
	8	Polynomials	10	06
	9	Linear equations in one variable	10	05
Geometry	10	Prallel Lines	10	05
	11	Understanding Quadrilaterals	12	07
	12	Construction of Quadrilaterals	10	04
	16	Rotational Symmetry	04	02
Graphs	13	Introduction to Graphs	05	03
Mensuration	14	Mensuration	15	09
Statistics / Probability	15	Statistics & Probability	12	06
		Total		80

Unit 1. Square and Square Roots **(14 Periods)**

Square of a number, triangular numbers and numbers between two

consecutive square numbers, finding square root of a number by the repeated subtraction method, finding square roots of perfect squares by factorization.

Using division method, finding square roots of -

(i) Positive integers which are perfect squares.

(ii) Decimals which are perfect squares.

Finding square roots of numbers which are not perfect squares by the division method correct up to three decimal places. Problems based on square roots (simple problems only). Square roots of other Numbers (not perfect squares) by estimation.

Learning Outcomes :

1. Students will be able to appreciate :
   - Squares of even numbers are even
   - Squares of odd numbers are odd
   - Perfect squares and number ending in 2, 3, 7 or 8 is never a perfect square.
   - Concept of Pythagorean triplet
2. Students will be able to find square root of a number
   - By prime factorisation
   - By long division method
3. Students will be able to understand and apply the followign rules:

   Ruel 1. If a and b are perfect square numbers ($b \neq 0$) then

   $$\sqrt{a \times b} = \sqrt{a} \times \sqrt{b}$$

   $$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

   Rule 2. The pairing of numbers in the division method starts from the decimal point.

   For the integral part it goes from right to left and for the decimal part, it goes from left to right.

Rule 3. If p and q are not perfect squares, then to find $\sqrt{\frac{p}{q}}$, we express $\frac{p}{q}$ as a decimal and then apply division method.

Unit 2. Cubes and Cube Roots **(6 Periods)**

Cube of a number, Cube roots of perfect cubes by factorization (cube root should not exceed two digits). Cube Root of a Number through Estimation.

Learning Outcomes :

1. Students will be able to understand :
   - Cube and cube root of positive/negative number is respectively positive / negative i.e. $\sqrt[3]{-x} = -\sqrt[3]{x}$
   - Cube of an even natural number is even and cube of odd natural number is odd.
2. Students will be able to apply the following rules :

   For any two integers a and b, we have

   (i) $\sqrt[3]{ab} = \sqrt[3]{a} \times \sqrt[3]{b}$

   (ii) $\sqrt[3]{\frac{a}{b}} = \frac{\sqrt[3]{a}}{\sqrt[3]{b}}$, $b \neq 0$

Unit 3. Exponents and Radicals **(8 Periods)**

Idea of rational exponents, Laws of exponents including rational numbers as exponents, Idea of radicals and radicand.

Learning Outcomes :

1. Students will be able to convert radical form to exponential form and vice versa.
2. Students will be able to apply the following rules :
   - If a is any positive rational number different from zero and x, y are any rational numbers, then

     (i) $a^x \times a^y = a^{x+y}$ (ii) $a^x \div a^y = a^{x-y}$

     (iii) $(a^x)^y = a^{xy}$ (iv) $(a)^0 = 1$

Unit 4. Direct and Inverse Variations **(10 Periods)**

Direct variation, Inverse variation with examples. Problems on Time and Work and Time and Distance.

Learning Outcomes :

1. Students will be able to distinguish between Direct Variation and Inverse Variation.
2. Students will be able to solve the problems on time and work as well as time and distance using the concepts of direct and inverse variations.

Unit 5. Profit / Loss and Discount **(12 Periods)**

Problems on profit and loss including discount (rebate), marked price, selling price (only single discount to be discussed), G.S.T.

Learning Outcomes :

The students will be able to :

1. understand concept of profit and loss.
2. calculate S.P./C.P.
3. apply concept of discount.
4. understand G.S.T. and its calculation.

Unit 6. Compound Interest **(12 Periods)**

Meaning of Compound Interest. Calculation of amount and compound interest by unitary method. Calculation of amount and compound interest by formula up to three years. Interest compounded annually, half yearly or quarterly up to three conversion periods, Growth and Depreciation.

Learning Outcomes :

Student will be able to :

1. distinguish between simple interest and compound interest.
2. calculate compound interest from amount, using formula or otherwise.
3. calculate compound interest when compounded annually, half-yearly and quarterly.

4. analyse growth and depreciation applicable in various situations.

Unit 7. Algebraic Identities **(12 Periods)**

Study of the following identities :

1. $(a + b)^2 = a^2 + 2ab + b^2$
2. $(a - b)^2 = a^2 - 2ab + b^2$
3. $(a + b)(a - b) = a^2 - b^2$

The above identities may be verified through cardboard models.

Expansion of the square of a trinomial :

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

Product of two binomials :

$(x + a)(x + b) = x^2 + (a + b)x + ab$

Factorization of Algebraic Expressions based on above identities.

Learning Outcomes :

After the completion of this chapter students will be able to :

1. distinguish between identity and equation.
2. learn the application of identities.
3. factorise algebraic expressions using the identities.
4. apply the identities in different practical situations.

Unit 8. Polynomials **(10 Periods)**

Idea of a polynomial in one variable and its terms, Coefficients and degree.

Division of a polynomial in one variable by a monomial or binomial. (Restricted to polynomials in one variable of degree '4')

Verification of Dividend = Divisor × Quotient + Remainder.

(Explain the cases of non-zero remainder and remainder equal to zero).

Concept of factors of a polynomial when the remainder is zero

Learning Outcomes :

The students will be able to :

1. identify coefficients and degree of a polynomial.
2. divide a polynomial in one variable by a monomial or a binomial.

3. verify the dividend by using Divisor × Quotient + Remainder.
4. undestand and appreciate the factor of a polynomial when remainder is zero.

Unit 9. Linear Equations in One Variable **(10 Periods)**

Solving equations of the type $\frac{ax+b}{cx+d} = k$; $cx + d \neq 0$

Word problems on linear equations in one variable.

Simple problems from daily life situations like age, coins, number of students of a class, speed, distance, formation of two digit numbers etc. with special emphasis on ability to translate word problems into mathematical statements.

Learning Outcomes :

The student will be able to :

1. solve linear equation in one variable.
2. convert the language problem into a linear equation based on different life situations.

Unit 10. Parallel Lines **(10 Periods)**

Definition, Angle made by a transversal with two parallel lines & vice-versa.

Verification of the following properties :

1. Two lines parallel to the same line are parallel to each other.
2. Two lines perpendicular to the same line are parallel to each other.
3. Division of a Line Segment :
   I. To divide a line segment into a given number of equal segments.
   II. To divide a line segment in a given ratio internally (constructions should be by using ruler and compasses).

Learning Outcomes :

After the completion of this unit students will be able to :

1. appreciate different types of angles and their relation when a

transversal intersects two parallel lines and vice-versa.

2. divide a line segment in equal parts using parallel lines with the help of ruler & compass.
3. comprehend that two lines parallel / perpendicular to the same line are parallel to each other.

Unit 11. Understanding Quadrilaterals (12 Periods)

Introduction to curves. Polygons, square, rectangle, rhombus, parallelogram and trapezium (Example of kite may be given as a special type of quadrilateral).

Verification of the following properties :

(i) Opposite sides of a parallelogram are equal.
(ii) Opposite angles of a parallelogram are equal.
(iii) Diagonals of a parallelogram bisect each other.
(iv) Diagonals of a rectangle are equal and bisect each other.
(v) Diagonals of a square are equal, perpendicular to each other and bisect each other.
(vi) Diagonals of a rhombus bisect each other at right angles.

(Simple problems based on these properties involving one or two logical steps).

Learning Outcomes :

After the completion of this chapter students will be able to :

1. recognize different types of quadrilaterals i.e. trapezium, parallelogram, rectangle, rhombus, square and kite.
2. understand the properties of parallelogram, rectangle, rhombus and square.
3. distinguish between different type of quadrilaterals.

Unit 12. Construction of Quadrilaterals (10 Periods)

Construction of quadrilateral given -

(i) Four sides and one diagonal
(ii) Three sides and both diagonals
(iii) Two adjacent sides and three angles

(iv) Three sides and two included angles

(The sides should be in whole no. of cm or at least multiples of ½ a cm. Angles should be multiples of 15.)

Learning Outcomes :

After the completion of this chapter students will be able to :

1. construct a quadrilateral with given conditions.
2. comprehend whether construction of a quadrilateral with given data is possible or not.

Unit 13. Introduction to Graphs **(5 Periods)**

Cartesian plane. Plotting a point on the Cartesian plane. Independent and dependent variables. Drawing of graphs and type of figure.

Learning Outcomes :

After the completion of this chapter students will be able to :

1. understand the Cartesian plane and its various elements.
2. identify the coordinates of a point.
3. evaluate the distance of a point from x-axis and y-axis.
4. plot the point on a Cartesian plane.
5. join the points and identify the figure so formed.
6. identify abscissa and ordinates of a point.

Unit 14. Mensuration **(15 Periods)**

Area of trapezium, general quadrilateral and polygon.

Surface area of cuboid, cube and right circular cylinder.

Volume of cuboid, cube and right circular cylinder.

Visualising solid shapes, polyhedron. Mapping space around us.

Learning Outcomes :

The student will be able to :

1. find the area of plane figure (trapezium & quadrilateral).
2. find the area of a polygon by dividing into various quadrilaterals and triangles.
3. calculate the surface area of rectilinear solid figures.
4. calculate the volume of rectilinear solids i.e. cube and cuboids.

5. distinguish between S.A. of a right circular cylinder and cube/ cuboid.
6. calculate S.A. of right circular cylinder.
7. understand the formation of cubes, cuboid with the help of nets.
8. locate side view, top view and front view of solid figures.
9. verify Euler's formula for polyhedrons.
10. map the different routes

Unit 15. Statistics & Probability **(12 Periods)**

Raw data, frequency, making frequency table from the given raw data. Ungrouped and grouped data. Range, class size, class limits, class marks. Grouping the given data into classes. Drawing, reading and interpretation of histogram. Circle graphs or pie chart and its dawing. Probability, Chance, Experiment, Outcome, Event, Probability of an event. Simple cases.

Learning Outcomes :

After studying this chapter students will be able to:

1. understand the terms observation, raw data, range, class marks, frequency, frequency table.
2. differentiate between raw data, ungrouped & grouped data.
3. mark pictorial representation through histogram and pie chart and can interpret the same.
4. define the term trial, outcome, probability.
5. find probability under different given situations.

Unit 16. Rotational Symmetry **(4 Periods)**

Rotational symmetry and its order, Centre of Rotation, Angle of Rotation. Line symmetry and Rotational Symmetry. Rotational symmetry should be confined.

Learning Outcomes :

The student will be able to :

1. understand symmetry.
2. distinguish between line symmetry and rotational symmetry.

3. understand rotational turns about a fixed point.
4. know the order of rotation of symmetry i.e. four in a square and 3 in an equilateral triangle.
5. calculate the angle of rotation about a fixed point.

SUGGESTED ACTIVITIES / PROJECT

(1) Exploring triangular numbers using dot patterns.

(2) Verify the following algebraic identities using geometrical interpretation :

- $(a + b)^2 = a^2 + 2ab + b^2$
- $(a - b)^2 = a^2 + 2ab + b^2$
- $a^2 - b^2 = (a + b)(a - b)$
- $(x + a)(x + b) = x^2 + (a + b)x + ab$

(3) Sierpinski triangle

(4) Take a square sheet of area 132.25 cm^2. Find the side of a sheet & create a beautiful greeting card using tessellations with a mathematical quotation.

(5) Create a life history of any Indian mathematician & his / her contribution in the field of Mathematics (Project or PPT).

(6) Activities based on the properties of natural numbers to Rational numbers.

(7) Role play on Mathematical situation.

(8) Number patterns

(9) Pythagorean triplet

(10) Do a survey of your class and collect the data from all students of your class who spent more than 4 hours in watching TV. Represent the collected data in the form of histogram by paper cutting & pasting.

(11) List your unit I marks in various subjects in tabular form & covert the same in the form of a pie-chart.

(12) Calculate the surface area to be painted / white-washed of each room of your house.

(13) Find no. of tiles used in your bathroom along with their cost.

(14) Find capacity of water tank [Cylinderical or cuboidal]. Estimate daily consumption of water in a household. Using it for how many days the water in the tank last.

(15) Mapping of your surroundings by making route maps having proper scale factor and different landmarks shown with appropriate symbols.

(16) Collect bill / cash memo for your recent shopping and calcualte discount and G.S.T. (etc.) from it.

(17) A worksheet involving comparison of interests when it is compounded annually, semi-annually and quarterly for the same sum at the same rate and for the same time period. Making a decision which option is better in different situations.

(18) Reinforcement of special type of quadrilatrals and their properties using Frayer's Model.

(19) Flow chart showing different types of Quadrilaterals.

(20) Making a scrap book of objects from our surroundings having different types of quadrilaterals.

(21) Talk on any one:

(a) Use of maths in different fields

(b) Value of maths in your life

(22) Making 3-D models of prisms and pyramids using their nets and verifying / obtaining Euler's formula for these solids.