



INDIAN SCHOOL AL WADI AL KABIR



Class: IX	DEPARTMENT OF SCIENCE -2026-27 SUBJECT: BIOLOGY	DATE: 07/08/2026
WORKSHEET NO:2 WITH ANSWERS	TOPIC: CELL: THE BUILDING BLOCK OF LIFE -PART 2	A4 FILE FORMAT
CLASS & SEC:	NAME OF THE STUDENT:	ROLL NO.

I. OBJECTIVE TYPE QUESTIONS (1 MARK):

1. A cell biologist observes a dense, round body inside the nucleus where the synthesis of ribosomal subunits takes place. Which structure is being observed?

- A) Nuclear membrane
- B) Nucleolus
- C) Chromatin
- D) Nuclear pore

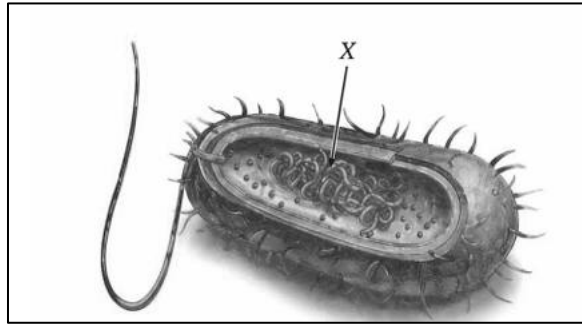
2. The inner membrane of the mitochondrion is folded into finger-like projections called cristae. What is the significance of these folds?

- A) They help in photosynthesis.
- B) They provide a large surface area for ATP-generating chemical reactions.
- C) They store the genetic material of the mitochondrion.
- D) They help the mitochondrion divide into two.

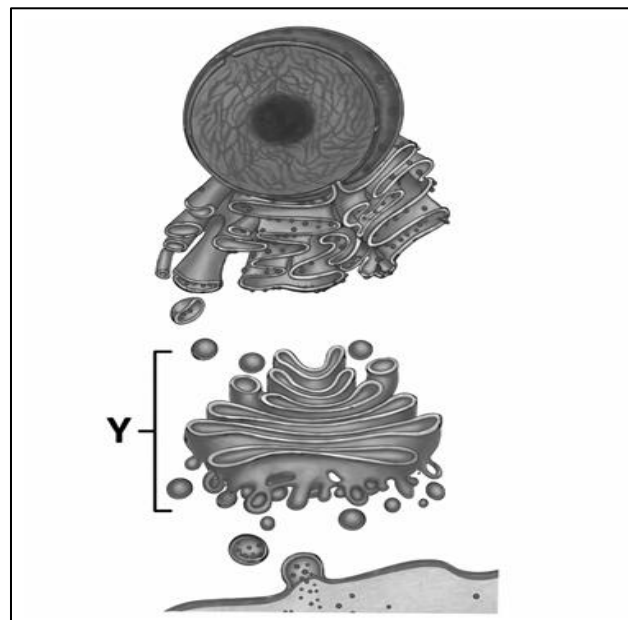
3. Which of the following features of mitochondria and plastids supports their ability to synthesise some proteins independently?

- A) Presence of a double membrane
- B) Presence of a large number of enzymes
- C) Presence of their own DNA and ribosomes
- D) Presence of a folded inner membrane

4. Observe the diagram of the given cell. Which of the following correctly identifies the structural region marked 'X' and describes its defining characteristic?



- A) Nucleolus; a dense spherical structure responsible for synthesising ribosomal subunits.
 - B) Cytoplasm; a jelly-like substance where most cellular chemical reactions occur.
 - C) Nucleus; a double-membrane-bound organelle storing tightly packed chromosomes.
 - D) Nucleoid; an undefined nuclear region containing genetic material without a membrane.
5. The diagram shows an interconnected system of cellular organelles. What is the primary function of the organelle labelled 'Y'?



- A) It helps in the transport of materials within the cell through a network of membranes.
- B) It modifies, stores and packages cellular products into vesicles for transport.
- C) It contains digestive enzymes that help in the breakdown of waste materials.
- D) It provides a site for the production of energy through cellular respiration.

6. The table provides data on chromosome changes during cell division observed in different biological samples. Which samples represent mitosis occurring for growth and repair of tissues?

Cell sample	Initial chromosome number in parent cell	Final chromosome number per daughter cell	Number of daughter cells formed
Sample 1	46	46	2
Sample 2	46	23	4
Sample 3	16	16	2
Sample 4	24	12	4

- A) Samples 1 and 2
- B) Samples 2 and 4
- C) Samples 1 and 3
- D) Samples 3 and 4

7. Plant cells contain different types of plastids, each performing specific functions. Which type of plastid lacks coloured pigments and functions mainly as a storage site for starch?

- A) Chromoplasts containing coloured pigments
- B) Leucoplasts involved in storage of starch
- C) Chloroplasts responsible for photosynthesis
- D) Amyloplasts containing chlorophyll and helping in the preparation of food

For the questions 8 to 11, two statements are given-one labelled Assertion (A) and the other labelled Reason(R). Select the correct answer to these questions from the options (A), (B), (C) and (D)as given below:

- A) Both A and R are true and R is the correct explanation of the assertion.
- B) Both A and R are true but R is not the correct explanation of the assertion.
- C) A is true but R is false.
- D) A is false but R is true.

8. **Assertion (A):** Mature RBCs in humans cannot repair or divide themselves.

Reason (R): Mature RBCs lack a nucleus.

9. **Assertion (A):** Rough Endoplasmic Reticulum is involved in the synthesis and storage of fats and hormones.

Reason (R): Rough Endoplasmic Reticulum has ribosomes attached to its surface.

10. **Assertion (A):** Cancer cells keep dividing uncontrollably, leading to the formation of tumours.

Reason (R): Cancer cells lose the control of contact inhibition.

11. **Assertion (A):** Plant cells generally have larger vacuoles than animal cells.

Reason (R): Vacuoles help maintain turgidity in plant cells.

II. VERY SHORT QUESTIONS (2 MARKS):

12. A scientist observed that some cells in the human body continue to divide uncontrollably, forming a mass of cells, while normal cells stop dividing when they come in contact with neighbouring cells.

(a) Name the process that controls cell division in normal animal cells when they touch neighbouring cells.

(b) Why do cancer cells form tumours?

13. During cellular activities, a cell produces waste materials and damaged cell parts. If these materials accumulate inside the cell, they may affect its normal functioning. Explain how lysosomes help the cell in maintaining its cleanliness and proper functioning.

14. Mitochondria and Chloroplasts are two important organelles in a plant cell. Discuss how these two organelles are structurally and functionally similar to each other and are different from each other.

15. A student observed that a well-watered plant remained upright, while another plant kept without water for several days became wilted. Based on the role of vacuoles in plant cells, answer the following:

(a) Why do plant cells become less firm when the plant does not receive enough water?

(b) How does the vacuole help a plant cell maintain its firmness?

16. How is the nucleoid of a prokaryotic cell different from the nucleus of a eukaryotic cell?

17. Why do fruits and flowers exhibit bright colours in nature?

III. SHORT ANSWER QUESTIONS (3 MARKS):

18. While studying a cell under an electron microscope, a scientist observed stacks of flattened, sac-like structures that were actively packaging and transporting substances within the cell.

(a) State any two functions of this cell organelle.

(b) Name one cell organelle that is formed with the help of this organelle.

19. A student observed that a plant kept in sunlight could prepare food, while a plant kept in the dark showed poor growth. The student studied the cells of these plants and found special organelles responsible for food synthesis and storage. Answer the following questions:

(a) Name the organelle responsible for food synthesis in plant cells.

(b) Which pigment present in this organelle helps in the absorption of sunlight? Explain its role in photosynthesis.

(c) Name the two other types of plastids and state one function of each.

20. Explain the difference between these two types of endoplasmic reticulum based on their structure and functions.

21. Explain why mitochondria are called the “powerhouses of the cell”. Describe their structure and explain how the energy produced by them is utilised by the cell.

IV. LONG ANSWER TYPE QUESTIONS (5 MARKS):

22. What is cell division? Why is cell division important? Differentiate between mitosis and meiosis.

23. Write the differences between a plant and an animal cell.

24. Explain the structure of the nucleus in detail. Mention the role of its different components.

V. SOURCE BASED/CASE BASED QUESTION (4 MARKS):

25. Rohan is a marathon runner who trains for several hours every day. His coach emphasizes the importance of a proper diet to keep his stamina high. During a sports science seminar, a doctor explains that endurance athletes need highly efficient muscle cells. These muscle cells contain a large number of specific double-membrane organelles that break down glucose from food to release massive amounts of energy for cellular activities. The doctor notes that the inner membrane of this organelle is deeply folded to maximize the surface area for energy-producing chemical reactions.

(a) Name the cell organelle being discussed by the doctor.

(b) What is the biological name for the deep folds of the inner membrane, and why is this folding important?

(c) In what chemical form is the energy released and stored by this organelle?

(d) Mention two features of mitochondria that show their similarity with certain bacteria.

ANSWERS

I.	OBJECTIVE TYPE QUESTIONS (1 MARK):
1.	B) Nucleolus
2.	B) They provide a large surface area for ATP-generating chemical reactions.
3.	C) Presence of their own DNA and ribosomes
4.	D) Nucleoid; an undefined nuclear region containing genetic material without a membrane.
5.	B) It modifies, stores and packages cellular products into vesicles for transport.
6.	C) Samples 1 and 3
7.	B) Leucoplasts involved in storage of starch
	ASSERTION AND REASONING:
8.	A) Both A and R are true and R is the correct explanation of the assertion.
9.	D) A is false but R is true.
10.	A) Both A and R are true and R is the correct explanation of the assertion.
11.	A) Both A and R are true and R is the correct explanation of the assertion.
II.	VERY SHORT QUESTIONS (2 MARKS)
12.	a. Contact inhibition. b. Cancer cells lose the control of contact inhibition and continue dividing uncontrollably, forming a mass of cells called tumours.
13.	Lysosomes are single membrane-bound sacs filled with enzymes, which can break down unwanted proteins, carbohydrates, fats, and even damaged parts of the cell, keeping it clean and healthy. The products formed by the breakdown are released into the cytoplasm, where they may be reused in other cellular processes.
14.	Similarities: (i) Both are double membrane-bound organelles. (ii) Both possess their own DNA and ribosomes and can synthesise some of their own proteins. Differences: Mitochondria carry out cellular respiration and release energy (ATP), whereas chloroplasts contain chlorophyll and perform photosynthesis to prepare food.
15.	(a) When a plant does not get enough water, the vacuole loses water, causing the cell to lose turgidity and become less firm, resulting in wilting.

	(b) The vacuole stores water and maintains pressure inside the cell, which keeps the plant cell firm.								
16.	Prokaryotic cells do not have a well-defined nucleus. Their DNA is present as a single circular molecule associated with specific proteins. The region containing this genetic material is called the nucleoid, whereas the nucleus is enclosed by a nuclear membrane and contains chromosomes.								
17.	Bright colours are due to chromoplasts, which contain coloured pigments. Their pigments (may be yellow, orange or red). Such bright colours help in attracting pollinators for pollination and fruit-eating animals that help in seed dispersal.								
III	SHORT ANSWER QUESTIONS (3 MARKS):								
18.	(a) Functions of the Golgi apparatus: It modifies, sorts, and packages proteins and/or lipids into vesicles for transport and secretion. It is functionally linked to the ER, the cell membrane, and other cell organelles, acting like the cell's post office. (b) Lysosome — the Golgi apparatus packages materials into vesicles for lysosome formation.								
19.	(a) Chloroplast is the organelle responsible for food synthesis in plant cells. (b) Chlorophyll absorbs sunlight and helps in the process of photosynthesis for the synthesis of food. (c) Chromoplasts – contain coloured pigments (yellow, orange or red) and provide colour to flowers and fruits, helping in attracting pollinators and seed dispersal. Leucoplasts – store food materials such as starch, oils or proteins.								
20.	• Rough Endoplasmic Reticulum (RER): It has ribosomes attached to its surface, giving it a rough appearance. It is mainly involved in protein synthesis and protein secretion. • Smooth Endoplasmic Reticulum (SER): It lacks ribosomes on its surface and appears smooth. It is involved in the synthesis and storage of fats (lipids) and hormones.								
21.	Mitochondria are called the powerhouses of the cell because they supply energy required for cellular activities. Glucose and other molecules are broken down during cellular respiration to release energy, which is stored in the form of ATP (Adenosine Triphosphate). The inner membrane of mitochondria is folded into finger-like projections called cristae, which increase the surface area for chemical reactions and facilitate energy production.								
IV.	LONG ANSWER TYPE QUESTIONS (5 MARKS):								
22.	Cell division is the process by which a parent cell divides to form new cells. Importance: (i) Growth. (ii) Repair and replacement of worn-out cells. (iii) Reproduction in unicellular organisms. Mitosis: One division; two identical daughter cells; chromosome number remains the same; occurs in body cells. Meiosis: Two successive divisions; four daughter cells; chromosome number is halved; occurs in reproductive cells.								
23.	<table border="1"> <thead> <tr> <th>Plant Cell</th><th>Animal Cell</th></tr> </thead> <tbody> <tr> <td>1. Cell wall is present.</td><td>1. Cell wall is absent.</td></tr> <tr> <td>2. Plastids are present.</td><td>2. Plastids are absent.</td></tr> <tr> <td>3. Usually one large central vacuole is present.</td><td>3. Vacuoles are small and temporary or absent.</td></tr> </tbody> </table>	Plant Cell	Animal Cell	1. Cell wall is present.	1. Cell wall is absent.	2. Plastids are present.	2. Plastids are absent.	3. Usually one large central vacuole is present.	3. Vacuoles are small and temporary or absent.
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	4. Nucleus is pushed towards the periphery due to the large vacuole.	4. Nucleus is generally present in the centre of the cell.
	5. Fixed shape due to the presence of the cell wall.	5. Shape is generally irregular or rounded due to the absence of a cell wall.
24.	The nucleus is a membrane-bound organelle that acts as the control centre of the cell. It is surrounded by a double-membrane structure called the nuclear envelope, which has nuclear pores that allow the exchange of materials between the nucleus and cytoplasm. The nucleus contains chromatin, which is a network of DNA and proteins. During cell division, chromatin condenses to form chromosomes, which carry genetic information. The nucleus also contains a dense region called the nucleolus, which helps in the formation of ribosomes. The nucleus controls cellular activities and plays an important role in cell growth, reproduction and transfer of genetic information.	
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25.	(a) The cell organelle being discussed is the mitochondrion (mitochondria). (b) The deep folds of the inner membrane are called cristae. They increase the surface area for chemical reactions involved in energy production. (c) The energy is released and stored in the form of ATP (Adenosine Triphosphate). (d) Mitochondria have their own DNA and ribosomes, which are features similar to certain bacteria.	

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