

NCERT Solutions Class 9 Science Chapter 5: In Chapter 5 of NCERT Solutions for Class 9 Science, we learn about cells, which are the basic building blocks of all living things. This chapter explain how cells were discovered and what they do in plants and animals.

We study the cell's structure, like its membrane, nucleus, and cytoplasm, and see how plant cells are different from animal cells. This knowledge helps us understand how living organisms function and grow.

NCERT Solutions Class 9 Science Chapter 5 Overview

The NCERT Solutions for Class 9 Science Chapter 5, "The Fundamental Unit of Life," are created by subject experts of Physics Wallah. This chapter explains cells, the tiny units that make up living organisms. It discusses cell theory and examines differences between plant and animal cells.

These solutions provide clear explanations and diagrams to help students grasp concepts such as cell structure, function, and the roles of organelles like the nucleus and cell membrane.

The Fundamental Unit Of Life

"The Fundamental Unit of Life" refers to the cell. Cells are the smallest structural and functional units of living organisms. They are capable of carrying out all the essential functions necessary for life, such as metabolism, growth, reproduction, and responding to stimuli.

Cells vary in size, shape, and function, but they all share common features, including a cell membrane, cytoplasm, genetic material (DNA), and often, organelles like the nucleus, mitochondria, and others.

Cells can exist independently as single-celled organisms (like bacteria and amoeba) or as part of multicellular organisms (like plants, animals, and humans), where they specialize into different types to perform specific functions.

NCERT Solutions Class 9 Science Chapter 5 PDF

You can find the PDF link for NCERT Solutions Class 9 Science Chapter 5 "The Fundamental Unit of Life" below.

This PDF provides detailed solutions and explanations to help you understand the concepts covered in the chapter.

NCERT Solutions Class 9 Science Chapter 5 PDF

NCERT Solutions for Class 9 Science Chapter 5 The Fundamental Unit Of Life

Below we have provided NCERT Solutions for Class 9 Science Chapter 5 The Fundamental Unit Of Life for the ease of the students –

NCERT Solutions for Class 9 Science Chapter 5 The Fundamental Unit Of Life Exercise-5.1 Page: 59

1. Who discovered cells, and how?

Solution:

In 1665, Robert Hooke discovered cells while examining a thin slice of cork through a self-designed microscope. He observed that the cork resembled the structure of a honeycomb consisting of numerous tiny compartments. The minuscule boxes are referred to as cells.

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

Solution:

Cells form the structure of an entity. A group of cells form a tissue, further an organ and ultimately an organ system. They perform fundamental functions and life processes such as respiration, digestion, excretion etc., in both unicellular and multicellular entities. They perform all the activities independently. Hence, cells are referred to as structural and fundamental units of life.

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3. How do substances like CO₂ and water move in and out of the cell? Discuss.

Solution:

CO₂ moves by diffusion. The cellular waste accumulates in high concentrations in the cell, whereas the concentration of CO₂ in the external surroundings is comparatively lower. This difference in the concentration level inside and outside of the cell causes the CO₂ to diffuse from a region of higher (within the cell) to a lower concentration.

H₂O diffuses by osmosis through the cell membrane. It moves from a region of higher concentration to a lower concentrated region through a selectively permeable membrane until equilibrium is reached.

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

Solution:

The plasma membrane is called as a selectively permeable membrane as it permits the movement of only certain molecules in and out of the cells. Not all molecules are free to diffuse.

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

Prokaryotic Cell	Eukaryotic Cell
1. Size: Generally small (1-10 μm)	1. Size: Generally large (5-100 μm)
1 $\mu\text{m} = 10^{-6}\text{m}$	2. Nuclear region: well-defined and surrounded by a nuclear membrane.
2. Nuclear region:	
_____	3. More than one chromosome.
_____	4. _____
and known as _____	_____
3. Chromosome: single	_____
4. Membrane-bound cell organelles absent.	

Solution:

Prokaryotic Cell

Eukaryotic Cell

1. Size: Generally small (1-10 μm)

1 $\mu\text{m} = 10^{-6}\text{m}$

2. The nuclear region is poorly defined due to the absence of a nuclear membrane and is known as the nucleoid.

3. There is a single chromosome.

4. Membrane-bound cell organelles absent.

1. Size: Generally large (5-100 μm)

2. Nuclear region: well-defined and surrounded by a nuclear membrane.

3. There is more than one chromosome.

4. Membrane-bound cell organelles present.

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

Solution:

The two organelles which have their own genetic material are

1. Mitochondria

2. Plastids

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

Solution:

In the event of any damage to cells and when the revival of cells is not possible, Lysosomes burst, and enzymes digest such cells. This is why lysosomes are often referred to as 'suicide bags'.

8. Why are lysosomes known as suicide bags?

Solution:

When there is damage to the cell and when revival is not possible, lysosomes may burst, and the enzymes digest their own cell. Consequently, lysosomes are known as suicide bags.

9. Where are proteins synthesised inside the cell?

Solution:

Protein synthesis in cells takes place in ribosomes. Hence, ribosomes are also referred to as protein factories. Ribosomes are particles that are found attached to the rough endoplasmic reticulum.

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

Solution:

The following table depicts the differences between plant cells and animal cells.

Characteristic	Plant Cell	Animal Cell
Cell Wall	Present	Absent
Shape of Cell	With distinct edges, the shape is either rectangular or square-shaped.	Round and irregular shape
Nucleus	Present. It lies on one side of the cell	Present. It lies in the centre of the cell
Lysosomes	Rarely present	Always present
Plastids	Present	Absent
Structure of Vacuoles	Single or a few large vacuoles that are centrally located	Presence of numerous and small vacuoles

2. How is a prokaryotic cell different from a eukaryotic cell?

Solution:

The following are the differences between prokaryotic and eukaryotic cells.

Feature	Prokaryotic Cell	Eukaryotic Cell
Size	Generally small (1-10 μm)	Generally large (5-100 μm)
Nuclear Region	Not well defined; nucleoid instead of nucleus	Well-defined; surrounded by a nuclear membrane

Chromosomes	Single chromosome	More than one chromosome
Membrane-bound Organelles	Absent	Present

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

Solution:

If the plasma membrane ruptures or breaks down, molecules of some substances will freely move in and out of the cell. Normally, the plasma membrane acts as a barrier that controls the exchange of materials through processes like osmosis and diffusion. If this barrier is compromised, the cell can't maintain its internal environment properly.

As a result, essential protoplasmic material can leak out or harmful substances can enter unchecked. This disruption can lead to the death of the cell due to the loss of its vital components and inability to function properly.

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

Solution:

The Golgi apparatus consists of stacks of membrane-bound vesicles with several key functions:

1. **Storage of Substances:** It stores and accumulates various molecules and substances synthesized by the cell.
2. **Packaging of Substances:** It modifies, sorts, and packages proteins and other molecules into vesicles for transport to different parts of the cell or for secretion outside the cell.
3. **Manufacture of Substances:** While the Golgi apparatus primarily processes and modifies substances rather than directly manufacturing them, it plays a crucial role in modifying proteins and lipids synthesized in the endoplasmic reticulum.

Without the Golgi apparatus, cells would be unable to properly package and transport materials essential for their functioning. This would impair processes such as secretion, cell signaling, and the maintenance of cellular structure. The Golgi apparatus is involved in the formation of lysosomes, which are essential for cellular digestion and recycling. Therefore, the absence of a functional Golgi apparatus would severely compromise the cell's ability to function and survive.

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

Solution:

Mitochondria are referred to as the powerhouse of the cell because they generate energy required for various life activities. They achieve this by releasing energy in the form of ATP (Adenosine triphosphate) molecules. ATP is essential for numerous chemical processes that

sustain life, including muscle contraction, protein synthesis, and cellular metabolism. This ability to produce ATP makes mitochondria crucial for providing the energy necessary for cells to function effectively, earning ATP the nickname 'energy currency of the cell'.

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

Solution:

Lipids and proteins are synthesised in the ER (Endoplasmic Reticulum).

7. How does an Amoeba obtain its food?

Solution:

Through the process of endocytosis, an Amoeba obtains its food. The Amoeba's flexible cell membrane allows it to engulf food particles, forming a food vacuole around them with the help of pseudopodia, which are extensions of its cell membrane. Once the food is trapped inside the food vacuole, Amoeba secretes digestive enzymes into the vacuole.

These enzymes break down the engulfed food particles through digestion, allowing the Amoeba to absorb nutrients and sustain itself. This process of endocytosis and digestion is essential for the Amoeba's nutrition and survival.

8. What is osmosis?

Solution:

Osmosis is the process where water molecules move across a semipermeable membrane from an area of higher water concentration to an area of lower water concentration. This movement occurs until equilibrium is reached, balancing the concentration of water on both sides of the membrane. Osmosis plays a crucial role in biological systems, helping regulate the balance of water and solutes inside cells and organisms.

9. 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.

Solution:

(i) Water accumulates in the hollowed portions of B and C as a difference in the water concentration

is observed. Thereby, endosmosis occurs as the cells act as a semipermeable membrane.

(ii) Potato A is essential in this experiment as it is significant to compare different scenarios seen in

potato cups B, C and D. Potato A in this experiment clearly shows that the potato cavity on its own cannot bring about water movement.

(iii) Cup in A does not show any change in the water flow concentration for osmosis to occur, which

requires concentration to be higher than the other. Cells in cup D are dead; thus, there is no existence of a semipermeable membrane for water flow. Consequently, osmosis does not occur.

10. Which type of cell division is required for the growth and repair of the body, and which type is involved in the formation of gametes?

Solution:

Mitosis: Mitosis is a type of cell division involved in the growth, development, and repair of the body. It produces two identical daughter cells, each with the same number of chromosomes as the parent cell. This process ensures that the body's cells can replace damaged or worn-out cells and maintain proper function.

Meiosis: Meiosis is a type of cell division that occurs in specialized cells called germ cells, which are involved in sexual reproduction. It results in the formation of gametes (sperm and egg cells) with half the number of chromosomes as the parent cell. During fertilization, these gametes combine to form a new organism with a full set of chromosomes.

These two processes, mitosis and meiosis, play crucial roles in maintaining the genetic stability of organisms and ensuring successful reproduction.

Benefits of NCERT Solutions Class 9 Science Chapter 5

- **Concept Clarity:** The solutions provide clear explanations and examples that help students understand the fundamental concepts of cell structure and function.
- **Structured Learning:** They are organized systematically, covering the chapter comprehensively, which aids in structured learning and revision.
- **Exam Preparation:** NCERT Solutions align with the CBSE curriculum, making them ideal for exam preparation. They help students practice questions similar to those that appear in exams.
- **Self-assessment:** They include exercises and solutions that enable students to assess their understanding and identify areas where they need more practice or clarification.