Science Course Structure - Class VIII (Theory)

1. Food (Periods - 22)

Crop production

Questions	Crop production: How are different food crops produced? What are the various foods we get from animal sources?
Key Concepts	Crop production: Soil preparation, selection of seeds, sowing, applying fertilizers, irrigation, weeding, harvesting and storage; nitrogen fixation, nitrogen cycle.
Resources	Interaction and discussion with local men and women farmers about farming and farm practices; visit to cold storage, go- downs; visit to any farm/ nursery/ garden.
Activities/Processes	Preparing herbarium specimens of some crop plants; collection of some seeds etc; preparing a table/chart on different irrigation practices and sources of water in different parts of India; looking at roots of any legume crop for nodules, hand section of nodules.

Micro-organisms

Questions	What living organisms do we see under a microscope in a drop of water? What helps make curd? How does food go bad? How do we preserve food?
Key Concepts	Micro organisms – useful and harmful.
Resources	Microscope, kit materials; information about techniques of food preservation.
Activities/Processes	Making a lens with a bulb; Observation of drop of water, curd, other sources, bread mould, orange mould under the microscope; experiment showing fermentation of dough – increase in volume (using yeast) – collect gas in balloon, test in lime water.

2. Materials (Periods - 26)

Materials in daily life

Questions	Are some of our clothes synthetic? How are they made?

	Where do the raw materials come from? Do we use other materials that are synthetic? Do we use cloth (fabric) for purposes other than making clothes to wear? What kind of fabric do we see around us? What are they used for?
Key Concepts	Synthetic clothing materials. Other synthetic materials, especially plastics; usefulness of plastics and problems associated with their excessive use.There are a variety of fibrous materials in use. A material is chosen based on desired property.
Resources	Sharing of prior knowledge, source materials on petroleum products.Collection of material from neighbourhood or should be part of the kit.
Activities/Processes	Survey on use of synthetic materials. Discussion. Testing various materials – for action of water, reaction on heating, effect of flame, electrical conductivity, thermal conductivity, tensile strength.

Different kinds of materials and their reactions.

Questions :

Can a wire be drawn out of wood? Do copper or aluminium also rust like iron?

What is the black material inside a pencil? Why are electrical wires made of aluminium or copper?

Key Concepts	Metals and non-metals.
Resources	Kit items.
Activities/Processes	Simple observations relating to physical properties of metals and non-metals, displacement reactions, experiments involving reactions with acids and bases. Introduction of word equations.

How things change/ react with one another

Questions	What happens to the wax when a candle is burnt? Is it possible to get this wax back? What happens to kerosene/natural gas when it is burnt? Which fuel is the best? Why?

Key Concepts	Combustion, flame All fuels release heat on burning. Fuels differ in efficiency, cost etc. Natural resources are limited. Burning of fuels leads to harmful by products.
Resources	"The Chemical History of a Candle", by M. Faraday, 1860. Collecting information from home and other sources.
Activities/Processes	Experiments with candles. Collecting information. Discussions involving whole class.

3. The World of the Living (Periods - 44)

Why conserve

Questions	What are reserve forests/ sanctuaries etc? How do we keep track of our plants and animals? How do we know that some species are in danger of disappearing? What would happen if you continuously cut trees?
Key Concepts	Conservation of biodiversity/wild life/ plants; zoos, sanctuaries, forest reserves etc. flora, fauna endangered species, red data book; endemic species, migration.
Resources	Films on wild life, TV programmes, visit to zoo/ forest area/sanctuaries etc.; case study with information on disappearing tigers; data on endemic and endangered species from MEF, Govt. of India, NGOs
Activities/Processes	Discussion on whether we find as many diverse plants/ animals in a 'well kept area' like a park or cultivated land, as compared to any area left alone. Discussion on depletion of wild life, why it happens, on poaching, economics.

The cell

Questions	What is the internal structure of a plant – what will we see if we look under the microscope? Which cells from our bodies can be easily seen? Are all cells similar?
Key Concepts	Cell structure, plant and animal cells, use of stain to observe, cell organelles – nucleus, vacuole, chloroplast, cell membrane, cell wall.

Resources	Microscope, onion peels, epidermal peels of any leaves, petals etc, buccal cavity cells, Spirogyra; permanent slides of animal cells.
Activities/Processes	Use of a microscope, preparation of a slide, observation of onion peel and cheek cells, other cells from plants e.g. Hydrilla leaf, permanent slides showing different cells, tissues, blood smear; observation of T.S. stem to see tissues; observing diverse types of cells from plants and animals (some permanent slides).

How babies are formed

Questions	How do babies develop inside the mother? Why does our body change when we reach our teens? How is the sex of the child determined? Who looks after the babies in your homes? Do all animals give birth to young ones?
Key Concepts	Sexual reproduction and endocrine system in animals, secondary sexual characters, reproductive health; internal and external fertilisation.
Resources	Counsellors, films, lectures.

4. Moving Things, People and Ideas

Idea of force

Questions	What happens when we push or pull anything? How can we change the speed, direction of a moving object? How can we shape the shape of an object?
Key Concepts	Idea of force-push or pull; change in speed, direction of moving objects and shape of objects by applying force; contact and non-contact forces.
Resources	Daily-life experience, kit items.
Activities/Processes	Observing and analysing the relation between force and motion in a variety of daily-life situations. Demonstrating change in speed of a moving object, its direction of motion and shape by applying force. Measuring the weight of an object, as a force pull) by the earth using a spring balance.

Friction

Questions	What makes a ball rolling on the ground slow down?
Key Concepts	Friction – factors affecting friction, sliding and rolling friction, moving; advantages and disadvantages of friction for the movement of automobiles, airplanes and boats/ships; increasing and reducing friction.
Resources	Various rough and smooth surfaces, ball bearings.
Activities/Processes	Demonstrating friction between rough/smooth surfaces of moving objects in contact, and wear and tear of moving objects by rubbing (eraser on paper, card board, sand paper). Activities on static, sliding and rolling friction. Studying ball bearings. Discussion on other methods of reducing friction and ways of increasing friction.

Pressure

Questions	Why are needles made pointed? Why does a balloon burst if too much air is blown into it? Why does an inverted glass/ bottle/pitcher resist being pushed down into water? How can air/liquids exert pressure?
Resources	Daily-life experiences; E x p e r i m e n t a t i o n - improvised manometer and improvised pressure detector.
Activities/Processes	Observing the dependence of pressure exerted by a force on surface area of an object. Demonstrating that air exerts pressure in a variety of situations. Demonstrating that liquids exert pressure. Designing an improvised manometer and measuring pressure exerted by liquids. Designing improvised pressure detector and demonstrating increase in pressure exerted by a liquidat greater depths.

Sound

Questions	How do we communicate through sound? How is sound produced? What characterises different sounds?

Key Concepts	Various types of sound; sources of sound; vibration as a cause of sound; frequency; medium for propagation of sound; idea of noise as unpleasant and unwanted sound and need to minimise noise.
Resources	Daily-life experiences; kit items; musical instruments.
Activities/Processes	Demonstrating and distinguishing different types (loud and feeble, pleasant/ musical and unpleasant / noise, audible and inaudible) of sound. Producing different types of sounds. using the same source. Making a 'Jal Tarang'. Demonstrating that vibration is the cause of sound. Designing a toy telephone. Identifying various sources of noise. (unpleasant and unwanted sound) in the locality and thinking of measures to minimise noise and its hazards (noise-pollution).

5. How Things Work (Periods - 14)

Electric current and circuits

Questions	Why do we get a shock when we touch an electric appliance with wet hands? What happens to a conducting solution when electric current flows through it? How can we coat an object with a layer of metal?
Key Concepts	Water conducts electricity depending on presence/ absence of salt in it. Other liquids may or may not conduct electricity. Chemical effects of current. Basic idea of electroplating.
Resources	Rubber cap, pins, water, bulb or LED, cells, various liquids. Carbon rods, beaker, water, bulb, battery. Improvised electrolytical cell, $CuSO_4$
Activities/Processes	Activity to study whether current flows through various liquid samples (tap water, salt solution, lemon juice, kerosene, distilled water if available). Emission of gases from salt solution. Deposition of Cu from copper sulphate solution. Electric pen using KI and starch solution. Simple experiment to show electroplating.

6. Natural Phenomena (Periods - 26)

Rain, thunder and lightning

Questions	What is lightning?What safety measures should we take against lightning strikes?
Key Concepts	Clouds carry electric charge. Positive and negative charges, attraction and repulsion. Principle of lightning conductor.
Resources	Articles on clouds and lightning; kit items.
Activities/Processes	Discussion on sparks. Experiments with comb and paper to show positive and negative charge. Discussion on lightning conductor.

Light

Questions	What are the differences between the images formed on a new utensil and an old one? Why is there this difference? When you see your image in the mirror it appears as if the left is on the right – why? Why don't we see images on all surfaces around us? What makes things visible? How do we see images of our back in a mirror? Why do we sometimes see colours on oil films on water? What is inside our eye that enables us to see? Why are some people unable to see?
Key Concepts	Laws of reflection. Characteristics of image formed with a plane mirror. Regular and diffused reflection. Reflection of light from an object to the eye. Multiple reflection. Dispersion of light. Structure of the eye. Lens becomes opaque, light not reaching the eye. Visually challenged use other senses to make sense of the world around. Alternative technology available. Role of nutrition in relation to blindness
Resources	Mirror, source of light, ray source (mirror covered with black paper with a thin slit). Plane glass, candle, scale.

	Experience.
	Mirrors and objects to be seen.
	Plane mirror, water.
	Model or chart of the human eye.
	Experiences of children; case histories. Samples of Braille sheets.
Activities/Processes	Exploring laws of reflection using ray source and another mirror.
	Locating the reflected image using glass sheet and candles.
	Discussion with various examples. Activity of observing an object through an object through a straight and bent tube; and discussion. Observing multiple images formed by mirrors placed at angles to each other.
	Making a kaleidoscope. Observing spectrum obtained on a white sheet of paper/wall using a plane mirror inclined on a water surface at an angle of 45^0.
	Observing reaction of pupil to a shining torch. Demonstration of blind spot.
	Description of case histories of visually challenged people who have been doing well in their studies and careers. Activities with Braille sheet.

Night sky

Questions	Idea about heavenly bodies/celestial objects and their classification – moon,
Key Concepts	What do we see in the sky at night? How can we identify stars and planets?
	planets, stars, constellations. Motion of celestial objects in space; the solar system.
Resources	Observation of motion of objects in the sky during the day and at night; models, charts, role-play and games, planetarium.
Activities/Processes	Observing and identifying the objects moving in the sky during the day and at night.
	Observing and identifying some prominent stars and constellations.
	Observing and identifying some prominent planets, visible to the naked eye, (Venus, Mars, Jupiter) in the night sky and their movement.
	Design and preparing models and charts of the solar system, constellations, etc.
	Roleplay and games for understanding movement of planets, stars etc.

Earthquakes

Questions	What happens during an earthquake? What can we do to minimise its effects?

Key Concepts	Phenomena related to earthquakes.
Resources	Earthquake data; visit to seismographic centre.
Activities/Processes	Looking at structures/ large objects and guessing what will happen to them in the event of an earthquake; activities to explore stable and unstable structures.

7. Natural Resources

Man's intervention in phenomena of nature

Questions	What do we do with wood? What if we had no wood? What will happen it we go on cutting trees/grass without limit? What do we do with coal and petroleum? Can we create coal and petroleum artificially?
Key Concepts	Consequences of deforestation: scarcity of products for humans and other living beings, change in physical properties of soil, reduced rainfall. Reforestation; recycling of paper. Formation of coal and petroleum in nature. (fossil fuels?). Consequences of over extraction of coal and petroleum.
Resources	Data and narratives on deforestation and on movements to protect forests. Background materials, charts etc.
Activities/Processes	Narration and discussions. Project- Recycling of paper. Discussion.

Pollution of air and water

Questions	What are the various activities by human beings that make air impure? Does clear, transparent water indicate purity?
Key Concepts	Water and air are increasingly getting polluted and therefore become scarce for use. Biological and chemical contamination of water; effect of impure water on soil and living beings; effect of soil containing excess of fertilisers and insecticides on water resources. Potable water.

Resources	Description of some specific examples of extremely polluted rivers.
Activities/Processes	Case study and discussion. Purification of water by physical and chemical methods including using sunlight. Discussion on other methods of water purification.