Life Process

Life Processes (जीवन प्रक्रिया)

Life processes are the basic functions performed by living organisms that are necessary for their survival and for maintaining the body's structure. If any of these processes stop, the organism dies.
The most basic processes that distinguish the living from the non-living are often called the Seven Characteristics of Life (MR. NIGER D):
Characteristic	Description	Animal Example	Plant Example
Movement	Change in position or location.	Walking, flying, swimming.	Roots growing down; stems bending towards light.
Respiration	The process of releasing energy from food, usually by taking in oxygen and giving out carbon dioxide.	Breathing through lungs or gills.	Gaseous exchange through stomata (leaves).
Nutrition	The process of taking in food and using it for energy, growth, and repair.	Eating grass, meat, or vegetables.	Making food through photosynthesis.
Irritability (Sensitivity)	The ability to sense and respond to changes in the environment (stimuli).	Jumping back from a hot object.	Mimosa plant leaves closing when touched.
Growth	A permanent and irreversible increase in the size, mass, and complexity of an organism.	A baby growing into an adult.	A seed sprouting into a sapling.
Excretion	The removal of metabolic waste products (unnecessary and often harmful) from the body.	Sweating, urination.	Shedding old leaves or bark.
Reproduction	The process of producing new individuals (offspring) of the same kind, ensuring the continuation of the species.	Laying eggs or giving birth to young ones.	Producing seeds, spores, or new shoots.
2. A Closer Look at Respiration
Respiration is not just breathing; it's the process that occurs inside the cells to generate power.
 * Breathing: The physical process of inhaling (O_2) and exhaling (CO_2).
 * Respiration (Cellular): The chemical process where digested food (glucose) is broken down using oxygen to release energy (in the form of ATP).
Difference in Respiration:
 * Humans/Animals: Breathe using specialized organs like lungs.
 * Plants: Take in and give out gases through tiny pores called stomata (mainly in leaves) and lenticels (on stems).
Page 2: Nutrition – The Energy Source

3. Modes of Nutrition (पोषण प्रक्रिया)
Nutrition is the most vital process, as it provides the energy for all other life processes. There are two main modes:
A. Autotrophic Nutrition (स्वपोषित पोषण)
 * Meaning: "Auto" means self; "Trophos" means nutrition.
 * Definition: The mode of nutrition where an organism makes its own food from simple inorganic substances like \text{CO}_2 and water.
 * Organisms: Mainly green plants and some algae and bacteria.
 * Key Process: Photosynthesis (प्रकाश संश्लेषण).
The Process of Photosynthesis
This is the most important concept of plant nutrition.
 * Raw Materials Required:
   * Carbon Dioxide (\text{CO}_2): Taken from the air through the stomata on leaves.
   * Water (\text{H}_2\text{O}): Absorbed from the soil by the roots.
 * Conditions Required:
   * Chlorophyll (हरितकण): The green pigment present in leaves, which traps sunlight energy.
   * Sunlight (प्रकाश): Provides the energy needed to drive the reaction.
 * The Formula:

   * Products: Glucose (\text{C}_6\text{H}_{12}\text{O}_6, the food) and Oxygen (\text{O}_2, released as a byproduct).
B. Heterotrophic Nutrition (परपोषित पोषण)
 * Meaning: "Hetero" means others.
 * Definition: The mode of nutrition where an organism depends on other organisms (plants or animals) for its food.
 * Organisms: All animals, fungi, and non-green plants.
Types of Heterotrophic Nutrition:
Type	Description	Example
Holozoic (प्राणीसदृश)	Organisms take in solid food (ingestion), digest it, absorb it, and egest the undigested waste.	Humans, Cows, Dogs, Amoeba.
Saprophytic (मृतोपजीवी)	Organisms feed on dead and decaying organic matter. They secrete digestive juices outside the body.	Fungi (Mushroom, Mold), some Bacteria.
Parasitic (परजीवी)	Organisms live on or inside another living organism (host) and derive their nutrition from the host, often harming it.	Non-green plant Cuscuta (Amarbel), Tapeworm, Mosquito.
Page 3: Key Distinctions and Exam Preparation
4. Important Distinctions (फरकहरू)
Feature	Living Organisms	Non-Living Things
Movement	Shows spontaneous internal movement.	Moves only when an external force is applied.
Growth	Growth is internal and uniform (from inside the cell).	Growth is external (e.g., dust collecting on a stone).

| Sensitivity | Responds to changes in the environment. | No response to external stimuli. |
| Organization | Has a definite cellular and tissue organization. | No definite organization. |
Feature	Plants (Autotrophs)	Animals (Heterotrophs)
Movement	Fixed at one place; show movement in parts only.	Show locomotion (move entire body from place to place).
Nutrition	Make their own food by photosynthesis.	Rely on plants or other animals for food.
Respiration	Occurs throughout the plant body (stomata/lenticels).	Occurs in specific organs (lungs, gills, skin).

5. Essential Exam Preparation Questions

A. Define the Following Terms (परिभाषा दिनुहोस्)

* Life Processes: The basic functions necessary for an organism's survival.
* Stimulus: A change in the environment that an organism can respond to.
* Chlorophyll: The green pigment in plants that traps sunlight for photosynthesis.
* Holozoic Nutrition: The type of nutrition where organisms ingest solid food and break it down internally.
* Excretion: The removal of metabolic wastes from the body.

B. Short Answer Questions (2-3 Marks)

* Why is respiration essential for all living organisms?
* Name the four things that are necessary for a plant to perform photosynthesis.
  * Answer: \text{CO}_2, Water, Sunlight, and Chlorophyll.
* Suggest one difference between how a tree grows and how a human grows.
  * Hint: Consider the stage of life when growth stops.
* If a plant's roots are cut, which life process will be most immediately affected? Explain why.
  * Hint: Water and mineral absorption.
* A rock grows bigger over time by dust collecting on its surface. Is the rock a living thing? Justify your answer.
  * Hint: Compare external vs. internal growth.

C. Long Answer Questions (4-5 Marks)

* Write a detailed note on the mode of nutrition in green plants, including the process, raw materials, and final products. (Focus on Photosynthesis)
* Describe three different types of heterotrophic nutrition. Give one example for each type.
* "Movement and Sensitivity are closely linked life processes." Explain this statement with two examples, one from a plant and one from an animal.
* Draw a neat, labelled diagram of the key parts of a leaf and indicate where gas exchange takes place.