9TH GRADE BIOLOGY

Chapter 5

The Fundamental Unit Of Life

Cells are the basic structural and functional unit of life. Cell was discovered by Robert Hooke. A number of cells can work together to form tissues and organs.

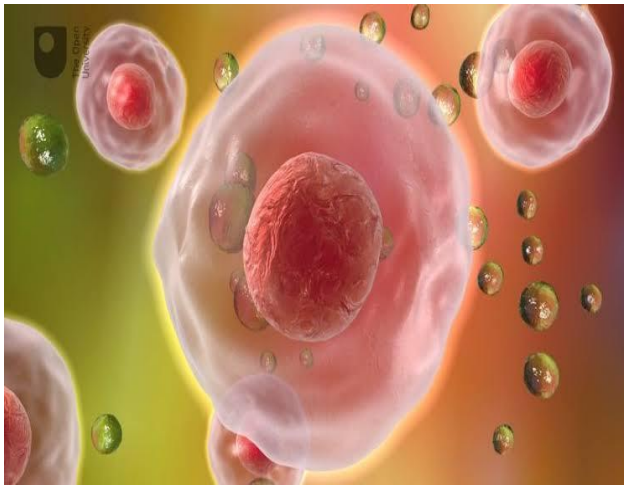


Fig. Cell

Fig. Robert Hooke

Cellular respiration

Cellular respiration is the process by which the food releases energy in the mitochondria. Cells absorb glucose from the food and burn it to produce energy.

Structural Organization of Cells

Prokaryotic & Eukaryotic cells

Two types of cell; Prokaryotic and Eukaryotic cells. Prokaryotic cells are primitive and lack well defined nuclei. Eukaryotic cells are more advanced and have well defined nuclei.

Difference between Prokaryotic and Eukaryotic Cell-

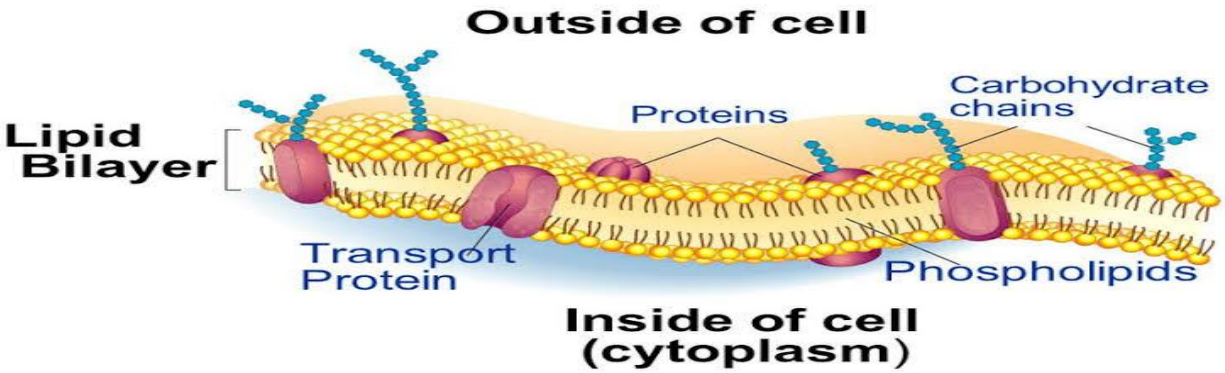
Prokaryotic Cell	Eukaryotic Cell
No well defined nucleus.	Well defined nucleus with a nuclear membrane.
A single length of only nucleic acid.	Several lengths of genetic material (chromosomes) containing DNA wound around certain proteins.
Small ribosomes.	Larger ribosomes.
No other cell organelles.	Several organelles like mitochondria, chloroplast etc.
Examples are bacteria, blue green algae etc.	Examples are *Amoeba* and all plants and animals.

Cell structure in Eukaryotic cells

Eukaryotic cells have the most well defined structure. These cells have cell membrane, membrane bound cell organelles and a well defined nucleus. The nucleus has its own membrane called the nuclear membrane.

1) Cell membrane

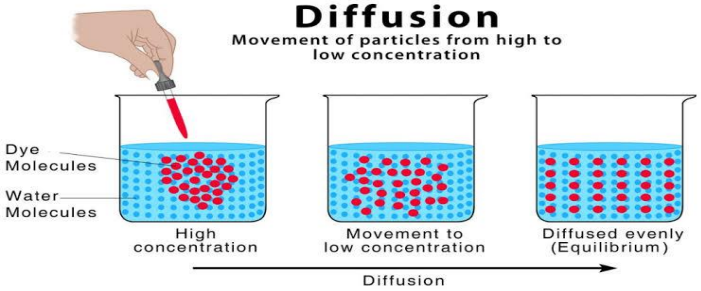
- Cell membrane is the outer covering of a cell.
- It is made up of phospho-lipid bilayer membrane.
- It is selectively permeable in nature.
- The structure of a cell membrane is best described by the fluid mosaic model.



Difference between Cell Membrane and Cell Wall

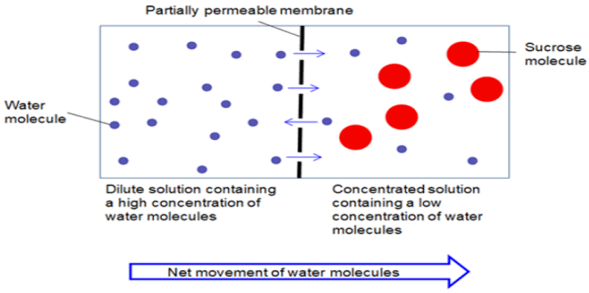
Diffusion

The movement of molecules from a region of their high concentration to a region of their lower concentration is known as diffusion.



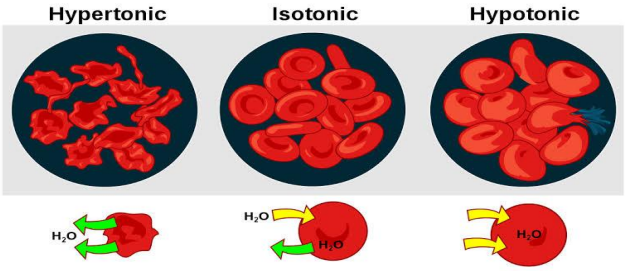
Osmosis in selectively permeable membrane

Osmosis is the movement of water across a semipermeable membrane. Osmosis is a selective process since the membrane does not allow all molecules to pass through it. Water is usually the only free flowing molecule across this membrane.



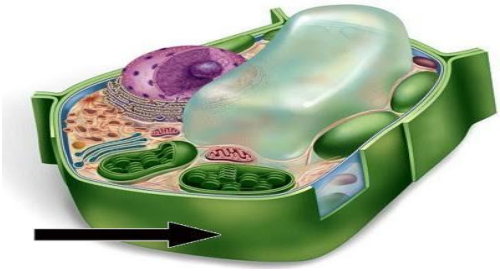
Isotonic, Hypotonic solutions, Hypertonic solutions

- Isotonic solutions are those which have the same solute and pH concentration as the surrounding body fluid or the cytoplasm.
- Hypotonic solutions contain a lesser amount of solute concentration compared to the surrounding fluid and can force the cell to rupture due to excess input of water into the cell.
- Hypertonic solutions contain higher concentration of solute compared to the surrounding fluid and thus push water out of the cell, shrinking it.



Cell walls in plants

Plant cells are different from animal cells due to the presence of a cell wall. The cell wall is made of cellulose and gives a rigid structure to the plant cell.



Cell Organelles

Endocytosis

Endocytosis is the invagination of a cell membrane, followed by pinching off forming a membrane bound vesicle. This is commonly seen in Amoeba.

Nucleus in cells

Nucleus is the processing unit of the cell. It is a double membrane bound organelle which contains the genetic material for inheritance.

Chromosomes

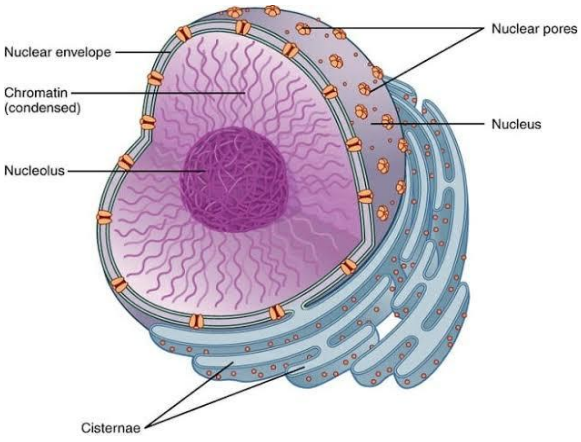
During the growth phase of the cell, the chromatin condenses into a much thicker structure called chromosome.

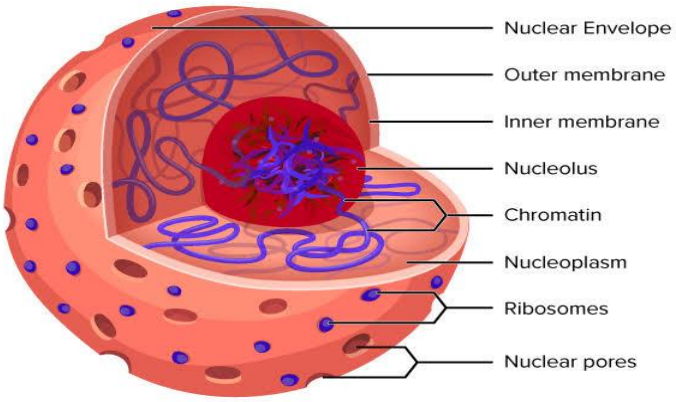
Chromatin

Chromatin is a thread-like structure which serves as the genetic material present inside the nucleus of the cell. It is made up of DNA and protein molecules. The DNA contains the hereditary information needed for the structure and function of the organism.

Cytoplasm

Cytoplasm is the fluid found inside the cell. It gives the structure to the cell and houses different organelles of the cell.





Organelles

Organelles are structures present in the cytoplasm of the cell that help in several functions of the cell.

Endoplasmic Reticulum

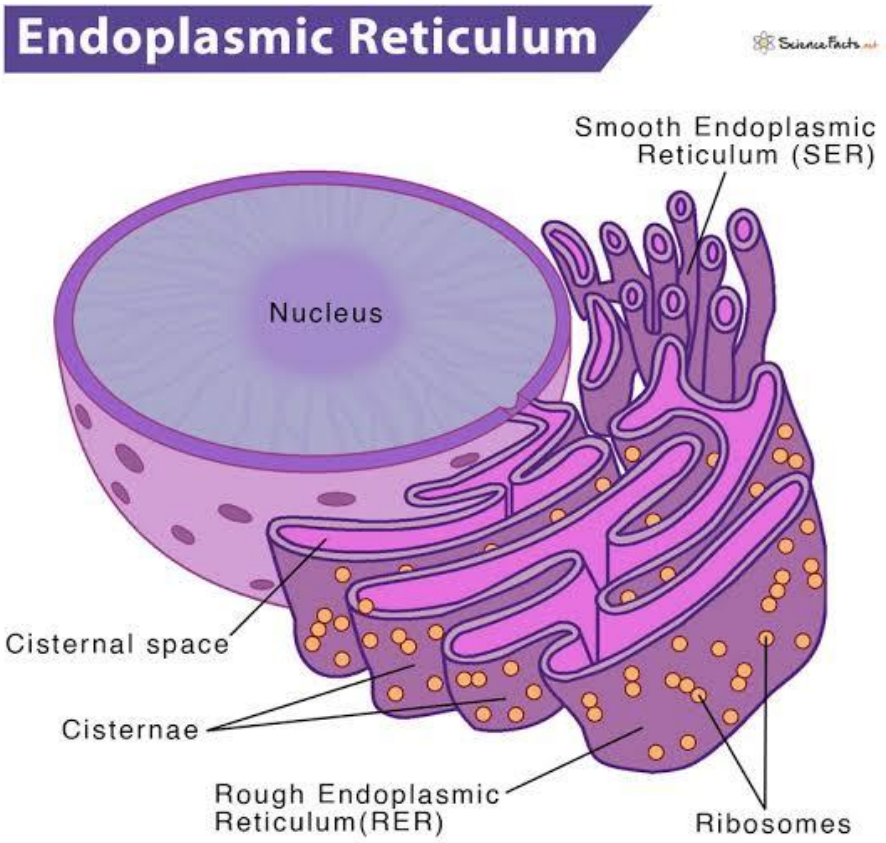
Endoplasmic reticulum is a membrane-like cell organelle that plays an integral role in the interpretation of the genetic information present in the nucleus.

Rough ER

Rough ERs are the ones that have ribosomes on it. The ribosome is made up of nucleic acids and proteins. They are the site of protein synthesis. The Rough ER is also involved in the modification and folding of protein.

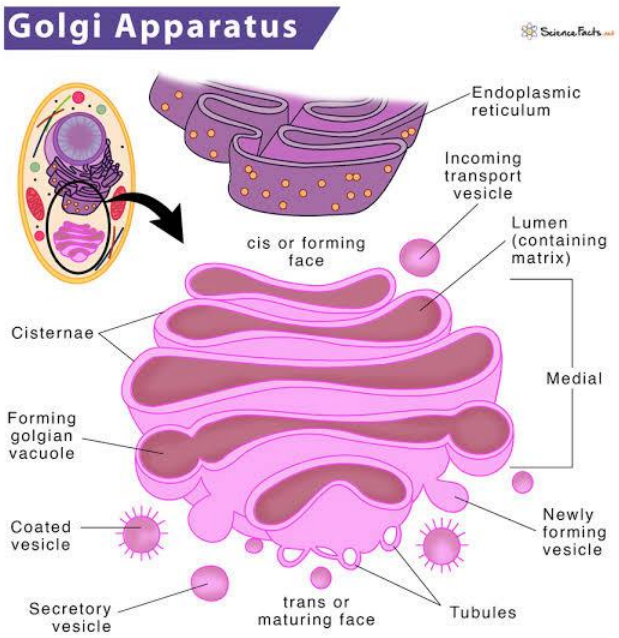
Smooth ER

Smooth ER do not have ribosomes and thus are not involved in protein synthesis. They are however, involved in the lipid metabolism and detoxifying poisonous molecules.



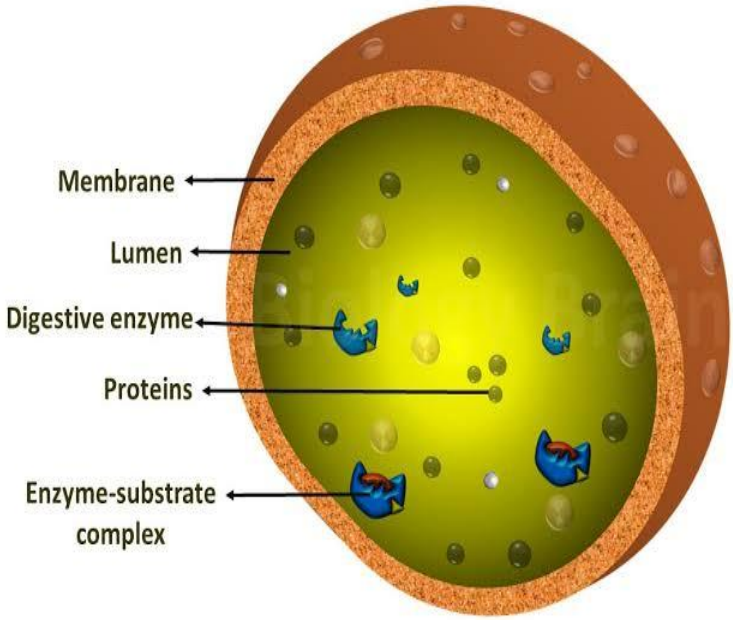
Golgi Apparatus

Golgi Apparatus is also called the post office of the cell. They package and transport the proteins across the cytoplasm.



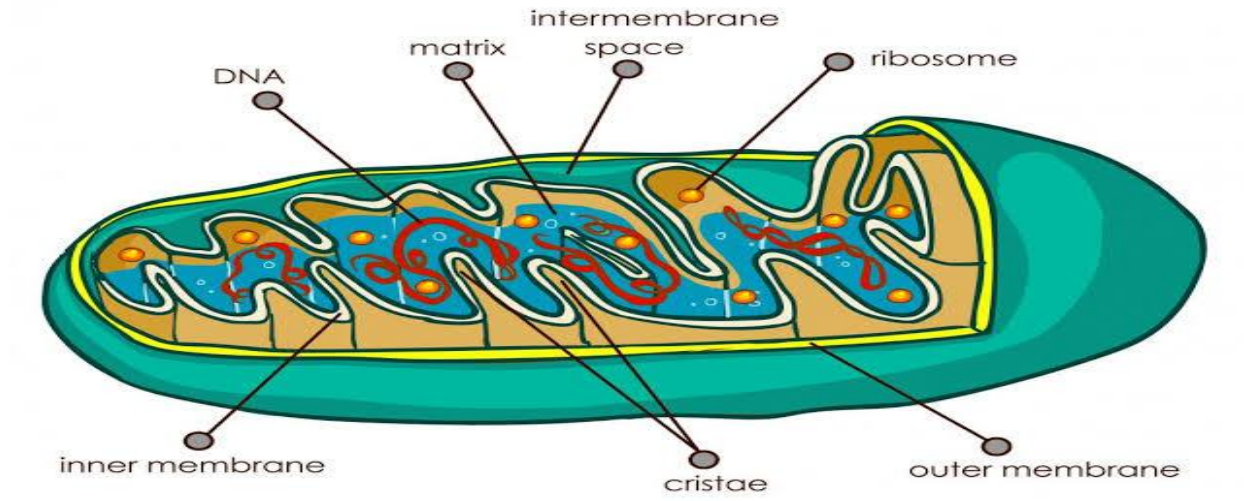
Lysosomes

They are referred to as suicide bags of the cell as they contain potent enzymes that can digest a cell. Lysosomes also help in defense by attacking a foreign object.



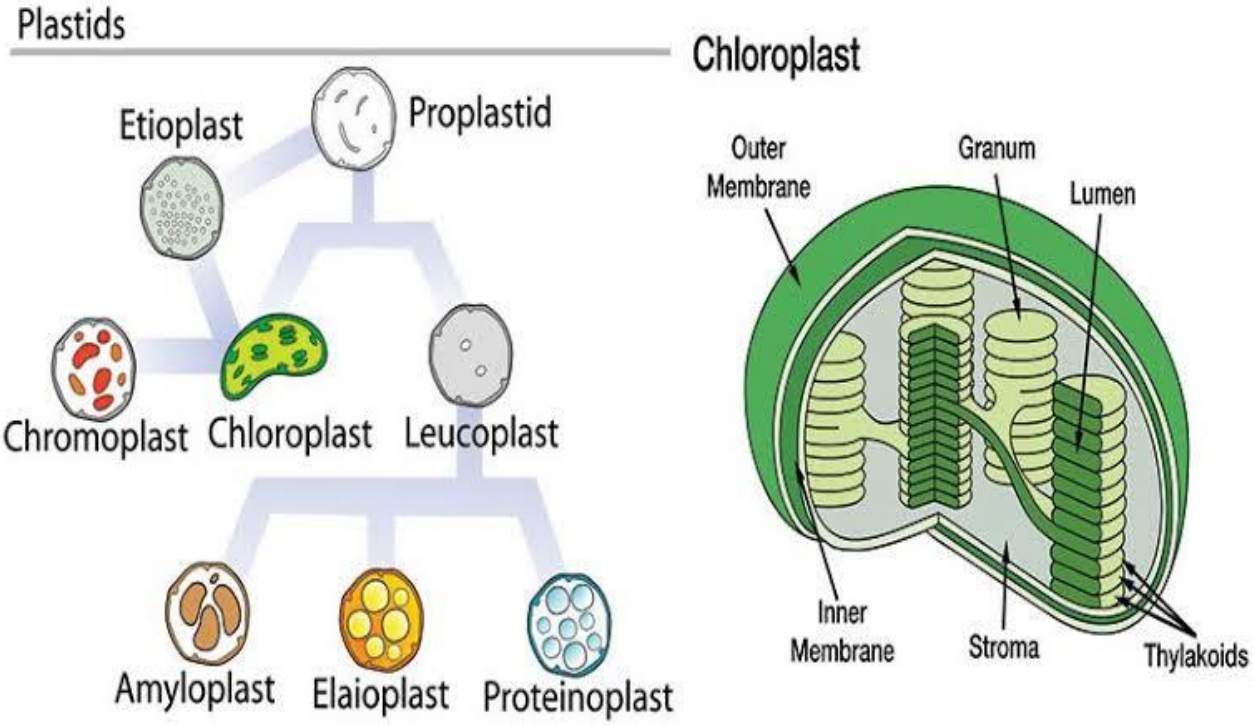
Mitochondria

Mitochondria are also called power plants of the cell. They generate ATP via the electron transport chain. They also have a DNA called mtDNA, which makes them semi-autonomous organelle.



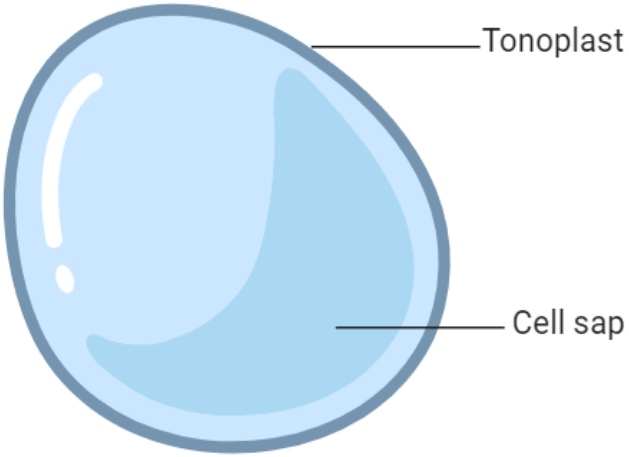
Plastids

There are various types of plastids in different cells based on the pigment they contain. The chloroplast is the plastid where the photosynthesis occurs. Some of the other plastids are leucoplast and chromoplast.



Vacuoles

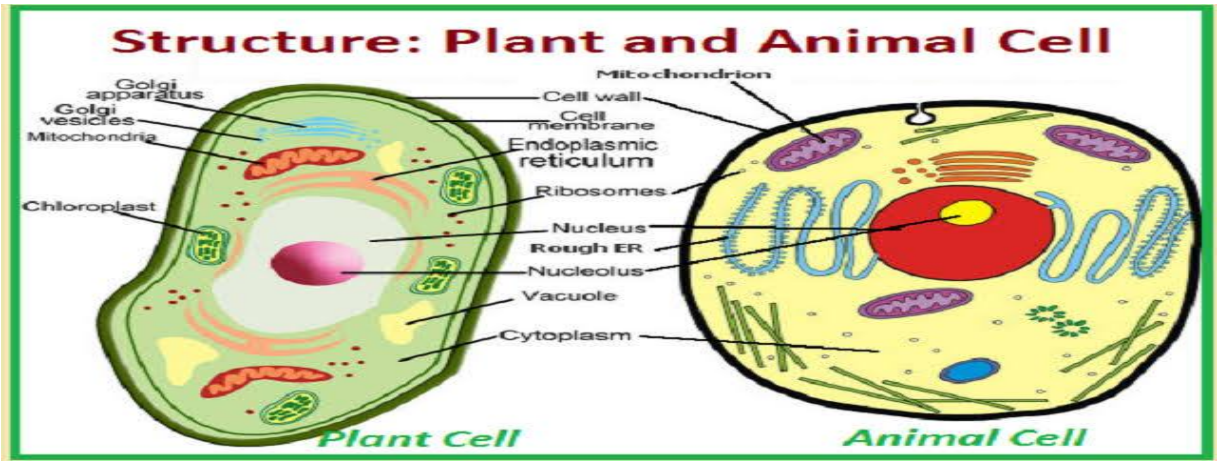
Vacuoles are large vesicles that hold water or air in them and give structural rigidity to the cell. Vacuoles are common in plant cells. In animals the vacuoles are either very small or absent.



Comparison between plant & animal cells

Plants cells are different from animal cells structurally. Plant cells have cell walls and chloroplast which are missing in animal cells. Plants cells also have large vacuoles which are either very small or missing in animal cells. The nucleus is present at the center of the cell in animal cells and at the periphery in plant cells.

Plant Cell	Animal Cell
It has definite cell wall, made up of cellulose.	No Cell wall.
Usually contain plastids.	Do not contain plastids.
Usually larger with distinct outlines.	Usually smaller with less distinct boundaries.
Centrosome is not present.	Centrosome is present.
Cytoplasm not so dense	Cytoplasm denser and more granular.



Question from The Fundamental Unit Of Life Class 9 Notes

1. How does a plant cell differ from an animal cell?
2. Differentiate between a eukaryotic cell and a prokaryotic cell.
3. What would be the outcome in a scenario where a rupture occurs in the plasma membrane?
4. Define osmosis.
5. How does an amoeba acquire food?
6. Growth and repair require which type of cell division?

Frequently asked Questions on CBSE Class 9 Biology Notes Chapter 5 : Fundamental Unit of Life

1) What is a 'Homogenous' mixture?

A homogeneous mixture is a mixture in which the composition is uniform throughout the mixture.

2) What is an 'Isotonic' medium?

A solution is isotonic when its effective mole concentration is the same as that of another solution.

3) What is a 'Vacuole'?

A vacuole is a membrane-bound cell organelle. In animal cells, vacuoles are generally small and help sequester waste products. In plant cells, vacuoles help maintain water balance.