GET THROUGH EDUCATION

Dear Parents/Students,

The following link is for downloading the app (GET THROUGH EDUCATION) for all the students (X and XII) through WhatsApp message or telegram message by school.

http://on-app.in/app/home?orgCode=gte

On clicking the link in their mobile phone, the student will be directed to Google play store page of the app, from where student can download and install the app named “GET THROUGH EDUCATION” in their mobile phone.

Student need to login into the app by putting their mobile number registered with the school.

The students will be added in the respective batches by us and test will be assigned to them through the app.

The test can be attempted by the students through the app on the scheduled day and time.

Test results analysis and rank and solution will also be displayed after the test is over.

The above activity of downloading and logging into the app may be completed before 05.08.2020.

The schedule and syllabus will be shared separately.

Some students in case they want to appear test from laptop/computer (web)

Need to follow the following procedure

go to link

web.classplusapp.com

Enter the organisation code as gte and then click on verify

Enter school registered mobile number there to login.

Thanks and regards

RSK - PRINCIPAL
Unit-I: Sets and Functions

1. Sets

2. Relations & Functions
Ordered pairs. Cartesian product of sets. Number of elements in the Cartesian product of two finite sets. Cartesian product of the set of reals with itself (upto R x R). Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special type of relation. Pictorial representation of a function, domain, co-domain and range of a function. Real valued functions, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum, exponential, logarithmic and greatest integer functions, with their graphs. Sum, difference, product and quotients of functions.

3. Trigonometric Functions
Positive and negative angles. Measuring angles in radians and in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Truth of the identity \( \sin 2x + \cos 2x = 1 \), for all \( x \). Signs of trigonometric functions. Domain and range of trigonometric functions and their graphs. Expressing \( \sin(x \pm y) \) and \( \cos(x \pm y) \) in terms of \( \sin x \), \( \sin y \), \( \cos x \) and \( \cos y \) and their simple applications. Deducing identities like the following:

\[
\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}, \quad \cot(x \pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x}
\]

\[
\sin \alpha \pm \sin \beta = 2 \sin \frac{1}{2} (\alpha \pm \beta) \cos \frac{1}{2} (\alpha \mp \beta)
\]

\[
\cos \alpha + \cos \beta = 2 \cos \frac{1}{2} (\alpha + \beta) \cos \frac{1}{2} (\alpha - \beta)
\]
Identities related to \( \sin 2x, \cos 2x, \tan 2x, \sin 3x, \cos 3x \) and \( \tan 3x \). General solution of trigonometric equations of the type \( \sin y = \sin a, \cos y = \cos a \) and \( \tan y = \tan a \).

Unit-II: Algebra

1. Principle of Mathematical Induction

Process of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple applications.

2. Complex Numbers and Quadratic Equations

Need for complex numbers, especially \( \sqrt{-1} \), to be motivated by inability to solve some of the quadradic equations. Algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations (with real coefficients) in the complex number system. Square root of a complex number.

3. Linear Inequalities


4. Permutations and Combinations

Fundamental principle of counting. Factorial \( n \). (n!) Permutations and combinations, derivation of formulae for permutation and combination, and their connections, simple applications.
5. Binomial Theorem

Historical perspective, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, General and middle term in binomial expansion, simple applications.

6. Sequence and Series


Unit-III: Coordinate Geometry

1. Straight Lines

Brief recall of two dimensional geometry from earlier classes. Shifting of origin. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axis, point-slope form, slope-intercept form, two-point form, intercept form and normal form. General equation of a line. Equation of family of lines passing through the point of intersection of two lines. Distance of a point from a line.

2. Conic Sections

Sections of a cone: circles, ellipse, parabola, hyperbola, a point, a straight line and a pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.

3. Introduction to Three-dimensional Geometry

Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points and section formula.
Unit-IV: Calculus

1. Limits and Derivatives

Derivative introduced as rate of change both as that of distance function and geometrically. Intuitive idea of limit. Limits of polynomials and rational functions trigonometric, exponential and logarithmic functions. Definition of derivative relate it to scope of tangent of the curve, derivative of sum, difference, product and quotient of functions. Derivatives of polynomial and trigonometric functions.

Unit-V: Mathematical Reasoning

1. Mathematical Reasoning

Mathematically acceptable statements. Connecting words/phrases - consolidating the understanding of "if and only if (necessary and sufficient) condition", "implies", "and/or", "implied by", "and", "or", "there exists" and their use through variety of examples related to real life and Mathematics. Validating the statements involving the connecting words, difference among contradiction, converse and contrapositive.

Unit-VI: Statistics and Probability

1. Statistics

Measures of Dispersion: Range, Mean deviation, variance and standard deviation of ungrouped/grouped data. Analysis of frequency distributions with equal means but different variances.

2. Probability

Random experiments; outcomes, sample spaces (set representation). Events; occurrence of events, ‘not’, ‘and’ and ‘or’ events, exhaustive events, mutually exclusive events, Axiomatic (set theoretic) probability, connections with other theories of earlier classes. Probability of an event, probability of ‘not’, ‘and’ and ‘or’ events.
PHYSICS XII

Unit I: Physical World and Measurement

Chapter–1: Physical World

Physics-scope and excitement; nature of physical laws; Physics, technology and society.

Chapter–2: Units and Measurements

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures.
Dimensions of physical quantities, dimensional analysis and its applications.

Unit II: Kinematics

Chapter–3: Motion in a Straight Line

Frame of reference, Motion in a straight line: Position-time graph, speed and velocity.

Elementary concepts of differentiation and integration for describing motion, uniform and non-uniform motion, average speed and instantaneous velocity, uniformly accelerated motion, velocity - time and position-time graphs.
Relations for uniformly accelerated motion (graphical treatment).

Chapter–4: Motion in a Plane

Scalar and vector quantities; position and displacement vectors, general vectors and their notations; equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors, relative velocity, Unit vector; resolution of a vector in a plane, rectangular components, Scalar and Vector product of vectors.

Motion in a plane, cases of uniform velocity and uniform acceleration projectile motion, uniform circular motion.

Unit III: Laws of Motion
Chapter–5: Laws of Motion

Intuitive concept of force, Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion.

Law of conservation of linear momentum and its applications.

Equilibrium of concurrent forces, Static and kinetic friction, laws of friction, rolling friction, lubrication.

Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on a level circular road, vehicle on a banked road).

Unit IV: Work, Energy and Power

Chapter–6: Work, Energy and Power

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power.

Notion of potential energy, potential energy of a spring, conservative forces: conservation of mechanical energy (kinetic and potential energies); nonconservative forces: motion in a vertical circle; elastic and inelastic collisions in one and two dimensions.

Unit V: Motion of System of Particles and Rigid Body

Chapter–7: System of Particles and Rotational Motion

Centre of mass of a two-particle system, momentum conservation and centre of mass motion. Centre of mass of a rigid body; centre of mass of a uniform rod. Moment of a force, torque, angular momentum, law of conservation of angular momentum and its applications.

Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions.

Moment of inertia, radius of gyration, values of moments of inertia for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications.
Unit VI: Gravitation
    Chapter–8: Gravitation

    Kepler's laws of planetary motion, universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth.
    Gravitational potential energy and gravitational potential, escape velocity, orbital velocity of a satellite, Geo-stationary satellites.

Unit VII: Properties of Bulk Matter

    Chapter–9: Mechanical Properties of Solids

    Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity, Poisson's ratio; elastic energy.

    Chapter–10: Mechanical Properties of Fluids

    Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes), effect of gravity on fluid pressure.
    Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, critical velocity, Bernoulli's theorem and its applications.
    Surface energy and surface tension, angle of contact, excess of pressure across a curved surface, application of surface tension ideas to drops, bubbles and capillary rise.

    Chapter–11: Thermal Properties of Matter

    Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; specific heat capacity; Cp, Cv - calorimetry; change of state - latent heat capacity.

    Heat transfer-conduction, convection and radiation, thermal conductivity, qualitative ideas of Blackbody radiation, Wein's displacement Law, Stefan's law, Greenhouse effect.
Unit VIII: Thermodynamics

Chapter–12: Thermodynamics

Thermal equilibrium and definition of temperature (zeroth law of thermodynamics), heat, work and internal energy. First law of thermodynamics, isothermal and adiabatic processes.


Unit IX: Behaviour of Perfect Gases and Kinetic Theory of Gases

Chapter–13: Kinetic Theory

Equation of state of a perfect gas, work done in compressing a gas.

Kinetic theory of gases - assumptions, concept of pressure. Kinetic interpretation of temperature; rms speed of gas molecules; degrees of freedom, law of equi-partition of energy (statement only) and application to specific heat capacities of gases; concept of mean free path, Avogadro's number.

Unit X: Oscillations and Waves

Chapter–14: Oscillations

Periodic motion - time period, frequency, displacement as a function of time, periodic functions.

Simple harmonic motion (S.H.M) and its equation; phase; oscillations of a loaded spring- restoring force and force constant; energy in S.H.M. Kinetic and potential energies; simple pendulum derivation of expression for its time period. Free, forced and damped oscillations (qualitative ideas only), resonance.

Chapter–15: Waves

Wave motion: Transverse and longitudinal waves, speed of travelling wave, displacement relation for a progressive wave, principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect.
Class XII - Chemistry Syllabus

Unit I: Some Basic Concepts of Chemistry
General Introduction: Importance and scope of Chemistry.
Nature of matter, laws of chemical combination, Dalton’s atomic theory: concept of elements, atoms and molecules.
Atomic and molecular masses, mole concept and molar mass, percentage composition, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry.

Unit II: Structure of Atom

Unit III: Classification of Elements and Periodicity in Properties
Significance of classification, brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements - atomic radii, ionic radii, inert gas radii, Ionization enthalpy, electron gain enthalpy, electronegativity, valency. Nomenclature of elements with atomic number greater than 100.

Unit IV: Chemical Bonding and Molecular Structure
Valence electrons, ionic bond, covalent bond, bond parameters, Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules, VSEPR theory, concept of hybridization, involving s, p and d orbitals and shapes of some simple molecules, molecular orbital theory of homonuclear diatomic molecules (qualitative idea only), Hydrogen bond.

Unit V: States of Matter: Gases and Liquids
Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, role of gas laws in elucidating the concept of the molecule, Boyle's law, Charles law, Gay Lussac's law, Avogadro's law, ideal behaviour, empirical derivation of gas equation, Avogadro's number, ideal gas equation. Deviation from ideal behaviour, liquefaction of gases, critical temperature, kinetic energy and molecular speeds (elementary idea), Liquid State- vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations)

Unit VI: Chemical Thermodynamics
Concepts of System and types of systems, surroundings, work, heat, energy, extensive and intensive properties, state functions.
First law of thermodynamics - internal energy and enthalpy, heat capacity and specific heat, measurement of Change in internal energy and change in enthalpy , Hess's law of constant heat summation, enthalpy of bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution. Second law of Thermodynamics (brief introduction)
Introduction of entropy as a state function, Gibb's energy change for spontaneous and non-spontaneous processes, criteria for equilibrium.
Third law of thermodynamics (brief introduction).

**Unit VII: Equilibrium**
Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium - Le Chatelier's principle, ionic equilibrium-ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of poly basic acids, acid strength, concept of pH, hydrolysis of salts (elementary idea), buffer solution, Henderson Equation, solubility product, common ion effect (with illustrative examples).

**Unit VIII: Redox Reactions**
Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, in terms of loss and gain of electrons and change in oxidation number, applications of redox reactions.

**Unit IX: Hydrogen**
Position of hydrogen in periodic table, occurrence, isotopes, preparation, properties and uses of hydrogen, hydrides-ionic covalent and interstitial; physical and chemical properties of water, heavy water, hydrogen peroxide - preparation, reactions and structure and use; hydrogen as a fuel.

**Unit X: s-Block Elements (Alkali and Alkaline Earth Metals)**
Group 1 and Group 2 Elements
General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens, uses.
**Preparation and Properties of Some Important Compounds:**
Sodium Carbonate, Sodium Chloride, Sodium Hydroxide and Sodium Hydrogen carbonate, Biological importance of Sodium and Potassium.
Calcium Oxide and Calcium Carbonate and their industrial uses, biological importance of Magnesium and Calcium.

**Unit XI: Some p-Block Elements**
**General Introduction to p -Block Elements**
**Group 13 Elements:** General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of first element of the group, Boron - physical and chemical properties, some important compounds: Borax, Boric acid, Boron Hydrides, Aluminium: Reactions with acids and alkalies, uses.
**Group 14 Elements:** General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behaviour of first elements. Carbon-catenation, allotropic forms, physical and chemical properties; uses of some important compounds: oxides. Important compounds of Silicon and a few uses: Silicon Tetrachloride, Silicones, Silicates and Zeolites, their uses.
Unit XII: Organic Chemistry - Some Basic Principles and Techniques


Unit XIII: Hydrocarbons
Classification of Hydrocarbons

Aliphatic Hydrocarbons:
Alkanes - Nomenclature, isomerism, conformation (ethane only), physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis.
Alkenes - Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation, chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.
Alkynes - Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of - hydrogen, halogens, hydrogen halides and water.

Aromatic Hydrocarbons:
XII Biology Syllabus

Unit-I Diversity of Living Organisms

Chapter-1: The Living World
What is living? Biodiversity; Need for classification; three domains of life; taxonomy and systematics; concept of species and taxonomical hierarchy; binomial nomenclature; tools for study of taxonomy- museums, zoological parks, herbaria, botanical gardens, keys for identification.

Chapter-2: Biological Classification
Five kingdom classification; Salient features and classification of Monera, Protista and Fungi into major groups; Lichens, Viruses and Viroids.

Chapter-3: Plant Kingdom
Salient features and classification of plants into major groups - Algae, Bryophyta, Pteridophyta, Gymnospermae and Angiospermae (salient and distinguishing features and a few examples of each category); Angiosperms - classification up to class, characteristic features and examples.

Chapter-4: Animal Kingdom
Salient features and classification of animals, non-chordates up to phyla level and chordates up to class level (salient features and distinguishing features of a few examples of each category). (No live animals or specimen should be displayed.)

Unit-II Structural Organization in Animals and Plants

Chapter-5: Morphology of Flowering Plants
Morphology and modifications: Morphology of different parts of flowering plants: root, stem, leaf, inflorescence, flower, fruit and seed. Description of families: Fabaceae, Solanaceae and Liliaceae (to be dealt along with the relevant experiments of the Practical Syllabus).

Chapter-6: Anatomy of Flowering Plants
Anatomy and functions of different tissues and tissue systems in dicots and monocots. Secondary growth.

Chapter-7: Structural Organisation in Animals
Animal tissues; Morphology, Anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect-cockroach (a brief account only).

Unit-III Cell: Structure and Function

Chapter-8: Cell-The Unit of Life
Cell theory and cell as the basic unit of life, structure of prokaryotic and eukaryotic cells; Plant cell and animal cell; cell envelope; cell membrane, cell wall; cell organelles - structure and function;
endomembrane system, endoplasmic reticulum, golgi bodies, lysosomes, vacuoles, mitochondria, ribosomes, plastids, microbodies; cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); nucleus.

**Chapter-9: Biomolecules**

Chemical constituents of living cells: biomolecules, structure and function of proteins, carbohydrates, lipids, nucleic acids; Enzymes- types, properties, enzyme action.

**Chapter-10: Cell Cycle and Cell Division**

Cell cycle, mitosis, meiosis and their significance

**Unit-IV Plant Physiology**

**Chapter-11: Transport in Plants**

Movement of water, gases and nutrients; cell to cell transport, diffusion, facilitated diffusion, active transport; plant-water relations, imbibition, water potential, osmosis, plasmolysis; long distance transport of water - Absorption, apoplast, symplast, transpiration pull, root pressure and guttation; transpiration, opening and closing of stomata; Uptake and translocation of mineral nutrients - Transport of food, phloem transport, mass flow hypothesis.

**Chapter-12: Mineral Nutrition**

Essential minerals, macro- and micronutrients and their role; deficiency symptoms; mineral toxicity; elementary idea of hydroponics as a method to study mineral nutrition; nitrogen metabolism, nitrogen cycle, biological nitrogen fixation.

**Chapter-13: Photosynthesis in Higher Plants**

Photosynthesis as a means of autotrophic nutrition; site of photosynthesis, pigments involved in photosynthesis (elementary idea); photochemical and biosynthetic phases of photosynthesis; cyclic and non-cyclic photophosphorylation; chemiosmotic hypothesis; photorespiration; C3 and C4 pathways; factors affecting photosynthesis.

**Chapter-14: Respiration in Plants**

Exchange of gases; cellular respiration - glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); energy relations - number of ATP molecules generated; amphibolic pathways; respiratory quotient.

**Chapter-15: Plant - Growth and Development**

Seed germination; phases of plant growth and plant growth rate; conditions of growth; differentiation, dedifferentiation and redifferentiation; sequence of developmental processes in a plant cell; growth regulators - auxin, gibberellin, cytokinin, ethylene, ABA; seed dormancy; vernalisation; photoperiodism.
Unit-V Human Physiology

Chapter-16: Digestion and Absorption
Alimentary canal and digestive glands, role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; calorific values of proteins, carbohydrates and fats; egestion; nutritional and digestive disorders - PEM, indigestion, constipation, vomiting, jaundice, diarrhoea.

Chapter-17: Breathing and Exchange of Gases
Respiratory organs in animals (recall only); Respiratory system in humans; mechanism of breathing and its regulation in humans - exchange of gases, transport of gases and regulation of respiration, respiratory volume; disorders related to respiration - asthma, emphysema, occupational respiratory disorders.

Chapter-18: Body Fluids and Circulation
Composition of blood, blood groups, coagulation of blood; composition of lymph and its function; human circulatory system - Structure of human heart and blood vessels; cardiac cycle, cardiac output, ECG; double circulation; regulation of cardiac activity; disorders of circulatory system - hypertension, coronary artery disease, angina pectoris, heart failure.

Chapter-19: Excretory Products and their Elimination
Modes of excretion - ammonotelism, ureotelism, uricotelism; human excretory system – structure and function; urine formation, osmoregulation; regulation of kidney function - renin - angiotensin, atrial natriuretic factor, ADH and diabetes insipidus; role of other organs in excretion; disorders - uremia, renal failure, renal calculi, nephritis; dialysis and artificial kidney, kidney transplant.

Chapter-20: Locomotion and Movement
Types of movement - ciliary, flagellar, muscular; skeletal muscle, contractile proteins and muscle contraction; skeletal system and its functions; joints; disorders of muscular and skeletal systems - myasthenia gravis, tetany, muscular dystrophy, arthritis, osteoporosis, gout.

Chapter-21: Neural Control and Coordination
Neuron and nerves; Nervous system in humans - central nervous system; peripheral nervous system and visceral nervous system; generation and conduction of nerve impulse; reflex action; sensory perception; sense organs; elementary structure and functions of eye and ear

Chapter-22: Chemical Coordination and Integration
Endocrine glands and hormones; human endocrine system - hypothalamus, pituitary, pineal, thyroid, parathyroid, adrenal, pancreas, gonads; mechanism of hormone action (elementary idea); role of hormones as messengers and regulators, hypo - and hyperactivity and related disorders; dwarfism, acromegaly, cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease. **Note:** Diseases related to all the human physiological systems to be taught in brief.
UNIT I: NUMBER SYSTEMS

1. REAL NUMBERS

1. Representation of natural numbers, integers, rational numbers on the number line. Rational numbers as recurring/terminating decimals. Operations on real numbers.

2. Non-recurring/non-terminating decimals. Existence of non-rational numbers (irrational numbers) such as $\sqrt{2}$, $\sqrt{3}$.

3. Definition of nth root of a real number.

4. Rationalization (with precise meaning) of real numbers of the type $\frac{1}{\sqrt{x} + \sqrt{y}}$ and $\frac{1}{\sqrt{a} + \sqrt{b}}$ (and their combinations) where $x$ and $y$ are natural numbers and $a$ and $b$ are integers.

5. Laws of exponents with integral powers. Rational exponents with positive real bases.

UNIT II: ALGEBRA

1. POLYNOMIALS

Polynomial in one variable, Coefficients of a polynomial, terms of a polynomial and zero polynomial. Degree of a polynomial. Constant, linear, quadratic and cubic polynomials. Monomials, binomials, trinomials. Factors and multiples. Zeros of a polynomial. Remainder Theorem. Factor Theorem. Factorization of $ax^2 + bx + c$, $a \neq 0$ where $a$, $b$ and $c$ are real numbers, and of cubic polynomials using the Factor Theorem.

Algebraic expressions and identities.

\[
(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx
\]

\[
(x \pm y)^3 = x^3 \pm y^3 \pm 3xy(x \pm y)
\]

\[
x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)
\]

and their use in factorization of polynomials.
2. LINEAR EQUATIONS IN TWO VARIABLES

Linear equations in one variable. Linear equation in two variables.

Linear equations of the type $ax+by+c=0$. Explain that a linear equation in two variables has infinitely many solutions and justify their being written as ordered pairs of real numbers, plotting them and showing that they lie on a line. Graph of linear equations in two variables. Examples, problems from real life, including problems on Ratio and Proportion and with algebraic and graphical solutions being done simultaneously.

UNIT III: COORDINATE GEOMETRY

COORDINATE GEOMETRY

The Cartesian plane, coordinates of a point, names and terms associated with the coordinate plane, notations, plotting points in the plane.

UNIT IV: GEOMETRY

1. INTRODUCTION TO EUCLID'S GEOMETRY

Euclid's geometry. Euclid's method of formalizing observed phenomenon into rigorous Mathematics with definitions, common/obvious notions, axioms/postulates and theorems. The five postulates of Euclid. Equivalent versions of the fifth postulate. Showing the relationship between axiom and theorem, for example:

(Axiom) 1. Given two distinct points, there exists one and only one line through them.
(Theorem) 2. (Prove) Two distinct lines cannot have more than one point in common.

2. LINES AND ANGLES

1. If a ray stands on a line, then the sum of the two adjacent angles so formed is $180^\circ$ and the converse.
2. If two lines intersect, vertically opposite angles are equal.
3. Results on corresponding angles, alternate angles, interior angles when a transversal intersects two parallel lines.
4. Lines which are parallel to a given line are parallel.
5. The sum of the angles of a triangle is $180^\circ$.
6. If a side of a triangle is produced, the exterior angle so formed is equal to the sum of the two interior opposite angles.
3. **TRIANGLES**

1. Two triangles are congruent if any two sides and the included angle of one triangle is equal to any two sides and the included angle of the other triangle (SAS Congruence).

2. Two triangles are congruent if any two angles and the included side of one triangle is equal to any two angles and the included side of the other triangle (ASA Congruence).

3. Two triangles are congruent if the three sides of one triangle are equal to three sides of the other triangle (SSS Congruence).

4. Two right triangles are congruent if the hypotenuse and a side of one triangle are equal (respectively) to the hypotenuse and a side of the other triangle. (RHS Congruence)

5. The angles opposite to equal sides of a triangle are equal.

6. The sides opposite to equal angles of a triangle are equal.

7. Triangle inequalities and relation between ‘angle and facing side’ inequalities in triangles.

4. **QUADRILATERALS**

1. The diagonal divides a parallelogram into two congruent triangles.

2. In a parallelogram opposite sides are equal, and conversely.

3. In a parallelogram opposite angles are equal, and conversely.

4. A quadrilateral is a parallelogram if a pair of its opposite sides is parallel and equal.

5. In a parallelogram, the diagonals bisect each other and conversely.

6. In a triangle, the line segment joining the mid points of any two sides is parallel to the third side and in half of it and (motivate) its converse.
5. **AREA**

Review concept of area, recall area of a rectangle.

1. Parallelograms on the same base and between the same parallels have equal area.

2. Triangles on the same base (or equal bases) and between the same parallels are equal in area.

6. **CIRCLES**

Through examples, arrive at definition of circle and related concepts-radius, circumference, diameter, chord, arc, secant, sector, segment, subtended angle.

1. Equal chords of a circle subtend equal angles at the center and (motivate) its converse.

2. The perpendicular from the center of a circle to a chord bisects the chord and conversely, the line drawn through the center of a circle to bisect a chord is perpendicular to the chord.

3. There is one and only one circle passing through three given non-collinear points.

4. Equal chords of a circle (or of congruent circles) are equidistant from the center (or their respective centers) and conversely.

5. The angle subtended by an arc at the center is double the angle subtended by it at any point on the remaining part of the circle.

6. Angles in the same segment of a circle are equal.

7. If a line segment joining two points subtends equal angle at two other points lying on the same side of the line containing the segment, the four points lie on a circle.

8. The sum of either of the pair of the opposite angles of a cyclic quadrilateral is 180° and its converse.

7. **CONSTRUCTIONS**

1. Construction of bisectors of line segments and angles of measure 60°, 90°, 45° etc., equilateral triangles.

2. Construction of a triangle given its base, sum/difference of the other two sides and one base angle.

3. Construction of a triangle of given perimeter and base angles.
UNIT V: MENSURATION

1. AREAS

Area of a triangle using Heron's formula (without proof) and its application in finding the area of a quadrilateral.

2. SURFACE AREAS AND VOLUMES

Surface areas and volumes of cubes, cuboids, spheres (including hemispheres) and right circular cylinders/cones.

UNIT VI: STATISTICS & PROBABILITY

1. STATISTICS

Introduction to Statistics: Collection of data, presentation of data — tabular form, ungrouped / grouped, bar graphs, histograms (with varying base lengths), frequency polygons. Mean, median and mode of ungrouped data.

2. PROBABILITY

History, Repeated experiments and observed frequency approach to probability. Focus is on empirical probability. (A large amount of time to be devoted to group and to individual activities to motivate the concept; the experiments to be drawn from real-life situations, and from examples used in the chapter on statistics).
Unit I: Matter-Nature and Behaviour
Definition of matter; solid, liquid and gas; characteristics - shape, volume, density; change of state- melting (absorption of heat), freezing, evaporation (cooling by evaporation), condensation, sublimation.

Nature of matter: Elements, compounds and mixtures. Heterogeneous and homogenous mixtures, colloids and suspensions.

Particle nature and their basic units: Atoms and molecules, Law of constant proportions, Atomic and molecular masses. Mole concept: Relationship of mole to mass of the particles and numbers. Structure of atoms: Electrons, protons and neutrons, valency, chemical formula of common compounds. Isotopes and Isobars.

Unit II: Organization in the Living World
Cell - Basic Unit of life: Cell as a basic unit of life; prokaryotic and eukaryotic cells, multicellular organisms; cell membrane and cell wall, cell organelles and cell inclusions; chloroplast, mitochondria, vacuoles, endoplasmic reticulum, Golgi apparatus; nucleus, chromosomes - basic structure, number. Tissues, Organs, Organ System, Organism:
Structure and functions of animal and plant tissues (only four types of tissues in animals; Meristematic and Permanent tissues in plants).

Biological Diversity: Diversity of plants and animals-basic issues in scientific naming, basis of classification. Hierarchy of categories / groups, Major groups of plants (salient features) (Bacteria, Thallophyta, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms). Major groups of animals (salient features) (Non-chordates upto phyla and chordates upto classes). Health and Diseases: Health and its failure. Infectious and Non-infectious diseases, their causes and manifestation. Diseases caused by microbes (Virus, Bacteria and Protozoans) and their prevention; Principles of treatment and prevention. Pulse Polio programmes.
Unit III: Motion, Force and Work

Motion: Distance and displacement, velocity; uniform and non-uniform motion along a straight line; acceleration, distance-time and velocity-time graphs for uniform motion and uniformly accelerated motion, derivation of equations of motion by graphical method; elementary idea of uniform circular motion.


Gravitation: Gravitation; Universal Law of Gravitation, Force of Gravitation of the earth (gravity), Acceleration due to Gravity; Mass and Weight; Free fall.

Floatation: Thrust and Pressure. Archimedes’ Principle; Buoyancy; Elementary idea of Relative Density.


Sound: Nature of sound and its propagation in various media, speed of sound, range of hearing in humans; ultrasound; reflection of sound; echo and SONAR. Structure of the Human Ear (Auditory aspect only).

Unit IV: Our Environment

Physical resources: Air, Water, Soil. Air for respiration, for combustion, for moderating temperatures; movements of air and its role in bringing rains across India.

Air, water and soil pollution (brief introduction). Holes in ozone layer and the probable damages.


Unit V: Food Production

Plant and animal breeding and selection for quality improvement and management; Use of fertilizers and manures; Protection from pests and diseases; Organic farming.