

Science & Technology

Class – IX

Sr. No.	Periods	Topic	Subject Matter	Activities
Unit– I Food				
1.	15	Food Resources : Improvement in Yields	Food resources : Classification (plants and animals), Crop production, Improvement in crop yields, animal and plant variety improvement (Genetic manipulation, plant breeding, hybridization), Pest and weed management, post harvest management, Main Crops of Himachal Pradesh. General Idea of Horticulture, Floriculture, Animal Husbandry, Apiculture, Aquaculture, Poultry farming and meat production. Poly houses and their usefulness. Organic	1) Collection of different food grains and seeds. 2) Collection of Rabi and Kharif Crop plants found in your area. 3) Visit a nearby farm or a polyhouse to observe its functioning. 4) Make a vermicompost pit.

			farming.	
Unit – II				
Materials				
	4	Measurement in Science and Technology.	General Introduction, International Units of measurement (S.I.), Multiples and Sub-multiples (Fractions), Indian National Standard of measurement.	<p>1) Measure the volume of liquids with the help of measuring cylinder.</p> <p>2) Measure the temperature of a hot substance with the help of mercury thermometer in °C and convert in to Kelvin (K).</p>
	16	Nature of Matter.	<p>Physical nature of matter (Particle and their characteristics), States of matter (Solids, Liquids and gases), Inter conversion of matter into different states, Chemical nature of matter (Elements, compounds and mixtures – Homogeneous and Heterogeneous mixtures).</p> <p>Solutions, suspensions</p>	<p>1) Blue/Red ink drop put in a glass or beaker containing Water- showing that there are gaps between particles of matter and the particles of one type of matter get into the spaces between the particles of the other.</p> <p>2) Observe shape & physical state of different</p>

			<p>and Colloids (Brief idea).</p> <p>Separation of mixtures by different methods [Evaporation, sublimation, distillation, fractional distillation (Brief idea)], Chromatography, Centrifugation].</p> <p>Cooling effect by Evaporation.</p> <p>Law of Conservation of Mass.</p> <p>Law of Constant proportion.</p> <p>Atoms and Molecules, Atomic and Molecular masses, Mole concept (brief idea), Empirical and molecular formula and related simple calculations.</p>	<p>materials (NCF).</p> <p>3) Conversion of ice (s) into water (l) and then water (l) into Water vapours (g) by heating.</p> <p>4) Sublimation can be shown by heating I₂ or NH₄Cl, or Camphor or Naphthalene (Using inverted funnel).</p> <p>5) Make some solutions (eg. NaCl in water, Sugar in Water, sand in water etc.) and classify each as Homogeneous/ Heterogeneous.</p> <p>6) Discussion: Sweating and evaporation cause cooling.</p> <p>7) Centrifugation process – Milk churner – Madhani, visit to a dairy – How</p>
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				<p>cream is separated from milk.</p> <p>8) Separation of two immiscible liquids by separating funnel. (Oil and water at home).</p> <p>9) Separation of NH_4Cl and NaCl by sublimation process.</p>
4	10	Structure of Atom.	<p>Idea about constituent particles of an Atom (Electrons, Protons and Neutrons), Thomson's model of Atom, Rutherford's model of atom (Experiment, model and drawbacks), Bohr's model (in brief), Distribution of electrons in an atom (1-18 elements only)</p> <p>Atomic number, Mass number, Valence electrons and valency, Isotopes & Isobars.</p>	Make a static atomic model displaying electronic configuration of first 18 elements.
5	6	Classification of elements.	Earlier development (Dobereiner, New	Periodic trends can be shown and

			land), Mendeleev's periodic table, Periodic law, Elementary idea about gradation in periodic properties (brief).	explained using charts and table.
6	8	Chemical Bonding	Why do elements combine? Formation of a chemical bond, Types of bonds, Ionic bonds, characteristics of ionic compounds, Covalent bond, characteristics of covalent compounds, Polar covalent bond.	1) Covalent bonds shown by ball and stick model (using clay). 2) Movement of ions of ionic compound towards opposite electrodes using Copper Chromate Solution.
		Chemical Reactions	----	-----
Unit – III				
The World Of Living				
7	10 periods	The Fundamental Unit of Life : Cell	Detailed structure (plant and animal cell), Functions of different cell organelles. Cell Division : Mitosis and meiosis (in brief).	1) Study of onion-peel under microscope. 2) Study of cheek epithelial membrane under microscope. 3) Observation of micro-organisms in a drop of pond water under microscope.

				4) Study of permanent slides (Amoeba, Paramecium, Volvox, Spirogyra, Chlamydomonas etc.).
8	10 periods	Tissues	<p>Plant Tissues: Meristematic tissue, Permanent tissue (Parenchyma, Collenchyma, Sclerenchyma, Epidermis, Stomata, Xylem, Phloem).</p> <p>Animal tissue : Epithelial tissue, Muscular tissue, connective tissue, Nervous tissue.</p>	<p>1) Permanent slides (plant/animal).</p> <p>2) Observation of growth in roots of onion.</p> <p>3) Cutting thin sections of the stem of plant with the help of teacher.</p>
9	12 Periods	Biological Diversity	Major groups of plants and animals. Brief idea about the principle of scientific nomenclature in plants and animals.	<p>1) Make a list of various plants and animals found in your locality.</p> <p>2) Take different seeds and see them germinate.</p> <p>3) Find out the scientific names of some of the</p>

				organisms found in your locality.
10	12 Periods	Health and Diseases.	Health and Hygiene : Diseases: types, causes, symptoms, spreading of diseases, prevention and cure of different diseases (AIDS, Typhoid, Tuberculosis, Malaria, Hepatitis, Rabies and Polio). Adolescent health. Dangers of smoking and carbon monoxide poisoning.	1) Prepare a chart showing life cycle of mosquito. 2) Familiarization with the vaccination process and preparation of chart thereof.
Unit – IV				
Moving Things, People & Ideas				
11	10 periods	1. Motion (4)	Introduction, Motion – distance and displacement, Uniform and non-uniform motion, Velocity, Non-Uniform velocity, non-uniform velocity and acceleration, Graph and their uses, uniform circular motion, conversion of units in Km/h in S.I. system vice versa. Numerical problems – Calculation of velocity,	1) Analysis of different common objects. 2) Drawing distance – time and velocity – time graphs for uniform motion and for uniformly accelerated motion.

			distance and time. Calculation of average velocity and acceleration. Simple numericals on equations of motion.	
12	10 Periods	Force (6)	Introduction, Newton's first law of motion, Newton's second law of motion, Newton's Third law of motion, Conservation of linear momentum, Friction, control of friction, thrust and pressure, Pulleys and gears. Numerical problems , Simple numericals on acceleration, force and mass, Calculation of mechanical advantage, velocity, rate and efficiency in case of pulley and gear.	1) Demonstrating the effect of force on state of motion of objects in a variety of daily life situations. 2) Demonstrate the change in direction of objects by applying force. 3) Bounce back of rubber ball. 4) Air - filled balloon advances as air escapes from it. 5) Fall of chalk on table—pieces of it conserving linear momentum by moving in opposite directions.
13	16 Periods	Gravitation (5)	Introduction, Universal law of gravitation, Centre of mass, Centre of Gravity,	1) Analysis of motion of ball or stone thrown up and allowed to

			<p>Implication of Newton's law of gravitation, Motion of particle under gravity, Projectile motion, Mass and weight, Geotropism, Archimede's principle and relative density.</p> <p>Numerical problems: Simple problems on equations of motion under gravity, Problem on relative density.</p>	<p>fall down.</p> <p>2) Measuring mass and weight of an object with spring balance and physical balance.</p> <p>3) Observing the growth of roots of seeds sown in pots in their (pots) different orientations.</p> <p>4) Throwing pieces of chalk or stone at different angles with horizontal and noting down their horizontal ranges, heights and time of flights.</p>
<p>Unit – V</p> <p>How Things Work</p>				
14	8 Periods	Work, Energy & Power (4)	<p>Introduction, Work – Work done when displacement is not in the direction of force, Energy, Kinetic and Potential energy, power, Transformation of energy from one form to another, Examples from solar</p>	<p>1) Experiment on bodies rolling down inclined plane pushing another body.</p> <p>2) Experiments with Simple pendulum and springs.</p>

			<p>energy. Conservation of energy, Simple pendulum—an example of conservation of mechanical energy.</p> <p>Numerical problems : Simple numericals on work, force and displacement, Potential energy and kinetic energy.</p>	
15	16 Periods	Wave Motion and Sound. (6)	<p>Introduction, Simple pendulum, wave motion, longitudinal and transverse wave, Relationship between velocity, frequency and wave length, Nature of sound and its propagation, Range of human hearing, Structure of human ear (Auditory aspect only), Reflection of sound, Eco, Sonar, Application of ultrasonic waves, Musical instruments and role of sound in animal world.</p> <p>Numerical problems :</p>	<p>1) Pendulum, mass attached to spring, a stone thrown into a bucket filled with water.</p> <p>2) Clapping or making loud sound in front of a huge building.</p> <p>3) Wall or hill from a distance of approximately 17 m. thereby approximating the velocity of sound.</p> <p>4) Model or chart of human ear.</p> <p>5) Discussion on musical instrument,</p>

			Calculation of length of second's pendulum, problems on frequency, time period and velocity.	animal like mosquitos, dog and bats. To draw the graphs of S.H.M.
Unit – VI				
Natural Resources				
16	16 Periods	Carbon Compounds – Hydrocarbon	Tetra-covalency of Carbon, Catenation, Hydrocarbon (Classification). Laboratory preparation of Methane, Ethene, Ethyne. Combustion of Hydrocarbon (Release of energy, basis of cooking), Hydrogenation of unsaturated Hydrocarbons, Petroleum and its refining, coal and its destructive distillation, LPG/CNG.	1) Tetra Co-valency and tetrahedral nature of carbon can be shown with the help of charts and models. 2) Preparation of Methane, Ethene and Ethyne is shown to the students in laboratory. 3) Destructive distillation of coal shown by heating coal pieces in a hard glass test tube and passing the gas/vapours in another glass tube. 4) Burning of hydrocarbons – Kerosene oil, L.P.G., Candle

				Wax, etc. releases energy shown & explained to the students.
17	11 Periods	Natural Resources : Environment & its working.	Environment : Abiotic components, Biotic components, Weather, Climate, Biogeochemical cycles. Role of man in disturbing natural environment. Food–Chain, Food – web, interdependence of organisms, Maintenance of ecological balance.	1) Observe abiotic and biotic components of a pond or forest ecosystem. 2) Suggest what you can do to keep your environment pollution free. 3) Van Mahotsav Celebration. 4) Collage – making on environmental topic.

Science & Technology

Class – X

Sr. No.	Periods	Topic	Subject Matter	Activities
			Unit – I Materials	
1	12 Periods	Different Kinds of Materials	Definition of acids and bases, Arrhenius Concept, General properties of acids and bases (taste, with indicators, etc.), Reaction with metals and with salts, Acid-Base neutralization reaction, Definition of salt, types of salt, Equivalent weight, Gram equivalent weight of some acids and bases. Elementary idea about preparation and uses of washing soda, baking soda, plaster of paris, bleaching powder, cement and glass.	1) Testing substances – Orange juice, lemon juice, soap solution, vinegar, etc. as acidic or basic by litmus solution, litmus paper (or taste). 2) Reactions of metals (Zn, Cu, Al, etc.) with acids (HCl, H ₂ SO ₄ , etc.) to be shown. 3) Reactions of acids with Na ₂ CO ₃ , NaHCO ₃ . 4) Neutralization reactions of acids and bases. 5) Samples of

				important compounds to be shown to students (to observe), also the setting of cement and plaster of paris.
2	12 Periods	Chemical Reactions	Brief idea about symbols, chemical formulae and chemical equation, Types of chemical reactions, combination, decomposition, displacement, double decomposition, precipitation, Neutralization, Oxidation & Reduction in terms of gain and loss of oxygen and hydrogen.	<p>1) A game for writing formulae eq. Criss-crossing of valencies to be taught by dividing students into pairs. Each student to hold two playcards : One with the symbol & the other with the valency. Keeping symbols in place, teacher to move only valencies to form the formula of a compound.</p> <p>2) Magnesium ribbon burning in air- combination reaction.</p>

				<p>3) Heating $Pb(NO_3)_2$ or $CaCO_3$ in a tube – decomposition reaction.</p> <p>4) Zinc and $CuSO_4$ solution, Iron (Nails) in $CuSO_4$ {Displacement reaction.</p> <p>5) $BaCl_2(aq.)$ $+Na_2SO_4(aq)$ $AgNO_3(aq) +$ $NaCl(aq)$ {Double Decomposition and ppt. Reaction.}</p>
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Unit – II

The World of Living

3	12 Periods	Life Processes : Nutrition and Respiration	<p>Process of synthesis of food and respiration in plants.</p> <p>Process of nutrition in Amoeba, grass hopper, and man.</p> <p>Respiration in animals with special reference to Amoeba, earthworm, fish, frog, insects and man.</p>	<p>1) To prepare temporary mount of a leaf and peel to show its stomata.</p> <p>2) Observation of plants for photosynthesis (to show that light is necessary for photosynthesis).</p>
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				3) To show that CO ₂ is produced during respiration.
4	10 Periods	Life Processes : Transportation and Excretion.	<p>Transportation of materials in plants (water, minerals and food).</p> <p>Transportation of material in animals (Amoeba, Man).</p> <p>Composition and function of blood, blood clotting, blood groups, blood transfusion (HIV-Test).</p> <p>Structure and functioning of heart and blood vessels (elementary idea), lymphatic system. Cardiac failure and technology for survival (brief idea).</p> <p>Excretion in animals (Amoeba, earthworm), Excretory system of man,</p>	<p>1) To show transpiration in plants.</p> <p>2) To show absorption of water by seeds.</p> <p>3) To observe blood clotting.</p> <p>4) To measure the pulse rate and heart rate.</p> <p>5) To familiarize the students with the various methods of artificial respiration.</p>

			Osmoregulation. Renal failure and technology for survival (Brief idea).	
5	12 Periods	Life Process : Control and Co- ordination.	Introduction about control and coordination, stimulus and response, organs involved in coordination, coordination in human beings, other organs involved in coordination. Reflex action, Reflex arc (briefly), Chemical coordination: coordination by endocrine system in brief. Role of growth hormone during adolescent period. Coordination in plants – Phytohormones, tropic movements.	1) To observe nastic movements in germinating seeds. 2) To observe the direction of sunflower plant in relation to Sun. 3) To observe the reflex actions.
6	11 Periods	Life Processes : Reproduction	Asexual reproduction in plants and animals, Cell fission, Budding, Spore formation, Fragmentation, Vegetative propagation in plants,	1) Try to propagate a few plants vegetatively i.e. by cutting, grafting or layering methods.

			<p>parthenogenesis.</p> <p>Sexual reproduction in flowering plants.</p> <p>Essential parts of a flower – pollination and fertilization, seed and fruit formation.</p> <p>Germination of seed (brief). Sexual reproduction in animals.</p> <p>Human reproductive system (male and female), Sexual cycles in females, fertilization, reproductive health and sexually transmitted diseases (including HIV/AIDS).</p> <p>Population control.</p>	<p>2) Observe honey bees – how they visit different flowers and thus help in pollination.</p> <p>3) Collect pollen grains of some plants and try to watch them under microscope.</p> <p>4) To conduct quiz/paper presentation/poster making competition on HIV/AIDS.</p>
7	8	Life Processes : Heredity and Evolution.	<p>Heredity and variation, structure of chromosomes, genes, sex determination in human being.</p> <p>Organic Evolution : Evidence of evolution (homologous, analogous, vestigial organs and fossils.)</p> <p>Theories of evolution (elementary idea).</p>	<p>1) Familiarisation with various types of fossils.</p> <p>2) Identify some physical traits which resemble with those of your parents and siblings.</p>

8	10 Periods	Life Processes : our Environment	Types of pollution, pollutants, sources of pollution (air, water, soil and solid, noise, thermal, nuclear). Prevention and control of various types of pollution. Biodegradable and non-biodegradable materials. Inter relationship of population, environment and development.	1) Identify different types of pollution in your locality and suggest measures to control. 2) Make a list of biodegradable and non-biodegradable material being used in household. 3) Visit a bio-gas plant and try to prepare it in your school with the help of your teacher.
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Unit – III

How Things Work

9	12 Periods	Electricity and its Heating Effects.	Electric charge and its properties, Electric current, charge in motion, electric potential and potential difference, electric circuit, Ohm's law, resistance, resistivity.	1) Using a simple electric circuit, show that charges flow from higher potential to lower potential. 2) Use the analogy of flow of water
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			<p>Resistors in parallel and series, heating effects of electric currents, electric energy, electric power, Numerical problems relating to Ohm's law, Calculation of equivalent resistance in series and parallel combination, Calculation of energy in kwh. in a domestic circuit.</p>	<p>from higher level to lower level (lower energy).</p> <p>3) Using a circuit consisting of a conductor, battery, key, voltmeter, ammeter, establish a relationship between V, I and R and hence Ohm's law.</p> <p>4) Using Ohm's law establish the rules for series and parallel combination of resistors.</p> <p>5) Identification of appliances in daily life based on heating effect of current.</p> <p>6) Calculation of power in daily life situations.</p>
10	14 Periods	Magnetic Effects of Electric Currents.	Magnetic field and field lines, Magnetic field around a current carrying straight	1) Drawing magnetic field lines in vicinity of bar magnet

			<p>conductor, magnetic field due to current carrying circular wire, Magnetic field due to current flow in solenoid, Magnetising a piece of a magnetic material, Electromagnets.</p> <p>Force on a current carrying conductor placed in magnetic field, electric motor, electromagnetic induction, electric generator, domestic electric circuit, the electric fuse—a safety device.</p>	<p>when placed in magnetic meridian (N-S Line).</p> <p>2) Demonstrating with the help of magnetic compass that a current carrying conductor produces a magnetic field.</p> <p>3) Magnetising a piece of iron by rubbing it with bar magnet or placing it inside a solenoid.</p> <p>4) Demonstrating that a current carrying conductor when placed in a magnetic field experiences force.</p> <p>5) Demonstrating the working of motor.</p> <p>6) Identifying the appliances based on electric motor.</p>
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				<p>7) Demonstrating electromagnetic induction.</p> <p>8) Demonstrating the principle and working of a generator.</p> <p>8) Familiarising with voltages and frequency of AC in our homes.</p> <p>9) Electaining the working of domestic electric circuit including the role of fuse.</p>
11	13 Periods	Sources of Energy.	<p>Conventional and non-conventional sources of energy, Solar energy, its use in house designing, Cooking food and other applications, heat & temperature, Mercury thermometer, thermal equilibrium, heat – a form of energy, Latent heat of fusion & evaporation, nuclear fission & fusion, composition of Sun's energy, Energy</p>	<p>1) Discussion on different forms of energy and their sources.</p> <p>2) Models of Solar Cooker and glass house.</p> <p>3) Burning of match stick by placing it at the focus of concave mirror or convex lens.</p> <p>4) Demonstrating the use of Solar Energy operated</p>

			released in fusion and fission, chain reaction, Hazards associated with nuclear reactors and safety measures, Energy from water – Hydro-electric power.	calculator or other devices. 5) Demonstrating heating by measuring temperature of objects at different temperatures with mercury thermometer.
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Unit – IV
Natural Phenomena

12	16 Periods	Light- Reflection, Refraction.	Nature of light, Reflection of light, Laws of reflection from a plane and curved surface; mirrors (concave, convex and plane), sign conventions, Derivation of mirror formula, Magnification refraction of light, laws of refraction, refraction through rectangular slab, Image formation by concave and convex lens. Some optical phenomena in nature—twinkling of	1) Exploring and recording features of images formed by a concave mirror by placing an object beyond c. Between c and F, between P & F and placing at F. 2) Ray diagrams to explore the laws of reflection. 3) Ray diagram to explore the laws of refraction. 4) Observation of convergence
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			stars, mirages, defects of vision and their correction, total internal reflection, dispersion of light through prism, primary colours and dyes, Elementary ideas about telescopes and microscopes, simple numerical problems related to mirror formula including magnification, calculation of refractive index.	and divergence with lenses. 5) Activities exploring and recording features/ images formed by convex lens. Ray Diagrams. 6) Studying the glasses used by human beings to correct different vision defects. 7) Observation of objects through prism. 8) Tracing rays refracted through prism. 9) Scattering of light in emulsions etc. 10) Observing objects through telescopes and microscopes.
Unit –V				
Natural Resources				
13	12 Periods	Metals and Non-metals.	Physical and chemical properties of metals, Activity series, Occurrence of metals,	1) Observe the metallic lustre of different metals. 2) Reaction of

			<p>Brief discussion on basic metallurgical processes (Al, Fe, Cu). Alloys (Steel, Stainless steel, brass). Corrosion (brief idea). Physical and chemical properties of non-metals. Extraction of Sulphur and uses. Allotropy, Allotropic forms of Sulphur.</p>	<p>different metals (Mg, Al, Zn & Fe).</p> <p>3) Demonstration of corrosion with the help of Iron nails in different conditions.</p> <p>4) Discussion on metallurgical processes.</p>
14	14 Periods	Carbon Compounds	<p>Functional Groups, Compounds with functional groups containing oxygen, Alcohols eg. Ethanol (Preparation, properties and uses). Harmful effects of drinking ethanol. Aldehydes and Ketones eg. Methanol (Preparation, properties and uses). Carboxylic acid eg. Acetic acid (Preparation, Properties and uses). Synthetic polymers, Classification of polymers (brief idea).</p>	<p>1) Reaction of C₂H₅OH with sodium metal, alk. KMnO₄ Shown to the students.</p> <p>2) Ester hydrolysis – Saponification.</p> <p>3) Reaction of methanol with Fehling's solution and Benedict's reagent (Glucose can also be used) for diabetic patients.</p> <p>4) Preparation of Soap using</p>

			Soaps and Detergents, Cleansing action of soap and detergent.	coconut/sarson oil or other oils and NaOH solution and HCl.
15	12 Periods	Natural Resources : Conservation & Management.	Types of natural resources, causes of depletion and degradation of natural resources. Management, conservation and judicious use of natural resources with reference to Himachal Pradesh. Hydroelectric projects in H.P. People's participation in conservation and management of natural resources (including Chipko Movement and Contribution made by Kinkri Devi , Sirmour H.P.). Legal perspectives in conservation (Forest Conservation Act, Wild Life Conservation act).	1) Make a suitable model to show conservation of water. 2) Develop some mechanisms in your school for water harvesting. 3) Constitute an Eco-Club in your school to protect the local environment.

			Prevention of trading and smuggling of wild plants and animals.	
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