	INDIAN SCHOOL AL WADI AL KABIR	
Class: IX	**DEPARTMENT OF SCIENCE -2024-25** **SUBJECT: BIOLOGY**	**DATE OF COMPLETION: 09.05.2024**
WORKSHEET NO:1 WITH ANSWERS	**TOPIC: THE FUNDAMENTAL UNIT OF LIFE - PART 1**	**A4 FILE FORMAT (PORTFOLIO)**
CLASS & SEC:	**NAME OF THE STUDENT:**	**ROLL NO.**

I. OBJECTIVE TYPE QUESTIONS (1 MARK):

1. Cell theory states that all organisms are made up of one or more similar units of organization called cells. Which of the following organisms do not strictly adhere to this theory?
   a) Protozoa
   b) Bacteria
   c) Viruses
   d) Algae

2. A plant cell placed in a hypo-tonic solution will not burst because of presence of:
   a) Plasma membrane
   b) Cell wall
   c) Chloroplast
   d) Cytoplasm

3. Plant cell wall is mainly composed of:
   a) Sugars
   b) Cellulose
   c) Proteins
   d) Lipids

4. A cell will swell up if:
   a) The concentration of water molecules in the cell is higher than the concentration of water molecules in surrounding medium.
   b) The concentration of water molecules in surrounding medium is higher than water molecules concentration in the cell.
   c) The concentration of water molecules is same in the cell and in the surrounding medium
   d) Concentration of water molecules does not matter.

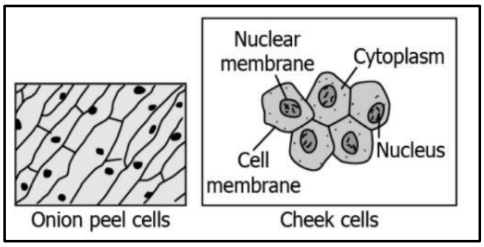
5.What is a basis for differentiation of a prokaryotic cell from a eukaryotic cell?

a) Presence or absence of cytoplasm
b) Presence or absence of cell membrane
c) Presence or absence of genetic material
d) Presence or absence of nuclear membrane.

6. Which of the following would you not find in a bacterial cell?

a) DNA
b) Cell membrane
c) Golgi apparatus
d) Ribosomes

7. The image shows cells in the onion peel and human cheek. What can be understood by observing these cells?

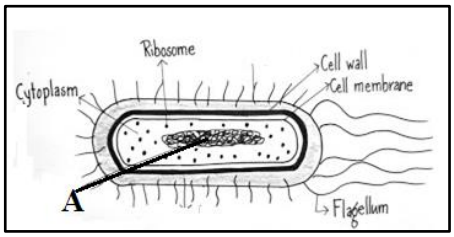


a) All living things are made up of cells that look similar.
b) All living things are made up of cells that are structurally similar but functionally different.
c) All living things are made up of cells that look different from each other.
d) None of the above.

8. The main function of a plasma membrane is to:

a) Prevent water from entering or leaving.
b) Control what goes into and out of the cell.
c) Act as a sieve, allowing only lipids to pass.
d) Move the cell from place to place.

9. In the diagram of the prokaryotic cell shown, the region labelled (A) is called the:

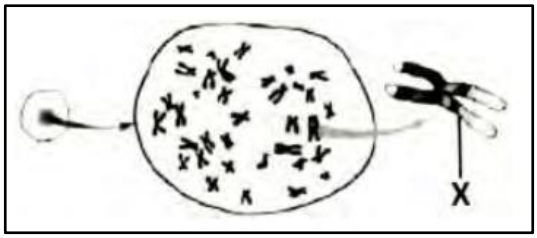


a) Nucleoid
b) Cytoplasm
c) Capsule
d) Plasma Membrane

10. When solute concentration is higher in the external solution then the solution is:
a) Hypotonic
b) Isotonic
c) Hypertonic
d) None of above

11. What will happen to an animal cell placed in a concentrated salt water solution?
a) The cell will shrink
b) The cell will expand
c) The cell will burst
d) The cell will shrink and then expand and then shrink again

12. The diagram below shows a magnified view of a particular part of a human cell. Name the part labelled X.



a) Ribosome
b) Chromosome
c) Nucleoplasm
d) Mitochondrion

For the questions 13 to 16, two statements are given-one labelled Assertion (A) and the other labelled Reason(R). Select the correct answer to these questions from the options (i) , (ii) ,(iii) and (iv)as given below:
(i) Both A and R are true and R is the correct explanation of the assertion.
(ii) Both A and R are true but R is not the correct explanation of the assertion.
(iii) A is true but R is false.
(iv) A is false but R is true.

13.**Assertion (A):** The shape of the cells is of different types ranging from circular, elongated, tubular, oval, cylindrical, etc.
Reason(R): The shape of the cells varies according to the specific function they perform.

14. **Assertion (A):** Cell wall is found in plant cell.
Reason(R): Animal cells are covered only by cell membrane.

15**. Assertion (A):** Cell wall is a non-living part of the cell.
Reason(R): It does not offer protection, definite shape and support.

16.**Assertion(A):** There is a division of labour in multicellular organisms such as human beings.
Reason(R): This means that different parts of the human body perform different functions.

II. VERY SHORT QUESTIONS (2 MARKS)

17. How is the nucleoid region of a prokaryotic cell different from the nucleus of a eukaryotic cell?
18. How does fungi and bacteria withstand much greater changes in the surrounding medium than animal cells?
19. What happens to a plasmolysed cell when it is placed in water?
20. Two beakers A and B contain plain water and concentrated sugar location respectively. Equal number of dried raisins and fresh grapes are kept in A and B for a few hours and then taken out. Explain the reason for the difference in the physical appearance of raisins/grapes which were taken out of the two beakers.
21. How does endocytosis help an organism like amoeba?
22. Why is the plasma membrane called as selectivity permeable membrane? Write one function of it.
23. Who proposed the cell theory? State the postulates of cell theory.
24. State two point of differences between prokaryotic and eukaryotic cell.

III. SHORT ANSWER QUESTIONS (3 MARKS);

25. Carry out the following experiment on osmosis note the observations and give answer of the following questions.
    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,
    i) Keep cup A empty
    ii) Put 1 tsp sugar in cup B
    iii) Put 1 tsp salt in cup C
    iv) Put 1 tsp sugar in the boiled potato cup D
    a) Explain why water gathers in the hollowed portion of B and C.
    b) Why is potato A necessary for the experiment.
    c) Explain why water does not gather in the hollowed-out portions of A and D?
26. In brief state what happens when:
    i) Dry apricots are left for some time in pure water and later transferred to sugar solution.
    ii) The plasma membrane of a cell breaks down.
    iii) Rheo leaves are boiled in water first and then a drop of sugar syrup is put on it.

27. Distinguish between hypotonic solution, isotonic solution and hypertonic solution.

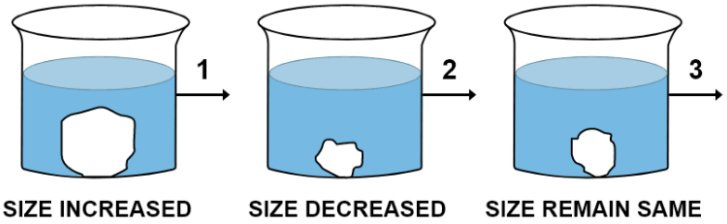
IV. LONG ANSWER TYPE QUESTIONS (5 MARKS):

28. a) Explain in detail what do you know about the structure of nucleus.
    b) Draw a neat labelled diagram of a prokaryotic cell.

29. a) Describe the process of diffusion of O_2 and CO_2 through the cell membranes.
    b) Define plasmolysis.

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

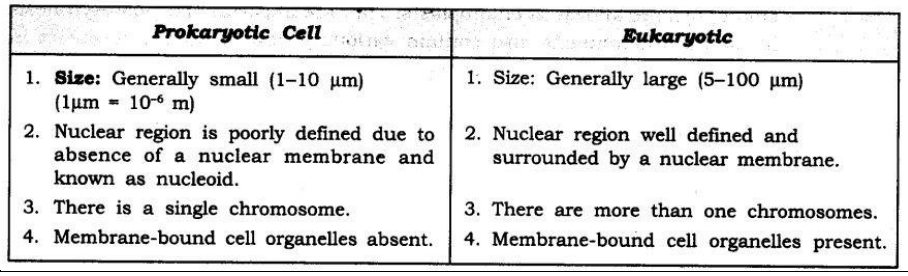
A candidate in order to study the process of osmosis has taken 3 potato cubes and put them in 3 different beakers containing 3 different solutions. After 24 hours, in the first beaker the potato cube increased in size, in the second beaker the potato cube decreased in size and in the third beaker, there was no change in the size of the potato cube. The following diagram shows the result of the same experiment.



a) Give the technical terms of the solutions used in the beakers 1, 2 and 3. In beaker 3, the size the potato cube remains the same. Explain the reason in brief.
b) Write the specific features of the cell sap of root hairs which helps in absorption of water.
c) What is osmosis?
d) How does a cell wall and a cell membrane differ in their permeability?

ANSWERS

I.	**OBJECTIVE TYPE QUESTIONS (1 MARK):**
1.	c) Viruses
2.	b) Cell wall
3.	b) Cellulose
4.	b) The concentration of water molecules in surrounding medium is higher than water molecules concentration in the cell.
5.	d) Presence or absence of nuclear membrane.
6.	c) Golgi apparatus
7.	c)All living things are made up of cells that look different from each other.
8.	b) Control what goes into and out of the cell.
9.	a) Nucleoid
10.	c) Hypertonic
11.	a) The cell will shrink
12.	b) Chromosome
II.	**ASSERTION AND REASONING:**

13.	(i)Both A and R are true and R is the correct explanation of the assertion.
14.	(ii)Both A and R are true but R is not the correct explanation of the assertion.
15.	(iii)A is true but R is false.
16.	(i)Both A and R are true and R is the correct explanation of the assertion.
III.	**VERY SHORT QUESTIONS (2 MARKS)**
17.	The nucleus found inside eukaryotic cells is protected by the nuclear membrane. It separates the nucleus from other cellular components inside the cell. The nucleoid possesses no such protective membrane and is not separated from the other components of the prokaryotic cell.
18.	The cells of plants, fungi and bacteria are surrounded by the cell wall. The cell wall allow them to take up water through osmosis when they are placed in hypotonic medium. The presence of cell wall allows these cells to tolerate high internal pressure. Hence these cells when placed in hypotonic solutions will swell but do not burst.
19.	When a plasmolysed cell is placed in water, the cell absorbs water from outside due to difference in solute concentration inside and outside the cell. By absorbing water the cell becomes turgid.
20.	Raisins in beaker A with plain water will get swollen due to endosmosis while grapes in beaker B with concentrated sugar solution will get shrink due to exosmosis.
21.	Endocytosis is the process by which amoeba takes up the food particle. During the process of endocytosis, the outermost membrane of the amoeba folds inwardly and extends outwards to catch the food. By the process of endocytosis, the amoeba takes up its nutrition.
22.	The cell membrane or plasma membrane is a biological membrane that separates the interior of the cell from the outside environment. The plasma membrane is called as selectively permeable membrane because it regulates the movement of substances in and out of the cell. It means that the plasma membrane allows some material to pass through it while at the same time it blocks other material from entering through it.
23.	Matthias Schleiden**,** Theodor Schwann and Rudolf Virchow. **Postulates of Cell theory are:** 1. All living organisms are made up of cells or the products of the cells. 2.Cells are the fundamental building blocks of tissues, organs, and entire functioning organisms. 3.New cells are formed through division in the pre-existing cells.
24	

Prokaryotic Cell	***Eukaryotic***
1. **Size:** Generally small (1–10 μm) (1μm = 10^{-6} m)	1. Size: Generally large (5–100 μm)
2. Nuclear region is poorly defined due to absence of a nuclear membrane and known as nucleoid.	2. Nuclear region well defined and surrounded by a nuclear membrane.
3. There is a single chromosome.	3. There are more than one chromosomes.
4. Membrane-bound cell organelles absent.	4. Membrane-bound cell organelles present.

IV **SHORT ANSWER QUESTIONS (3 MARKS);**

25. (i) Water gathers in the hollowed portions of set-up B and C because water enters the potato as a result of osmosis. Since the medium surrounding the cell has a higher water concentration than the cell, the water moves inside by osmosis. Hence, water gathers in the hollowed portions of the potato cup.

(ii) Potato A in the experiment acts as a control set-up. No water gathers in the hollowed portions of potato A.

(iii) Water does not gather in the hollowed portions of potato A because potato cup A is empty. It is a control set-up in the experiment.

Water is not able to enter potato D because the potato used here is boiled. Boiling denatures the proteins present in the cell membrane and thus, disrupts the cell membrane. For osmosis, a semi-permeable membrane is required, which is disrupted in this case. Therefore, osmosis will not occur. Hence, water does not enter the boiled potato cup.

26. i) The apricots swell due to osmosis initially and when transferred to sugar solution shrink again due to exosmosis.
ii)It would lead to scattering of cell organelles and there will be no functioning of the organelles.
iii)There will be no change in cell shape or size because the cells are dead due to boiling.

27.

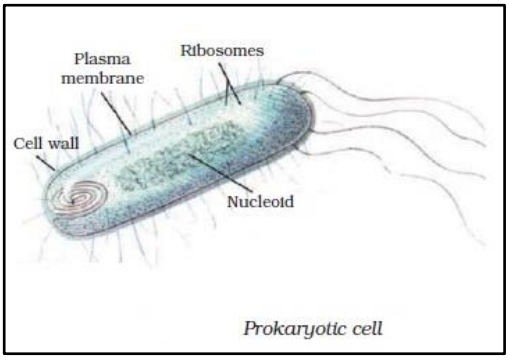
Hypotonic solution	**Isotonic solution**	**Hypertonic solution**
If the medium surrounding the cell has a higher water concentration than the cell, meaning that the outside solution is very dilute, the cell will gain water by osmosis. Such a solution is known as a **hypotonic solution.**	If the medium has exactly the same water concentration as the cell, there will be no net movement of water across the cell membrane. Such a solution is known as an **isotonic solution**.	If the medium has a lower concentration of water than the cell, meaning that it is a very concentrated solution, the cell will lose water by osmosis. Such a solution is known as a **hypertonic solution.**

V. **LONG ANSWER TYPE QUESTIONS (5 MARKS):**

28. a) **Structure of nucleus:**

1. It is large and well organized in structure which controls all the cell activities and called as brain of the cell.
2. The nucleus contains a covering layer called **a nuclear envelope** which covers all the contents of the nucleus.
3. A nuclear membrane is a selectively permeable membrane.
4. The nucleus contains a dense network of fine fibrous called chromatin.
5. Chromatin is made up of DNA and nuclear proteins.
6. The nucleus contains nucleic acids such as DNA and RNA.

Functions of the nucleus:

	1. The chromatin part of the nucleus possesses all genetic information that is required for the growth and development of an organism, reproduction, metabolism, and behavior. **2.** It plays a central role in cellular reproduction. b) 
29.	a) CO_2 is a cellular waste which accumulates in high concentrations inside the cell and needs to be excreted out. In the cell's external environment, the concentration of CO_2 is low as compared to inside of the cell. CO_2 tends to move out by the process of diffusion. Similarly, O_2 enters the cell by the process of diffusion when the level or concentration of O_2 inside the cell decreases with respect to the outside. Thus, diffusion plays an important role in gaseous exchange between the cells as well as the cell and its external environment. b) Plasmolysis is the process of shrinkage or contraction of protoplasm of a plant cell as a result of loss of water from the cell.
VI	**SOURCE BASED/CASE BASED QUESTION (4 MARKS):**
	a) Solution 1 → Hypotonic solution Solution 2 → Hypertonic solution Solution 3 → Isotonic solution In beaker 3, the solution present is an isotonic solution, i.e. the relative concentration of water molecules and solutes is the same in the solution as well as inside the cell. There is no movement of water molecules across the cell membrane. Hence, the size of potato cube remains the same. b) The cell sap of root hair has a higher concentration of salts as compared to the outside soil water. c) Osmosis is the movement of water molecules from their region of higher concentration (dilute solution or with a lower solute concentration) to their region of lower concentration (concentrated solution or with a higher solute concentration) through a semi permeable membrane. d) The cell wall is freely permeable. It allows the movement of water molecules and dissolved substances freely in and out of the cell. The cell membrane is semi permeable. It allows water molecules to pass through but not the larger molecules of the dissolved salts.

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