

Class 9 science
Ch Fundamental unit of life: Cell

Name _____ Roll _____

Q.1 Who discovered cells, and how?

Ans: Robert Hooke discovered cells in 1665 while examining a thin slice of cork through a self-designed microscope. He saw that the cork resembled the structure of a honey comb consisting of many little compartments. These small boxes are called cells.

Q.2 Why the cell is called the structural and Junctional unit of life?

Ans: A cell is capable of independently carrying out all necessary activities of life. So, they are called basic or functional unit of life.

Q.3 How do substances like CO_2 and water move in and out of the cell? Discuss.

Ans: Substances like CO_2 and water move in and out of the cell through a process called diffusion.

1. Diffusion: This is the movement of molecules from an area of higher concentration to an area of lower concentration.
2. CO_2 : During cellular respiration, CO_2 is produced inside the cell and needs to move out. Since there is a higher concentration of CO_2 inside the cell and a lower concentration outside, it moves out of the cell through the cell membrane by diffusion.
3. Water: Water moves in and out of the cell through osmosis, which is a type of diffusion specific to water. Water moves from an area of lower solute concentration (outside the cell) to an area of higher solute concentration (inside the cell), balancing the concentration on both sides.

Q.4 Why is the plasma membrane called a selectively permeable membrane?

Ans: It is called selectively permeable membrane because it allows the entry and exit of some substances, not all.

Q.5 Fill in the gaps in the following table illustrating differences between prokaryotic and eukaryotic cells.

Feature	Prokaryotic Cells	Eukaryotic Cells
Cell Type	Unicellular organisms (e.g., bacteria)	Unicellular or multicellular organisms (e.g., plants, animals, fungi, protists)
Nucleus	No defined nucleus, genetic material is in the nucleoid region	Has a membrane-bound nucleus containing DNA
Size	Generally smaller (1–10 μm)	Generally larger (10–100 μm)
Cell Wall	Present in most (made of peptidoglycan)	Present in plants (cellulose) and fungi (chitin); absent in animals
Membrane-Bound Organelles	Absent	Present (e.g., mitochondria, endoplasmic reticulum, Golgi apparatus)
DNA	Circular DNA, located in the nucleoid region	Linear DNA, located in the nucleus

Q.6 Can you name the two organelles we have studied that contain their own genetic material?

Ans: The two organelles which have their own genetic material are:

1. Mitochondria
2. Plastids

Q.7 If the organisation of a cell is destroyed due to some physical or chemical influence, what will happen?

Ans: If the organization of a cell is destroyed due to physical or chemical damage, the cell will not function properly. This can lead to the breakdown of its structures and processes. For example, the cell membrane might lose its ability to control what enters or leaves the cell, or the nucleus may not be able to manage cell activities like growth and division. In severe cases, the cell could die because it can no longer maintain its normal functions. The damage can also spread to nearby cells, affecting the overall health of the tissue or organ.

Q.8 Why are lysosomes known as suicide bags?

Ans: Lysosomes are called “suicide bags” because they contain strong enzymes that can break down the cell’s own parts. If the cell gets damaged or is no longer needed, the lysosomes release these enzymes, which destroy the cell. This helps remove unhealthy or old cells from the body. So, they are called “suicide bags” because they can cause the cell to destroy itself when necessary.

Q.9 Where are proteins synthesised inside the cell?

Ans: The proteins are synthesised in the ribosomes that are also known as protein factories.

Q.10. Make a comparison and write down ways in which plant cells are also different from animal cells.

Ans:

Feature	Plant Cells	Animal Cells
Cell Wall	Present (made of cellulose)	Absent
Chloroplasts	Present (for photosynthesis)	Absent
Vacuole	Large central vacuole filled with cell sap	Small or absent
Shape	Usually rectangular or box-like	Irregular or round shape
Plasma Membrane	Present, but cell wall also provides structure	Present (only the plasma membrane)
Centrioles	Absent	Present (involved in cell division)
Lysosomes	Rare, not as common	Present (involved in digestion and waste removal)
Energy Storage	Stores energy in the form of starch	Stores energy in the form of glycogen
Cytoskeleton	Present (similar to animal cells)	Present (involved in cell shape and movement)

Q.11 What would happen if the plasma membrane ruptures or breaks down?

Ans: If plasma membrane ruptures or breaks down then molecules of some substances will freely move in and out.

Q.12 What would happen to the life of a cell if there was no Golgi apparatus?

Ans: Golgi apparatus has the function of storage, modification and packaging of the products in vesicles. If there were no Golgi bodies, packaging and dispatching of materials synthesised by the cell will be stalled.

Q.13 Which organelle is known as the powerhouse of the cell? Why?

Ans: Mitochondria is known as powerhouse of the cell because it releases the energy required for different activities of life.

Q.14 Where do the lipids and proteins constituting the cell membrane get synthesised?

Ans: Lipids and proteins are synthesised in ER [Endoplasmic Reticulum].

Q.15 How does Amoeba obtain it's food?

Ans: Amoeba obtains food through phagocytosis. It extends its pseudopodia to surround and engulf food, forming a food vacuole. Inside the vacuole, digestive enzymes break down the food into nutrients, which are absorbed by the cell. Any waste is then expelled from the cell.

Q.16 What is osmosis?

Ans: Osmosis is the process of movement of water molecule from a region of higher water concentration through a semi-permeable membrane to a region of lower water concentration.

Q.17 Carry out the following osmosis experiment:

Take four peeled potato halves and scoop each one out to make potato cups, one of these potato cups should be made from a boiled potato. Put each potato cup in a trough containing water.

Now,

- (a) Keep cup A empty
- (b) Put one teaspoon sugar in cup B
- (c) Put one teaspoon salt in cup C
- (d) Put one teaspoon sugar in the boiled potato cup D

Keep these for two hours. Then observe the four potato cups and answer the following:

- (i) Explain why water gathers in the hollowed portion of B and C.
- (ii) Why is potato A necessary for this experiment?
- (iii) Explain why water does not gather in the hollowed out portions of A and D.

Answer:

i) Water gathers in B and C because in both the situations there is difference in the concentration of water in the trough and water in the cup of Potato. Hence, osmosis takes place as the potato cells act as a semi-permeable membrane.

ii) Potato A is necessary for this experiment for comparison, it acts as a control.

iii) Water does not gather in the hollowed out portions of A and D. As cup of A does not have change in the concentration for water to flow. For osmosis to occur one of the concentration should be higher than the other.

In cup D, the cells are dead and hence the semi-permeable membrane does not exists for the flow of water and no osmosis takes place.

Q.18 What is the basic structural and functional unit of life?

Ans: The basic structural and functional unit of life is the cell. It is the smallest unit of an organism that performs all the vital functions of life, such as metabolism, growth, and reproduction.

Q19 What is the difference between prokaryotic and eukaryotic cells?

Ans: a) Prokaryotic cells do not have a defined nucleus or membrane-bound organelles. Examples include bacteria and archaea.

b) Eukaryotic cells have a well-defined nucleus and membrane-bound organelles. Examples include plant, animal, and fungi cells.

Q.20 What are the main components of the cell membrane?

Ans: The cell membrane is mainly composed of a phospholipid bilayer with proteins embedded in it. This structure allows the cell membrane to be selectively permeable, controlling the entry and exit of substances.

Q.21 What is the function of mitochondria?

Ans: Mitochondria are known as the powerhouse of the cell. They generate energy in the form of ATP through cellular respiration, which is essential for the cell's functions.

Q.22 What is the function of the nucleus?

Ans: The nucleus controls the activities of the cell and contains the cell's genetic material (DNA). It is responsible for growth, reproduction, and the functioning of the cell.

Q.23 Explain the structure and function of chloroplasts.

Ans: Chloroplasts are found in plant cells and contain a green pigment called chlorophyll. They are responsible for photosynthesis, the process by which plants convert light energy into chemical energy to make food.

Q.24 What is the role of ribosomes in a cell?

Ans: Ribosomes are the sites of protein synthesis. They help assemble amino acids into proteins based on the instructions carried by mRNA from the nucleus.

Q.25 What is osmosis?

Ans: Osmosis is the movement of water molecules across a selectively permeable membrane from an area of low solute concentration to an area of high solute concentration, until equilibrium is reached.

Q.26 What are vacuoles and what is their function?

Ans: Vacuoles are membrane-bound organelles in cells, mainly found in plant cells. They store water, nutrients, and waste products. In plant cells, the large central vacuole also helps maintain turgidity.

Q.27 What is the role of lysosomes in the cell?

Ans: Lysosomes are membrane-bound organelles that contain digestive enzymes. They help break down waste materials, cellular debris, and foreign substances. They also play a role in autophagy and apoptosis (programmed cell death).

Q.28 What is the function of the endoplasmic reticulum (ER)?

Ans: The endoplasmic reticulum (ER) is a network of membranes found in the cytoplasm. There are two types of ER:

Smooth ER: Lacks ribosomes and is involved in lipid synthesis, detoxification, and storage of calcium ions.

Rough ER: Studded with ribosomes and helps in the synthesis and transport of proteins.

Q.29 Explain the role of the vacuole in plant cells.

Ans: The vacuole in plant cells is a large, membrane-bound organelle filled with water, nutrients, and waste products. It helps maintain turgidity (rigidity) of the cell, stores essential substances, and plays a role in maintaining the cell's shape. The vacuole also helps in the breakdown of waste materials and toxins.