

Life Processes: Life processes are basic essential activities performed by living organisms to maintain life, such as: Nutrition, Respiration, Transportation, Excretion.

1. Nutrition: The process by which organisms obtain and utilize food.

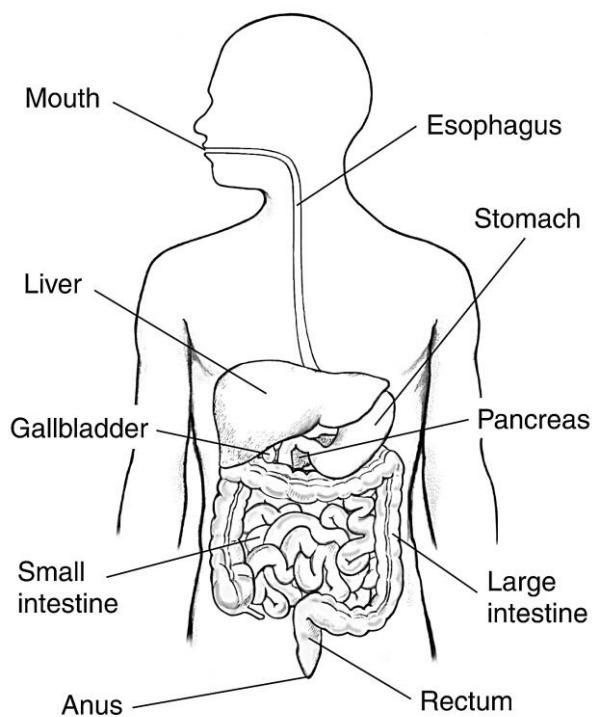
Types of Nutrition:

- Autotrophic: Organisms (like green plants) make their own food by photosynthesis.
- Heterotrophic: Organisms (like animals and humans) depend on others for food.
- Photosynthesis Equation: $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ (in the presence of sunlight and chlorophyll).

Alimentary Canal (Digestive Tract)

The alimentary canal is a long, muscular tube that runs from the mouth to the anus. It is responsible for the ingestion, digestion, absorption, and elimination of food.

Part	Function
Mouth	Ingestion; food is chewed by teeth, mixed with saliva from salivary glands.
Pharynx	Common passage for food and air; leads to the oesophagus.
Oesophagus (Food Pipe)	Transfers food from mouth to stomach by peristalsis (muscular movement).
Stomach	Secretes gastric juices (HCl + enzymes) to digest proteins; churns food into chyme.
Small Intestine (duodenum, jejunum, ileum)	Main site of digestion and absorption of nutrients. Receives bile and pancreatic juices.
Large Intestine	Absorbs water and minerals; forms feces.
Rectum	Stores feces temporarily.
Anus	Egestion – removes undigested waste from the body.



2. **Respiration:** The process of breaking down food (glucose) to release energy.

Types:

- Aerobic respiration: Uses oxygen. Produces more energy.
- Anaerobic respiration: Occurs without oxygen. Produces less energy.
- Human respiratory system includes: Nostrils → Nasal cavity → Pharynx → Larynx → Trachea → Bronchi → Bronchioles → Alveoli
- In alveoli: Oxygen diffuses into the blood. Carbon dioxide diffuses out of the blood.

Mechanism of Respiration:

1. Nostrils

- Two external openings of the nose through which air enters the body.
- They contain fine hairs and mucus to trap dust, pollen, and microbes.

2. Nasal Cavity

- A large air-filled space behind the nostrils.
- It warms, moistens, and filters the air using mucus and cilia before it passes further.

3. Pharynx

- A muscular passage that serves as a common pathway for both air and food. It connects the nasal cavity to the larynx and esophagus.

4. Larynx (Voice Box)

- A cartilaginous structure located at the top of the trachea.
- It produces sound when air passes over the vocal cords, and also ensures air flows into the trachea.

5. Trachea (Windpipe)

- A tube supported by C-shaped cartilage rings that keeps it open.
- It carries inhaled air from the larynx to the bronchi and filters dust using its lining of mucus and cilia.

6. Bronchi (Right and Left Bronchus)

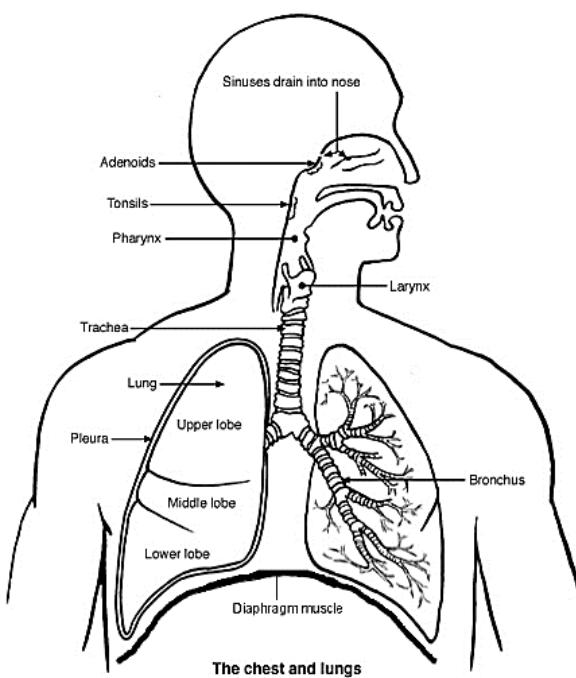
- The trachea divides into two bronchi, each entering one lung. They distribute air into the respective lung and branch into smaller bronchioles.

7. Bronchioles

- Smaller branches of the bronchi that spread throughout the lungs. They conduct air to the alveoli and regulate airflow using smooth muscle walls.

8. Alveoli

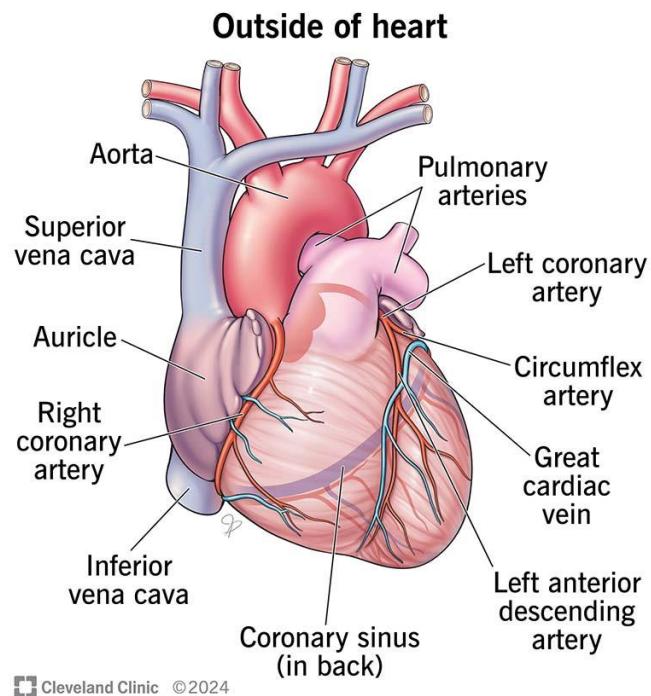
- Microscopic, balloon-like air sacs at the end of bronchioles.
- They are surrounded by capillaries where oxygen diffuses into the blood and carbon dioxide diffuses out into the lungs to be exhaled.



3. **Transportation:** Transportation is the process by which essential substances such as water, minerals, nutrients, gases, and waste products are moved from one part of the body to another in plants and animals.

Structure of the Human Heart

The human heart is a muscular, hollow, fist-sized organ located slightly left in the chest cavity. It pumps blood throughout the body and is made up of the following main parts:



Chambers of the Heart (4 Chambers):

- Right Atrium: Receives deoxygenated blood from the body through superior and inferior vena cava.
- Right Ventricle: Pumps deoxygenated blood to the lungs via the pulmonary artery.
- Left Atrium: Receives oxygenated blood from the lungs through the pulmonary veins.
- Left Ventricle: Pumps oxygenated blood to the entire body via the aorta.

Valves of the Heart (Prevent backflow):

- Tricuspid Valve: Between right atrium and right ventricle.
- Bicuspid/Mitral Valve: Between left atrium and left ventricle.
- Pulmonary Valve: Between right ventricle and pulmonary artery.
- Aortic Valve: Between left ventricle and aorta.

Major Blood Vessels:

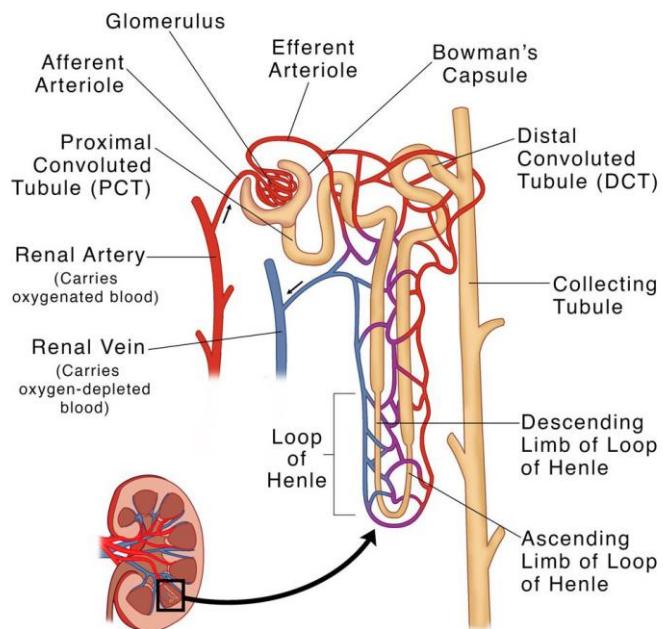
- Vena Cava (Superior & Inferior): Brings deoxygenated blood from body to right atrium.
- Pulmonary Arteries: Carry deoxygenated blood from right ventricle to lungs.
- Pulmonary Veins: Bring oxygenated blood from lungs to left atrium.
- Aorta: Distributes oxygenated blood from left ventricle to the rest of the body.
- In Human Beings: Blood transports oxygen, nutrients, hormones. Heart pumps blood. Blood vessels: Arteries (carry oxygen-rich blood from heart), Veins (carry oxygen-poor blood to heart), Capillaries (exchange materials with cells)
- In Plants: Xylem: Transports water, Phloem: Transports food

4. **Excretion:** The removal of waste products from the body.

- In Humans: Kidneys filter blood to form urine. Nephron is the functional unit of the kidney.
- In Plants: Store waste in leaves, bark, or excrete through stomata.

Structure of Nephron:

- Nephron is the structural and functional unit of the kidney.
- Each kidney contains about 1 to 1.5 million nephrons.
- Nephrons help in filtration of blood, formation of urine, and maintaining water and salt balance in the body.



- The nephron has two main parts: 1. Malpighian Body, 2. Renal Tubule

□ Malpighian Body (Renal corpuscle):

- ✓ **Bowman's Capsule:** A cup-shaped structure that surrounds the glomerulus and collects the filtrate.
- ✓ **Glomerulus:** A network of capillaries where blood filtration begins.

□ Renal Tubule:

- **Proximal Convolute Tubule (PCT):** Reabsorbs glucose, amino acids, salts, and water.
- **Loop of Henle:** U-shaped loop (descending and ascending limb) – helps in concentration of urine.
- **Distal Convolute Tubule (DCT):** Further reabsorption and secretion of ions and water.
- **Collecting Duct:** Collects urine from several nephrons and sends it to the renal pelvis.

Q1. What is meant by life processes?

Ans: The basic activities that are essential for an organism to survive, such as nutrition, respiration, transportation, and excretion.

Q2. What is the difference between autotrophic and heterotrophic nutrition?

Ans:

Autotrophic nutrition: Organisms make their own food (e.g., plants).

Heterotrophic nutrition: Organisms depend on others for food (e.g., animals, humans).

Q3. Why is respiration important?

Ans: Respiration releases energy by breaking down food molecules. This energy is used for various life activities.

Q4. What is the role of alveoli in the lungs?

Ans: Alveoli are tiny air sacs where exchange of gases occurs. Oxygen enters the blood and carbon dioxide exits the blood here.

Q5. Name the functional unit of kidney.

Ans: Nephron

Q6. What are the main functions of xylem and phloem in plants?

Ans:

Xylem: Transports water from roots to leaves.

Phloem: Transports food from leaves to other parts of the plant.

Q7. The kidneys in human beings are a part of the system for

Answer: (c) Excretion

Q8. The xylem in plants are responsible for

Answer: (a) Transport of water

Q9. The autotrophic mode of nutrition requires

Answer: (d) All of the above (*carbon dioxide, water, chlorophyll, and sunlight*)

Q10. The breakdown of pyruvate to give carbon dioxide, water, and energy takes place in

Answer: (b) Mitochondria

Q11. How are fats digested in our bodies? Where does this process take place?

Answer: Fats are broken down into fatty acids and glycerol by bile (from the liver) and lipase enzyme (from the pancreas). This process mainly takes place in the small intestine.

Q12. What is the role of saliva in the digestion of food?

Answer: Saliva contains an enzyme called salivary amylase (ptyalin) that breaks down starch into simple sugars. It also moistens food, making it easier to swallow.

Q13. What are the necessary conditions for autotrophic nutrition and what are its by-products?

Answer: Necessary conditions:

- Sunlight
- Chlorophyll
- Carbon dioxide
- Water

By-product:

- Oxygen

Q14. What are the differences between aerobic and anaerobic respiration? Name some organisms that use anaerobic mode of respiration.

Aerobic Respiration	Anaerobic Respiration
Uses oxygen	Does not use oxygen
More energy released	Less energy released
Products: $\text{CO}_2 + \text{H}_2\text{O}$	Products: Alcohol or Lactic acid
Occurs in mitochondria	Occurs in cytoplasm

Organisms using anaerobic respiration: Yeast, some bacteria, and human muscle cells (temporarily during heavy exercise).

Q15. How are the alveoli designed to maximise the exchange of gases?

Answer:

- Alveoli have a large surface area.
- They are thin-walled for easy diffusion.
- Surrounded by blood capillaries, allowing rapid gas exchange.
- Moist surface helps in dissolving gases.

16. What would be the consequences of a deficiency of haemoglobin in our bodies?

Answer:

- Less oxygen would be transported to body cells.
- Leads to fatigue, weakness, breathlessness.
- Condition is known as anaemia.

17. Describe double circulation of blood in human beings. Why is it necessary?

Answer:

Double circulation involves two separate circuits:

1. Pulmonary circulation – between heart and lungs.
2. Systemic circulation – between heart and rest of the body.

It is necessary to separate oxygenated and deoxygenated blood and ensure efficient oxygen supply to all tissues.

18. What are the differences between the transport of materials in xylem and phloem?

Xylem	Phloem
Transports water & minerals	Transports food
Movement is one-directional	Movement is bidirectional
Made of dead cells	Made of living cells
No energy required	Requires energy (ATP)

19. Compare the functioning of alveoli in the lungs and nephrons in the kidneys with respect to their structure and functioning.

Feature	Alveoli (Lungs)	Nephrons (Kidneys)
Function	Exchange of gases (O ₂ in, CO ₂ out)	Filtration of blood, formation of urine
Structure	Thin-walled air sacs with capillaries	Tubular structure with glomerulus and tubules
Process	Diffusion of gases across moist surface	Filtration, reabsorption, secretion
Importance	Supplies oxygen, removes carbon dioxide	Removes nitrogenous wastes, maintains balance