

Theme 1: Transport of Food and Minerals in Plants

This theme deals with the movement of water containing minerals and food in plants. The exchange of water, gases, minerals and other substances into and out of the cells and also between neighboring 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.

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;
- ☑ define transpiration, interpret its role in xylem transport and know about the factors affecting rate of transpiration.

Transport of Food and Minerals in Plants

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>Transport in Plants</p> <ul style="list-style-type: none"> ➤ 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. 	<p>➤ Experiments</p> <ul style="list-style-type: none"> ☛ Putting a twig of any available white flower in coloured water and noting the flower and portion of stem that becomes coloured. ☛ Demonstrating experiments on osmosis (potato osmoscope), (online/video) and asking the children to do same at home. ☛ Showing experiments on diffusion, root pressure and transpiration (covering the aerial part with a transparent colourless bag). ☛ Performing simple experiments to study the process of diffusion, osmosis, active transport and transpiration. <p>➤ Drawing and labelling diagrams of experiments on osmosis, diffusion.</p>	<ul style="list-style-type: none"> ➤ PPTs, Videos ➤ Discussion ➤ Drawings

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 sexual reproduction in plants and animals.

Learning Outcomes:

Children will be able to:

- ✔ observe and correlate butterflies and honeybees moving around flowers to the process of pollination;
- ✔ 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
<p style="text-align: center;">PLANTS</p> <p>➤ Sexual reproduction in Plants:</p> <ul style="list-style-type: none"> ☛ 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). ☛ Fertilization 	<ul style="list-style-type: none"> ➤ 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. ➤ Learning through PPTs, videos, the process of fertilization in plants ➤ Explaining the main organs of human reproductive system (male and female) through images, diagrams, videos 	<ul style="list-style-type: none"> ➤ Actual specimens of flowers ➤ Dissection of typical bisexual flower to study the different whorls. (to be explained so children can do the dissection at home) ➤ PPTs and Videos. ➤ Tissue culture photographs ➤ PPTs/videos of human reproductive system (male and female)
<p style="text-align: center;">ANIMALS</p> <ul style="list-style-type: none"> ➤ Sexual reproduction in humans ➤ Main organs of male and female reproductive system. 		

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).

Ecosystems		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ 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. ➤ Only, forest ecosystem with its flora and fauna to be taught. 	<ul style="list-style-type: none"> ➤ Asking children to collect information on the flora and fauna of a forest ecosystem, and noting down: <ul style="list-style-type: none"> • <i>The different producers and consumers;</i> • <i>the decomposers acting on the leaves fallen on the forest floor, and</i> • <i>the abiotic factors.</i> 	<ul style="list-style-type: none"> ➤ 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 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 circulatory system, which was 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 neuron and reflex action;
- ☑ list out the functions of the heart, nervous system, RBC and WBC.

Human Body – Endocrine, Circulatory and Nervous Systems

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p style="text-align: center;">Endocrine System</p> <ul style="list-style-type: none"> ➤ 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. <p style="text-align: center;">Adolescence and accompanying changes</p> <ul style="list-style-type: none"> ➤ Physical and emotional changes in the body during adolescence. ➤ Importance of personal hygiene. ➤ Stress management (meaning of stress; ways to tackle stress: yoga, meditation, time 	<ul style="list-style-type: none"> ➤ Revisiting previous concepts learnt by children. ➤ Discussing and explaining to children, the concept of hormones and endocrine glands. ➤ Describing the endocrine system in human beings through PPTs and videos. ➤ Asking children to show the location of endocrine glands in the human body by means of a labelled diagram. <ul style="list-style-type: none"> ➤ Discussing how hormones bring about changes in the body. ➤ Explaining the changes taking place (physical and emotional) in the body during adolescence; ➤ Encouraging children to maintain a personal journal/ diary ➤ Discussing the importance of personal hygiene; 	<ul style="list-style-type: none"> ➤ PPTs and videos. ➤ Photographs of the structure of heart, neuron, circulatory system, nervous system. ➤ B.P measuring instrument, ECG; ➤ Videos on reflex action.

Human Body – Endocrine, Circulatory and Nervous Systems

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>management, sports, hobbies, rational thinking etc.)</p> <p style="text-align: center;">Circulatory System</p> <p>Revisit learning of earlier class</p> <ul style="list-style-type: none"> ➤ External structure of heart ➤ 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. <p style="text-align: center;">Nervous System</p> <p>Revisit learning of earlier class</p> <ul style="list-style-type: none"> ➤ 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. 	<ul style="list-style-type: none"> ➤ Discussing various ways to tackle stress. ➤ Encouraging children to label diagram of the heart. ➤ Discussing about the different types of blood vessels and double circulation. ➤ Asking children to check the pulse at home after a vigorous exercise (with the help of an adult) ➤ Learning about the structure of a neuron. ➤ Explaining the central nervous system in detail through 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. 	