SCIENCE

Subject Code – 086

Classes IX (2026-27)

Introduction

Science is the study of the natural and physical world around us through a systematic process of observing, questioning, forming hypotheses, testing hypotheses through experiment, analysing evidence, and continuously revising our knowledge. It develops essential skills like curiosity, creativity, evidence-based thinking, and sound decision-making that help us lead rational and fulfilling lives. Learning Science provides valid knowledge about the world, and builds scientific values and capacities. It draws knowledge from Biology, Chemistry, Physics, Earth Science, Mathematics, Computational Sciences, and sometimes Social Science and Vocational Education to offer an interdisciplinary understanding of the role of science.

Science Education helps students to develop an understanding of the natural and physical world through systematic inquiry. Learning Science also develops important capacities, such as observation, questioning, analysis, inference, etc. This helps individuals to meaningfully participate in society and the world of work with a scientific temper, critical and evidence-based thinking, asking relevant questions, analysing practices and norms, and acting for necessary change.

Science Education aims to achieve:

- Scientific understanding of the natural and physical world;
- Capacities for scientific inquiry;
- Understanding the evolution of scientific knowledge;
- Interdisciplinary understanding between Science and other curricular areas;
- Understanding of the relationship between Science, Technology, and Society;
- Scientific temper, and
- Creativity.

Together, the NEP 2020 and NCF-SE 2023 envision science classrooms that encourage curiosity, creativity, collaboration and connection with the real world, ultimately nurturing not just future scientists, but responsible, informed and critically thinking citizens.

Learning standards (Curricular Goals and Competencies) describe what students should know, understand, and be able to do in Science. In Grades 9 – 10, Science is taught using an integrated approach that combines Biology, Chemistry, Physics, and Earth Science. This helps students understand the connections between disciplines and relate Science to their observations and experiences. At this stage, scientific inquiry skills are developed alongside conceptual understanding, with content selected both for disciplinary relevance and real-life usefulness. Students must deepen their understanding of the world, explore scientific questions through discussion and experimentation, and communicate their learning in various ways. It is important to note that the Curricular Goals are interdependent and not separate.

Learning standards are organised into four levels: broad curricular aims define the overall objectives for Science Learning by the end of each schooling stage; more specific Curricular Goals guide the design of the science curriculum for each stage and topic; Competencies

represent measurable scientific skills and knowledge-based on these goals, assessed at the end of each stage; and detailed Learning Outcomes (LOs) are granular milestones of learning and usually progress in a sequence leading to the attainment of a competency. These LOs enable teachers to plan their content, pedagogy, and assessments towards achieving specific competencies.

Curricular Goals (CGs) and Competencies (Cs)

CG 1 – Explores the world of matter, its interactions, and properties at the atomic level

C 1.1 – Describes classification of elements in the Periodic Table, and explains how compounds (including carbon compounds) are formed based on the atomic structure (Bohr's model) and properties (valency).

C 1.2 – Investigates the nature and properties of chemical substances (distillation, crystallisation, chromatography, centrifugation, types and properties of mixtures, solutions, colloids, and suspensions)

C 1.3 – Describes and represents chemical interactions and changes using symbols and chemical equations (acid and base, metal and non-metal, reversible and irreversible)

CG 2 – **Explores the physical world around them, and understands scientific principles and laws based on observations and analysis**

C 2.1 – Applies Newton's laws to explain the effect of forces (change in state of motion — displacement and direction, velocity and acceleration, uniform circular motion, acceleration due to gravity) and analyses graphical and mathematical representations of motion in one dimension

C 2.2 – Explains the relationship between mass and weight using universal law of gravitation, and connect it to the laws of motion

C 2.3 – Manipulates the position of object and properties of lenses (focus, centre of curvature) to observe image characteristics and correspondence with a ray diagram, and extends this understanding to a combination of lenses (telescope, microscope)

C 2.4 – Manipulates and analyses different characteristics of the circuit (current, voltage, resistance) and mathematises their relationship (Ohm's law), and applies it to everyday usage (electricity bill, short circuit, safety measures)

C 2.5 – Defines work in scientific terms, and represents the relationship between potential and kinetic energy (conservation of energy) in mathematical expressions

C 2.6 – Demonstrates the principle of mechanical advantage by constructing simple machines (system of levers and pulleys)

C 2.7 – Describes the origin and properties of sound (wavelength, frequency, amplitude) and differences in what we hear as it propagates through different instruments

C 2.8 – *Explores interconnected systems and phenomena that support and affect life on Earth (hydrosphere, biosphere, atmosphere, geosphere, cryosphere and their interrelationships, earth processes, hazards, etc.)

*Additional Competency for Earth Science

CG 3 – **Explores the structure and function of the living world at the cellular level**

C 3.1 – Explains the role of cellular components (nucleus, mitochondria, endoplasmic reticulum, vacuoles, chloroplast, cell wall), including the semi-permeability of cell membrane in making cell the structural basis of living organisms and functional basis of life processes

C 3.2 – Analyses similarities and differences in the life processes involved in nutrition (photosynthesis in plants; absorption of nutrients in fungi; digestion in animals), transport (transport of water in plants; circulation in animals), exchange of materials (respiration and excretion), and reproduction

C 3.3 – Describes the mechanisms of heredity (in terms of DNA, genes, chromosomes) and variation (as changes in the sequence of DNA)

CG 4 – **Explores interconnectedness between organisms and their environment**

C 4.1 – Applies the knowledge of cellular diversity in organisms along with the ecological role organisms play (autotrophic or heterotrophic nutrition) to classify them into five kingdoms

C 4.2 – Illustrates different levels of organisations of living organisms (from molecules to organisms)

C 4.3 – Analyses different levels of biological organisation from organisms to ecosystems and biomes along with interactions that take place at each level

C 4.4 – Analyses patterns of inheritance of traits in terms of Mendel's laws and its consequences at a population level (using models and/or simulations)

C 4.5 – Analyses evidences of biological evolution demonstrating the consequences of the process of natural selection in terms of changes — in allele frequency in population, structure, and function of organisms

CG 5 – **Draws linkages between scientific knowledge and knowledge across other curricular areas**

C 5.1 – Explores how literature and arts have influenced Science

C 5.2 – Examines a case study related to the use of Science in human life from the perspective of Social Sciences and Ethics (for example, Marie Curie, Jenner, treatment of patients with mental illnesses, the story of the atomic bomb, green revolution and GMOs, conservation of biodiversity)

C 5.3 – Applies scientific principles to explain phenomena in other subjects (sound pitch, octave, and amplitude in music; use of muscles in dance form and sports)

CG 6 – **Understands and appreciates the contribution of India through history, and the present time to the overall field of Science, including the disciplines that constitute it**

C 6.1 – Knows and explains the significant contributions of India to all matters (concepts, explanations, methods) that are studied within the curriculum in an integrated manner

CG 7 – **Develops awareness of the most current discoveries, ideas, and frontiers in all areas of scientific knowledge in order to appreciate that Science is ever evolving, and that there are still many unanswered questions**

C 7.1 – States concepts that represent the most current understanding of the matter being studied, ranging from mere familiarity to conceptual understanding of the matter as appropriate to the developmental stage of the students

C 7.2 – States questions related to matters in the curriculum for which current scientific understanding is well-recognised

CG 8 – **Explores the nature of Science by doing Science**

C 8.1 – Develops accurate and appropriate models (including geometric, mathematical, graphical) to represent real-life events and phenomena using scientific principles, and use these models to manipulate variables and predict results

C 8.2 – Designs and implements a plan for scientific inquiry (formulates hypotheses, makes predictions, identifies variables, accurately uses scientific instruments, represents data — primary and secondary — in multiple modes, draws inferences based on data, and understanding of scientific concepts, theories, laws and principles, and communicates findings using scientific terminology)

COURSE OUTLINE

CLASS IX (2026-27)

Cell **No. of Periods: 12**

Key Concepts		Learning Outcomes
• Discovery of cell • Plant and animal cells • Prokaryotic and eukaryotic cells • Cell as a structural and functional unit of life; structure and function of key organelles (nucleus, mitochondria, chloroplast, endoplasmic reticulum, vacuoles, plasma membrane, cell wall) • Permeability of cell membranes • Cellular division and cancer • Recent advancement in cell biology	C-3.1	• Differentiate between plant and animal cell, prokaryote and eukaryote • Describe the structural and functional features of cells • Explain the role of cells in the structure and functions of organisms • Explain activities inside the cell and its interactions with the environment • Demonstrate osmosis in cells • Prepare slides to observe cell structure
	C-3.2	• Differentiate between diffusion and osmosis
	C-3.3	• Explain the role of cell division mitosis and meiosis in creating similarities and variations
	C-4.2	• Identify and describe the role of biomolecules in the structure and function of cell
	C-5.2	• Cite case study related to the use of science in human life, for example, Leigh Syndrome and mitochondrial dysfunction
	C-5.3	• Apply learning of a structure and function of muscles cells or joints in dance form and/or sports
	C-6.1	• Discuss significant contributions of India, for example, Professor Arun Kumar Sharma for his work on chromosomes and methods for its studies
	C-7.1	• Recognise that the cell is a structural unit of life and functional unit of life processes
	C-7.2	• Pose questions, such as — Can we create artificial cell which behaves exactly like a natural living cell?

	C-8.1	• Exhibit creativity and design models using low cost or no-cost eco-friendly material to study structure and functions of cell and cell organelles
	C-8.2	• Carry out an experiment to understand the osmosis • Analyze result and present finding using scientific terms

Tissues **No. of Periods: 13**

Key Concepts		Learning Outcomes
Tissues: Introduction and importance • Level of organisation in the living organisms • Plant and animal tissues • Types of plant tissues • Meristematic tissues (types and function of each) • Permanent tissues (types, structure and function of each) • Animal tissues • Overview (epithelial, connective, muscular and nervous tissues — types, structure and function of each) • Elementary idea of musculoskeletal system • Care of musculoskeletal system: injuries, postural care, nutrition and exercise	C-4.2	• Differentiate between plant and animal tissues; meristematic and permanent tissues; simple and complex tissues; parenchyma, collenchyma and sclerenchyma; xylem and phloem; striated smooth and cardiac muscles; • Different types of joints • Relate the structure of the different types of tissues with their functions • Explain the role of various types of tissues in plants and animals • Describe the level of organisation in a multicellular organism
	C-5.3	• Establish the correlation between different tissues for fitness, for example, role of muscles, cartilage and bones in facilitating movement
	C-6.1	• Explain the importance of yoga exercises for physical agility and in maintaining the correct posture
	C-6.1	• Discuss significant contributions of India, for example, Professor Sipra Guha Mukherjee and Professor S.C. Maheshwari for their significant contribution in the plant cell and tissue culture research in India
	C-7.1	• Discuss the techniques and medical recommendations in recovery from muscular injuries

	C-8.2	• Carry out an experiment to understand the growth in plant due to apical meristem • Represent data in multiple modes, including appropriate figures, tables, graphs, or digital formats, interpret and draw inferences from the data • Analyse results and present findings using scientific terms • Communicate findings and conclusions effectively, such as those from experiments, activities, or projects, both orally and in written form

Reproduction **No. of Periods: 13**

Key Concepts		Learning Outcomes
• Introduction to different forms of reproduction — sexual and asexual • Types of asexual reproduction with examples • Sexual reproduction in flowering plants (flower and its parts, pollination, fertilisation, seed dispersal) • Sexual reproduction in humans: male and female reproductive systems (structure and function, formation of gametes, sperm and egg, fertilisation, pregnancy and development of embryo, menstrual cycle) • Reproductive health and hygiene • Introduction to birth control methods and importance	C-2.8	• Analyse the interactions between members of different groups of organisms, such as plants and pollinators
	C-3.2	• Compare asexual and sexual reproduction • Describe male and female reproductive organs in plants and animals • Differentiate between ovule and seed; ovary and fruit • Explain pollination and fertilisation
	C-3.3	• Explain how variations are introduced by sexual reproduction
	C-4.3	• Identify and explain the role of biotic and abiotic agents in seed dispersal and pollination
	C-5.1	• Illustrate the structure of male and female reproductive units or systems in plants and animals
	C-5.2	• Recognise the significance of contraceptive devices for population control and health including reproductive health
	C-6.1	• Describe the contribution of India to the understanding of human anatomy
	C-6.1	• Discuss significant contributions of India, for example, Professor Panchanan Maheshwari for

		laying the foundation of plant cell and tissue culture research in India
	C-7.1	• Recognise the importance of improvements in medical field for assisted reproductive technologies
	C-7.2	• Pose questions, such as — How do heavy metals harm reproductive organs? Can extreme heat affect fertility?

Diversity **No. of Periods: 12**

Key Concepts		Learning Outcomes
• Importance of classification • Five kingdoms and their key features with examples • Major division of animals and plants • Binomial nomenclature • Acellular entities: viruses	C-4.1	• Distinguish organisms based on certain characteristics, such as number of cells present, cellular organisation and mode of nutrition • Classify various organisms in groups, such as five kingdoms, on the basis of their cellular organisation and ecological role • Describe the significance and rules of binomial nomenclature • Apply binomial nomenclature on some common organisms in their surroundings
	C-2.8	• Analyse the interactions between members of different groups of organisms, such as lichens • Discuss ecological role of diverse organisms
	C--7.1	• Recognise three domains of classification of organisms on molecular basis

Exploring Mixtures and their Separation **No. of Periods: 12**

Key Concepts		Learning Outcomes
• Homogeneous and heterogeneous mixtures; • Solutions, suspensions, colloids and their properties • Various ways to express concentration of solutions (mass by mass percentage of a solution,	C-1.2	• Differentiate between homogeneous and heterogeneous mixtures on the basis of their properties • Demonstrate separation techniques, such as crystallisation, distillation, paper chromatography, sublimation, centrifugation and coagulation • Classify mixtures as solutions, suspensions, or colloids based on their properties • Explain the scientific principles behind different

mass by volume percentage of a solution, volume by volume percentage of a solution) • Separation techniques based on the physical properties of components, including crystallisation, distillation, paper chromatography, sublimation, centrifugation and coagulation		separation techniques • Apply the knowledge of homogeneous and heterogeneous mixtures in daily life • Define and calculate the concentration of solutions using mass by mass percentage, mass by volume percentage, volume by volume percentage • Analyse graphs of solubility and explain how the solubility of substances changes with temperature • Use scientific conventions and standard units to express concentrations • Handle common laboratory chemicals and apparatus safely • Relate separation techniques with practices observed in the local environment
	C-5.1	• Draw labelled diagrams or flow charts of separation techniques
	C-5.2	• Display awareness about the societal impact of chemistry in making life healthier, cleaner and sustainable
	C-5.3	• Correlate the phenomenon used in centrifugation to the spinning dance
	C-6.1	• Describe the cultural practices, like traditional methods of distillation • Display awareness about the contributions of Indian scientists, such as Dilip Mahalanabis
	C-7.1	• Demonstrate the use of small-scale or micro-scale experiments, such as crystallisation of copper sulfate, as an alternative to traditional methods
	C-7.2	• Poses question, such as — Can we create artificial blood that works just as real blood for all patients?
	C-8.1	• Exhibit creativity and work collaboratively in groups to create models of apparatus used for separating mixtures, such as a paperfuge and a distillation unit, using eco-friendly materials
	C-8.2	• Formulate hypotheses about scientific phenomena based on prior knowledge and understanding of scientific concepts, and predict the results of an experiment or investigation based on their hypotheses

		• Accurately use scientific instruments, apparatus and chemicals to collect data • Analyse results and findings using scientific terms • Represent findings in multiple modes, including appropriate figures, tables, graphs, or digital formats, and interpret and draw inferences from the findings • Communicate findings and conclusions effectively, such as those from experiments, activities or projects, both orally and in written form

Structure of an Atom **No. of Periods: 14**

Key Concepts		Learning Outcomes
• Atoms are the basic units of elements • Atoms consist of subatomic particles • Atomic Models (Thomson's Model, Rutherford's Model, and Bohr's Model) • Distributions of electrons in elements (up to 18 elements) • Symbols • Valency as the combining capacity • Atomic number • Mass number • Isotopes • Isobars	C-1.1	• Differentiate between subatomic particles (electrons, protons, and neutrons) based on their charge, and position in the atom • Illustrate how electrons are distributed in different energy levels, such as K, L, M, N ... or by numbers n = 1, 2, 3, 4 ... • Explain valence electrons, valency, atomic number, atomic mass, isotopes, and isobars • Calculate the number of electrons, protons, and neutrons of an element using its atomic and mass numbers • Interpret data, such as atomic mass, maximum number of electrons in a shell, and valency to classify elements accurately • Use scientific conventions as per international standards, such as notations for electron, proton, neutron, unified atomic mass unit (u), and distribution of electrons in various shells, such as K, L, M, N …
	C-1.3	• Recognise and accurately apply the chemical symbols for the first eighteen elements according to IUPAC
	C-5.1	• Draw labelled diagrams of various atomic models, such as Thomson's model, Rutherford's model and Bohr's model • Create and present a role play, stage play, or story of 'Journey Inside the Atom' to display awareness about the contributions of key scientists in the

		discovery and development of atomic structure
	C-5.2	• Display awareness about the role of Indian scientists and their contributions to atomic science for peaceful purposes and explore how their works influenced India's scientific development
	C-5.3	• Display awareness about the societal impact of science in making life healthier, like the use of various isotopes in medicines to treat different diseases, and atomic energy in power generation • Design and develop games that utilise atomic number, mass number, and subatomic particle clues to accurately predict and identify elements
	C-6.1	• Display awareness about the contributions of the ancient Indian philosopher, Acharya Kanad's idea of indivisible particles (Parmanu)
	C-7.1	• Describe the use of the atomic mass unit (u) to measure the mass of atoms as per IUPAC recommendations • Describe scientific discoveries that explain how the structure of the atom has evolved over time through various atomic models proposed by different scientists
	C-7.2	• Pose question, such as — is it possible to completely understand everything that happens inside an atom?
	C-8.1	• Exhibit creativity and work collaboratively in groups to design different models of atoms
	C-8.2	• Formulate hypotheses about scientific phenomena by applying prior knowledge and understanding of scientific concepts, and predict the results of data based on the hypotheses • Analyse results and present findings using scientific terms • Correlate the results and conclusions of different models of atomic structure • Represent data in multiple modes, including appropriate figures, tables, graphs or digital formats, and interpret and draw inferences from the data

		• Communicate findings and conclusions effectively, such as those from experiments, activities or projects, both orally and in written form

Atoms and Molecules **No. of Periods: 14**

Key Concepts		Learning Outcomes
• Law of conservation of mass • Law of constant proportion • Dalton's Atomic theory • Molecules of elements, Molecules of covalent compounds and their properties • Ions, Ionic compounds and their properties • Writing chemical formulae • Molecular mass • Formula unit mass	C-1.1	• Differentiate between chemical species based on their properties or characteristics, such as atoms and molecules, elements and compounds, ionic and covalent compounds, cations and anions, formula unit mass and molecular mass• Plan and demonstrate activities to observe and verify the law of conservation of mass • Explain the Dalton's atomic theory, the law of conservation of mass, the law of constant proportions, and formation of ionic and covalent compounds • Calculate the charge on an ion, valency from the atomic number, the molecular and formula unit mass • Use scientific conventions, symbols, and valency to write the chemical formulae of simple compounds • Display awareness about the scientific discoveries, such as the contributions of Antoine Lavoisier, Joseph Proust, and John Dalton • Handle common laboratory chemicals and apparatus safely
	C-5.1	• Draw diagrams of electron dot structures of atoms and molecules
	C-5.2	• Describe how atoms and molecules can lead to beneficial applications, such as medicine, energy and peaceful use of atomic science • Relate atomic bonding to social bonding
	C-5.3	• Design educational games to write chemical formulae using symbols
	C-6.1	• Display awareness about the contributions of Indian scientists in promoting the peaceful use of atomic energy and the traditional use of the red pigment 'cinnabar' obtained from rocks

	C-7.1	• Describe the basic concepts that matter are made of particles; elements combine in fixed ratios to form compounds; the law of conservation of mass; and different types of bonding (ionic and covalent)
	C-7.2	• Pose question, such as — Are there any chemical changes that do not obey the law of conservation of mass?
	C-8.1	• Exhibit creativity and work collaboratively in groups to construct simple models of compounds
	C-8.2	• Formulate hypotheses about scientific phenomena by applying prior knowledge and understanding of scientific concepts and laws, and predict the results of data based on the hypotheses • Accurately use scientific instruments, apparatus and chemicals to collect data • Analyse results and findings using scientific terms • Represent data in multiple modes, including appropriate figures, tables, graphs or digital formats • Communicate findings and conclusions effectively, such as those from experiments, activities or projects, both orally and in written form

Earth as a System: Energy, Matter & Life **No. of Periods: 12**

Key Concepts		Learning Outcomes
• Earth as interconnected system • Nature of solar energy: solar radiation, electromagnetic • spectrum, and speed of light • Solar energy interaction with the Earth's Surface and differential heating of the Earth (the role of the atmosphere and the Earth's surface) • Differential warming of the Earth causes winds	C-2.8	• Explain the interconnectedness between different spheres of the Earth (biosphere, geosphere, hydrosphere, cryosphere and atmosphere) • Explain the nature of solar radiation • Explain that solar radiation is an electromagnetic waves having different Frequencies • Explain how heat from the Sun warms the Earth's surface differently based on the shape, latitude and tilt of the Earth • Explain the interaction of solar radiation with the Earth's surface and relate the differential heating of the Earth's surface with the atmospheric phenomena, such as air movement, evaporation, etc., and describe phenomena like mountain, valley, sea and land breezes

• Biogeochemical cycles (water cycle, carbon cycle, nitrogen cycle, oxygen cycle) • Human impact on Earth's system		• Describe how the latitude and tilt of the Earth, and absorption and reflection of solar radiation by different surfaces cause differential heating of the Earth's surface • Identify various components of the Earth that interact with solar energy • Explain the role of the atmosphere in influencing weather and climate on the Earth • Identify the reflectivity of different materials through reliable scientific sources, such as the internet and books • Describe how elements like carbon, nitrogen, oxygen and water are recycled between biotic and abiotic environments • Explain biogeochemical cycles, and the roles of biogeochemical cycles in circulating matter and energy continuously between the non-living environment (abiotic) and living (biotic) organisms, making nutrients available, and maintaining environmental balance
	C-6.1	• Reflect the changing nature of Earth's environment through our traditional knowledge
	C-7.2	• Pose questions, such as — What will happen if there is no differential heating of the Earth?
	C-8.1	• Draw flow charts, concept maps for biogeochemical cycles, differential heating of the Earth's surface and Electromagnetic spectrum
	C-8.2	• Formulate hypotheses about scientific phenomena based on prior knowledge and understanding of differential heating of the Earth and biogeochemical cycle • Predict the results of an experiment or investigation based on their hypotheses • Communicate findings and conclusions effectively, such as those from experiments, activities or projects, both orally and in written form

Motion **No. of Periods: 13**

Key Concepts		Learning Outcomes
• Motion — displacement, velocity, acceleration • Graphical representation of motion for an object moving in a straight line in one direction (with constant velocity, and constant acceleration) • Kinematic equations for motion in a straight line with constant acceleration (by graphical method) • Elementary idea of uniform circular motion	C-2.1	• Differentiate between distance travelled and displacement, and speed and velocity for objects moving in a straight line • Define displacement, velocity, acceleration, and uniform circular motion • Express displacement, velocity, acceleration in appropriate SI units • Plot and interpret position-time graphs and velocity-time graphs to describe the motion of an object moving in a straight line in one direction (with constant velocity and constant acceleration) • Calculate average velocity from position-time graph, displacement and average acceleration from velocity-time graph • Derive kinematic equations for motion in a straight line with constant acceleration by graphical method • Calculate values of unknown physical quantities from the given physical quantities, using kinematic equations • Derive the expression of speed for uniform circular motion
	C-8.1	• Analyse real-life events and phenomena, and identify the key factors that influence their Behaviour.
	C-8.2	• Formulate hypotheses about scientific phenomena based on prior knowledge and understanding of scientific concepts, theories, laws, and principles • Predict about the outcome of an experiment or investigation based on their hypotheses • Identify the variables that are relevant to a scientific investigation and determine how to control or manipulate them • Accurately use scientific instruments and equipment to collect data • Represent data in multiple modes, including tables, graphs and visual representations, and interpret and draw inferences from the data • Communicate their findings using scientific terminology and effectively communicate their conclusions to others

Force and Laws of Motion **No. of Periods: 13**

Key Concepts		Learning Outcomes
• Force; balanced and unbalanced forces • Force of friction • Newton's first law of motion • Newton's second law of motion • Newton's third law of motion	C-2.1	• Explain that force has magnitude as well as direction • Identify situations in which balanced and unbalanced forces are acting on an object • Explain the role of friction on the motion of objects • Recognise that for an object moving with constant velocity, the net force is zero, whereas a change in velocity (acceleration) is caused by a force • State and explain Newton's first law of motion • State and explain Newton's second law in terms of mass and acceleration • Calculate force using mathematical expression of Newton's second law of motion • Define SI unit of force • State and explain Newton's third law of motion • Apply Newton's laws of motion to explain everyday life events
	C-8.1	• Analyse real-life events and phenomena, and identify the key factors that influence their behaviour • Develop a model to represent real-life event • Use models to manipulate variables and predict results
	C-8.2	• Formulate hypotheses about scientific phenomena based on prior knowledge and understanding of scientific concepts, theories, laws, and principles • Predict about the outcome of an experiment or investigation based on their hypotheses • Identify the variables that are relevant to a scientific investigation and determine how to control or manipulate them • Accurately use scientific instruments and equipment to collect data • Represent data in multiple modes, including tables, graphs and visual representations, and interpret and draw inferences from the data • Communicate their findings using scientific terminology and effectively communicate their conclusions to others

Work, Energy and Simple Machines **No. of Periods: 13**

Key Concepts		Learning Outcomes
• Concept of work; work done by a constant force • Work-Energy theorem • Mechanical energy, kinetic and potential energy, and conversion between potential energy and kinetic energy • Conservation of energy • Power • Simple machines and their mechanical advantage (pulley, inclined plane, lever)	C-2.5	• Define work done by a constant force and its SI unit • Calculate work done by a force using mathematical expression • State work-energy theorem • Explain the concept of energy and state its SI unit • Name forms of energy and identify their interconversion in surroundings (elementary idea) • Define kinetic energy of a moving object and derive its mathematical expression • Define potential energy for an object raised to a height and derive its mathematical expression • Calculate kinetic and potential energy using mathematical expressions • Explain conversion between potential energy and kinetic energy (for the case of an object under free fall) • State the law of conservation of energy • Define power and its unit • Calculate power using its mathematical expression
	C-2.6	• Identify different simple machines (pulley, inclined plane and lever) • Define mechanical advantage and calculate its value for simple machine • Demonstrate and explain mechanical advantage of simple machines their conclusions to others
	C-8.1	• Analyse real-life events and phenomena, and identify the key factors that influence their behaviour • Develop model to represent real-life event • Use models to manipulate variables and predict results
	C-8.2	• Formulate hypotheses about scientific phenomena based on prior knowledge and understanding of scientific concepts, theories, laws, and principles • Predict about the outcome of an experiment or investigation based on their hypotheses • Identify the variables that are relevant to a scientific

		investigation and determine how to control or manipulate them • Accurately use scientific instruments and equipment to collect data • Represent data in multiple modes, including tables, graphs and visual representations, and interpret and draw inferences from the data • Communicate their findings using scientific terminology and effectively communicate their conclusions to others

Sound **No. of Periods: 11**

Key Concepts		Learning Outcomes
• Production of sound • Propagation of sound (as a longitudinal wave through a medium) • Graphical representation of sound wave • Characteristics of sound wave (wavelength, frequency, time period, amplitude, intensity, speed) • Human perception of sound (pitch, loudness) • Propagation of sound in different media (solid, liquid) • Reflection of sound (echo, reverberation), echolocation	C-2.7	• Demonstrate the production of sound in multiple ways (through vibration of strings, membranes, air columns) using materials in surroundings • Explain that sound is produced by vibrations • Demonstrate that sound can travel through different mediums (air, solid and liquid) • Describe that sound needs a medium for propagation • Explain that sound travels as a longitudinal wave • Describe the characteristics of sound waves the (wavelength, frequency, time period, amplitude, intensity and speed) • Analyse graphs representing sound • Write relationship between time period and frequency of sound wave • Derive mathematical expression for speed of sound • Calculate speed of sound using its mathematical expression • Explain human perception of sound in terms of audible range, loudness and pitch of sound • Describe reflection of sound, and apply it to echo and reverberations in surroundings • Explain the use of sound waves for echolocation
	C-5.3	• Describe music in terms of characteristics of sound waves, such as loudness and pitch
	C-6.1	• Name historical buildings designed for echoes, such as whispering gallery of Gol Gumbaz

		• Display awareness about Sir C.V. Raman
	C-8.1	• Analyse real-life events and phenomena, and identify the key factors that influence their behaviour • Develop model to represent real-life event • Use models to manipulate variables and predict results
	C-8.2	• Formulate hypotheses about scientific phenomena based on prior knowledge and understanding of scientific concepts, theories, laws, and principles • Predict about the outcome of an experiment or investigation based on their hypotheses • Identify the variables that are relevant to a scientific investigation and determine how to control or manipulate them • Accurately use scientific instruments and equipment to collect data • Represent data in multiple modes, including tables, graphs and visual representations, and interpret and draw inferences from the data • Communicate their findings using scientific terminology and effectively communicate their conclusions to others

Practical will be announced shortly.

Assessment Structure	Marks
Annual Examination (03 hrs.)	80 Marks
Internal Assessment • Periodic Assessment - 05 marks + 05 marks • Subject Enrichment (Practical Work) - 05 marks • Portfolio - 05 marks	20 Marks
Total	100 Marks

PRESCRIBED BOOKS:

- Science-Textbook for class IX-NCERT Publication
- Assessment of Practical Skills in Science-Class IX - CBSE Publication
- Laboratory Manual-Science-Class IX, NCERT Publication
- Exemplar Problems Class IX – NCERT Publication