INTERNATIONAL INDIAN SCHOOL BURAIDAH
Worksheet

CLASS 9. **Subject:BIOLOGY**

CHAPTER 5 CELL : THE UNIT OF LIFE

1)Who discovered cell and in which year?

Ans: Robert hook discovered cell in the year 1665.

2)What are unicellular and multicellular organisms? Give examples.

Ans: The organisms which are made up of one cell are called unicellular organisms. Ex Amoeba, Paramecium.

The organisms which are made up of more cells are known as multicellular organisms. Ex plants, animals and human beings.

3)Draw a schematic sketch of various cells from the human body.

4)Why is the cell called structural and functional unit of life?

Ans: Because all living organisms are made up of cells and also all functions taking place inside the body of organisms are performed by cells.

5)Why plasma membrane is called selectively permeable membrane?

Ans: Plasma membrane allows or permits the entry and exit of some materials in and out of the cell. Therefore, it is called selectively permeable membrane.

6)How does the movement of substances take place into the cell? How do substances move out of the cell?

7)What is a cell made up of?

Ans: A cell is made up of plasma membrane, nucleus and cytoplasm.

8)Explain division of labour in multicellular organisms.

Ans: Multicellular organisms such as human beings have different body organs to perform different functions. The human body has a heart to pump blood, a stomach to digest food and so on.

9) Define cell organelles and write their function.

Ans: Each cell has got specific component in it is known as cell organelles.

Each kind of cell organelle performs a special function, such as making new material in the cell, clearing up the waste material from the cell.

10)Differentiate between Osmosis and Diffusion

Ans: Diffusion is the movement of substances i.e. carbon dioxide and oxygen from the region of high concentration to a region of low concentration.

It does not require semi permeable membrane.

Osmosis is the movement of water molecules from a region of High concentration to a region of low concentration.

It requires semi permeable membrane.

11) Explain the terms hypotonic, isotonic and hypertonic solution.

Ans: Hypotonic - If the medium surrounding the cell has a high-water concentration than the cell, the cell will gain water by osmosis and swells up.

Isotonic – If the medium has exactly the same water concentration as the cell, there will be no net movement of water across the cell membrane and the cell remains the same

Hypertonic – If the medium has a lower concentration of water than the cell, the cell will lose water by osmosis and shrinks. 12)What plasma membrane is made up of?

Ans: Plasma membrane is flexible and made-up of organic molecules called lipids and proteins.

13)What is Endocytosis? Give example.

Ans :The flexibility of the cell membrane enables the cell to engulf in food and other material from its external environment. Such processes are known as Endocytosis. Amoeba acquires its food through such processes.

14)Describe cell wall.

Ans :Plant cell, in addition to the plasma membrane, have another rigid outer covering called the cell wall. The cell wall lies outside the plasma membrane. The plant cell wall is mainly composed of cellulose. Cellulose is a complex substance and provides structural strength to plants.

15)What is Plasmolysis?

Ans :When a living plant cell loses water through osmosis there is a shrinkage or contraction of the contents of the cell away from the cell wall. This phenomenon is known as Plasmolysis.

16) Describe nuclear membrane.

Ans :The nucleus has a double layered covering called nuclear membrane. The nuclear membrane has pores which allow the transfer of material from inside the nucleus to its outside that is to the cytoplasm.

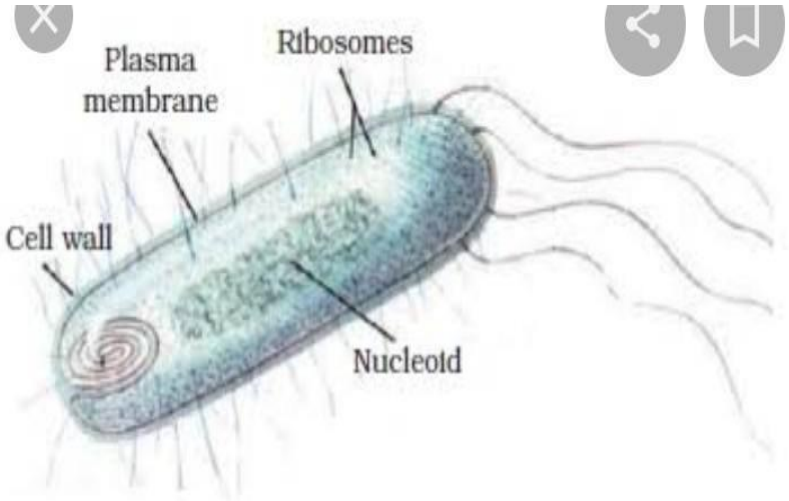
17)What are chromosomes? Write their function.

Ans :The nucleus of a cell contains rod shaped structures are called chromosomes. They are visible when the cell is about to divide.

Chromosomes contain information for inheritance of features from parents to next generation in the form of DNA(Deoxyribonucleic acid) molecules.

18)Draw a neat labelled diagram of prokaryotic cell.

Ans.



19) Write a note on cytoplasm.

Ans: Cytoplasm is the fluid content inside the plasma membrane. It also contains many specialised cell organelles. Each of these organelles performs a specific function for the cell.

20) Write the significance of cell membrane illustrating the example of viruses.

Ans: Cell membrane significance

The cell membrane is like the skin of a cell. It protects the cell and controls what goes in and out.

Example with viruses:

Viruses are too small to enter a cell on their own. They stick to special spots called receptors on the cell membrane. Only if the virus matches these spots can it enter the cell and cause infection.

Example: The COVID virus enters human cells by attaching to receptors on the cell membrane.

So, the cell membrane acts as a gate and protects the cell from unwanted things like viruses.

21)Write the differences between prokaryotic and eukaryotic cells.

Ans: *Differences between Prokaryotic and Eukaryotic Cells*

1. Nucleus

Prokaryotic cells do not have a true nucleus. Their DNA floats freely in the cytoplasm. Eukaryotic cells have a well-defined nucleus surrounded by a nuclear membrane that holds the DNA.

2. Size

Prokaryotic cells are small, usually 1-10 μm in size. Eukaryotic cells are larger, generally 10-100 μm.

3. Organelles

Prokaryotic cells lack membrane-bound organelles. Eukaryotic cells have organelles like mitochondria, chloroplast, endoplasmic reticulum, and Golgi apparatus.

4. DNA Structure

In prokaryotic cells, DNA is circular and not associated with histone proteins. In eukaryotic cells, DNA is linear and wrapped around histone proteins to form chromosomes.

5. Cell Division

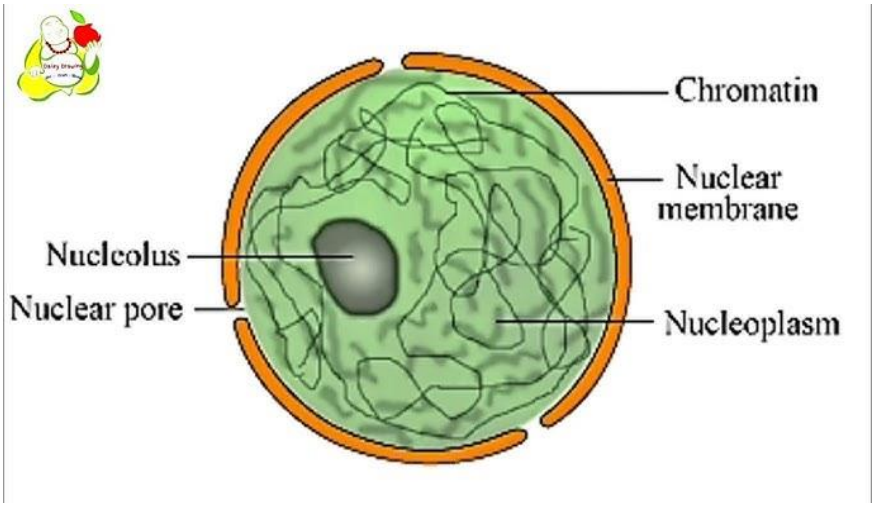
Prokaryotic cells divide by binary fission, a simple splitting process. Eukaryotic cells divide by mitosis or meiosis.

6. Examples

Bacteria and blue-green algae are prokaryotic cells. Plants, animals, fungi, and protists are made of eukaryotic cells.

Prokaryotic cells are simple and primitive with no nucleus. Eukaryotic cells are complex and have a true nucleus with organelles.

Q. Draw and label nucleus .



Q. What are the functions of nucleus?

Structure Of Nucleus

- Typically, it is the most evident organelle in the cell.
- The nucleus is completely bound by membranes.
- It is engirdled by a structure referred to as the nuclear envelope.
- The membrane distinguishes the cytoplasm from the contents of the nucleus
- The cell's chromosomes are also confined within it.
- DNA is present in the Chromosomes, and they provide the genetic information required for the creation of different cell components in addition to the reproduction of life.

Following are the important nucleus function:

- It contains the cell's hereditary information and controls the cell's growth and reproduction.
- The nucleus has been clearly explained as a membrane-bound structure that comprises the genetic material of a cell.
- It is not just a storage compartment for DNA, but also happens to be the home of some important cellular processes.

- First and foremost, it is possible to duplicate one's DNA in the nucleus. This process has been named DNA Replication and produces an identical copy of the DNA.
- Producing two identical copies of the body or host is the first step in cell division, where every new cell will get its own set of instructions.
- Secondly, the nucleus is the site of transcription. Transcription creates different types of RNA from DNA. Transcription would be a lot like creating copies of individual pages of the human body's instructions which may be moved out and read by the rest of the cell.
- The central rule of biology states that DNA is copied into RNA, and then proteins.

CELL ORGANELLES

1. ENDOPLASMIC RETICULUM:

These are membrane bound organelles which are long tubes, round or bag like structures.

There are two types of ER: rough ER and smooth ER .

Rough ER are named so because it contains ribosomes on their membranes, and is involved in protein synthesis.

Smooth ER lacks ribosomes on their surface and are involved in fats or lipids synthesis. SER in liver cells of vertebrates carry out detoxification of poisons and drugs.

Proteins and lipids synthesized by ER help in building the cell membrane, this process is known as membrane biogenesis.

Some proteins and fats functions as enzymes and hormones.

2.GOLGI APPARATUS:

It was first described by Camillo Golgi.

These are membrane bound vesicles arranged parallel to each other in stacks called cisterns.

Function of Golgi apparatus is to collect, modify and pack the materials in their functional form synthesized by ER. Such functional products are transported either within or outside a cell for their specific role to perform.

Golgi apparatus is involved in the formation of lysosomes.

3.LYSOSOMES:

They are membrane bound sac like structures and are waste disposal system of a cell.

Lysosomes contains strong digestive enzymes and carry out intracellular digestion of any foreign materials (like bacteria) and old, worn-out organelles.

Their digestive enzymes are synthesized by rough ER.

Lysosomes may burst when certain cellular functions are disturbed and enzymes released by them digest their own cell, for this reason they are also known as ‘suicide bags’ of a cell.

4. **Mitochondria** :

Mitochondria are double membrane structures, outer membrane is porous while the inner membrane is highly folded.

These are strange organelles in the sense they contain their own DNA and protein synthesizing structures called ribosomes.

Mitochondria are involved in cellular respiration i.e, they release energy in the form of ATP, for various life activities to occur.

ATP stands for Adenosine triphosphate and is known as the energy currency of a cell.

Energy stored in ATP is used for synthesizing new chemical compounds and mechanical work.

Since mitochondria is involved in releasing energy, it is commonly called as the ‘power house of the cell’.

5. **Plastids :**

Plastids are double membrane structures. Space present within the plastids is called stroma.

Plastids have their own DNA and ribosomes.

Chromoplasts (colored plastids) and leucoplasts (white or colorless plastids) are the two types of plastids.

Chloroplast is a kind of plastid that contain chlorophyll a green pigment, essential to perform photosynthesis process in plants.

Besides chlorophyll, chloroplast also contain yellow, orange pigments that imparts particular color to the plant parts (flowers, fruits).

Leucoplasts store starch, oils and protein granules within them.

6. **vacuoles :**

Solid or liquid materials are stored in the storage sacs of a cell called vacuoles.

Vacuoles in plant cells accounts for 50-90% of cell volume.

It provide rigidity, turgidity and stores cell sap (watery fluid) in plant cells.

It also stores sugars, amino acids and some proteins.

Vacuole in Amoeba is called food vacuole, as it is involved in digestion process.

Cell Division

The process in which a parent cell divide into daughter cells is known as cell division.

Cell division is the characteristic feature of all living organisms. There are two types of cell division-mitosis and meiosis.

Mitosis - It occurs in vegetative cells.

In this process, a parent cell divides into two daughter cells. Daughter cells so formed will have equal number of chromosomes as that of parent cell.

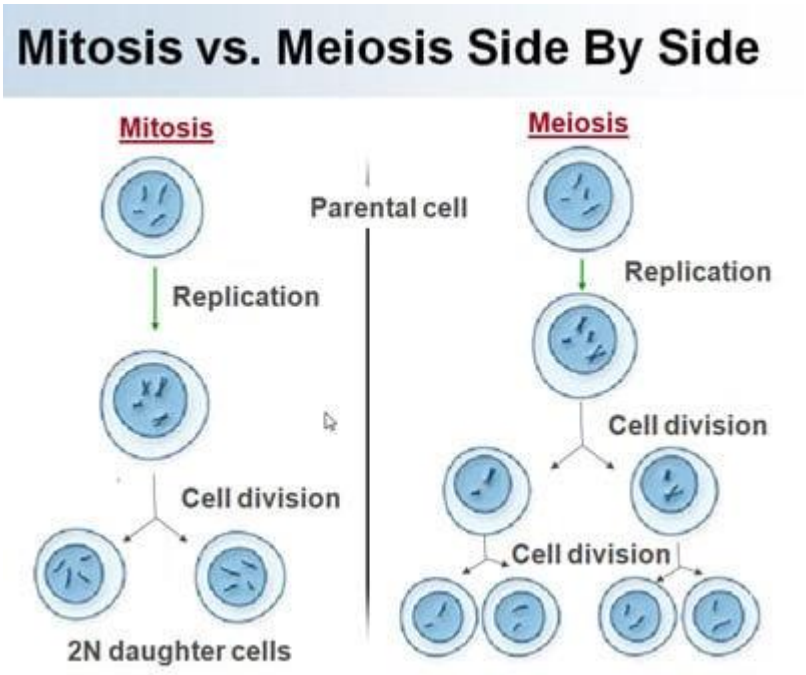
Mitosis is important for growth of an organism and repair of tissues and replacement of old and dead cells.

Meiosis – It occurs in reproductive or sex cells.

A parent cell undergoes division to produce four new daughter cells.

Each daughter cell will have half number of chromosomes to that of parent cell.

Meiosis is responsible for the formation of gametes or sex cells.



Objective type questions with answers

1. Cell theory was given by
   a) Schleiden & Schwann b) Robert hook c) Virchow d) Purkinje
2. Cell arises from pre-existing cells is stated by
   a) Robert hook b) Robert brown c) Virchow d) Purkinje
3. Amoeba acquire its food through a process termed
   a) Endocytosis b) Plasmolysis c) Exocytosis d) osmosis
4. The cell organelle involved in the storage, modification and packaging of products in vesicles.
   a) Endoplasmic Reticulum b) Mitochondria c) Golgi apparatus d) Lysosomes
5. The organelle known as "Suicide Bags" of a cell
   a) Ribosome b) Golgi body c) Lysosome d) Mitochondria
6. The enzymes present in lysosomes are made by
   a) Rough endoplasmic reticulum b) Smooth endoplasmic reticulum
   c) Golgi apparatus d) Mitochondria
7. The cell organelle enclosed by double membrane is
   a) Ribosome b) Vacuole c) Mitochondria d) Nucleolus
8. Which of these is known as the energy currency of the Cell?
   a) DNA b) Gene c) ATP d) Mitochondria
9. _____ are Organelles in which materials such as starch, oil & protein granules are stored.
   a) Chromoplast b) Leucoplasts c) Chloroplast d) Ribosome
10. Chromosomes are made up of
    - a) DNA b) Proteins c) DNA & proteins d) RNA
11. The cell organelle involved in forming complex sugars from simple sugars is
    a) Plastids b) Golgi apparatus c) Ribosome d) endoplasmic reticulum
12. Cell wall in plant cell is made of
    a) Starch b) Cellulose c) Glycogen d) Chitin
13. A cell is placed in solution, swells up. The solution is
    a) Hypertonic b) Hypotonic c) Isotonic d) Saturated
14. The movement of water molecules from region of higher concentration to a region of lower concentration through semi permeable membrane is called_____.
    a) Osmosis b) Diffusion c) Endocytosis d) Plasmolysis
15. Lysosome arises from
    a) Endoplasmic reticulum b) Golgi apparatus c) Nucleus d) Mitochondria

NAME THE FOLLOWING:

1. A solution which has a higher concentration of water than the cell_____.
2. Two cell organelles, which contain their own genetic material_____,_____.
3. Cell Organelle known as "powerhouse of the cell"_____.
4. The phenomenon by which protoplast of a cell shrinks from the cell wall _____.
5. The Site of protein synthesis _____.
6. Nucleic material present in prokaryotes_____.
7. The scientist who discovered nucleus in the cell _____.
8. The process in which protein and lipids help in building the cell membrane _____.
9. The process of movement of substance from a region of higher concentration to region of lower concentration_____
10. The cell organelle plays a crucial role in detoxifying many poisons and drugs____

Answer key

MCQ

1.a) Schleiden& Schwann	2. C) Virchow	3. a) Endocytosis
4.c) Golgi apparatus	5.C) Lysosomes	6. a) RER
7.c) Mitochondria	8. c) ATP	9. b) Leucoplast
10. c) DNA & Protein	11. b) Golgi apparatus	12.b) Cellulose
13 b) Hypotonic	14. a) Osmosis	15.b) Golgi Apparatus

Name the following:

1. Hypotonic solution
2. Mitochondria, plastids
3. Mitochondria
4. Plasmolysis
5. Ribosome
6. Nucleoid
7. Robert Brown

8. Membrane biogenesis
9. Diffusion
10. Smooth endoplasmic reticulum