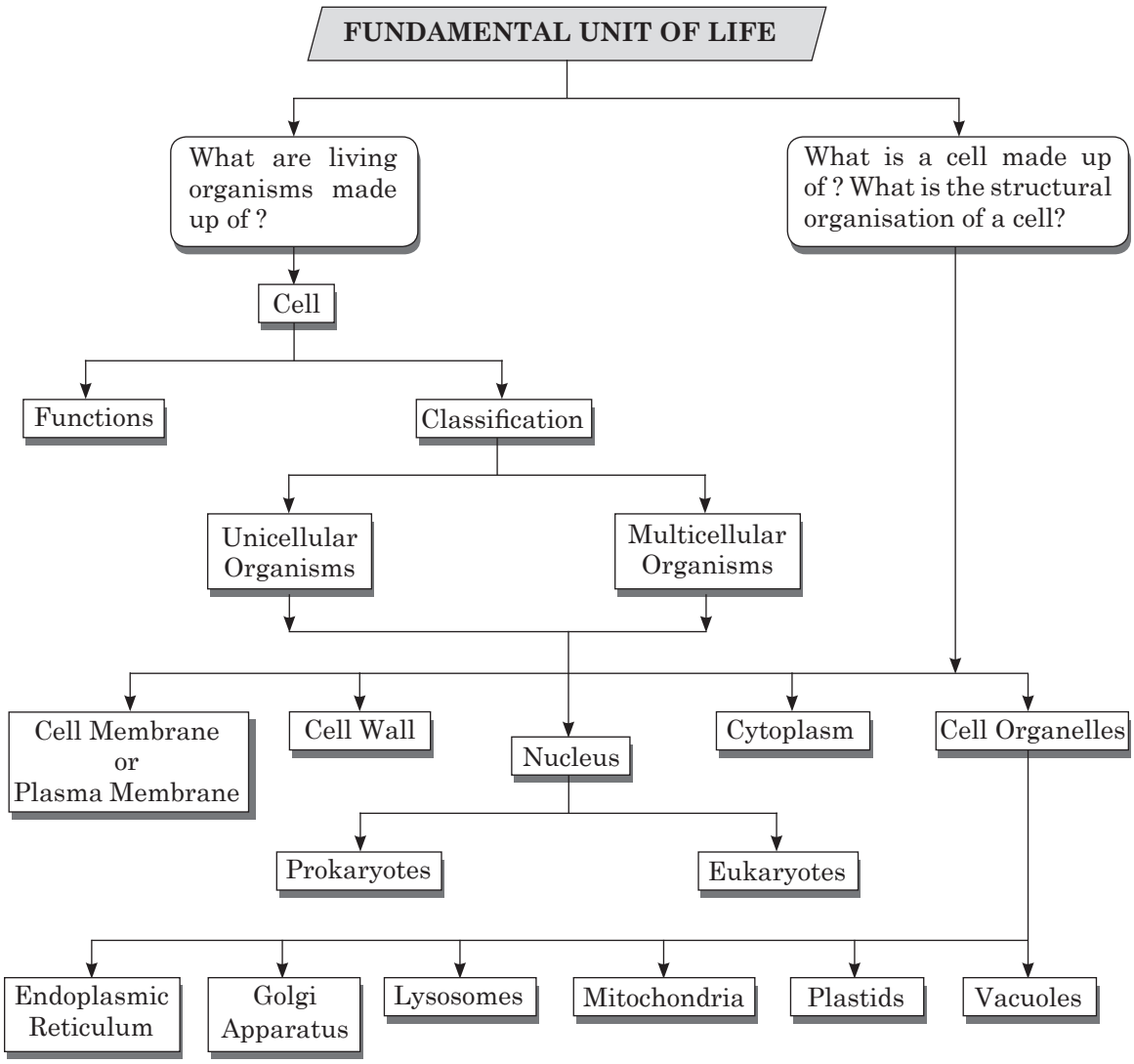
5 The Fundamental Unit of Life

Topics Covered

5.1 What are Living Organisms Made up of?
5.2 What is a Cell Made up of? What is the Structural Organisation of a Cell?
5.3 Cell Organelles

CHAPTER MAP



Quick Revision Notes

- All living organisms are made up of small microscopic units called 'cells'.
- *Cell* is a basic structural and functional unit of all living organisms.
- *Cytology* is a science which deals with the study of structure and composition of cells.
- *Robert Brown* discovered the nucleus in the cell.
- *Purkinje* coined the term 'protoplasm' for the fluid substance of the cell.
- The cell theory was presented by *Schleiden* and *Schwann*, all the plants and animals are composed of cells and that the cell is the basic unit of life. *Virchow* suggested that all cells arise from pre-existing cells.
- *Knoll and Ruska* discovered of the electron microscope which made it possible to observe and understand the complex structure of the cell and its various organelles.
- First living cell was discovered by *A.V. Leeuwenhock* in pond water.
- Cells may be prokaryotic or eukaryotic.
- Amoeba, Paramecium and bacteria are eukaryolic unicellular organisms.
- In multicellular organism, many cells group together to perform different functions, e.g. fungi, plants and animals.
- Cells divide to produce cells of their own kind.
- Cells have specific shape, e.g. nerve cell has a tree like shape.
- Each living cell perform a different function.
- Each cell is made up of specific components called *cell organelles* which help a cell to perform specific functions.
- Every cell has plasma membrane (cell membrane), nucleus and cytoplasm.
- Cell membrane is also called *selective permeable membrane* because it allows entry and exist of only some materials in and out of the cell.
- Plant cells have cell wall made up of cellulose in addition to plasma membrane.
- Nucleus has a double layer covering and is called nuclear membrane.
- Nucleoid is undefined nuclear region containing only nucleic acids is prokaryotic cells, e.g. bacteria, blue green algae, PPLO (mycoplasms)
- Prokaryotic cells do not have nuclear membrane and most of cytoplasmic organelles.
- Eukaryotic cells have nuclear membrane, plastids and cytoplasmic organelles, e.g. cells of plants and animals.
- Cytoplasm is the liquid content inside the plasma membrane.
- The largest cell is a *Ostrich* cell (15 cm in diameter).
- The smallest cell is *mycoplasm*. Human egg is 0.1 mm in diameter.
- The presence of a cell wall enables the cells of plant, fungi and bacteria to exist in hypotonic (concentration less than body fluids) media without bursting.
- *Endoplasmic Reticulum (ER)* acts as a passage for the cellular (within the cell) transport. It is a network of membranes in cytoplasm. They store proteins and lipids after their synthesis.
- Endoplasmic Reticulums are of two types, smooth and rough.
- *Golgi apparatus* pack and dispatch the proteins synthesised by the ER to various targets inside and outside the cell.
- Golgi apparatus also help in the formation of lysosomes.
- *Ribosomes* are site of protein synthesis present individually on the surface of RER, nuclear envelope inside mitochondria and plastids.
- Transportation of molecule across plasma membrane takes place by diffusion and osmosis.
- *Mitochondria* is present in eukaryotic cells except mammalian RBC's. It is a power house of the cell. It produces and stores ATP which is a molecular units of currency of energy.

- *Plastids* are only present in plant cells. They are chromoplast (coloured) like chlorophyll and leucoplast (colourless) like starch.
- Vacuoles are the storage sacs for solid or liquid contents (cell sap) These are very large in plants but small in animal cells.
- Lysosome are small sac-like small granules containing hydrolytic enzymes for intracellular digestion. They are the garbage disposable system of animal cells.
- Genes are made of DNA and help to transfer heredity traits. They are present on chromosomes.
- Chromosomes are present inside the nucleus.

1. What are Living Organisms Made up of?

Compound microscope: It is the instrument which is used to observe cells in biological laboratory.

Cell: The body of a living organism is made up of microscopic units called cell.

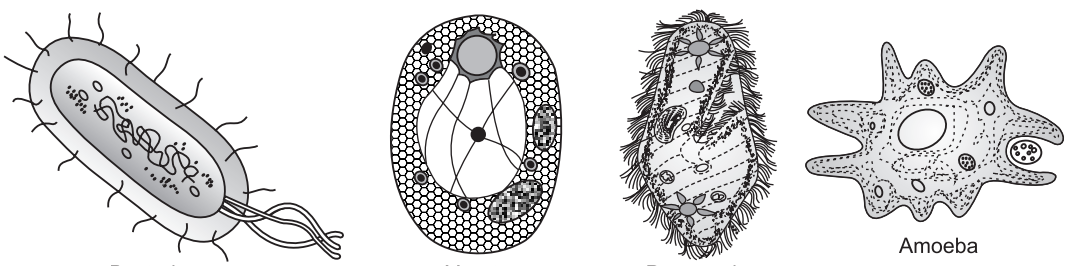
- **Unicellular organism:** Those organisms which have only single cell, e.g. bacteria, protozoa, amoeba, paramecium and blue green algae.
- **Multicellular organism:** They consist of large number of cells which function in a coordinated manner to perform different function, e.g. human being, animals, ostrich and pine tree.
- **Plant cells:** They have chloroplasts, large vacuoles, prepare their own food by photosynthesis (autotrophs), cell wall is made up of cellulose.
- **Animals cells:** They do not have cell wall, have small vacuole, lysosomes, nucleus and cannot prepare their own food and take chemical energy of plants and other animals (heterotrophs). Human adult has 10^{13} cells (10 trillion).

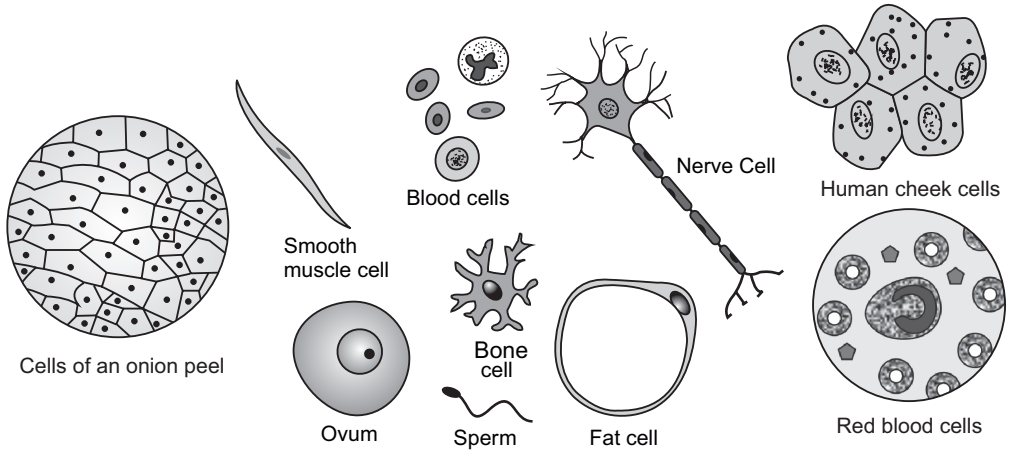
Discovery of cell: *Robert Hooke* discovered cells in a cork which was obtained from a bark of a tree in 1665.

Cell Theory

- Cell is a basic unit of life where all metabolic reactions take place.
- All cells are formed from pre-existing cells by cell division.
- Every organism starts its life as a single cell.
- All plants and animals are composed of cell.
- Viruses are the exceptions to cell theory.

Shape of a cell: Cells are of different size and shape. Some cells like amoeba can change its shape. Nerve cells have tree like shape. A red blood cell is biconcave in shape (circular and flattened in middle on both sides)





Different shapes of the cells

Size of a cell: Some cells are microscopic and some are visible by naked eyes. Largest cell is about 170 × 135 mm in diameter, i.e. *Ostrich egg* whereas the longest cell is upto 1 m or more, i.e. *nerve cell*. Human egg is 0.1 mm in diameter.

Protoplasm: The living matter which consist of water, ions, salt, protein, carbohydrate, fats, vitamins, nucleic acids.

Organelles: Each cell is made up of specific living components within it. They are called cell organelles. Each organelle performs a specific function. A cell is able to live because of its organelles.

Centrosome: It is present near nucleus of the animal cell. The microtubules of the cyctoskeleton are organised by it during cell division.

- **Centriole:** A cylindrical structure comprising the centrosome in animal cell and is not found in plant cells. They occur in pairs at right angle to each other. They also make cilia and flagella in some cells.

Functions of cells: Different cells perform different function, e.g.

- RBCs carries oxygen to the heart.
- Neuron process and transmit information to the brain.

Stem cells: These cells are *blank cells* because they do not perform any particular function but can later change into nearly any type of body cell. Human stem cells can be found in the embryo's umbilical cord blood and bone marrow.

- These days people are preserving their stem cells which can be used in future for treatment of certain diseases of heart, cancer, injuries, leukemia (blood cancer) etc.

Exercise 5.1

I. Very Short Answer Type Questions (1 Mark)

1. Why is the cell called the structural and functional unit of life? [*NCERT*]
2. Name the largest cell of living world. **[***DOE***]**
3. What is the size of human egg cell?
4. Which functions are performed by a single cell organism like amoeba?
5. How many types of different cells are present in our body?
6. Name two cells with cell wall.
7. Name the animal cell which does not possess nucleus.
8. Name the stain which is commonly used to stain onion peel cells? Which part of the cell is stained by it?

9. What is a cell?
10. Which is the longest cell in the human body?
11. Who proposed cell theory?
12. Which chemical is used to stain human cheek cells?
13. While preparing a temporary mount, why should the peel be kept in water?
14. Why is the cell called the structural and functional unit of life?
15. What is the basis of microscopy? Invention of which simple device made the discovery of microscope possible?
16. The shape and size of cells are related to the specific function they perform. Is it true for a unicellular organism?
17. What is a cell made up of?

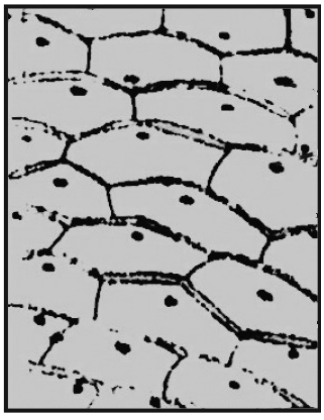
OR

Describe the structural organisation of a cell?

18. How is a cell organised to interact with its environment and yet functions like an independent unit?

II. Short Answer Type Questions–I (2 Marks)

19. Who discovered the cell and how? [*NCERT*]
20. Give specific functions which are performed by the cells in our body.
21. Why does a person become paralysed?
22. Why is red blood cells biconcave in shape?
23. Why does red blood cell contains red pigment haemoglobin?
24. Why does a nerve cell has a branched endings and a long thread like structure?
25. How do cells keep organisms alive?
26. What were the observations made by Robert Hooke while examining a thin slice of cork through a self-designed microscope?
27. On preparing temporary mounts of peels of onions of different sizes do we see different sizes of cell? Will they possess different inner structures too?
28. Identify the diagram and structure X.



29. Why are some organisms called unicellular organisms? Do we belong to this category? Elaborate.
30. Every multi-cellular organism has come from a single cell. How?

31. How does a living cell perform these basic functions?

OR

There is a division of labour in multicellular organisms such as human beings. Does it apply to a cell and its components too? Justify your answer through examples.

32. Which type of cells contain cell wall? Give one example.

III. Short Answer Type Questions–II (3 Marks)

33. What is fundamental unit of life? Who discovered it? How can they be observed?

[*CBSE* 2016]

34. What is difference between unicellular organism and multicellular organism? Give an example of each.

IV. Long Answer Type Questions (5 Marks)

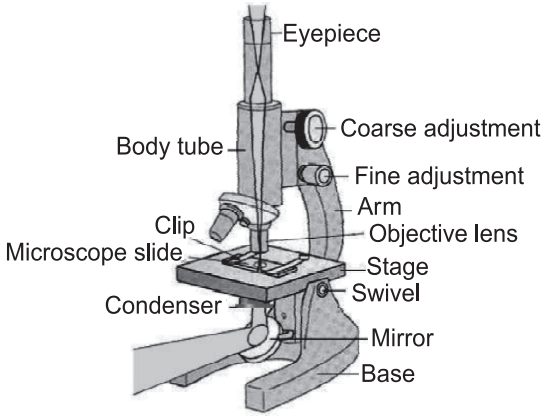
35. (*a*) Who discovered the cell? Which major invention led to the discovery of microscopic world?

(*b*) Name a single cell which may constitute a whole organism. What are they called?

(*c*) Every multicellular organism has come from a single cell. Justify the statement.

[*CBSE* 2016]

36. Answer these questions after observing the given figure.



Compound microscope

(*i*) What is the use of mirror and condenser?

(*ii*) When do we use screws for coarse adjustment and fine adjustment?

(*iii*) Which of the lenses can be rotated? Why are they rotated?

(*iv*) Name the lenses present in the microscope? What is the nature of lenses?

(*v*) How do we hold a microscope while transporting in the room?

Answers 5.1

1. A cell is a smallest part of a living organism which is fully alive and is capable of performing basic processes of life like reproduction and respiration, therefore, it is called the structural and functional unit of life.

2. Unfertilized Ostrich egg is the largest cell which is about 170 mm × 135 mm in diameter and is also visible by naked eye.

3. Human egg is 0.1 mm in diameter.

4. A single cell takes in food, excrete waste, move, grow and reproduce.

5. There are 200 different types of cells present in our body.
6. Onion cell (Plant cell) and fungi have cell wall.
7. Red blood cells does not possess nucleus.
8. Safranin is used to stain onion peel cells. It stains cell wall.
9. Cell is a basic structural and functional unit of all living organisms.
10. Nerve cell is the longest cell in human body.
11. Schleiden and Schwann proposed cell theory.
12. Methylene blue is used to stain human check cells.
13. Water prevent the peel from getting folded or dry.
14. Cells are the basic building units of the life. Each living cell has the capacity to perform certain basic functions that are characteristic of all living forms.
15. All organisms that we observe around are made up of cells but cell and its components can't be observed with naked human eye because of limited magnification and resolving power.
    The invention of magnifying lenses led to the discovery of the microscopic world.
16. Some cells like Amoeba have changing shapes. In some cases the cell shape could be more or less fixed and peculiar for a particular type of cell.
17. The cell has special components called organelles. All cells are found to have the same organelles, no matter what their function is or what organism they are found in.
18. There are three components in almost every cell; plasma membrane, nucleus and cytoplasm. All activities inside the cell and interactions of the cell with its environment are possible due to these components.
19. Robert Hooke saw the cork which resembled the structure of a honey comb consisting of many little compartments. He observed these through a microscope. He called these boxes as cell.
20. Nerve cells pass message from the sensory organ to our brain.
    Red blood cells absorb and transport oxygen.
21. When the nerve cells in the spinal cord of a person are damaged, a person become paralysed because other cells cannot perform their function.
22. Biconcave shape provides a large surface area to volume ratio to the red blood cells so that oxygen can be absorbed by the cell quickly.
23. Haemoglobin enables RBCs to transport oxygen.
24. The branch endings helps to receive and transmit message to other nerve cells quickly .
25. Many bio-chemical reactions take place inside a cell to keep an organism alive.
26. Robert Hooke saw that the cork resembled the structure of a honeycomb consisting of many little compartments. He called these boxes '*Cellulae*' that is a Latin word for 'a little room'.
27. The cells of the onion peel will all look the same in size, shape and inner structure, regardless of the size of the onion they came from. This is because their functions are same. The size of onion is different because of difference in number of cells in individual onion.
28. It is a magnified view of onion peel. These structures 'X' are called cells.
29. If a single cell constitute a whole organism as in amoeba, chlamydomonas, paramecium and bacteria. These organisms are called unicellular organisms (uni = single).
    No, our body is made of many cells so we are multicellular organism. Many cells group together in a single body and assume different functions in it to form various body parts in multicellular organisms (multi = many) such as some fungi, plants and animals.

30. Cells divide to produce cells of their own kind. All cells thus come from pre-existing cells. If the multicellular is sexually reproducing organism, it will begin its life as a zygote. If it is asexually reproducing organism, it may begin its life from some asexual structure such as a spore: fungi, algae, moss and ferns or a bud (yeast) or through binary fission (amoeba, bacteria and other unicellular).

31. Different parts of the human body perform different functions.
The human body has a heart to pump blood, a stomach to digest food and so on. Similarly, division of labour is also seen within a single cell. Each such cell has got certain specific components within it 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 and so on. A cell is able to live and perform all its functions because of these organelles. These organelles together constitute the basic unit called the cell.

32. Plant cells e.g. onion cell contains cell wall.

33. Cell is a fundamental unit of life. It was discovered by Robert Hooke.
They can be observed under microscope. Some are big enough which can be seen even with our naked eye like Ostrich egg.

34.

Unicellular	Multicellular
They have a single cell.	They have large number of cells.
Single cell performs all cell functions	Different cell perform different functions.
Reproduction is by single cell	Reproduction is by special cells like germ cell
Have short life span, e.g. Amoeba, paramecium	Have long life span, e.g. cats, dogs, insects.

35. (*a*) Robert Hooke discovered the cell. Invention of microscope by Anton Van Leeuwenhock.
(*b*) Amoeba, unicellular organism.
(*c*) Single cell forms a zygote which is first cell formed after fertilization. It further leads to the formation of large number of cells by cell division.

36. (*i*) Mirror reflects the light from source of light to the stage area while condenser focusses or condenses it more.
(*ii*) Coarse adjustment is done for human eye till the object becomes visible. Fine adjustment is done by the individual for his/ her eye power.
(*iii*) Objective lens. They are present on a rotatable piece. They are of different powers like 10X, 40X and 100X to be used as low and high power for different degrees of magnification.
(*iv*) Eye piece, objective, a lens in body tube at the focal length of eye piece, condenser. They all are magnifying lenses.
(*v*) While transporting in the room we should hold a microscope by even arm with one hand and place another hand under the base.

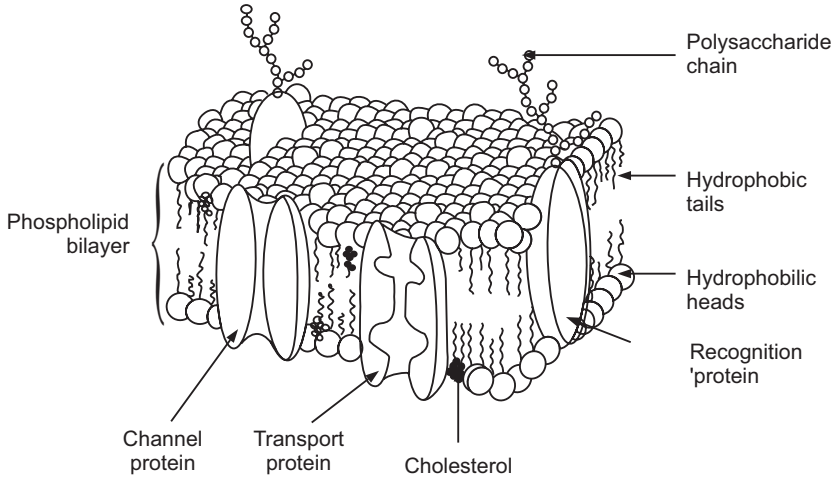
2. What is a Cell Made up of? What is the Structural Organisation of a Cell?

A typical cell is made up three main components – the **nucleus, cytoplasm** and the **cell membrane**.

Cell Membrane (Plasma Membrane)

- It separates cytoplasm (contents of cell) from its surrounding.
- It allows movement of materials in and out of the cell.

- It is selectively permeable, allows only certain material to pass in and out of the cell.
- It is found in both plants and animals cells.
- It is the outermost covering of a cell in animals and lies below the cell wall in case of plants.
- It is made up of proteins and lipids where proteins are sandwiched in between layers of lipids.
- According to **Singer** and **Nicholson**, it is in quasifluid (semifluid) state.
- It is flexible, can be folded, broken and reunited.



Plasma membrane

Function of cell membrane

- It helps in maintaining the composition of cell.
- It regulates movement of molecules inside and outside the cell by diffusion and osmosis, e.g. if CO_2 is in excess inside the cell, it moves out of the cell from a region of high concentration to a region of low concentration.
- O_2 enters the cell by diffusion when the level of O_2 inside the cell becomes less.

Movement of solute and solvent

- **Diffusion:** The movement of solute or ions or gases from a region of higher concentration to a region of lower concentration is called diffusion. It is also called passive transport as it does not requires energy.
- **Osmosis:** The movement of water or solvent molecules from a region of higher concentration (solvent) to a region of lower concentration (solvent) through a semipermeable membrane or vice versa is called osmosis. Osmosis can be called as diffusion of solvents.

Types of Osmosis

- **Endomosis:** Movement of solvent molecules into a cell when placed into a hypotonic solution is called endomosis.
- **Exosmosis:** Movement of solvent molecules outside the cell when placed in a hypertonic solution is called exosmosis.

Types of Solutions

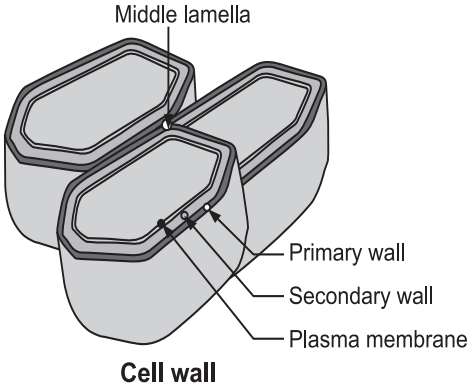
- **Isotonic solution:** The two solutions which have same concentration as body fluids are called isotonic. All intravenous injections must be isotonic with body fluids, e.g. 0.9% of saline water.

- **Hypertonic solution:** It is a more concentrated solution than body fluids. A cell will shrink when placed in hypertonic solution. This is called plasmolysis.
- **Hypotonic solution:** It is a less concentrated solution than body fluids. A cell will swell or burst in hypotonic solution.
- Unicellular freshwater organisms and most of plant cells tend to gain water through osmosis. Absorption of water by plant roots is also an example of osmosis.
- Diffusion is used in exchange of gases and water in the life of a cell.
- The cell also obtains nutrition from its environment.
- Transport of different molecules in and out of cell require energy in form of ATP (Adenosine triphosphate). a currency of energy.

Endocytosis: The process by which cell membrane gets food and other materials from the environment, e.g. Amoeba gets food by this process.

Electron microscope: It is used to see the structure of plasma membrane.

Cell Wall



Cell wall

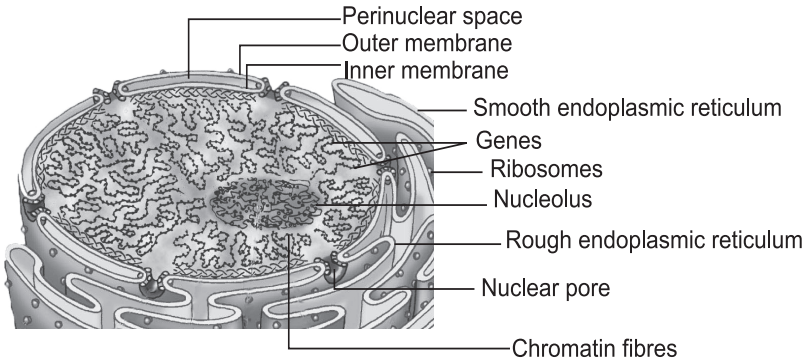
- It is the outer most covering of the plant cell, and is absent in animal cell.
- It is made up of cellulose and hemicellulose.
- The cell wall supports the plant cell, give it a regular shape and holds it together with adjacent plant cells.
- It is rigid, strong, thick, porous and a non-living structure.
- Cell wall of two adjacent cells is joined by the a layer called middle lamella as shown in the diagram.
- It lies outside the plasma membrane.
- When a plant cell loses water through osmosis, there is shrinkage or contraction of the contents of the cell away from the cell wall. It is called *plasmolysis*.
- Only living cells undergo plasmolysis and not the dead cells.
- Cell wall permit the cells of plants, fungi and bacteria to withstand very dilute (hypotonic) external media without bursting. In such medium, a cells tend to take water by osmosis, the cell swells and exerts pressure on cell wall. Cell wall exerts equal pressure and prevent itself from bursting.

Function of Cell Wall

- It provides shape and strength to the cell.
- It allows entry of molecules into the cell of different sizes.
- It can repair and regenerate itself.

Nucleus

- It is called '*Head quarter*' of the cell. It controls and directs all cellular activities.
- It was discovered by *Robert Brown*.
- It has a double layer covering called nuclear membrane. It has a pores which allow the transfer of material from the inside of the nucleus to cytoplasm.
- It has thread like structure called chromosomes.
- Genes are part of chromosomes which transfer genetic (hereditary) traits.
- Chromosomes contain DNA (Deoxyribo nucleic acid) which stores and transmits genetic information for a cell to grow, function and reproduce.
- It is present in Eukaryotic but not in Prokaryotic cell (which contain primitive nucleus).
- The substance filled inside the nucleus is called **nucleolus.**



Structure of a Nucleus

Functions

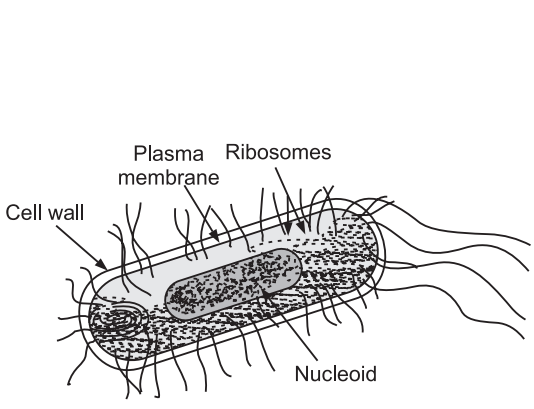
- It controls all metabolic activities of the cell and also regulates cellular reproduction.
- It helps in transfer of hereditary traits from the parents to the off springs.
- It plays a central role in cellular reproduction.

Nucleoid

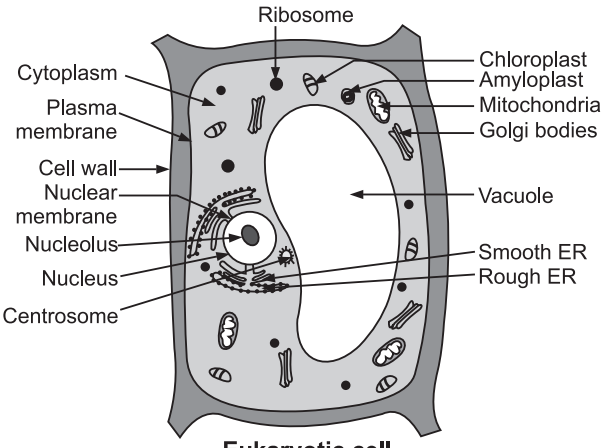
The absence of nuclear membrane in prokaryotic cell organism like bacteria leads to a region containing only nucleic acid and is called nucleoid.

On the basis of type of organization and presence of nuclear material organisms are divided into (*i*) Prokaryotes (*ii*) Eukaryotes

Prokaryotes	Eukaryotes
These do not have nuclear membrane.	These have nuclear membrane.
They are small in size (10^{-6} m).	They are large in size.
Single chromosome present.	More than one chromosome are present.
Membrane bound cell organelles are not present.	Membrane bound cell organelles are present.
Cell division takes place by fission or budding.	Cell division takes place by mitosis or meiosis.



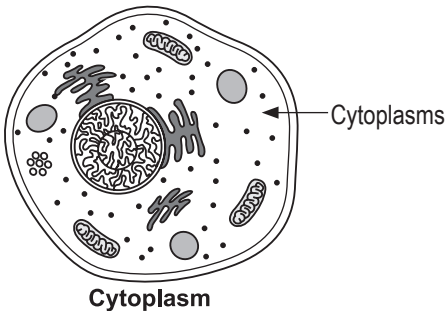
Prokaryotic cell



Eukaryotic cell

Cytoplasm

- It is a jelly like substance which surrounds a nucleus. It is a fluid content inside the plasma membrane.
- It mainly consists of water, proteins, lipids etc.
- It fills almost the entire animal cell.
- Many metabolic reactions take place in the cytoplasm.
- All the organelles are embedded in it. The transport of substance within a long cell takes place through cytoplasmic streaming—a cyclic movement of cytoplasm.



Cell Organelles

These are the living part of a cell bounded by membrane.

Structural Organisation

- Each cell acquires its structure and ability to function due to organisation of its membrane and organelles in specific ways.
- The basic structural organisation helps the cells to perform different functions like respiration, digestion, formation of proteins, fats, cleaning of waste materials and reproduction.

Exercise 5.2

I. Very Short Answer Type Questions (1 Mark)

1. Why is plasma membrane called a selective permeable membrane? [*NCERT*]
2. Which cell organelle is called 'Head quarter' of the cell?
3. What is the composition of protoplasm?
4. Name the process through which unicellular fresh water organisms and most plants tend to gain water.

   OR

   Name the process in which diffusion take place through a selectively permeable membrane. [*CBSE* 2011]
5. What is the nuclear region of the prokaryotic cells called?
6. Where is the genetic material of a eukaryotic cell present?
7. Name an instrument which helps to see structure of plasma membrane.
8. Where are ribosomes synthesized?
9. A cell placed in a solution swells up. What is the nature of the solution?
10. Who gave the fluid mosaic model of plasma membrane? **[***DOE***]**
11. What happen to an animal cell if placed in the hypertonic solution?
12. Where is the nucleus located in human check cells?
13. Name the process in which movement of solvent into cell takes place.
14. List two properties of cell wall.
15. What is the shape of nucleues?
16. Which is the outer most layer in (*i*) animal cells (*ii*) plant cell
17. Why do dry apricot placed in water swell?
18. Name the only cell orgenelle seen in prokaryotic cell.
19. What is plasmolysis?
20. What will happen to a cell if the concentration of water molecules in the cell is higher than the concentration of water molecules in surrounding medium?

21. Give a function of Ribosomes?
22. Which organelles other than nucleus, contain DNA?
23. Who stated "cell arises from pre-existing cell"?
24. Why does the skin of your finger shrink when you wash clothes for a long time?
25. If you are provided with some vegetables to cook. You generally add salt into the vegetables during cooking process. After adding salt, vegetables release water. What mechanism is responsible for this?
26. Human RBCs placed in distilled water burst but a spirogyra cell doesn't. Why?
27. Which of the organelles are double membrane?
28. Where is the nuclear or genetic material present in bacteria?

II. Short Answer Type Questions–I (2 Marks)

29. How do substances like CO_2 and water move in and out of the cell? Discuss. [*NCERT*]
30. What is plasma membrane made up of ? Is it tough or flexible? [*CBSE* 2014, 2012]
31. What would happen if the plasma membrane ruptures or breaks down? [*NCERT*]
32. What is difference between diffusion and osmosis? [*DOE*]
33. What will happen when a human red blood cells is placed in hypertonic salt/sugar solution? [*CBSE* 2016]
34. Where is cell membrane present in animal and plant cells?
35. What is thickness of a plasma membrane?
36. Name the three components which are present in all cells.
37. Any four properties of plasma membrane or cell membrane.
38. If a cell is kept in hypertonic or hypotonic solution, does water move only in one direction or both? Clarify.
39. What are the factors on which movement of water across membrane depend? List any two and exemplify them.
40. Is osmosis same as diffusion?
41. How does cell wall help a cell?

III. Short Answer Type Questions–II (3 Marks)

42. How will you prove that plasmolysis is due to exosmosis and not due to diffusion or some other type of movement?

    OR

    How will you set up an experiment to demonstrate plasmolysis?
43. How would the observation be different in following situations? Give reasons too.
    (*i*) When we put iodine solution on the peel
    (*ii*) We use safranin solution to stain the cells.
    (*iii*) We use methylene blue solution to stain the cells.
44. Describe the structure of a nucleus? Discuss functions of its components too.
45. Discuss functions of nucleus.
46. How does a photosynthetic bacteria differ in structure from the cell of a green alga?
47. Draw labelled diagram of Prokaryotic cell.
48. How can importance of membranes be illustrated through viruses and other cells?

IV. Long Answer Type Question (5 Marks)

49. How does the movement of substances take place into the cell? How do substances move out of the cell? Discuss these processes emphasising their significance in the living world.

Answers 5.2

1. It is because plasma membrane allows only certain materials to pass through it and not all the materials.
2. Nucleus is called the 'Head quarter' of the cell.
3. Protoplasm contains living contents of the cells except large vacuoles and materials to be excreted. It contains cytosol and cell organelles. Cytoplasm is a protoplasm excluding plasma membrane and nucleus.
4. Osmosis process helps the unicellular fresh water organisms and most plants to gain water.
5. Nucleoid is the nuclear region of the prokaryotic cells.
6. Genetic material of eukaryotic cell is present in nucleus of the cell.
7. Electron microscope helps in viewing the structure of plasma membrane.
8. Ribosomes are synthesised in nucleolus and cytoplasm.
9. Cell swells up in hypotonic solution.
10. Singer and Nicholson.
11. Animal cell will shrink, i.e. plasmolysis will take place, when placed in hyper tonic solution.
12. Nucleus is located in the centre.
13. Endo-osmosis.
14. Cell wall is rigid and non-living.
15. Nucleus is round in shape.
16. (*i*) Plasma membrane (*ii*) Cell wall
17. It is due to endosmosis because cells of apricot have hypotonic solution w.r.t. to water which cause entry of water into them.
18. Ribosomes.
19. Plasmolysis is a shrinkage of protoplasm or cytoplasm away from the cell wall when cell is left in hypertonic solution.
20. Cell will shrink because of exosmosis.
21. Cell help in manufacture of protein molecules.
22. Mitochondria and plastid also contain DNA.
23. Rudolf Virchow stated that cell arise from preexisting cells.
24. Soap solution is very concentrated (hypertonic solution) so water moves out of our finger cells by osmosis.
25. Exosmosis
26. Spirogyra cell walls can withstand much greater changes in the surrounding medium than animal cells like RBCs.
27. Nucleus, plastid and mitochondrion are all double membrane organelles.
28. In bacteria, the nuclear region of the cell is be poorly defined due to the absence of a nuclear membrane and only contains nucleic acids called a nucleoid.
29. Movement of water and gas molecules take place through diffusion from higher concentration to lower concentration across a cell membrane.
30. Plasma membrane is made up of lipids and proteins . It is flexible.
31. The molecules of substances will move freely in and out of the cell.
32.

Diffusion	Osmosis
Movement of ions, solute, solvent or gases take place.	Movement of solvent takes place.
Semipermeable membrane is not involved.	Semipermeable membrane is involved.

33. RBCs will shrink.

34. In animals, it is outermost covering whereas it lies below the cell wall in plants.

35. 75A° [1A° = 10^{-10} m] is the thickness of plasma membrane.

36. Nucleus, Cell membrane and Cytoplasm are present in all cells.

37. (*i*) Cell membrane is the outermost covering of the cell that separates the contents of the cell from its external environment.

(*ii*) It is living and is made up of organic molecules called lipids and proteins.

(*iii*) It allows or permits the entry and exit of some materials in and out of the cell. It also prevents movement of some other materials. it is, therefore called a selectively permeable membrane.

(*iv*) With the help of special proteins, different molecules move in and out of the cell through a type of transport requiring use of energy.

(*v*) It is flexible.

38. Water crosses the cell membrane in both directions, but more water leaves the cell than enters it in a hypertonic solution. Therefore the cell will shrink.

In a hypotonic solution again water molecules are free to pass across the cell membrane in both directions, but more water will come into the cell than will leave. The net (overall) result is that water enters the cell.

Even in an isotonic solution water crosses the cell membrane in both directions, but the amount of water going in is the same as the amount of water going out, so there is no overall movement of water.

39. (*i*) The movement of water across the plasma membrane is also affected by the amount of substance dissolved in water. Osmosis is the passage of water from a region of it high water concentration (dilute solution) through a semi-permeable membrane to a region of its low water concentration (concentrated solution). Example water comes out if we sprinkle water on cucumber pieces, raisins swell up when soaked in water.

(*ii*) Temperature: High temperature increase the kinetic energy of water molecules so rate of osmosis is faster. Raisins swell up faster in warm water than in cold water.

40. Osmosis is a special case of diffusion as water also obeys the law of diffusion. But it moves through a selectively permeable membrane which means it takes place only in a living system.

41. Cell walls permit the cells of plants, fungi and bacteria to withstand very dilute (hypotonic) external media without bursting. In such media the cells tend to take up water by osmosis. The cell swells, building up pressure against the cell wall. The wall exerts an equal pressure against the swollen cell.

42. *Procedure:* Mount the peel of a Rhoeo leaf in water on a slide and examine cells under the high power of a microscope. Note the small green granules, called chloroplasts. They contain a green substance called chlorophyll. Put a strong solution of sugar or salt on the mounted leaf on the slide. Wait for a minute and observe under a microscope.

Observation: Protoplasm loses water and membrane shrinks away from the wall.

Now place some Rheo leaves in boiling water for a few minutes. This kills the cells. Then mount one leaf on a slide and observe it under a microscope. Put a strong solution of sugar or salt on the mounted leaf on the slide. Wait for a minute and observe it again. Plasmolysis does not occur now. Only living cells, and not dead cells, are able to absorb water by osmosis.

43. (*i*) Cytoplasm shows colour according to their chemical composition. Different regions of cells get coloured differently. Some regions appear darker than other regions. Iodine stains starch blue black present in cytoplasm of cell.

(*ii*) Safranin stains denser parts like cell wall and nucleus red while less denser parts like cytoplasm will be pink.

(*iii*) Vacuole will not take up stain at all. Methylene blue stains chromatin in nucleus hence the blue colour.

44. The nucleus has a double layered covering called nuclear membrane.

(*i*) The nuclear membrane has pores which allow the transfer of material from inside the nucleus to its outside, that is, to the cytoplasm.

(*ii*) The nucleus contains chromosomes, which are visible as rod-shaped structures only when the cell is about to divide.

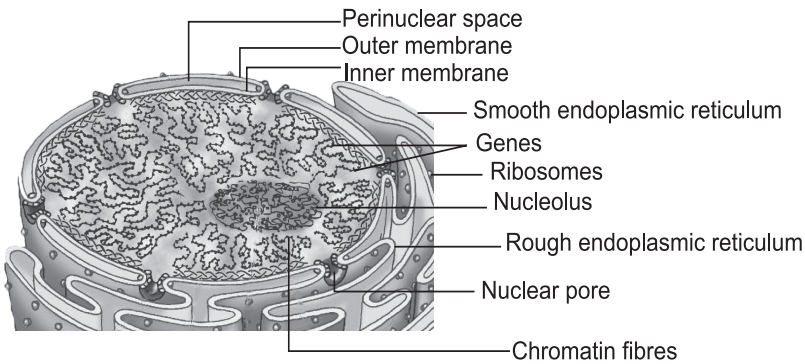
(*iii*) Chromosomes contain information for inheritance of features from parents to next generation in the form of DNA (Deoxyribo Nucleic Acid) molecules.

(*iv*) Chromosomes are composed of DNA and protein. DNA molecules contain the information necessary for constructing and organising cells.

(*v*) Functional segments of DNA are called genes. In a cell which is not dividing, this DNA is present as part of chromatin material.

(*vi*) Chromatin material is visible as entangled mass of thread like structures.

(*vii*) Whenever the cell is about to divide, the chromatin material gets organised into chromosomes.



45. (*i*) The nucleus plays a central role in cellular reproduction, the process by which a single cell divides and forms two new cells.

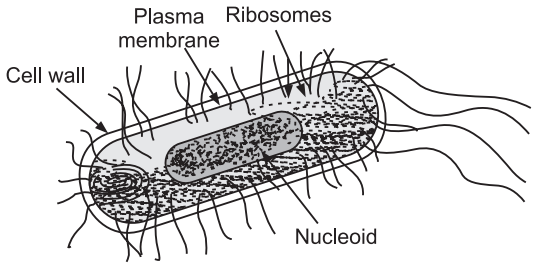
(*ii*) It is the controlling centre for metabolism. It plays a crucial part, along with the environment, in determining the way the cell will develop and what form it will exhibit at maturity, by directing the chemical activities of the cell.

(*iii*) It carries the genetic material from one generation to the next hence it is a seat of heredity.

46.

Photosynthetic Bacteria	Cell of a Green Alga
Cells lack a nuclear membrane hence prokaryotes	Cells having a nuclear membrane hence eukaryotic cells
Lack most of the other cytoplasmic organelles except ribosomes	Have properly formed organelle
Functions of such organelles are also performed by poorly organised parts of the cytoplasm—chlorophyll is associated with membranous vesicles (bag like structures)	The chlorophyll in photosynthetic cells of alga takes place in well defined organelle like chloroplasts [plastids].
Smaller in size	Larger in size (Any three)

47. The 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.



48. The significance of membranes can be illustrated with the example of viruses. Viruses lack any membranes and hence do not show characteristics of life until they enter a living body and use its cell machinery to multiply. Every cell has a membrane around it to keep its own contents separate from the external environment. Large and complex cells, including cells from multicellular organisms, need a lot of chemical activities to support their complicated structure and function. To keep these activities of different kinds separate from each other, these cells use membrane-bound little structures (or 'organelles') within themselves. This is one of the features of the eukaryotic cells that distinguish them from prokaryotic cells. Examples: endoplasmic reticulum, Golgi apparatus.

49. (*i*) *Diffusion:* Some substances like carbon dioxide or oxygen can move across the cell membrane by a process called diffusion. It means there is spontaneous movement of a substance from a region of high concentration to a region where its concentration is low. For example, some substance like CO_2 (which is cellular waste and requires to be excreted out by the cell) accumulates in high concentrations inside the cell. In the cell's external environment, the concentration of CO_2 is low as compared to that inside the cell. As soon as there is a difference of concentration of CO_2 inside and outside a cell, CO_2 moves out of the cell, from a region of high concentration, to a region of low concentration outside the cell 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.

Thus, diffusion plays an important role in gaseous exchange between the cells as well as the cell and its external environment.

Diffusion also helps the cell obtains nutrition from its environment.

(*ii*) *Osmosis:* The movement of water molecules through such a selectively permeable membrane is called osmosis.

For example, if we put an animal cell or a plant cell into a solution of sugar or salt in water.

(*a*) If the medium surrounding the cell has a higher water concentration than the cell, meaning that the outside solutionis very dilute, the cell will gain water by osmosis. The cell is likely to swell up.

(*b*) If the medium has exactly the same water concentration as the cell, there will be no net movement of water across the cell membrane. The cell will stay the same size.

(*c*) 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 and shrink.

(*iii*) *Active Transport:* Different molecules move in and out of the cell through a type of transport requiring use of energy. It happens with the help of special proteins in the membrane.

(*iv*) *Exocytosis and Endocytosis:* some cells engulf its food and other material from its external environment. Such processes are known as endocytosis. Amoeba acquires its food through such processes. Similarly throwing out waste is done by it through exocytosis.

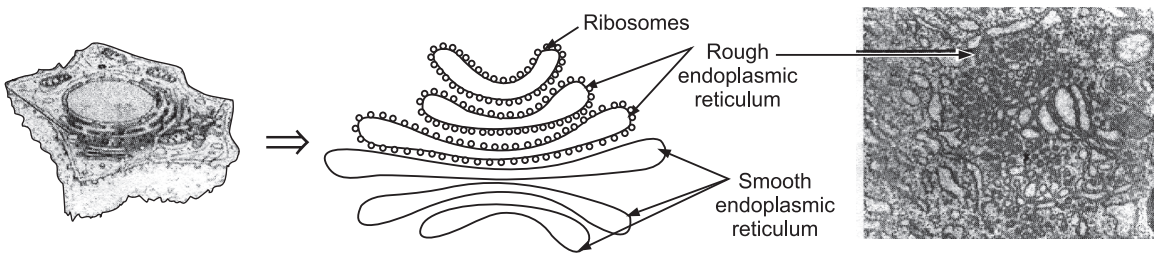
3. Cell Organelles

A cell performs different functions with the help of various membrane bound organelles.

- These cell organelles distinguishes prokaryotic cells from the eukaryotic cells.
- Some cell organelles are visible only with the help of an electron microscope.
- Some important example of cell organelles are: Endoplasmic reticulum, Golgi apparatus, lysosomes, mitochondria, plastids and vacuoles.
- They carry out important functions in the cell.

Endoplasmic Reticulum (ER)

- It is a network of membrane bound tubes and sheets present in the cytoplasm.
- It is present in all cells except prokaryotes and mammalian erythrocytes (white blood cells)
- ER membrane structure is very similar to plasma membrane.



Endoplasmic reticulum

Different type of ER

- Rough endoplasmic reticulum (RER)
- Smooth endoplasmic reticulum (SER)

Difference between RER and SER

Rough endoplasmic reticulum (RER)	Smooth endoplasmic reticulum (SER)
It looks rough under microscope because it has ribosomes attached to its surface.	It looks smooth because it does not have ribosomes
It contains flattened sacs called cisternae.	It consists of vesicles and tubules.
It helps in protein synthesis.	It helps in synthesis of lipids and steroids.
It is abundant in exocrine pancreatic cells and antibodies secreting plasma cells.	It is abundant in liver and the testicular cells synthesising steroid hormones.

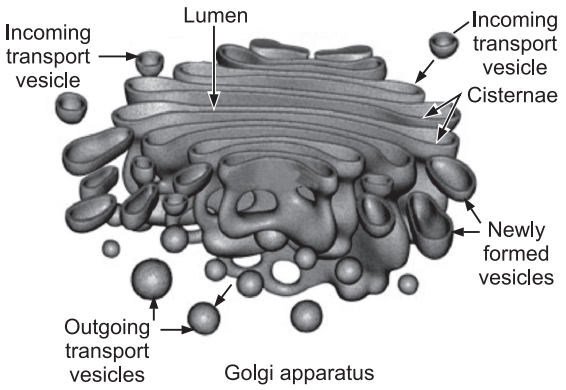
Function of ER

- It serves as a channel for the transport of proteins between various regions of the cytoplasm or between the nucleus and the cytoplasm for biochemical activity.
- In liver cells of vertebrate, SER plays an important role in detoxifying many poisons and drugs.
- It forms endoskeleton of the cell.
- It helps in synthesis of proteins, lipids, steroid hormones and cholesterol.
- Helps in biographies of cell membrane.

Golgi Apparatus

- It consists of a system of membrane bound vesicles arranged approximately parallel to each other in stacks called **cisterns** along with some large and spherical vacuoles discovered by **Camillo Golgi**.

- These exist as an extensive network membrane near the nucleus in the animal cells.
- Plant contains many freely distributed sub units called **dictyosomes**.
- Golgi apparatus are not found in bacteria, blue green algae, mature sperms and RBC of mammals and other animals.
- Golgi apparatus arise from SER which in turn originates from RER.
- Golgi apparatus are constantly and rapidly renewed.



Functions

(*i*) It helps in formation of Lysosomes and complex sugars from simple sugars.
(*ii*) It helps in the storage, modification and packaging of products in the vesicles.
(*iii*) It also helps in the formation of glycoproteins, lipoproteins and glycolipids.

Lysosomes

- They form the waste disposable system of the cell.
- They are spherical sac like structure found in cytoplasm.
- Each lysosome is a small vesicle surrounded by a single membrane. It contains hydrolytic digestive enzymes, i.e. digestive bags and is capable of breaking down all organic materials in case an organelle is damaged.
- These are synthesised by golgi apparatus.
- They are also called 'suicide bags' of the cell because if cell gets damaged or received any mass, lysosome bursts and the enzyme present inside it digest their own cells.

Functions

- It acts as a waste disposal system.
- It acts as a suicide bag in case of cell damage or if the cell is not required any more.
- It serves as an intracellular digestive system to dispose off older injured parts.
- It helps to recycle the substances in cell.

Mitochondria

- It is called the 'power house of a cell'.
- The energy which is needed for carrying out the various chemical processes by the cell is released by mitochondria in form of ATP (known as currency of cell).
- It has two membranes covering.
- The outer covering is very porous while inner membrane is deeply folded which creates a large surface area.
- ATP, on hydrolysis gets converted to ADP (adenosine diphosphate) and energy is released.
- It has its own DNA and ribosomes.
- It is able to make some of its own proteins.

Plastids

- They are present only in plant cells.
- They are of two types: chromoplasts (coloured), leucoplasts (white or colourless).
- Plastid containing chlorophyll is called chloroplast which is essential for photosynthesis.
- Leucoplasts are organelles in which starch, oil and proteins are stored.

- It consist of numerous membrane layers embedded in the material called **stroma**.
- It resembles with mitochondria in structure and also have its own DNA and ribosomes.

Vacuoles

- They are the storage sacs for solid or liquid contents.
- They are small in animals but large in plant cells which may occupy 50-90% of the cell volume in some plants.
- Vacuoles are full of cell sap and provide turgidity and rigidity to the plant cell.
- They store amino acids, sugars, various organic acids and some proteins. They may store food, water like gums, resins, salt, oil, etc.
- In Amoeba, food vacuoles contain the food items and expel excess of water and wastes from the cell.

Exercise 5.3

I. Very Short Answer Type Questions (1 Mark)

1. Which organelles is called the Kitchen of a cell?
2. Name an organelle without a cell membrane i.e. non-membranous? [*NCERT Exemplar*]
3. How many membranes are present in vacuole?
4. Which cell organelle synthesize lipids?
5. Where from a lysosome arise?
6. Which plastid is responsible for yellow and other colours in petals of flower?
7. Which is the largest organelle of the plant cell?
8. Can you name the two organelles which contain their own genetic material? [*NCERT*] [*CBSE* 2010]
9. If the organisation of a cell is destroyed due to some physical or chemical influence, what will happen? [*NCERT*]
10. Why are lysosomes known as suicide bags? [*NCERT*]
11. Where are proteins synthesized inside the cell? [*NCERT*]
12. What would happen to the life of a cell if there was no Golgi apparatus? [*NCERT*]
13. Which organelle is known as the powerhouse of the cell? Why? [*NCERT*] [*CBSE* 2016]
14. Where do the lipids and proteins constituting the cell membrane get synthesised? [*NCERT*]
15. What are chromosomes?
16. How many chromosomes are present in human cells?
17. The fibres in fruits and vegetable are made up of which material? Is it the same material which is also used for making paper?
18. Name the processes by which (*a*) water (*b*) mineral salt are absorbed into the root hairs.
19. Lipid molecules in the cell are sythesised by
    (*a*) smooth endoplasmic reticulum
    (*b*) rough endoplasmic reticulum
    (*c*) golgi apparatus (*d*) plastids [*NCERT Exemplar*]
20. Which cell organelle would you associate with elimination of old and worn out cells and why?

II. Short Answer Type Questions–I (2 Marks)

21. Make a comparison and write down the ways in which plant cells are different from animal cells. [*NCERT*]
22. What is meant by the division of labour among cells? Explain its importance.

23. Lysosomes, mitochondria, plastids and vacuoles are important because they carry out some very crucial functions in cells. Choose the ones which synthesize some molecules and name the molecules too.

III. Short Answer Type Questions–II (3 Marks)

24. State two differences between mitochondria and plastid. **[***DOE***]**

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

26. Name the organelles which show the analogy written as under:
(*a*) Transporting channels of the cell (*b*) Power house of the cell
(*c*) Packaging and dispatching unit of the cell
(*d*) Digestive bag of the cell (*e*) Storage sacs of the cell
(*f*) Kitchen of the cell

27. Name the control room of the cell and show its components.

28. Write the name of different plant parts in which chromoplast, chloroplast and leucoplast are present.

29. Draw a neat diagram of plant cell and label any three parts which differentiate it from animal cell.

IV. Long Answer Type Questions (5 Marks)

30. (*a*) Draw a plant cell and name the seven important organelles found in it.
(*b*) Name one organelle that can make some of its protein in a plant cell and also mention one function of such organelle. [*CBSE* 2010]

31. (*a*) Name and draw a cell which does not have a well defined nuclear region. Label any four parts.

OR

Draw a neat and labelled diagram of a typical prokaryotic cell. [*CBSE* 2014]

(*b*) Mention two ways by which a photosynthesing cell belonging to this group differs from a cell of your body. [*CBSE* 2010]

32. Fill the blanks in the table given below.

S.No.	Organelle	Structure	Type (if any)	Function
1.			chloroplast	
2.				produces ATP
3.		vesicles with hydrolytic enzymes		
4.			SER/RER	
5.	ribosome			
6.	Golgi apparatus			lipid synthesis

Answers 5.3

1. Chloroplast.
2. Ribosome.
3. Single membrane
4. SER
5. Golgi apparatus.
6. Chromoplast
7. Nucleus.
8. (*i*) Mitochondria (*ii*) Chloroplast
9. The cell will die because essential function like respiration, digestion, excretion will stop. It will burst lysosome, or outer cover may be digested, when the covering membrane breaks.

10. Lysosomes spill digestive enzyme which digest the organic materials and will kill cells, therefore, they are called suicide bags.
11. Proteins are synthesized in the ribosomes. They may or may not be associated with RER.
12. Packaging, storage and dispatching of the materials, synthesized inside the cell will not take place.
13. Mitochondria provides energy in the form of ATP for all cellular activities and is therefore called powerhouse of a cell.
14. Proteins are synthesised in ribosomes with or without (RER) and lipids are synthesised by SER in liver.
15. Chromosomes are thread like structure of nucleic acid and protein is found in the nucleus of the cell.
16. There are 23 pairs of chromosomes except sperm and the egg.
17. Cellulose. Yes, paper is also made up of cellulose.
18. (*a*) Osmosis (*b*) Diffusion.
19. (*a*) Smooth endoplasmic reticulum.
20. Old and worn out parts are removed by Lysosomes. It contains strong digestive enzymes that hydrolyse the old and worn out parts. The number of lysosomes vary from cell to cell.
21.

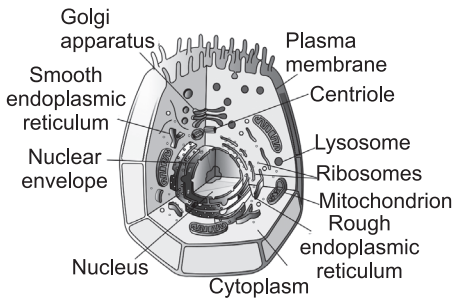
Plant Cell	Animal Cell
Cell wall is present.	Cell wall is absent.
Large vacuoles are present.	Small vacuoles are present.
Chloroplasts are present.	Chloroplast are absent.
Cytoplasm is reduced to thin lining.	Cytoplasm fill up the entire cell.
They have simple Golgi apparatus.	They have highly complex Golgi apparatus.
They do not have centrosome and centrioles	They have centrosome and centrioles.

22. In multicellular organisms, the different functions are performed by different types of cells, e.g. in human body nerve cells pass messages whereas RBC absorbs and transports oxygen. It means life processes of multicellular organism is divided and shared among different types of cells in the organism. This is called division of labour.

    It allows all cells to work effectively and efficiently.
23. Mitochondrion - ATP, Plastid - Starch
24.

Mitochondria	Plastid
It is a double membrane structure.	It is a semi autonomous structure.
It releases energy in the form of ATP.	It provides colour to the plant parts.
It is the power house of the cell .	It is the Kitchen of the plant cell.

25.



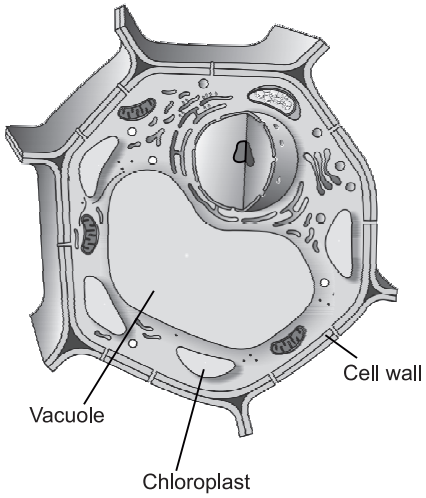
Animal cell

26. (*a*) ER (*b*) Mitochondrion (*c*) Golgi apparatus
(*d*) Lysosome (*e*) Vacuole (*f*) Chloroplast

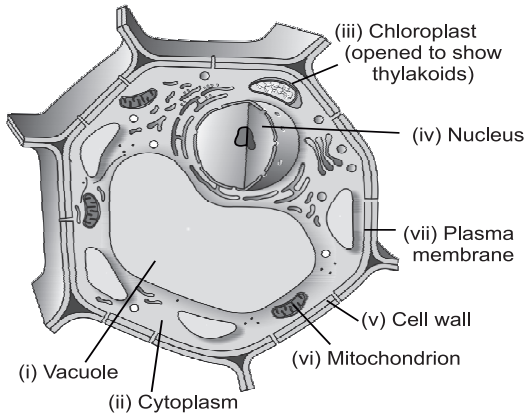
27. Nucleus.

28. (*i*) Chromoplasts are present in petals and ripe fruits.
(*ii*) Chloroplasts are present in green leaves, young stems, sepals and unripe fruits.
(*iii*) Leucoplasts are present in roots, seeds, storage parts like tubers, corm, bulbs and rhizomes.

29.



30. (*a*)

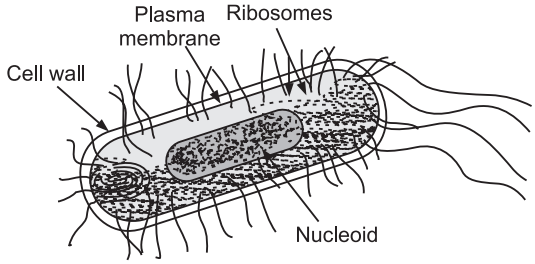


Plant cell

(*b*) Mitochondria makes some of its protein with the help of its own DNA and ribosome.

- It performs aerobic respiration, uses O_2 for complete oxidation of food and manufacture ATP molecules which is a currency of energy.

31. (*a*)



(*b*)

Photosynthetic prokaryotic cell	Human cell
It contains chloroplast.	It does not contain chloroplast.
It has a cell wall.	It does not have a cell wall.
Nucleoid is embedded in the cytoplasm.	Nucleus is present.

32.

S.No.	Organelle	Structure	Type (if any)	Function
1.	plastid		chloroplast	photosynthesis
2.	Mitochondrion	Porous outer membrane, the inner membrane is deeply folded		produces ATP
3.	Lysosomes	vesicles with hydrolytic enzymes		suicidal and digestive bags
4.	Endoplasmic Reticulum	network of membrane-bound tubes and sheets	SER RER	lipid synthesis
5.	Ribosome	no membrane		protein sysnthesis
6.	Golgi apparatus	parallel membrane-bound vesicles in stacks		packaging and cell secretion

Value Based Questions

1. Durgesh has many plants on the roof of their house. She water plants everyday. She converts kitchen waste into a manure and adds them to flower pots. There is all over greenary and she remains very happy in the company of the plants.

(*i*) What values are associated with Durgesh?

(*ii*) Why should we walk under trees early in the morning?

(*iii*) Why should we not go near plants during night?

2. Krishna had a viral infection. She had cold and cough. Dr. Gupta gave her antibiotic. She could not get relief. She went to Dr. Gulati who gave her advice to have saline gargles and to inhale steam. She felt relief.

(*i*) What values are associated with Dr. Gulati?

(*ii*) Why are antibiotics not effective in cold and cough?

(*iii*) Why is saline water gargles are useful in sore throat? [*DOE*]

Answers

1. (*i*) Durgesh is fond of green environment which is good for the health.

(*ii*) It is because they give out oxygen during photosynthesis.

(*iii*) It is because plants give CO_2 at night.

2. (*i*) Dr. Gulati gave right treatment and is a sincere doctor.

(*ii*) Cough and cold are viral infections which cannot be treated by antibiotics which kill only bacteria.

(*iii*) Saline water is a hypertonic solution exosmosis will occur and common salt is an antiviral agent.

Practical Based Questions

Experiment 7: *To prepare stained temporary mounts of onion peel and human cheek cells and to record observations and draw their labelled diagram.*

Q1. To observe cells in onion peel which part is mounted on the slide? Which chemical compound is used to mount the specimen? (Experimental Skills)

Ans. Thin layer of fleshy leaf of onion should be used to observe the distinct nucleus. Glycerine is used which is hygroscopic (absorbs moisture from atmosphere and does not allow the mounted material to dry up.

Q2. Give the steps for the preparation of temporary mount of onion peel in a proper sequence. (Experimental Skills)

Ans.
- Remove a thin transparent peel from a piece of onion.
- Put few drops of safranin stain in the watch glass to stain the peel.
- Transfer the peel on a clean slide with the help of a brush and a needle in a drop of water is the centre of slide.
- Examine the slide under the microscope, drop the cover slip gently avoiding air bubble. Remove extra liquid.

Q3. Give four operations for preparing a temporary mount of human cheek cell. (Experimental Skills)

Ans.
- Rinse the mouth with fresh water and disinfectant solution.
- Take scraping from the inner side of the cheek by rolling blunt side of tooth pick or clean spatula and spread it on a clean slide.
- Add two or three drops of methylene blue.
- Put a drop of glycerine on the material.
- Drop a coverslip gently. Remove liquid.

Q4. A student used a red stain for mounting peel of onion. This corresponds to which stain? What is the special characteristic of plant cell by which it can be identified? (Observation Skills)

Ans. Safranine is used for staining. Large vacuole are present in plant cells by which they can be identified. Presence of cell wall.

Q5. Which of the following components are seen in a slide of human cheek cell when observed under a microscope? (Observation Skills)

Ans. Human cheek cell contains nucleus, cytoplasm and cell membrane.

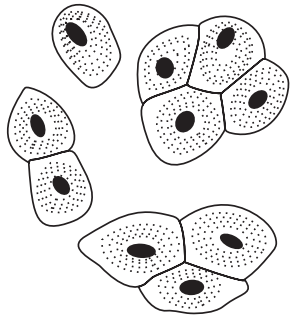
Q6. Gita observed a temporary mount of human cheek cell first under low power and then under high power of the microscope. Under high power, what would she observe? (Observation Skills)

Ans. She will observe fewer cells in field of view with increase in magnifying power. The cytoplasm of cell is granule-fed, dense and has no vacuoles.

Q7. What type of vacuoles are present in plant cells? Do plant cells have cell wall? (Conceptual Skills)

Ans. Large size of vacuoles are present in plant cell. These have cell walls.

Q8.

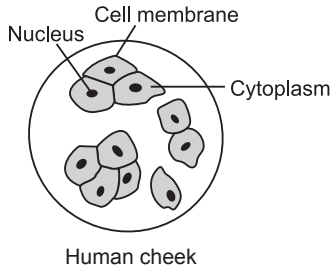


Identify the cells shown above. To prepare a slide of such cells, from where these should be obtained? (Interpretation Skills)

Ans. It is slide of human cheek cell. The cells must be taken by scrapping the uppermost inside lining of the cheek.

Q9. Draw the human cheek cell with correct labelling.

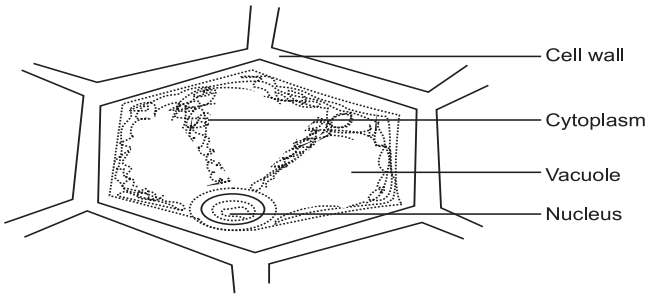
Ans.



Human cheek

Q10. Draw the labelled diagram of onion epidermal cell seen under high power microscope. (Interpretation Skills)

Ans.



Onion epidermal cell

COMMON ERRORS

Errors	Corrections
• Children don't make labelled diagram properly.	☞ Do lot of practice in making neat labelled diagram of plant cell, animal cell and prokaryotic cell.
• Children write one word answer for 1 Mark question.	☞ Better write complete sentence.
• Children do not attempt all parts of long answer questions.	☞ Attempt all questions parts of questions carefully. Read once again after writing answers.
• Children do not give examples with definition	☞ Always give examples with definition to increase its quality.
• Children do not remember all parts of plant and animal cell.	☞ Make a short word or sentence which will help you to remember all the parts, take help of internet.

REVISION CHART

Classification of Organization

On number of cells

Unicellular have only one cell, e.g. bacteria, protozoa, ameoba, paramecium.

Multicellular consists of large number of cells, e.g. human beings, plants, animals etc.

On type of organization

Prokaryotes do not have nuclear membrane, single chromosomes and cell division is by fission or budding.

Eukaryotes have nuclear membrane, more than one chromosomes and cell division by mitosis or meiosis.

On presence of certain organelles

Plants cell have chloroplasts, large vacuoles, prepare their own food by photosynthesis, cell wall made up of cellulose and hemicellulose.

Animal cell do not have cell wall, small vacuole, have lysosomes and nucleus and cannot prepare their own food.

Cell Theory

Cell is a basic unit of life, all cells are formed from pre-existing cells by cell division, every organism starts its life as a single cell and all plants and animals are composed of cells.

Cell

A cell is made up of three main parts: the nucleus, cytoplasm and the cell membrane. It was discovered by **Robert Hooke**.

Main Parts of the Cell

Cell membrane is selectively permeable, separates cytoplasm, made up of protein and lipids, flexible and found in both plants and animals.

Functions: Maintains composition, and regulates movement.

Cell wall lies outside plasma membrane, made up of cellulose, and support the plant cell.

Nucleus is a headquarter of a cell, present only in Eukaryotes.

Functions: Controls metabolic activities, transfer hereditary traits and plays a central role in cellular reproduction.

Cytoplasm surround the nucleus and present inside the plasma membrane. Consists of water and other substances.

Functions of Cell

Different cells perform different functions, i.e. **RBCs** carry oxygen to the heart and **neuron** process and transmits information to the brain.

Cell Orgnelles

Endoplasmic Reticulum (ER) is a network of membrane bound tubes and sheets present in the cytoplasm. Present in all eukaryotic cells.

Functions: It is a channel for transportation of protein, forms endoskeleton, help in synthesis of protein, lipids, steroid hormones and cholestrol. biogenesis of membranes.

Golgi Apparatus consists of vesicles, cisterns, vaculoes. Found in bacteria, blue green algae, sperms, RBCs etc.

Functions: Helps in formation of lysosomes, complex sugar, lipids, melanine and in storage, modification and packaging of products in vesicles.

Lysosomes form the waste disposable system of the cell. They are also called suicide bags.

Functions: Serves as intracellular digestive system.

Mitochondria also called power house of a cell, release energy in the form of ATP, has its own DNA and ribosomes and is able to make its own protein.

Plastids present only in plants cells, contain chlorophyll, store starch, oil and protein, has its own DNA. It is of two types: *Chromoplasts and leucoplasts*.

Vacuoles are the storage sacs, store amino acids, sugars, various organic acids and some proteins. These are full of cell sap and provide turgidity and rigidity to the plant cell.