

SCIENCE

Course Structure & Syllabus

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Course Syllabus

Unit 1: Exploring Forces

- Define the term force
- Explore the effects of force in our daily life
- Name different kinds of forces such as gravitational force, impact force, muscular force, magnetic force, electrostatic force and frictional force
- Classify forces into contact and noncontact forces
- Describe the effects of balanced and unbalanced forces on moving objects.
- Explore the force of friction
- Investigate the factors affecting friction
- Analyze situations to decide whether friction is desirable or undesirable
- Explain how lubricants and ball bearings reduce friction
- Suggest ways of reducing /increasing friction in daily life
- Perform simple activities related to different kinds of forces

Unit 2: Understanding Pressure

- Understand the concept of pressure as force per unit area
- Explore the situations where high or low pressure is useful
- Name the units of pressure like N/m and Pascal
- Solve numerical based on pressure
- Investigate the effect of pressure exerted by liquids at varying depths
- Explore the impact of pressure on construction of dams and fountains
- Apply the concept of atmospheric pressure to explain real life examples

Unit 3: Sound

- Understand and explore the production of sound
- Investigate the conditions under which sound travels
- Understand and explain the characteristics of sound
- Explore the effect of amplitude on loudness and frequency on pitch of a sound
- Understand the working of human ear
- Explore that all the vibrations are not audible
- Understand the difference between noise and pleasant sound
- Analyse the effects of noise pollution on human health
- Explore the methods to reduce noise pollution

Unit 4: Language of Chemistry

- Recall the meaning of the terms-atoms and molecules
- Explain the formation of cations and anions
- Define the term radical.
- List acidic and basic radicals.
- Differentiate between acid and basic radicals
- Explain the formation of salts.
- Comprehend the concept of atomicity.
- Deduce the formula of salts using displacement reaction
- Write chemical equations from word equations
- Explain balancing of chemical equations
- Infer that balancing of chemical equation justifies that mass remains conserved during a chemical reaction
- Carry out an activity to show balancing of chemical equations

Unit 5: Metals and Non-Metals

- Define the terms: displacement reaction, minerals and ores
- Explain briefly the position of metals and non-metals in the periodic table
- Identify the substances around you as metals and non-metals
- Study the physical properties of metals and non-metals highlighting the exceptions
- Differentiate between the physical properties of metals and non-metals
- Investigate the effect of air, water, acids and bases on metals and nonmetals and compare their chemical properties
- Recall the burning of magnesium ribbon in air and identify the nature of the oxide formed by using litmus solution
- Study the reactivity of different metals such as zinc and copper with the salt solution selected as Ferrous Sulphate
- Recognize the uses of metals and nonmetals in day to day life
- Investigate the factors causing corrosion in metals
- Carry out an activity to show the liberation of Hydrogen gas on reaction of Zinc metal with dilute Hydrochloric acid

Unit 6: Chemical Effects of Electric Current

- Recall different materials which conduct electric current
- Define the terms: electrodes, electrolytes, electroplating and electrolysis

- Devise a tester to test the conducting ability of liquids, using magnetic effects of current
- Comprehend that the solutions of acids, bases and salts conduct electricity
- Describe the process of electrolysis through examples
- Infer that passage of electric current through a conducting solution causes chemical reactions
- Justify that electrical appliances should not be touched with wet hands
- Test whether fruits and vegetables also conduct electricity
- Explain the applications of electroplating in day to day life
- Describe the process that is used to carry out purification of copper
- Appreciate how the process of electroplating helps to coat a layer of more expensive metal over an object made of a cheaper metal thus giving it an expensive look. For example, silver plating on an artificial flower vase made up of ordinary metal
- Carry out an activity to show that liquids conduct electricity
- Carry out an activity to show that acidified water breaks down to form hydrogen and oxygen gas on passing current through it

Unit 7: Cell – A Coordinator

- Familiarize with biographies of scientists and their work in discovering the cell
- Understand the term structural and functional unit of a living organism
- Define a 'cell'
- Explore different shapes, sizes and number of cells that make an organism(s)
- Comprehend that cell is a unit of structure and function of an organism.
- Analyze the role of a cell as a coordinator
- Identify the role of parts of a cell and relate it to the function of an organism
- Differentiate between unicellular and multicellular organisms
- Compare and illustrate plant and animal cells

Unit 8: Managing Interdependence

- Relate the existence of flora and fauna in a given area
- Comprehend that different climatic conditions determine the flora and fauna
- Recognize inter –relationship between living and non-living components of the habitat
- Describe Interdependence between living organisms

- List and examine how unfavorable conditions affect lives of the organisms
- Identify and categorize man – made and natural disasters
- Relate man-made disasters to natural disasters
- Justify how human action can create conditions for natural disasters
- Prioritize responsibility to conserve wildlife
- Design campaigns for conservation of wildlife
- Classify the organisms according to their status (Endangered species)
- Illustrate with examples the role of adults, children, students for Reuse, Recycle, Reduce
- Restate that natural disasters happen more infrequently as compared to man-made disasters
- Comprehend the need to maintain a balance in the Ecosystem

Unit 9: Exploring Microorganism

- Recognise the presence of organisms which are not visible to the naked eye
- Explore diversity in the world of microbes and classify them on the basis of their distinctive features
- Identify the role of microbes in various spheres of life. (medicine, industry, environment, agriculture, etc.)
- Establish active and passive unique position of viruses in nature.
- Comprehend the importance of microbes as recyclers
- Cite examples of microbes becoming a threat to the living world – animals and plants
- List some methods of curtailing food spoilage by microbes and relate them to the day to day activities which prevent food spoilage

Unit 10: Light Exploration

- Understand the phenomenon of refraction of light
- Explore the factors that cause refraction of light
- Trace the path of a ray of light through different transparent media like a rectangular glass slab
- Apply the concept of refraction to real life examples
- Differentiate between convex and concave lens
- Perform experiments to show the formation of image by convex and concave lenses
- Analyse the use of different lenses for different purposes

- Understand the structure and function of human eye
- Explore common defects of vision and their correction
- Understand the need/importance of taking care of eyes
- Explore how visually challenged persons read or write and empathise with them
- Perform simple activities related to refraction of light

Unit 11: Some Natural Phenomena

- Recall the structure of an atom
- Understand the production of static charges on rubbing
- Explore how charges are acquired on different objects
- Investigate the behavior of charges
- Understand the working of an electroscope
- Understand how accumulation of charges in clouds causes lightning
- Explain the precautions which need to be taken during a thunderstorm
- Understand the working of a lightning conductor
- Understand the causes of an earthquake
- Collect information on different earthquake zones
- Explore the measures taken to minimize the destruction caused by an earthquake

Unit 12: The Night Sky

- Explore the phases of the moon to explain its formation
- Explain why we always see the same face of the moon
- Describe the surface of the moon
- Identify some common constellations in the night sky
- Name the planets in the solar system in order of distance from the Sun and state some facts about these
- Differentiate between a star and a planet
- Explain with diagrams how eclipses of the Sun and the Moon occur
- Describe some other members of the solar system like the asteroid, comets, meteor and meteorites
- Differentiate between natural and artificial satellite
- List the uses of artificial satellite
- Locate and use information about the universe from different sources

Unit 13: Synthetic Fibres and Plastics

- Recall the meaning of the terms: natural fibers and fabrics
- Define the terms: monomers, polymers, plastics and polymerization
- Comprehend the transformation from fiber to fabric
- Explain the meaning of synthetic fibers
- Name various synthetic fibers
- Distinguish between natural and synthetic fibers
- Describe the properties of various synthetic fibers
- Appreciate the knowledge of the properties of synthetic fibers before selecting a fiber for a particular purpose
- Learn the effect of heat on various fibers
- State the uses of synthetic fibers in daily life
- Explain different types of plastics
- Differentiate between different types of plastics
- Appreciate the importance of biodegradable plastics over non-biodegradable ones
- Recognize different linkages of monomers in plastics
- Describe the properties and uses of plastics
- Explore the harmful effects of excessive use of plastics on environment
- Discuss the ways to reduce usage of plastics
- Carry out a survey in your area and name the marts where use of plastic bags is totally prohibited

Unit 14: Coal and Petroleum

- Recall the meaning of the term natural resources
- Explain the term refining of Petroleum
- Classify natural resources as exhaustible and inexhaustible resources
- Appreciate the historical background of the formation of coal
- Classify different types of coal based on their carbon content
- Appreciate the uses of the products of destructive distillation of coal
- List the uses and properties of coke, coal tar and coal gas
- Describe the process of combustion of coal
- List the products of combustion of coal
- Relate the process of combustion of petroleum with coal
- Name various fractions of petroleum
- Comprehend the uses of various fractions
- Explain the process of Fractional distillation
- Describe the principle of Fractional distillation

- Infer the importance of non-renewable sources of energy
- Explore the harmful effects of excessive combustion of coal and petroleum
- Carry out an activity to study the process of destructive distillation of coal

Unit 15: Combustion and Flame

- Recall the process of Combustion
- Define the term ignition temperature
- Appreciate the significance of air for combustion
- Differentiate the types of combustion on the basis of availability of oxygen
- Compare Rapid, Spontaneous and Explosive combustion
- Classify different examples of combustion observed in daily life
- Recognize the necessary conditions of combustion
- Explain the methods of controlling fire
- Recognise that attainment of ignition temperature can be made easier or difficult
- Explore the working of a simple fire extinguisher
- Appreciate the aesthetic sense of chemistry behind fire extinguisher by writing the chemical equation
- Identify different zones of a candle flame
- Explain the fuel efficiency in terms of calorific value
- Describe the causes of burning of fuel
- Carry out an activity to prepare a simple fire extinguisher
- Carry out an activity to deduce the necessary conditions required for combustion

Unit 16: Air and Water Pollution

- Recall the composition of air
- Define the terms: pollution and pollutants
- Explain air pollution
- List some air pollutants
- Discuss the sources of air pollutants
- Examine the harmful effects of air pollutants
- Classify different types of smog
- Develop an understanding of Greenhouse effect and Global warming
- Name various greenhouse gases
- Explore the ways to reduce air pollution

- Predict the meaning of water pollution
- Enlist the factors responsible for water pollution
- Describe the meaning of potable water
- Determine various ways to reduce pollution
- Carry out a survey of your local area by rising factories to find out the measures taken by them to reduce air and water pollutions
- Carry out simple activities to purify water which lead to reduction in air and water pollutions

Unit 17: Cell to Organism

- Recall the characteristics of living beings
- Comprehend the importance of reproduction in the continuation of species
- Categorize reproduction as Asexual and Sexual reproduction
- Describe and draw the structure of male and female reproductive system
- Relate the structure of reproductive organs with their functions
- Describe the process of fertilization
- Identify male and female gametes
- Define the term fertilization
- Outline the steps of development of foetus from a zygote
- Diagrammatically present the steps of development of a zygote
- Differentiate between external and internal fertilization
- Distinguish between ovipary and vivipary
- Understand that asexual reproduction takes place in microscopic organisms
- Describe and draw the process of Budding and Binary Fission
- Appreciate the contribution of technology in medicine (e.g., IVF) and childless couple
- Imagine the impact of cloning of different organisms on society

Unit 18: Landmark in the Human Development

- Identify different physical, emotional and mental changes that occur during teenage
- Define and understand the term 'puberty' and 'adolescence' and secondary sexual characters
- Discuss the difference between secondary sexual characteristics of human male and female

- Differentiate endocrine glands from exocrine glands
- Locate the functions of different endocrine glands in a human body
- Describe the main functions of each glands and the role of hormones in maintaining homeostasis
- Correlate the role of pituitary gland as master gland
- Identify different disorders/diseases caused due to malfunctioning of different glands and interpret their symptoms
- Recognise the importance of reproductive health and importance of nutritional needs of adolescents
- Discuss the possible role of hormones in life cycle of animals other than humans. Example - butterfly and frog

Unit 19: Technology in Food Production

- Recognize agriculture as the biggest industry in the world
- Distinguish between various categories of crop plants on the basis of season and the part which is used the most
- Identify the benefits that horticulture has brought to the farmers as well as the economy of a country
- Compare the conventional and modern methods of agricultural practices and relate them to the progress made in the field of agro sciences and technology
- Interpret the link between scientific advancement and the development of high yielding methods using scientific methods
- Describe the role of different agricultural revolutions in making the countries self-sustainable