Theme 1: Plant Life

Plants play an important role in our lives. As learnt in the previous classes, there exists a great variety of plant life on the planet Earth. Plants vary in size from minute microscopic forms to complex tall trees. Most of the tall trees belong to higher plants. Herbs and shrubs also constitute a large proportion of higher plants. In previous classes, children have already been familiarised with parts of a plant body (root, stem, leaf, flower, fruit and seed) and their functions. This topic aims at enabling children to know and learn more about the leaf, flower and fruit, including the arrangement, characteristics and functions of the parts of a leaf and flower. Modifications of leaves for performing special functions will also be covered in this topic.

Learning Outcomes:

Children will be able to:

- distinguish between leaves (reticulate vs parallel venation /simple vs compound leaves);
- recognize, identify and draw figures of leaf modifications for support, protection, reduction in water loss and vegetative propagation in leaf;
- recognize that flowers are of various shapes, sizes and colours and are an important part of the plant;
- collect and preserve various types of flowers;
- explain the structure and function of each whorl of flower (complete flower);
- list the agents of cross pollination;
- learn the process of seed germination and list the conditions required for germination;
- list common names of locally available plants;
- list the various types of modifications for special functions such as vegetative propagation and storage.

Plant Life

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
THE LEAF ▸ External structure (parts of a leaf in detail). ▸ Kinds of leaves (simple & compound). ▸ Types of venation (reticulate and parallel). ▸ Functions of leaf (main functions). ▸ Modifications (tendrils, spines, scale leaves). ▸ Insectivorous plants. Need for modification with an example. ▸ Vegetative propagation in leaf (example bryophyllum).	▸ Revisiting previous concepts and building on past learning. ▸ Promoting children's observation of plants in their surroundings, and drawing pictures with the common names of the plants written below the pictures. ▸ Providing opportunities for children to observe plants, leaves and flowers through organizing a visit to a nearby garden or forest area. ▸ Asking children to draw different types of leaves, their structure and kinds and types of venation and modifications. ▸ Observing a pea plant, noting the tendril which is a modified leaf.	▸ Visit to school or nearby garden or park/ forest with teachers/ parents. ▸ Specimens of different types of leaves, school garden /herbarium. ▸ Charts /specimens of leaf modifications. ▸ Demonstration

Plant Life

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
THE FLOWER • Parts (4 whorls), structure and function of each whorl. • Pollination (self and cross): An idea about agents of cross pollination (wind, water and insects – their examples). • Fertilization: process in simple terms. • Formation of fruit – fate of each part (whorl) of flower after fertilization. • Parts of fruits: dry and fleshy, examples of dry and fleshy parts; parts of the pericarp of fleshy fruits (epicarp, mesocarp, endocarp) and function of each part. • Seed- parts (cotyledon, embryo: Radicle, plumule) and types (monocot, dicot) • Germination – conditions required for germination (moisture, warmth), seed germination of different seeds.	• Discussing the function of a tendril. • Conducting activities to demonstrate photosynthesis and transpiration in leaves. • Observing spines in the Cactus plant and stating their function. • Drawing a diagram of the Cactus plant and labelling it. • Organising activities to observe vegetative propagation in leaf and discussing. • Asking children to observe a flower (such as petunia, china rose or mustard) and studying its different parts and whorls. • Encouraging children to draw pictures of different flowers and labelling the parts observed (only complete flowers showing all 4 whorls). • Discussing the process of fertilization in plants using models/ charts, etc. • Studying and drawing pictures of different fruits (like pea, bean, mango, tomato, coconut); and seeds of maize, wheat/paddy (rice). • Asking children to soak seeds in a petri dish containing a wet blotting paper to observe germination phenomenon. • Asking learners to classify fruits as dry and fleshy. • Developing a herbarium of flowers / leaves. • Conducting simple activities to identify: cotyledon, monocot seeds, dicot seeds. • Setting up experiments for seed germination in different seeds.	• Flowers – petunia, China rose and/or mustard; • Charts /specimens of inflorescence, flowers, fruits, dicot and monocot embryo, vs mango or any other fruit. • Fruits such as, pea, bean, mango, tomato, coconut. • Germinating seeds.

Integration: Geography, Languages
Life Skill: Sensitivity towards environment

Theme 2: The Cell

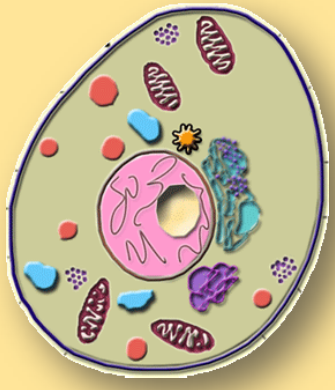
In this theme children will be introduced to the Cell. All living things consist of cells. A few organisms are single- celled (unicellular), while majority of the organisms are many-celled (multicellular). In structure, cells in plants and animals are quite similar, except for a few differences. Cells contain organelles which perform important functions for the sustenance of life. Plant cells are characterized by presence of a cell wall, plastids and a large vacuole whereas animal cells do not possess cell wall and plastids.

Learning Outcomes:

Children will be able to:

- identify difference in unicellular and multicellular organisms and cite examples;
- observe cell (plant and animal) under microscope and discuss in class;
- identify the different cell organelles (cell wall, cell membrane, nucleus, chloroplast, vacuole) and learn about their primary functions;
- distinguish and draw diagrams of a plant cell and an animal cell.

The Cell

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Plant cell: Cell organelles and their functions. ▸ Animal cell: Cell organelles and their functions. ▸ Diagrams of plant and animal cell. ▸ Only the following to be included: Cell wall, Cell membrane, Plastids, Nucleus, Vacuole, Cytoplasm – their structure and functions ▸ Differences between plant and animal cells.	▸ Organising visits to the laboratory to show children slides on the theme. ▸ Asking children to observe and draw the structures seen in the permanent slides of: ☛ *cells from onion peel* ☛ *human cheek cells* ☛ *blood Cells* ☛ *Amoeba* ☛ *Chlamydomonas* ▸ Asking children to differentiate between plant and animal cells based on their observations of slides. ▸ Showing videos and PPTs on structure of the Cell. ▸ Assigning projects and preparation of models (individually or in groups) on plant and animal cell; ▸ Discussing the structure and functions of cell organelles; ▸ Appreciating the discovery and use of the microscope in human life.	▸ Permanent slides of onion peel, human cheek cells, blood cells, *Amoeba*, *Chlamydomonas using* a microscope. ▸ Microscope. ▸ Models and charts of the above -listed materials ▸ Videos, E.M. photographs and PPTs of plant and animal cell, listed cell organelles. 

Theme 3: Human Body

The human body consists of a number of organ systems. Some of the major organ systems are the digestive, respiratory, circulatory, excretory, nervous and skeletal system. Each of these systems consists of organs, which help them perform specific functions. The expectation of this theme is to develop an understanding in children of the functioning of the digestive, respiratory and circulatory systems in the human body.

Learning Outcomes:

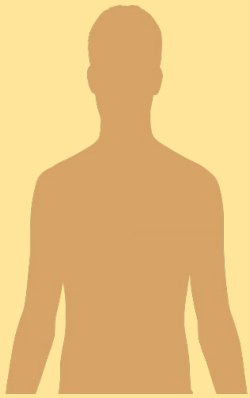
Children will be able to:

- list the main parts and functions of each part of the respiratory system;
- distinguish between respiration and breathing;
- outline the mechanism of breathing and the role of diaphragm in inhalation and exhalation;
- name some common respiratory diseases;
- explain the main parts of the circulatory system;
- list the components of blood and types of blood vessels;
- take their own/ others' pulse;
- demonstrate the significance of exercise and good food habits in keeping the heart healthy.

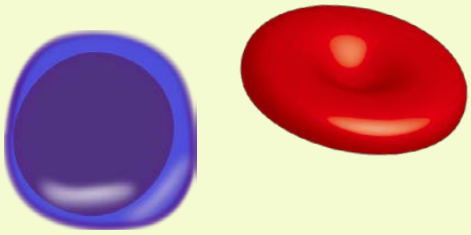
Human Body

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Digestive System ▸ Revisit previous learning. ▸ Organs of the digestive system; function of each organ. ▸ Process of digestion particularly of Carbohydrates Proteins and Fats.	▸ Discussing with children about their own experiences. ▸ Providing opportunities to: ☛ *draw diagram of digestive system and label its parts.* ☛ *describe functions of each organ.* ☛ *make model / functional model of digestive system.* ▸ Discussing the process of digestion in terms of: ☛ *site of components of food;* ☛ *role of enzymes in digestion end products of the digestive process.* ▸ Discussing and finding out: ☛ *causes of indigestion.* ☛ *healthy and unhealthy food habits.* ☛ *ways to keep on oneself healthy.* ▸ Assigning Projects either in groups or individually to - interview three people and find out about their food habits. Sharing the same in class.	▸ Picture of Digestive system ▸ Working Model of the Digestive system. ▸ Children's drawings. ▸ ▸ Interview. ▸ Report on project work. ▸ Models and charts. ▸ PPTs and videos. ▸ Family doctor/Other Doctors.
Respiratory System ▸ Main parts (nose, pharynx, larynx, trachea, bronchi, lungs); functions of each part of the respiratory	▸ Asking children to: ☛ *observe through models and charts different parts of the human respiratory system;*	▸ Models and charts ▸ PPTs and videos

Human Body

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
system. ▸ Difference between respiration and breathing. ▸ Mechanism of breathing (physical process with respect to diaphragm and ribs-inhalation and exhalation). ▸ Mention of common respiratory diseases: asthma, bronchitis, pneumonia, tuberculosis (T.B.).	☛ *draw pictures of respiratory system and label its parts;* ☛ *discuss the process of respiration using working models;* ☛ *discuss the effects of increased physical activity on breathing;* ☛ *inviting a doctor to discuss health issues related to diseases.* ▸ Discussing various causes of diseases related to respiration; ▸ Identifying ways to prevent diseases related to respiration.	
Circulatory System ▸ Main parts of the circulatory system (heart, blood, blood vessels). ▸ Process of circulation in the body. ▸ Components of blood (plasma and blood cells - RBC, WBC, platelets with their functions only). ▸ Types of Blood groups (A, B, AB, O): mention only. ▸ Blood pressure (concept only); heartbeat, pulse ▸ Keeping the heart healthy through exercise and good food habits.	▸ Asking children to: ☛ *observe different parts of the human circulatory system through models and charts;* ☛ *draw the figure of a heart; circulatory system;* ☛ *identify the different types of blood vessels and components of blood through PPTs/ videos/ permanent slides.* ▸ Inviting a doctor and/or visiting a doctor to know about blood pressure and observing the instrument used to measure it and how it is done; ▸ Showing children how to measure their pulse. ▸ Demonstrating activities related to: process of deep breathing, brisk walking/ jogging. ▸ Discussing the need for a blood bank, blood donation.	▸ Models and charts ▸ PPTs and videos ▸ Permanent slides of blood cells. ▸ Instrument used to measure blood pressure.

Integration: Chemistry, Health and Physical Education



Theme 4: Health and Hygiene

Health is defined as a state of complete physical, mental and social well-being. When diseases occur, the normal functioning of the body is disturbed. Hygiene includes all factors that contribute to healthy living. Three factors that are important for maintaining good health are balanced diet, personal cleanliness and public sanitation. This theme focuses on enabling children to know and understand that diseases are broadly classified into communicable (or infectious) diseases, and non-communicable (non-infectious) diseases and also how diseases are transmitted and why it is essential to control them.

Learning Outcomes:

Children will be able to:

- explain the meaning of terms such as 'health', 'hygiene' and 'disease';
- relate the knowledge acquired to the personal experiences of diseases suffered, if any.
- relate the types of diseases on the basis of their transmission as infectious and non-infectious.
- spread awareness regarding diseases to friends and family.

Health and Hygiene

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Types of diseases (communicable and non-communicable). ▸ Communicable diseases: bacterial, viral, protozoal, diseases caused by worms (common examples of each). ▸ Modes of transmission of diseases (air, water, food, insects). ▸ Ways to prevent communicable diseases. ▸ Non-communicable diseases: examples, ways to prevent them. ▸ Hygiene – ways to keep the surroundings clean, safe disposal of garbage, healthy practices for hygiene.	▸ Building on previous learning and concepts. ▸ Discussing with children: ☛ names of some diseases and their symptoms; ☛ some non-communicable diseases: their causes and ways to prevent them; ☛ prevention of diseases while sharing their experiences. ▸ Asking children to relate their experiences when they had a particular disease/ seen patient in the family. ▸ Organizing brainstorming sessions to discuss: ☛ disposal of garbage, its segregation ☛ healthy practices for hygiene ☛ ways to keep the surroundings clean	▸ Charts. ▸ PPTs. ▸ Videos. ▸ Physician. ▸ Discussion on disposal practices

Integration: Health and Physical Education

Life Skill: Health awareness, concern for environmental cleanliness

Theme 5: Adaptation

All living organisms, for their survival, need to be well-suited to the environment in which they live. To attain this, organisms develop some features which help them to survive and reproduce in their environment. Features so acquired help organisms to adapt to their particular environments. This theme enables children to understand how some plants and animals are adapted to live and survive in dry habitats, whereas others can live in water or on mountains, or fly in air.

Learning Outcomes:

Children will be able to:

- define adaptation and habitat;
- recall the names of plants and animals, and their adaptations studied in earlier classes;
- record the adaptations shown by plants and animals living in desert/ aquatic conditions;
- prepare a list of plants and animals occurring in different habitats with their common names and adaptations.

Adaptation

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Habitat – definition. ▸ Adaptations of plants and animals to the following habitats along with characteristics and examples: ☛ *Aquatic habitat- floating, submerged and fixed plants; adaptations in fish.* ☛ *Desert - adaptations in cactus as desert plant and camel as desert animal.* ☛ *Mountain – adaptations in trees like Pine and Fir; mountain goat* ☛ *Air - adaptation for flight in birds, aerial plants.*	▸ Discussing the concept of habitat and adaptation in plants and animals though examples. ▸ Asking learners to study external features of: ☛ *Water lily and water hyacinth (with floating leaves)* ☛ *Hydrilla (root submerged)* ☛ *Cactus/Opuntia (desert habitat)* ☛ *Babul or Kikar (desert habitat)* ☛ *Pine/Fir (mountain region).* ▸ Drawing pictures of above-named plants and writing down the special features ▸ Asking children to - collect information and study the external features of fish, camel, bird (pigeon) and mountain goat. ▸ Drawing pictures of above mentioned animals and describing their special features.	▸ Preserved/ herbarium/ fresh specimens of plants and animals from different habitats (aquatic, desert, mountain, air). ▸ Field visit for observations in nature ▸ PPTs. ▸ Videos. ▸ Pictures and photographs.

Integration: Geography, Languages

Theme 1: Tissue

In the previous class, children learnt about the cell, which is the basic unit of life in plants and animals. The cells are organized into tissues, organs, organ-systems and finally into an organism. The theme in this class will focus on enabling children to know about tissues and the different types of tissues in plants and animals.

Learning Outcomes:

Children will be able to:

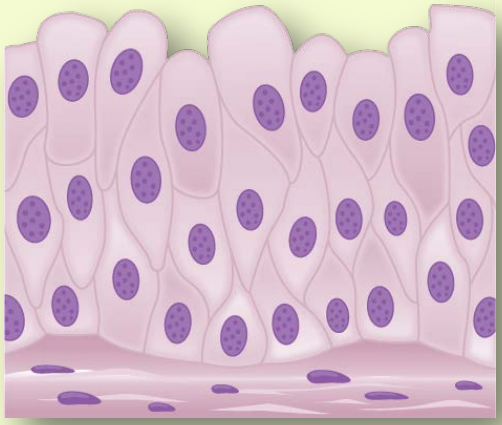
- define the term 'tissue';
- relate that plants and animals have different types of tissues;
- explain the differences between meristematic and permanent tissues with examples;
- draw the relation between structure, location and function of different tissues;
- draw diagrams of different tissues and label them;
- classify the different types of animal tissues (epithelial, connective, muscular and nerve tissues) with functions.

Tissue

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Plant Tissues ▸ Definition of tissue. ▸ Classification of plant tissues: Meristematic and permanent (simple and complex). ▸ Meristematic tissues: characteristics (any two), simple structure, location, function, examples. ▸ Simple permanent tissues: parenchyma, collenchyma, sclerenchyma (simple structure, location and functions of each), examples. ▸ Complex permanent tissues: xylem, phloem (only nature of cells and function. Elements of xylem and phloem not to be mentioned).	▸ Showing and explaining the different plant tissues to children - their location, structure, characteristics and functions charts and models. ▸ Encouraging children to develop charts and models. ▸ Drawing of diagrams by children of kinds of tissues and differentiating between them. ▸ Collecting more information on plant tissues, such as tissue culture by children in groups or individually **Experiments** ▸ Keep a twig of petunia with white flowers in a beaker containing coloured water and observe the flowers after a few hours (flowers will become coloured). ▸ Perform an experiment and ask the children to observe and record what happens to the plant seedlings if the roots	▸ Permanent slides on kinds of tissues. ▸ Charts and models. ▸ PPTs and Videos on tissues. ▸ Photographs and pictures of tissues. 

Tissue

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Animal Tissues ▸ Epithelial tissue: simple location, and function (types of epithelial tissue not to be mentioned). ▸ Connective tissue location and functions of areolar, adipose, bone, cartilage, blood, ligament, tendon. ▸ Muscular tissue: location and one function of: ☛ *striated (voluntary or skeletal muscle),* ☛ *unstriated (involuntary/ smooth muscle),* ☛ *cardiac (specialized muscle*). ▸ Nerve tissue: parts of neuron (cell body, Dendron, axon). ***Note**: Only basic structure and basic functions of the above mentioned tissues to be done.*	are removed and seedlings are kept in coloured water. **Animal Tissues** ▸ Showing diagrams of the following tissues: Epithetical, Connective, Muscular and Nervous tissue, through charts and models. ▸ Providing opportunities to children to: ☛ *draw diagrams of animal tissues.* ☛ *label them* ☛ *write functions of each kind of tissue* ☛ *collect more information on animal tissues* ☛ *model/charts of animal tissues.* ▸ Showing children, the model of the nervous system and pictures of Dendron and axon. ▸ Asking children to draw a diagram of nerve tissue. ▸ Discussing functions of nervous system.	▸ Specimens, charts and models. ▸ Models and pictures of nervous system. ▸ Children's drawings.



Theme 2: Kingdom Classification

This theme gives an insight into the study of the types of Kingdoms in Plants and Animals. Living organisms are divided into two kingdoms – Kingdom Plantae and Kingdom Animalia. The kingdom Plantae includes plants, while the animals are included under kingdom Animalia. This two-kingdom classification was found inadequate in the light of disputed position of organisms like bacteria and fungi. In view of the objections to the two-kingdom system of classification, a Five-Kingdom Classification was proposed in 1969. The five Kingdoms are Monera, Protista, Fungi, Plantae and Animalia.

Learning Outcomes:

Children will be able to:

- explain the purpose and advantages of classification;
- explain the basis of 5-kingdom classification;
- differentiate between major groups of organisms;
- draw pictures of organisms representing each kingdom;
- list the useful and harmful effects of bacteria and fungi;
- infer that complex organisms have evolved from simple organisms (evolution of life).

Kingdom Classification

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Meaning and concept of classification. ▸ Need and advantages of Classification. ▸ Characteristics of each kingdom with suitable examples: (i) Monera: bacteria - shape; useful bacteria, harmful bacteria (applications related to daily life to be discussed); (ii) Protista: *Amoeba* - basic structure and life processes (nutrition, locomotion, respiration, excretion and reproduction – by binary and multiple fission); (iii) Fungi: basic structure of mould, nutrition and respiration in mould, useful fungi, harmful fungi (applications related to daily life to be discussed); (iv) Plantae: characteristics and examples (classification of plantae not to be discussed); (v) Animalia (a) Vertebrates. (b) Invertebrates: 9 major Phyla, Porifera, Cnidaria, Coelenterata, Platyhelminthes, nematoda, Annelida, Arthropoda, Mollusca, Echinodermata) (Two characteristics and two examples of each Phylum).	▸ Providing opportunities for observation through visit to a nearby garden/zoo or a nature walk. ▸ Asking children to classify or group these plants and animals in their own way. ▸ Learning about different organisms belonging to each kingdom and asking them to write about examples of each kingdom. ▸ Drawing pictures of organisms belonging to each kingdom. ▸ Encouraging children to collect more information on each phylum. ▸ Assigning projects to make picture cards and writing their features on the other side.	▸ Plants and animals in their natural habitats. ▸ Zoo to see the diversity of life. ▸ Specimen from the laboratory. ▸ Charts, Models and photographs. ▸ PPTs and Videos. ▸ Picture cards.

Life Skill: appreciate diversity of life

Theme 3: Plant Life

The theme Plant Life aims at promoting children's understanding that all living organisms despite their great diversity in shapes and sizes, show similarity in their activities. They all need food, energy, grow, remove waste materials from their bodies, reproduce and respond to their environment. Growth, excretion, reproduction and response to stimuli are some of the basic life processes. This theme will particularly focus on enabling children to understand the two important processes in plants of Photosynthesis and Respiration, differences between the two and factors affecting them.

Learning Outcomes:

Children will be able to:

- discuss and demonstrate that leaves perform the function of photosynthesis;
- enlist the factors affecting photosynthesis;
- draw picture of stomata and chloroplast;
- identify the difference between respiration and photosynthesis and relate that respiration and photosynthesis help maintain the balance of CO_2 and O_2 in the atmosphere;
- reason out that the energy produced in respiration is used up by the body to perform life-sustaining activities;
- differentiate between the aerobic and anaerobic respiration;
- discuss the need for growing more and more plants.

Plant Life

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Photosynthesis ▸ Definition, basic process, factors affecting photosynthesis: (light, carbon dioxide, water, chlorophyll), significance of photosynthesis, setup. ▸ Experiment to demonstrate photosynthesis process. **Respiration** ▸ Basic process, word equation; respiration as a process which releases energy; respiration in plants: two types (aerobic and anaerobic: basic concept, word equations for both, examples). ▸ Respiration and photosynthesis in plants, difference in both processes.	▸ Revisiting previous concepts. ▸ Building on children's previous learning. ▸ Asking children to observe the colour of leaves and also name plants that have yellow or red coloured leaves, discussing the reasons for such colours. ▸ Providing opportunities for observation of stomata and chloroplasts present in the leaves using a microscope. ▸ Drawing picture of stomata and chloroplast and labelling their parts. ▸ Summarizing the process of photosynthesis with the help of a word equation (No symbols) ▸ Demonstrating experiments in setup on photosynthesis and respiration with the support of elders. ▸ Demonstrating to children the hydrilla experiment to show evolution of oxygen during	▸ Charts. ▸ Plants like hydrilla (water plant), mushroom, money plant, yeast, leaves of croton, *Rhoeo* (*to see colour of leaves and performing experiments*). ▸ Permanent slides/fresh preparations of epidermal peels of leaves (to observe stomata) and Hydrilla leaf to study stomata and plastids. ▸ PPTs, videos.

Plant Life		
Key Concepts	**Suggested Transactional Processes**	**Suggested Learning Resources**
	photosynthesis. - Discussing the difference between aerobic and anaerobic respiration and citing examples of both. - Discussing differences between the respiration and photosynthesis process in plants and asking children to explain both the processes in their own words.	

Theme 4: Human Body

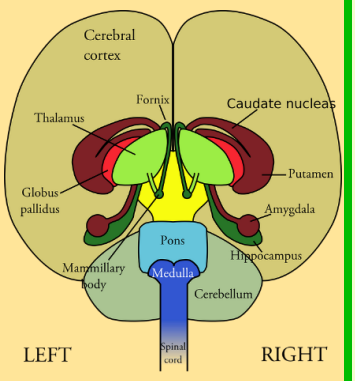
In the previous classes, children were exposed to basic information regarding some of the organ systems in the human body (digestive, respiratory and circulatory systems). In this theme, children will study the excretory and nervous systems in the human body.

Learning Outcomes:

Children will be able to:

- define the term 'excretion' and its need/significance;
- draw the outline figure of the human body and mark the location of kidneys, skin, sweat glands and lungs;
- infer that the kidneys are very important as they filter the blood;
- identify various parts of nervous system i.e. brain, spinal cord and nerves.
- discuss the need of spinal cord, brain, nerves for the body;
- relate that all parts of the body are connected to the brain through the nerves;
- list some of the activities that are under the control of the nervous system.

Human Body

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Excretory System **Excretion: Definition.** ▸ Organs and their excretory products (kidneys, sweat glands, lungs); ▸ Renal Excretory System - kidneys, ureter, urinary bladder, urethra (location and functions to be explained along with diagram); ▸ Role of kidneys infiltration of blood through millions of nephrons (details not required, structure of nephron not to be discussed); common disorders of the urinary system: Urinary Tract Infection, kidney stone. **Nervous System** ▸ Main parts: brain, spinal cord, nerves. ▸ Brain: cerebrum, cerebellum, medulla oblongata (location and function). ▸ Spinal cord: location and function. ▸ Nerves: what are nerves; their general function.	▸ Building on children's previous learning. ▸ Explaining the various parts of excretory and nervous system with the help of charts, models, PPTs and videos. ▸ Explaining the difference between excretory and waste products. ▸ Asking children to draw labelled diagrams of the following: ☛ *The excretory system showing the various parts along with labelling.* ☛ *The nervous system – the brain, spinal cord, and nerves.* ▸ Discussing common disorders of the urinary system. ▸ Assigning group projects on making models and charts on both systems. ▸ Providing children opportunities to share their personal experiences.	▸ Charts and models. ▸ PPTs and videos. ▸ Model of the brain and human excretory system. ▸ Children's drawings. 

Theme 5: Health and Hygiene

In the earlier classes children have learnt that diseases develop due to infections by micro-organisms, imbalances in diet and malfunctioning of vital body organs, and that hygiene is important to prevent spread of diseases. In this theme, children will know and understand the allergic reactions of the body due to certain substances in the environment and how they can be prevented.

Learning Outcomes:

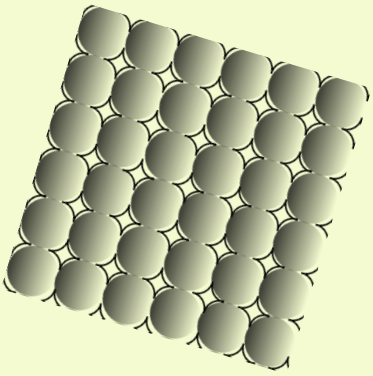
Children will be able to:

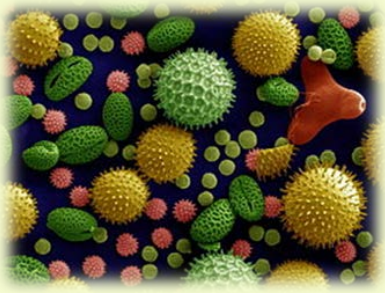
- define the terms allergy and allergens and differentiate between them;
- identify the symptoms produced by allergens;
- infer that allergy can be seasonal or perennial;
- know the precautions to be taken if they suffer from any particular type of allergy.

Health and Hygiene

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Allergy • Concept of allergy. • Allergens: Common allergens like dust, pollen grain, mites, strong sunlight, particular food items. • Entry routes of allergens: mouth, nose, skin. • Symptoms of allergic reaction. • Types of allergies: seasonal and perennial with examples. • Precautions and care to be taken by a person who is prone to allergies.	• Enlisting causes of allergy. • Discussing with children the concept of allergy, explaining the various aspects of entry route of allergens, symptoms produced, precaution to be taken to control allergic reactions. • Providing opportunities for discussion with the school physician. • Organising group discussion on prevention and care of allergy. • Discussing various ways to keep oneself healthy and safe.	• PPTs, Videos, photographs • Permanent/temporary slide of *Aspergillus* conidiophores • Photographs/ slide showing mites, pollen, etc. in house dust. • Physician.

Integration: Health and Physical Education
Life Skill: Health awareness





Theme 1: Transport of Food and Minerals in Plants

This theme deals with the movement of water containing minerals and food with plants. The exchange of water, gases, minerals and other substances into and out of the cells and also between neighbouring cells, takes place through a system called transportation system. In unicellular organisms (*Chlamydomonas*) and simple multicellular organisms like *Spirogyra*, diffusion is a major method of transportation. Diffusion of water across a semipermeable membrane is called osmosis. In complex higher plants because of enormity of size and complex organization, there is an elaborate transportation system and transport occurs through a vascular system of independent channels or conducting tubes (xylem and phloem). In addition to transport, xylem tissue also provides mechanical strength to the plant body. Essential mineral nutrients are also needed for the healthy growth of plant. In the absence or non-availability of the essential element the plant shows specific deficiency symptoms.

Learning Outcomes:

Children will be able to:

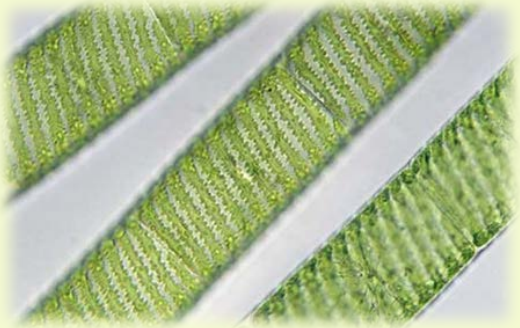
- learn about the existence of a transport system inside the plant body of complex multicellular higher plants;
- explain that transport in unicellular and simple multicellular plants takes place by diffusion;
- define and discuss diffusion, osmosis, transpiration, root pressure;
- perform experiments and demonstrate the process of osmosis;
- realize that the minerals required are either micronutrients or macronutrients depending upon the quantity required by the plants;
- relate that the deficiency or lack of essential nutrients leads to specific symptoms and diseases.
- define transpiration, interpret its role in xylem transport and know about the factors affecting rate of transpiration.
- demonstrate transpiration through simple experiments.

Transport of Food and Minerals in Plants

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Transport in Plants ▸ Diffusion – definition; ▸ Osmosis – definition, example, semipermeable membrane, root pressure; active transport. ▸ Transpiration - definition, importance and factors affecting transpiration. ▸ Structure and function of Xylem and Phloem in detail; ▸ Importance of minerals: macro and micro-	▸ Asking children to find out the presence/absence of conducting tissues in simple plants like *Chlamydomonas, Spirogyra* and higher plants like *Petunia, Vinca*, mustard, balsam, mango tree and neem tree; ▸ **Experiments** ☛ Putting a twig of (with white flowers) of petunia, balsam or *Vinca* in coloured water and noting the flower and portion of stem that becomes coloured (in a	▸ Charts, models ▸ PPTs, Videos ▸ Laboratory experiments ▸ Discussion ▸ Drawings

Transport of Food and Minerals in Plants

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
nutrients; three deficiency diseases caused by lack of these essential nutrients.	transverse/ vertical section of the twig). ☛ Demonstrating experiments on osmosis (potato osmoscope), diffusion, root pressure and transpiration (covering the aerial part with a bell jar/transparent colourless bag). ☛ Performing simple experiments to study the process of diffusion, osmosis, active transport and transpiration. ➢ Transverse section of wood of neem/mango or any other locally available specimen. ➢ Providing opportunities for observation of the conducting tissues through permanent/ freshly prepared slides, charts, models and PPTs; ➢ Asking children to draw the outline of transverse and vertical sections of stem of some of the above mentioned plants and locate the presence of xylem and phloem under the microscope; ➢ Drawing and labelling diagrams of experiments on osmosis, diffusion.	



Theme 2: Reproduction in Plants and Animals

Reproduction is one of the most important functions of living organisms. It is essential for perpetuation of species. There are two ways by which living organisms give rise to new organisms – Asexual (vegetative propagation) and sexual reproduction. While asexual reproduction involves a single individual parent, sexual reproduction involves two different individuals of different sexes, one male and another female. In this theme children will learn more about various methods of vegetative/asexual reproduction in plants and animals, a brief account of fertilization and post fertilization changes in flower and main organs of reproductive system of human male and female.

Learning Outcomes:

Children will be able to:

- record during a visit to garden the common names of plants and how they are multiplied;
- observe and correlate butterflies and honeybees moving around flowers to the process of pollination;
- ask the gardener how he raises or multiplies plants like jasmine, rose, Bryophyllum, Chrysanthemum, Dahlia, potato and money plant;
- observe in a nursery how cuttings and budding methods of vegetative propagation are used for growing larger number of roses;
- observe how grass plants which are planted at some distance from each other cover the entire soil after some days due to vegetative propagation;
- recognize that sexual reproduction involves the fertilization of an egg cell by a sperm cell to produce offspring that may closely resemble the parents.

Reproduction in Plants and Animals

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
PLANTS **Types of Asexual reproduction:** Binary fission, budding, fragmentation, spore formation, vegetative propagation, artificial propagation by tissue culture (basic process along with a suitable example of each) **Sexual reproduction in Plants:** ☛ Review of parts of a typical flower (4 whorls and their structure and function) ☛ Pollination: self and cross; ☛ Agents of pollination: three characteristics of plants pollinated by insects, water and wind (with examples).	Asking children their experiences about multiplication and reproduction in plants and animals seen by them in their surroundings. Analysing the advantages and disadvantages of vegetative propagation in group work. Learning the economic importance of artificial propagation. Providing opportunities for observations through various ways – ☛ *Observations of actual specimens in the field, dissecting a bisexual flower (mustard, china rose, vinca) to study the*	Actual specimens of flowers Biology laboratory with a dissecting and a compound microscope. Dissection of typical bisexual flower to study the different whorls. PPTs and Videos. Permanent/temporary slide preparations of budding in yeast and Hydra, dividing bacterium, fragmentation (fungal hypha/any filamentous algae, conidiophores or any other vegetative spores of any fungus. Bagging technique (emasculation and artificial pollination) Tissue culture photographs

Reproduction in Plants and Animals

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Characteristics of flowers of each kind. ☛ Fertilization process in brief by flow chart. ☛ Mention of artificial pollination. **ANIMALS** ➢ Sexual reproduction in humans: ➢ Main organs of male and female reproductive system	*different whorls;* ☛ *Observing permanent slides in the laboratory;* ☛ *Observing the pollinators (butterflies/ bees) and their movement from one flower to another of same plant, or from a flower of one plant to flower of another plant, observing a flower changing into a fruit in a kitchen garden (tomato/chilli/lady's finger etc.) and discussing pollination process in them.* ➢ Observing the flower of wheat, rice and maize plants; ➢ Learning through charts, PPTs, videos, the process of fertilization and artificial pollination. ➢ Explaining the main organs of human reproductive system (male and female) through charts and models.	➢ Charts/models/PPTs/videos of human reproductive system (male and female)

Theme 3: Ecosystems

A community of organisms (plants and animals) in a given area, live in harmony with the environment. There is a close interaction between the living (called biotic) and non-living (called abiotic) components of the environment. The study of interaction between biotic and abiotic components is known as ecology and the ecosystem is the basic unit of study. There are many types of ecosystems, namely aquatic (fresh water/ marine), terrestrial (forest/ grassland/ desert), etc. The composition of biotic community and the abiotic components (environment) varies in different ecosystems. Organisms develop adaptations suited to live in a particular environment. Living organisms, which may be producers (plants), consumers (animals) or decomposers (micro-organisms), are linked to each other through food chains. Ecosystems exhibit two important functional attributes (a) A unidirectional flow of energy from sun to producers to consumers and finally to decomposers, and (b) Cyclic flow of nutrients.

Learning Outcomes:

Children will be able to:

- define the terms ecosystem, producer, consumer, decomposer, food chain, food web and pyramid of numbers, with examples (technical terms);
- explain and analyze the biotic and abiotic components of an ecosystem;
- interpret the relationship between different biotic components in terms of food chain, food web and pyramid of numbers;
- evaluate the abiotic factors and their influence on biotic factors;
- describe and provide examples for inter dependence relationships between organisms (symbiosis, parasitism and predation);
- draw relationship between the flora and fauna of a particular forest ecosystem;
- make a flow chart of a food chain and food web.

Ecosystems

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Understanding ecosystems: definition, interaction between biotic and abiotic factors; ▸ Biotic components consisting of producers, consumers, decomposers. Meaning of food chain. Food web, and pyramid of numbers. ▸ Interdependence between organisms: symbiosis, parasitism and predation. ▸ Brief account of abiotic or non-living components such as air, soil, water and climatic factors such as sunlight, temperature, humidity and wind; ▸ Only, forest ecosystem with its flora and fauna to be taught.	▸ Asking children to observe plants and animals in their surroundings and noting down: ☛ *their names (help of the class teacher may be sought);* ☛ *names of animals which consume plants.* ☛ *names of larger animals which eat smaller ones.* ☛ *names of omnivores (if any)* Using the data collected to construct food chain, food web. ▸ Providing opportunities for observations on the flora and fauna of a forest ecosystem, and noting down: ☛ *The different producers and consumers;* ☛ *the decomposers acting on the leaves fallen on the forest floor, and* ☛ *the abiotic factors.*	▸ Visit to school/local garden, forest area ▸ Charts, photographs, PPTs. ▸ Specimens/pictures /charts of examples for predation, symbiosis, parasitism

Integration: Geography, Languages
Life Skill: Concern for environment

Theme 4: Human Body – Endocrine, Circulatory and Nervous Systems

This theme focuses on the nervous system. It aims at enabling children to know and understand that in human beings, there are two kinds of control and coordination (nervous and chemical). The nervous coordination is brought about by the nervous system, and the chemical coordination by the chemicals called hormones. Children will also learn about the hormonal system called endocrine system. In addition, this theme will build and expand on the respiratory, circulatory and systems, which were introduced in earlier classes.

Learning Outcomes:

Children will be able to:

- explain that in addition to nervous control, another control/coordination mechanism called hormonal control also exists in humans;
- define the terms – endocrine system, hormones, endocrine and exocrine glands;
- draw a diagram showing the location of endocrine glands in the body and describe the functions of hormonal glands namely the thyroid, adrenal, pituitary and pancreas;
- relate the knowledge gained and explain the changes in their own bodies;
- become aware about the changes that occur during adolescence and how to manage the emotional and physical changes;
- explain the techniques used in the management of stress;
- draw diagrams of the heart, circulatory system, neuron and reflex action;
- list out the functions of the heart, nervous system, lymph, RBC and WBC.

Human Body – Endocrine, Circulatory and Nervous Systems

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Endocrine System ▸ Two types of glands- exocrine, endocrine (basic concept and difference); ▸ Hormone (definition). ▸ Hormonal glands - (thyroid, adrenal, pancreas, pituitary); location and function of each. ▸ Following points to be studied in tabular form: name of gland, location in body, secretion, function.	▸ Discussing and explaining to children, the concept of hormones and endocrine glands. ▸ Describing the endocrine system in human beings through chart, models, PPTs and videos. ▸ Asking children to show the location of endocrine glands in the human body by means of a labelled diagram. ▸ Talk by the school physician emphasizing the role of endocrine glands in the life of the children; changes during adolescence and management of stress.	▸ Charts and models. ▸ PPTs and videos. ▸ School Physician/Doctor. ▸ Photographs of the structure of heart, neuron, circulatory system, nervous system. ▸ B.P measuring instrument, ECG; ▸ Charts and videos on reflex action.
Adolescence and accompanying changes ▸ Physical and emotional changes in the body during adolescence. ▸ Importance of personal hygiene.	▸ Discussing how hormones bring about changes in the body. ▸ Explaining the changes taking place (physical and emotional) in the body during adolescence; ▸ Discussing the importance of personal hygiene;	

Human Body – Endocrine, Circulatory and Nervous Systems

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Stress management (meaning of stress; ways to tackle stress: yoga, meditation, time management, sports, hobbies, rational thinking etc.)	▸ Discussing various ways to tackle stress.	
Circulatory System **Revisit learning of earlier class** ▸ Internal structure of heart in detail (including valves, septum; pace maker). ▸ Schematic diagram of the heart; ▸ Blood vessels - aorta, pulmonary trunk, coronary artery & vein, vena cava. ▸ Circulation of blood as double circulation. ▸ Blood Groups (A, B, AB and O): universal donor and universal acceptor. ▸ Conditions related to the functioning of the heart: palpitations, cardiac arrest and hyper tension. ▸ Introduction of lymphatic system as a parallel circulatory system.	▸ Revisiting previous concepts learnt by children. ▸ Revising what has been discussed in previous class. ▸ Building on children's previous learning. ▸ Explaining the internal structure of heart in detail including information on valves, septum and pace maker. ▸ Encouraging children to draw a labelled diagram of the heart. ▸ Discussing about the different types of blood vessels and double circulation. ▸ Introducing the lymphatic system and its role.	
Nervous System **Revisit learning of earlier class** ▸ Types of nerves: sensory, motor, mixed (function only). Cranial and spinal nerves (only definition and number). ▸ Structure of a motor neuron ▸ Central nervous system (CNS) in detail with its parts and their functions. ▸ Reflex action: definition and basic terms used to describe reflex action stimulus, response, impulse, receptor, effector); common examples of reflex action.	▸ Revising what has been discussed in previous class. ▸ Learning about the structure of a neuron. ▸ Explaining the central nervous system in detail through charts and diagrams. ▸ Discussing with children about Reflex action and its impact in their daily lives. Citing the example of Pavlov's experiment on the dog, and its relation to our body. ▸ Providing experiences to children by making them experience common reflex actions – when a hand is moved in front of the face – eyes close; when a knee is tapped while sitting, the foot moves forward etc.	

Theme 5: Health and Hygiene

In the previous classes, children learnt about health, personal and public hygiene, balanced diet, deficiency diseases, life style associated health problems and diseases caused by infection. In this class this theme aims at enabling children to know more about communicable diseases and understand their mode of transmission and prevention. Further, they will also understand the role of the immune system of the body in resisting diseases and the concepts of vaccination and immunization. Children will also appreciate the importance of 'First Aid' and learn to undertake some simple common first aid measures to deal with emergency situations.

Learning Outcomes:

Children will be able to:

- identify some communicable diseases, their causative agents and symptoms;
- show concern towards maintaining personal hygiene and cleanliness of the surroundings;
- list some common vector borne diseases;
- differentiate between vaccination and immunization;
- list the harmful effects of consumption of tobacco, drinking alcohol and taking habit forming drugs;
- use some simple first aid methods in day to day emergency situations.

Health and Hygiene

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Diseases ▸ A brief idea of communicable diseases (influenza, measles, malaria, dengue, chikungunya, HIV) – causative agents, symptoms and prevention to be dealt with in a tabular form. ▸ The meaning of vector. ▸ Method of preventing diseases in general; use of vaccines to be mentioned. ▸ Vaccination and immunization: the concepts and difference between the two. ▸ Harmful effects of consuming tobacco, drinking alcohol, taking drugs.	▸ Revising the topic on diseases, done in class VI. ▸ Revisiting concepts learnt by children. ▸ Building on children's previous learning. ▸ Explaining briefly about communicable diseases, their causal organisms, symptoms produced and methods of prevention and control. ▸ Discussing the general methods of preventing diseases. ▸ Explaining the concept of vaccination and immunization, giving examples. ▸ Discussing the harmful effects of consuming tobacco, drinking alcohol and taking drugs.	▸ PPTs, videos, documentaries on communicable diseases, first aid, harmful effects of liquor, drugs and tobacco. ▸ First aid Box. ▸ Visit to a hospital/ consulting the school physician. ▸ Hospital. ▸ School Physician/Doctor. ▸ Specimens/pictures of tobacco products showing warning messages. ▸ Charts/ PPTs/ of diseases such as malaria, chikungunya, measles, etc. ▸ Medicine shop, school dispensary.
First Aid ▸ First aid- meaning. ▸ First aid given in the following cases:(burns, bleeding, fracture,	▸ Requesting the school physician to demonstrate the methods of giving first aid.	

Health and Hygiene		
Key Concepts	**Suggested Transactional Processes**	**Suggested Learning Resources**
object in the eye, unconsciousness, swallowing poison, snake bite, stings).	▸ Organising a visit to the nearby hospital asking children to observe and then conduct a discussion with them. ▸ Asking children to prepare a first aid box which they can use at home.	

Integration: Health and Physical Education, Languages

Life Skills: Health Awareness, taking care of oneself and others

Theme 6: Food Production

Plants and animals provide a number of useful products to mankind. Plants are useful to us in many ways - as sources of food, fibre, timber, medicines, oils, dyes, resins and as ornamentals. Likewise, animals provide us milk, flesh, eggs, fibre, honey, silk, lac, and many more items. Micro-organisms like bacteria are also useful to us - in the production of cheese, bread, alcohol, vinegar and vaccines. There has been a great improvement in the techniques of food production and their scientific management over the years. This theme introduces children to the various methods of food production.

Learning Outcomes:

Children will be able to:

- discuss uses of bacteria in the food industry;
- list importance of mushroom and yeast in the food industry;
- explain the meaning of agriculture, horticulture, pisiculture (fish farming), apiculture, sericulture, green revolution, white revolution and animal husbandry;
- identify and provide examples for various food crops and cash crops cultivated in India and make a list of useful cereal, fruit and vegetable plants;
- list common names of (i) useful plants and animals, (ii) ornamental plants/decorative flowers;
- list the milk-yielding (milch) animals, meat and egg-laying animals, draught animals and poultry.

Food Production

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Bacteria: uses of bacteria in food industry. ▸ Fungi - Importance of mushrooms and yeast in food industry. ▸ Agriculture: cultivated crops (food-crops and cash crops), crops grown in India. ▸ Horticulture- vegetables, fruits, decorative plants and flowers. ▸ Organic farming and green revolution in brief (awareness level). ▸ Animal husbandry: milk yielding (milch) animals; white revolution; meat providing livestock; draught animals (heavy work); poultry; fish farming (pisiculture); sericulture and apiculture (awareness level).	▸ Giving opportunities to children to: ☛ *observe the use of bacteria in making curd and cheese* ☛ *observe specimens of mushroom, and note down the useful parts;* ☛ *draw pictures of the plants along with the useful parts;* ▸ *Organizing visits to:* ☛ *a garden to observe the decorative plants and listing the plants observed;* ☛ *farms for studying the milk- yielding, meat–yielding and poultry animals;* ☛ food industries ☛ sericulture and a pisiculture centre ☛ Collecting photographs of above listed categories of animals. ▸ Growing plants organically within the school premises and comparing these plants with plants grown otherwise. ▸ Showing a film on the green and white revolution in India followed by a discussion/class debate about the about the same.	▸ Field Visits ▸ PPTs and videos. ▸ Visit to food industries ▸ Visit to sericulture and a pisiculture centre ▸ Pictures of ornamental plants. ▸ Decorative flowers. ▸ Film on Green revolution/ white revolution.

Integration: Geography