

परमाणु ऊर्जा शिक्षण संस्था, मुंबई

ATOMIC ENERGY EDUCATION SOCIETY, MUMBAI

SESSION: 2023-24

CLASS: 9 SUBJECT: BIOLOGY

**WORKSHEET NO. 1 ANSWER KEY**

Name of the Chapter: The Fundamental Unit of Life

Name of the topic: Cell

Q 1. Choose one correct option for the following questions (MCQ): 10 X 1 = 10 Marks

1. Movement of water molecules from higher to lower concentration through semi-permeable membrane is called as:  
c. Osmosis
2. Shrinkage of the cell content away from the cell wall is called as:  
b. Plasmolysis
3. We are mostly internal, small-sized \_\_\_\_\_ found in eukaryotic cells:  
d. Organelles
4. Identify us: We're non-green coloured plastids who attract animals for pollination:  
d. Chromoplasts
5. If there were no \_\_\_\_\_, packaging and dispatching of materials synthesized by the cell will stop:  
b. Golgi bodies
6. \_\_\_\_\_ is called as powerhouse of a cell.  
a. Mitochondria
7. Which organelle present in the liver of animal cells detoxifies poison?  
b. Smooth Endoplasmic Reticulum
8. \_\_\_\_\_, mitochondria and plastids have their own DNA & Ribosomes  
d. Nucleus
9. Movement of materials in and out of the cells take place by \_\_\_\_\_ & Osmosis.  
d. Diffusion
10. Who discovered the first living cell?  
a. Antony Van Leeuwenhoek

Q 2. Answer the questions in one or two sentences: 10 X 1 = 10 Marks

1. Name the organelle that is called the powerhouse of the cell, and Why?

Mitochondria, because it is responsible for the extracting energy from food through cellular respiration. The energy is released in the form of ATP, the energy currency of a cell.

2. Why is the plasma membrane called as selectively permeable membrane?

It is called so because it regulates the movement of substances in and out of the cell. It allows some material to pass while it blocks other material from entering through it.

3. What is plasmolysis?

Plasmolysis is defined as the process of contraction or shrinkage of the protoplasm of a plant cell and is caused due to the loss of water in the cell.

4. Do vacuoles store any material? Name at least three materials stored by them.

Yes, it stores salts, minerals, pigments and proteins, lipids and food within the cell. The solution that fills a vacuole is known as the cell sap.

5. What is an ATP (Expand) and its use?

Adenosine triphosphate (ATP), is energy currency of a living cell. ATP captures chemical energy obtained from the breakdown of food molecules and releases it to meet other cellular processes.

6. Justify the statement 'All cells come from pre-existing cells'.

The cell theory proposed by Schleiden & Schwann states that all living organisms are made up of cells – the smallest functional units in a living organism.

7. What are chromosomes?

DNA molecule packaged into thread-like structures in the nucleus are called chromosomes. Explain cytoplasm.

8. What is the function of nucleus in a cell?

It is responsible for storing the cell's hereditary material or the DNA. It is responsible for coordinating many of the important cellular activities such as protein synthesis, cell division and growth.

9. Why are viruses dependant on living cells to multiply?

Since viruses don't have organelles, nuclei or even ribosomes, they don't have the tools they need to copy their genes and create whole new virions. Instead, viruses enter living cells and copy living cells' genetic information to reproduce.

Q 3. Answer the questions in brief (3-4 sentences):

10 X 2 = 20 Marks

1. Why do dry raisins swell-up when placed in water?

When raisins are placed in water they swell up due to endosmosis. The cells of the raisins have a low water concentration. This means that they absorb water and become turgid.

2. Explain the structure and function of Golgi apparatus.

The Golgi apparatus is a central intracellular membrane-bound organelle with key functions in transporting, processing, and sorting of newly synthesized membrane and secretory proteins and lipids. Golgi membranes form a unique stacked structure.

3. Name and explain - with examples - the types of cells based on organization.

A prokaryotic cell is a simple, unicellular organism that lacks a nucleus, or any other membrane-bound organelle. Ex: bacteria. A eukaryotic cell has a membrane-bound nucleus and other membrane-bound compartments or sacs, called organelles, which have specialized functions. Ex: Animal cell

4. Explain what would happen if we put an animal cell in salt or sugar solution.

The solution is a hypertonic solution. The cell will shrink if placed in a solution of sugar or salt in water due to osmosis. It is because the movement of water takes place from lower solute concentration to higher solute concentration.

5. Write two differences between a eukaryotic and a prokaryotic cell. (Table)

Eukaryote	Prokaryote
Unicellular, without nucleus, nucleoid present.	Unicellular as well as multicellular with nucleus
Cell size 0.2 $\mu\text{m}$ – 2.0 $\mu\text{m}$ in diameter	Cell size 10 $\mu\text{m}$ – 100 $\mu\text{m}$ in diameter
Cell division through binary fission	Cell division through mitosis

6. State the types and functions of Endoplasmic Reticulum.

The two types of ER are Rough Endoplasmic Reticulum [RER]: Their main function is to produce proteins in the cells. Ribosomes are attached to their surface. Smooth Endoplasmic Reticulum [SER]: Their main function is to produce lipids and also detoxify toxins in the body in the liver and kidney cells.

7. Explain isotonic, hypotonic and hypertonic solutions.

Isotonic solution has similar concentration of fluid, sugars and salt to blood, no net water movement takes place. Hypotonic has a lower concentration of fluid, sugars and salt than blood, water will enter the cell, and the cell will swell. Hypertonic has a higher concentration of fluid, sugars and salt than blood, water will leave the cell, and the cell will shrink.

8. What is the advantage of deeply folded membrane in mitochondria?

To increase the capacity of the mitochondrion to synthesize ATP, the inner membrane is folded to form cristae. These folds allow a much greater amount of chain enzymes and ATP synthase to be packed into the mitochondrion.

9. What is the function of plastids?

Plastids are double-membrane organelles which are found in the cells of plants and algae. Plastids are responsible for manufacturing and storing of food. These often contain pigments that are used in photosynthesis and different types of pigments that can change the colour of the cell.

10. What will happen if an RBC is kept in concentrated saline solution? Why?

The cell will shrink. A saline solution is made up of saltwater. When red blood (RBC) is put in a concentrated saline solution having more solute, it will lead to the shrinkage of the RBC cell.

Q 4. Answer the questions elaborately:

5 X 3 = 15 Marks

1. What does 'Cell theory' state? Which organism is an exception and why?

Cell theory was proposed by Schleiden & Schwann in 1839. There are three parts to this theory. The first part states that all organisms are made of cells. The second part states that cells are the basic units of life. The third part, which asserts that cells come from pre-existing cells that have multiplied, was described by Rudolf Virchow in 1858, when he stated *omnis cellula e cellula* (all cells come from cells).

2. Write three points of difference between diffusion and osmosis. (Table)

Diffusion	Osmosis
It occurs in all states of matter i.e., solids, liquids or gases.	It happens only in the liquid state.
Any type of substance that moves from higher concentration area to lower concentration area.	Movement of water or solvent through semipermeable membrane from lower concentration to higher concentration.
Not dependant on solute potential	Depends on solute potential
Ex. Exchange of gases - Respiration	Ex. Water absorbed from soil by root hair of a plant.

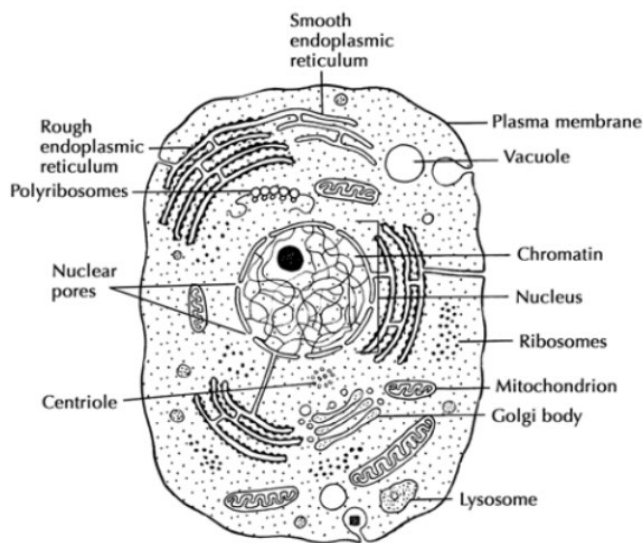
3. Write three points of difference between a plant cell and an animal cell.

Plant cell	Animal cell
Square or rectangular in shape	Irregular or circular in shape
Cell wall is present	Cell wall is absent
Nucleus in one side of a cell	Nucleus in the centre of a cell
One large vacuole	Small and many vacuoles
Plastids are present	No plastids

4. Explain membrane biogenesis.

Membrane biogenesis is the process of biological membrane formation. It occurs through the synthesis of cell membranes using proteins and lipids. The endoplasmic reticulum is important in membrane biogenesis. The type of cell membrane largely determines the function and structure of the cell. It protects the cell's internal components, including the nucleus.

5. Draw a neat labelled diagram of an animal cell.



Q 5. Answer the questions descriptively:

5 X 5 = 25 Marks

1. Differentiate between mitochondria and plastids (three points). What are the different types of plastids based on colours and functions? Quote one or two examples.

Mitochondria	Plastids
Found in all eukaryotic cells	Found in only plant cells
Pigments are absent	Pigments are present
Produces ATP	Produces glucose and stores it as starch
Size is smaller	Size is larger

Types of plastids: They are classified based on the presence or absence of the Biological pigments and their stages of development.

Chloroplasts

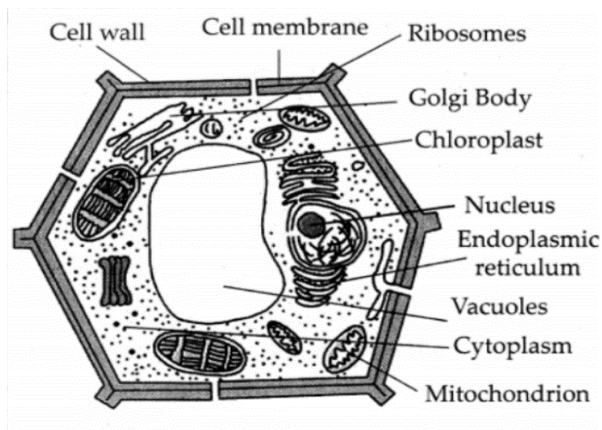
Chromoplasts

Gerontoplasts

Leucoplasts

Examples: flowering plants and fruits like papaya, water melon etc.

2. Draw a neat – labelled diagram of a plant cell w.r.t. the following organelles to locate:
- Nucleus, b. Vacuoles c. Chloroplast, d. Golgi apparatus & e. Mitochondrion



3. Write one function each of the following:

- Lysosome, b. Chloroplast, c. Vacuole, d. Microvilli & e. Nucleus

- Lysosomes, also called as suicidal bags, are membranous organelles whose specific function is to breakdown cellular wastes and debris by engulfing it with hydrolytic enzymes.
- Chloroplast: They are green coloured plastids, which comprise green-coloured pigments within the plant cell and are called chlorophyll.
- Vacuole: The term “vacuole” means “empty space”. They help in the storage and disposal of various substances. They can store food or other nutrients required by a cell to survive. They also store waste products and prevent the entire cell from contamination. The vacuoles in plant cells are larger than those in the animal cells.
- Microvilli: Microvilli are the finger-shaped plasma membrane projections that is present on the surface of certain cells. It increases the surface area and facilitates the path of fluid or nutrients. Villi increase the surface area hence allowing more foods and nutrients to be absorbed. Ex- Small intestine villi.

- e. Nucleus: The most important part of a eukaryotic cell is nucleus. It contains the genetic material and helps in cell growth and division. It is surrounded by a nuclear membrane that distinguishes the cytoplasm from the contents of the nucleus.

4. Why are lysosomes also called as suicidal bags, and how are they useful?

If the cell gets damaged, then one of the lysosomes bursts and release some digestive enzymes. The lysosomes undergo autolysis and burst open. This results in the release of hydrolytic enzymes. The released enzymes then digest their own cell and ultimately the cell dies. Hence, lysosomes are called suicide bags of the cell.

5. Ishu was helping his mother in laying the table when they had some guest for lunch at 1 p.m. Ishu was about to sprinkle salt on the garnished salad at 12:30 p.m. His mother stopped him from doing so and told him that it was too early to sprinkle salt on the salad, he should do so only when they are seated for having the lunch. Ishu tries to find out the reason....

(a) What would happen if salt is sprinkled on the salad?

On sprinkling of some salt on the salad, the salad will release water.

(b) Which property of cells is seen in adding salt to it?

The salt outside the salad acts as hypertonic solution as it has less water concentration and therefore the cell loses water by osmosis.

(c) What two values of Ishu can be observed through the situation above?

- i. Helping parents
- ii. Inquisitive with scientific temperament to discover more such examples.