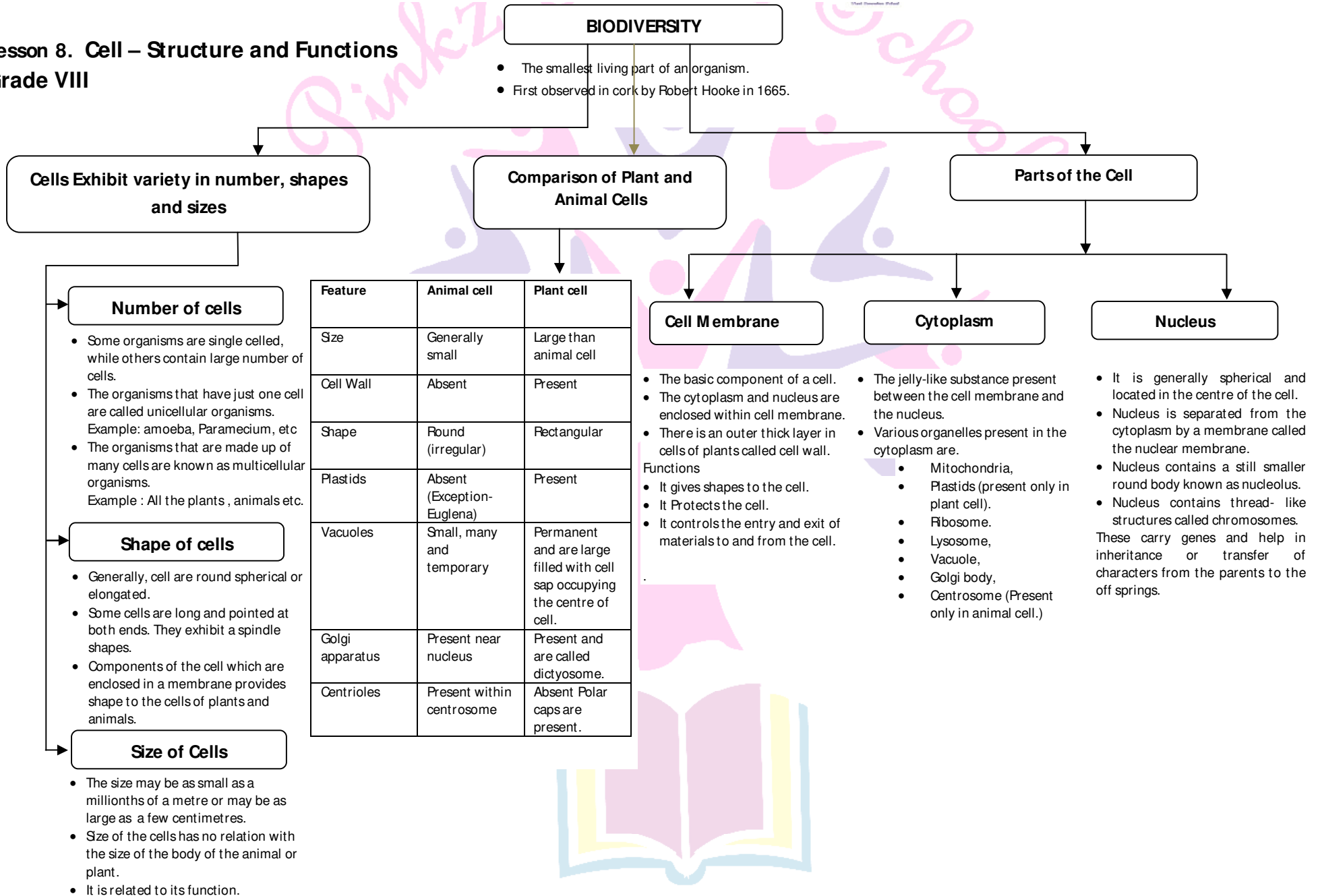


Basic concepts – A Flow Chart

Lesson 8. Cell – Structure and Functions Grade VIII



Know the Terms

- **Unicellular and Multicellular** : Organisms that are made up of more than one cells are called multicellular organisms. Organisms made up of single cell are called unicellular organisms. They are able to carry out all metabolic functions essential for life in a single cell are called unicellular organisms. e.g., Amoeba, Paramecium etc.
- **Pseudopodia** : Amoeba is capable of changing its shape with the help of cytoplasmic projections of varying length that protrude out of its body called pseudopodia. It helps in digestion and locomotion in Amoeba.
- **Organ** : An organ is made up of tissues which in turn, are made up of cells. The cell in a living organism is the basic structural unit.
- **Chromosomes** : The thread like structure, present inside the nucleus are called chromosomes and are visible only during cell division. They contain genes.
- **Gene** : It is a unit of inheritance in living organisms. It controls the transfer of hereditary characteristics from parents to offsprings in different combinations, that result in different new characteristics.
- **Protoplasm** : It is the living substance including the entire contents of cell, i.e., cytoplasm and nucleus.

Objective Type Questions

I. Multiple Choice Questions

1. Choose the correct statement with respect to unicellular organisms: **(NCERT Exemplar)**
 - (a) In unicellular organisms, tissues work in co-ordination to perform different functions.
 - (b) Unicellular organisms do not require food.
 - (c) Unicellular organisms respire and reproduce.
 - (d) All unicellular organisms move by cilia.
2. Majority of cells cannot be seen directly with our naked eyes because : **(NCERT Exemplar)**
 - (a) organisms are generally unicellular
 - (b) cells are microscopic
 - (c) cells are present only inside the body
 - (d) cells are grouped into tissues



3. Read the different combinations of terms given below. The correct combination of terms with reference to an animal cell is : **(NCERT Exemplar)**
- (a) cell wall, cell membrane, nucleus, plastid
 - (b) cell wall, nucleus, ribosome, chromosome
 - (c) cell membrane, ribosome, mitochondria, chromosome
 - (d) cell membrane, ribosome, mitochondria, chloroplast.
4. Which one of the following terms is not a part of the nucleus? **(NCERT Exemplar)**
- (a) ribosome (b) chromosome (c) nucleolus (d) gene
5. A suitable term for the various components of cells is : **(NCERT Exemplar)**
- (a) tissue (b) chromosomes (c) cell organelles (d) gene
6. The jelly-like fluid substance present in cells is called **(NCERT Exemplar)**
- (a) protoplasm (b) chloroplast (c) chromosome (d) cytoplasm
7. Read the following pairs of examples of organisms. The pair that belongs to the group prokaryotes is : **(NCERT Exemplar)**
- (a) moss and sponge (b) bacteria and blue-green algae
 - (c) yeast and amoeba (d) penicillium and spirgyra
8. Read the following terms and select the pair that is related to inheritance of characters. **(NCERT Exemplar)**
- (a) Cell wall and cell membrane (b) Chromosome and mitochondria
 - (c) Chloroplast and cell membrane (d) Chromosome and genes
9. Choose the correct statement : **(NCERT Exemplar)**
- (a) Genes are located in the chromosomes
 - (b) Cell is located in the nucleus
 - (c) Chromosomes are located in the nucleolus
 - (d) Cell membrane surrounds the nucleus
10. Green colour of leaves is due to presence of the pigment : **(NCERT Exemplar)**
- (a) chlorophyll (b) mitochondria (c) ribosomes (d) chloroplast
11. The unit of measurement used for expressing dimension (size) of cells is: **(NCERT Exemplar)**
- (a) centimeter (b) micrometer (c) millimeter (d) metre



12. The most important function of cell membrane is that it : **(NCERT Exemplar)**
- (a) controls the entry and exit of materials from cells
 - (b) controls only the entry of materials into cells
 - (c) controls only the exit of materials from cells
 - (d) allows entry and exit of materials without any control
13. Paheli accidentally placed her hand over a flame and immediately pulled it back. She felt the sensation of heat and reacted due to the action of : **(NCERT Exemplar)**
- (a) blood cells
 - (b) nerve cells
 - (c) skin surface
 - (d) nucleus of cells
14. Of the parts of a cell listed below, name the part that is common to plant cell, animal cell and a bacterial cell : **(NCERT Exemplar)**
- (a) chloroplast
 - (b) cell membrane
 - (c) cell wall
 - (d) nucleus
15. The thread-like structures present in the nucleus are : **(NCERT Exemplar)**
- (a) nucleolus
 - (b) genes
 - (c) chromosomes
 - (d) ribosomes
16. Identify the statement which is true for cells : **(NCERT Exemplar)**
- (a) Cells can be easily seen with naked eyes.
 - (b) Insect's egg is not a cell
 - (c) A single cell can perform all the functions in a unicellular organism
 - (d) The size and shape of cells is uniform in multicellular organism
17. Which of the following is not a cell? **(NCERT Exemplar)**
- (a) Red Blood Corpuscle (RBC)
 - (b) Bacterium
 - (c) Spermatozoa
 - (d) Virus
18. Which of the following features will help you in distinguishing a plant cell from an animal cell? **(NCERT Exemplar)**
- (a) cell wall
 - (b) mitochondria
 - (c) cell membrane
 - (d) nucleus
19. Under a microscope Paheli observes a cell that has a cell wall but no distinct nucleus. The cell that she observes is :
- (a) a plant cell
 - (b) a nerve cell
 - (c) an animal cell
 - (d) a bacterial cell
20. Cheek cells do not have
- (a) cell membrane
 - (b) golgi apparatus
 - (c) nucleus
 - (d) plastids
21. Identify the correct statement.
- (a) Tissue is a group of dissimilar cells
 - (b) An organ consists of similar cells
 - (c) Vacuoles are not found in plant cells
 - (d) Prokaryotes do not have nucleus



22. Which of the following statements are true for eukaryotic cells?

- (a) They do not have a nuclear membrane (b) They have a well organized nucleus
 (c) They have a nuclear membrane (d) Blue green algae are eukaryotic cells
 (a) (ii) and (iv) (b) (ii) and (iii) (c) (i) and (ii) (d) (i) and (iv)

23. Identify the correct statement about cells.

- (a) All the cells have nucleus (b) Cells of an organ have similar structure
 (c) Cells of a tissue have similar structure (d) Shape of all types of cells is round

24. The table given below has certain terms and four blank spaces named A, B, C and D

Cell	Feature/ Part	Function
Amoeba	A	Movement
Plant	Cell Plastid	B
C	Spindle Shaped	Contraction
Nerve Cell	D	Stimuli and response

From the options given below choose the correct combination of terms :

(NCERT Exemplar)

- (a) A-Pseudopodia; B-Respiration; C-Muscle Cell; D-Branched
 (b) A-Pseudopodia; B-Photosynthesis; C-Muscle Cell; D-Branched
 (c) A-Contractile vacuole; B-Photosynthesis; C-Blood Cell; D-Spindle Shaped
 (d) A-Pseudopodia; B-Photosynthesis; C-Cheek Cell; D-Spindle Shaped

1. (c)	2. (b)	3. (c),	4. (a),	5. (b),	6. (d),	7. (c),	8. (d),	9. (a),	10. (a),
11. (c),	12. (a),	13. (c),	14. (c)	15. (b),	16. (c),	17. (d),	18. (b),	19. (d),	20. (d),
21. (d),	22. (b),	23. (c),	24. (b).						

II. Multiple Choice Questions

1. The power house of cell is called

- a. Cell wall b. Mitochondria
 c. Ribosomes d. Nucleus



2. The kitchen of the cell is called

a. Cell wall

b. Nucleus

c. Vacuoles

d. Plastids

3. The functional unit of life is called

a. Cell

b. Egg

c. Nucleus

d. None of these

4. Chloroplast is found in the

a. Plant cell only

b. Animal cell only

c. Both of these

d. None of these

5. The control unit of cell is

a. Nucleus

b. Cell wall

c. Cytoplasm

d. All of these

6. Single celled organisms are called

a. Unicellular

b. Multicellular

c. Both of these

d. None of these

7. Tissue is a

a. Group of organs

b. Group of cells

c. Groups of tissues

d. Group of organisms

8. Cell is discovered by

a. Robert Brown

b. Robert Hooke

c. John Mendal

d. Charles Darwin

9. The cell which can change its shape are

a. Amoeba cell

b. WBC

c. Both of these

d. None of these

10. Hen's egg is a

a. Tissue

b. Organ

c. Organ system

d. Cell

1. b	2. d	3. a	4. a	5. a	6. a	7. b	8. b	9. c	10. d
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I. Fill in the blanks

1. All organisms are made of small parts called _____.
2. Cell was first observed in cork by _____ in _____.
3. Cells exhibit variety of _____ and _____.
4. _____ is separated from cytoplasm by a nuclear membrane.
5. Plant cells have an additional layer around the cell membrane called _____.
6. Green plastids containing chlorophyll are called _____.
7. Plant cell has a big central _____ unlike a number of small vacuoles in _____ cells.

1. organs	2. Robert Hooke, 1665	3. shapes, sizes	4. Nucleus
5. cell wall	6. chloroplast	7. vacuole, animal	

II. Fill in the blanks

1. The structural unit of the body is _____.
2. The small parts inside the cell are called _____.
3. The power house of the cell is called the _____.
4. _____ is called kitchen of the cell.
5. _____ is the control unit of the cell.
6. There are two types of organisms unicellular and _____.
7. Cork is part of _____ tree.
8. Cell is discovered by _____.
9. Cell is discovered in _____.
10. _____ is the unit of inheritance in living organism.

1. Cell	2. Organelles	3. Mitochondria	4. Plastids (Chloroplast)	5. Nucleus
6. Multicellular	7. Bark	8. Robert Hooke	9. 1665	10. Gene

I . Match the following.

1. Match the items given in Column A with those in Column B suitably.

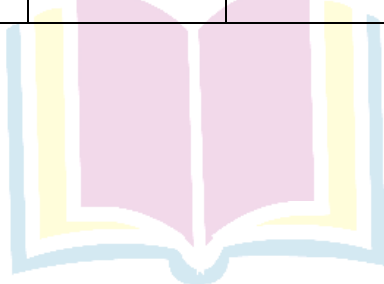
Column A		Column B	
(i)	Structural unit of body	(a)	Mitochondria
(ii)	Cell wall	(b)	Chloroplast
(iii)	Power house of the cell	(c)	Nucleus
(iv)	Kitchen of the cell	(d)	Cell
(v)	Control unit of the cell	(e)	Plant cell

(i). (d)	(ii). (e)	(iii). (a)	(iv). (b)	(v). (c)
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2. Match the items given in Column A with those in Column B suitably.

Column A		Column B	
(i)	Discovery of cell	(a)	Amoeba
(ii)	Fundamental unit of life	(b)	Cork
(iii)	Living material of cell	(c)	Robert Brown
(iv)	Unicellular organism	(d)	Robert Hooke
(v)	Part of bark	(e)	Cell
(vi)	Discovery of nucleus	(f)	Protoplasm

(i). (d)	(ii). (e)	(iii). (f)	(iv). (a)	(v). (b)	(vi). (c)
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Next Generation School

II. Match the following.

I. Column I	Column II
1. Cell Wall	(i) A jelly like substance
2. Chloroplast	(ii) Cell having well defined nucleus
3. Gene	(iii) Group of similar cells
4. Cytoplasm	(iv) White Blood Cell
5. Eukaryotes	(v) Plant cell
6. Nucleolus	(vi) Dense round body in centre of nucleolus
7. Tissue	(vii) Green coloured plastid
8. WBC	(viii) A unit of inheritance

1. (v)	2. (vii)	3. (viii)	4. (i)	5. (ii)	6. (vi)	7. (iii)	8. (iv)
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II. Column I	Column II
1. Chloroplast	(i) Carries hereditary characters
2. Cell membrane	(ii) Controls the activities of cells
3. Nucleus	(iii) Site of photosynthesis
4. Chromosome	(iv) Controls the movement of materials into and out of cells.

1. iii	2. iv	3. ii	4. i
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I. True or False

- Cell is the structural unit of living beings.
- There is a rigid cell wall in animal cells.
- The instrument used to see the tiny objects is called microscope.
- The vacuoles are present in animal cells and are very big.
- Ostrich egg is a cell which can be seen by naked eyes.
- Cell is discovered by Robert Brown.
- Amoeba is an example of multicellular organism.
- The living substance in the cell is called plasma membrane.



9. Human cell is a eukaryotic cell.

10. Nucleus is the part of a cell which helps in the control of the activities.

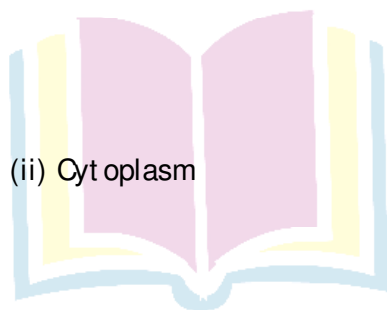
1. True	2. False	3. True	4. False	5. True	6. False	7. False	8. False	9. True	10. True
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Quiz Time

1. Give an example of a unicellular organism.
2. On what observation Robert Hooke discovered the cell?
3. What are the finger like projections in amoeba called?
4. Name the cell which can change its shape.
5. What is the unit of inheritance in living beings?
6. Name the functional parts of the cell.
7. Which pigment helps the plants to make their own food?
8. What is the type of cell of blue green algae?
9. What the group of cells performing a specific function is called?
10. A hen's egg can be seen easily. Is it a cell or a group of cells?

Answers :

1. Amoeba
2. Observation of cork slice
3. Pseudopodia
4. Amoeba cell or WBC
5. Gene
6. (i) Cell membrane
7. Chlorophyll
8. Prokaryotic cell
9. Tissue
10. The egg of a hen is a single cell



(iii) Nucleus

(ii) Cytoplasm

**Intext Questions**

1. Paheli read somewhere that hen's egg is a single cell. She is wondering how can it be seen easily.

Yes, egg of hen represent a single cell and is big enough to be seen by the unaided eye.

2. Boojoh asked Paheli about the advantage of changing shape in Ameoeba.

It facilitates movement and helps in capturing food.

3. Paheli is curious to know whether the cells in an elephant are larger than cells in a rat.

The size of the cells, in fact, has no relation with size of the body of the animal or plant. It is not necessary that the cells in the elephant will be much bigger than those in a rat. The size of the cell is related to its function. For example, nerve cells, both in the elephant and rat, are long branched. They perform the same function of transferring message.

4. Boojho wants to know whether all plants have cell wall. Why do they need them?

Cell wall i.e., additional layer surrounding the cell membrane is required by the plants for protection. Plant cells are exposed to the environment and need protection against variations in temperature, wind velocity, atmospheric moisture etc.

5. Paheli wants to know if the structure of the nucleus is the same in cells of plants, animals and bacteria.

No, the nucleus of the bacterial cells is not well organized like the cells of multicellular organism. Plant cells has cell wall while animal cells do not.

6. How do scientists observe and study the living cells?

Scientists use microscope to magnify cells and stains (dyes) to colour various parts of the cell while studying and observing their detailed structures.

Textbook Question

1. Indicate whether and following statements are true (T) or False (f).

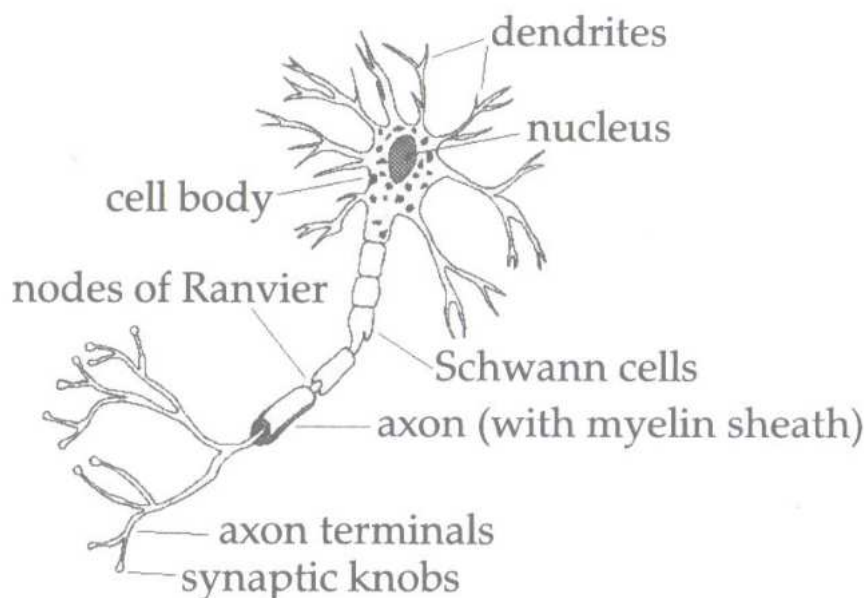
- i. Unicellular organisms have one-celled body.
- ii. Muscle cells are branched structures.

iii. The basic living structure of an organism is an organ.

iv. Ameoba has irregular shape.

i. True	ii. True	iii. False	iv. True
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2. Make a sketch of the human nerve cell. What function do nerve cell do?



Function : The nerve cell receives and transfers messages, thereby helping to control and coordinate the working of different parts of the body.

3. Write short notes on the following :

(i) Cytoplasm

(ii) Nucleus of a cell

(i) Cytoplasm : It is a jelly-like substance, present between the cell membrane and the nucleus. It encloses all tiny structures called cell organelles that perform different functions. It also contains water, sugar, proteins, minerals etc.

(ii) Nucleus of a Cell : It is a spherical component of cell commonly located in the centre of cell. It is covered by porous nuclear membrane and contains genetic material like RNA and DNA. It also contains thread-like structures called chromosomes, which carry genes. Nucleus controls various activities of cell.

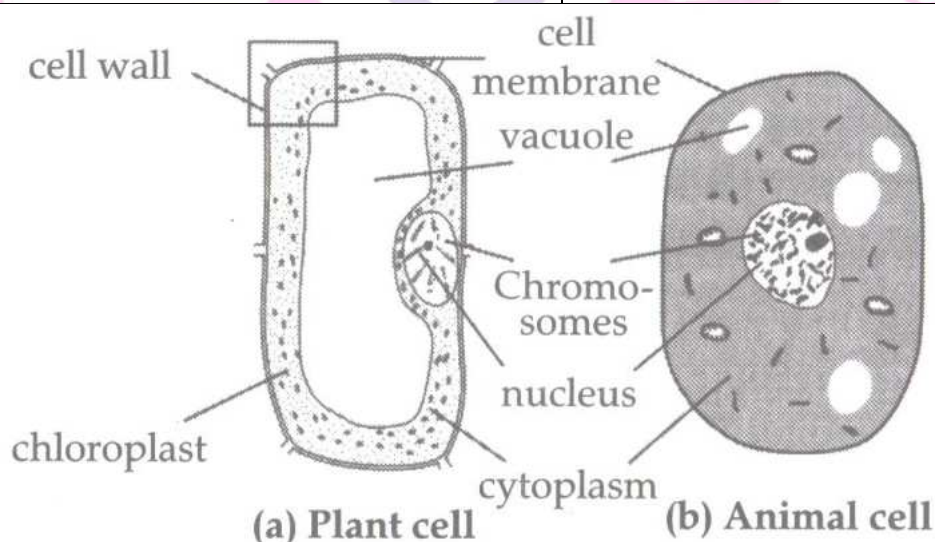
4. Which part of the cell contains organelles?

Organelles are present in the cytoplasm. Cytoplasm is the fluid present between the cell membrane and the nucleus.

5. Make sketches of animal and plant cells. State three differences between plant and animals cells.

Differences between plant and animal cells :

S.No.	Plant Cell	Animal Cell
(i)	Plant cells have cell wall.	Animal cells do not have cell wall.
(ii)	Plant cell has a big central vacuole.	Animal cell has number of small vacuoles.
(iii)	Coloured bodies called plastids are found in the plant cells.	Animal cells do not have plastids.



6 State a difference between eukaryotes and prokaryotes.

Eukaryotes have the cells which consist of a well organized nucleus with a nuclear membrane. While prokaryotes have the cells having nucleus material without nucleus membrane.

7. Where are chromosomes found in a cell? State their function.

Nucleus contains hair like structures called chromosomes. These carry genes and help in inheritance or transfer of characters from the parents to the offspring.

8. "Cells are the basic structural units of living organisms." Explain.

Organisms in the living world differ from one another but all are made up of cells. So, cells in the living organisms are basic complex living structures.

9. Explain why chloroplasts are found only in plant cells.

Green coloured plastids are called chloroplasts. They provide green colour to the leaves and chlorophyll in the chloroplasts of leaves is essential for photosynthesis. In human cell, it is not required. So, chloroplasts are found only in plant cells.

10. Complete the following crossword with the help of clues given.

Across :

- (1) This is necessary for photosynthesis.
- (3) Term for component present in the cytoplasm.
- (6) The living substance in the cell.
- (8) Unit of inheritance present on the chromosomes.

Down :

- (1) Green plastids.
- (2) Formed by collection of tissues.
- (4) It separates the contents of the surrounding medium.
- (5) Empty space in the cytoplasm.
- (7) A group of cells.

Across

- (1) Chlorophyll, chloroplasts
- (3) Organelle
- (5) Vacuole
- (7) Tissue

Down

- (2) Organ
- (4) Membrane
- (6) Protoplasm
- (8) Genes

I. Very Short Answer Type Questions

1. How many types of things are there on earth?

There are two types of things.

- (i) Living things
- (ii) Non-living things

2. Name the structural unit of an organism.

Cell.

3. What is cell?

The structural and functional unit of life is called cell.

4. What is cork?

Cork is the part of bark of a tree.



5. Who discovered the cell and when?

Robert Hooke discovered the cell in 1665.

6. What is basic structural unit of a building?

Bricks.

7. Is hen's egg a cell or group of cells?

Hen's egg is a cell.

8. Name a cell which can be seen by an unaided eye.

Hen's egg.

9. How do scientists observe and study the living cells?

By using highly magnifying microscopes.

10. How many cells are there in human body?

There are trillions of cells in human body.

11. How many types of organisms are there on the basis of number of cells?

There are two types of organisms on the basis of number of cells;

(i) Unicellular

(ii) Multicellular

12. Name two unicellular organisms.

Amoeba, Paramecium

13. Name two multicellular organisms.

Man, Dog.

14. What are tissues?

The groups of specialised cells to perform a special function are called tissues.

15. How can you define the shape of amoeba?

The shape of amoeba is irregular.

16. What are pseudopodia?

The finger-like projections of different lengths out of the body of amoeba are called pseudopodia.

17. Name two cells which can change their shape.

(i) Amoeba cell

(ii) WBC

18. Mention three different shapes of cells in human body.

(i) Spherical red blood cells

(ii) Spindle shaped muscle cells

(iii) Long branched nerve cell



19. Which part of the cell gives the shape to a cell?

Cell wall or Plasma membrane.

20. What are the basic components of a cell?

- (i) Cell membrane
- (ii) Cytoplasm
- (iii) Nucleus

21. What are chromosomes?

The thread-like structures in the nucleus are called chromosomes.

22. Write the name of unit of inheritance in living things.

Gene.

23. Name the part of a cell which helps in control of the activities.

Nucleus.

24. What is protoplasm?

The living substance of the cell is called protoplasm.

25. What is nuclear membrane?

The membrane used to cover the nucleus and separate it from cytoplasm is called nuclear membrane.

26. How many types of cells are there?

There are two types of cells.

- (i) Prokaryotic cells
- (ii) Eukaryotic cells

27. What are prokaryotic cells?

The cells having nuclear material without nuclear membrane are called prokaryotic cells.

28. Name the organisms having prokaryotic cell.

Bacteria and blue green algae.

29. What are eukaryotic cells?

The cells having well organised nucleus with a nuclear membrane are called eukaryotic cells.

30. Name the organisms having eukaryotic cells.

All organisms, other than bacteria and blue green algae, have eukaryotic cells.

31. What are prokaryotes and eukaryotes?

The organisms having prokaryotic cells are called prokaryotes and those having eukaryotic cells are called eukaryotes.



32. What are vacuoles?

The blank looking structures in the cytoplasm are called vacuoles.

33. What are plastids?

The small coloured bodies in plant cells are called plastids.

34. Name the green coloured plastids.

Chloroplasts.

35. Write the name of pigment found in chloroplasts.

Chlorophyll.

36. Name the longest cell in human body.

Nerve cell.

37. Name two blood cells.

(i) RBC

(ii) WBC

38. Expand RBC and WBC.

Red Blood Cell , White Blood Cell

39. Name the blood cell whose shape changes like amoeba.

White Blood cells

40. At which stage genes can be appeared?

At the time of cell division.

II. Very Short Answer Type Questions

1. Name the cell organelle and pigment present in leaf which are responsible for green colour.

The cell organelle is chloroplast and chlorophyll is the pigment responsible for green colour of leaves.

2. In a cell, where are the genes located?

Genes are located in thread-like structures called chromosomes, inside the nucleus.

3. Amoeba and Paramecium belong to which category of organisms?

Amoeba and Paramecium are unicellular prokaryotic organisms.

4. A single celled animal.

Amoeba



5. A human cell that can change shape.

White Blood Cell

6. A cell in the human body that receives and transfers messages.

Nerve cell

7. A group of similar cells performing a specific function.

Tissue.

8. Name a solution which should be added to make onion peel slide.

Methylene blue

9. Various components are present in cytoplasm. Name them.

They are mitochondria, golgi bodies, ribosomes, vacuoles etc.

III. Very Short Answer Type Questions

1. We do not sense any pain when we clip our nails or cut our hair. Why?

Nails and hair are both made up of dead cells. They do not have nerve cells. Hence we don't feel the pain when they are cut.

2. What are the functions of cell wall in plant cells?

Cell wall protects the cell contents, gives shape to the cell.

3. Give the difference between unicellular and multicellular organisms.

Unicellular organisms like amoeba or paramecium are single celled while multicellular organisms like human beings are made up of many cells.

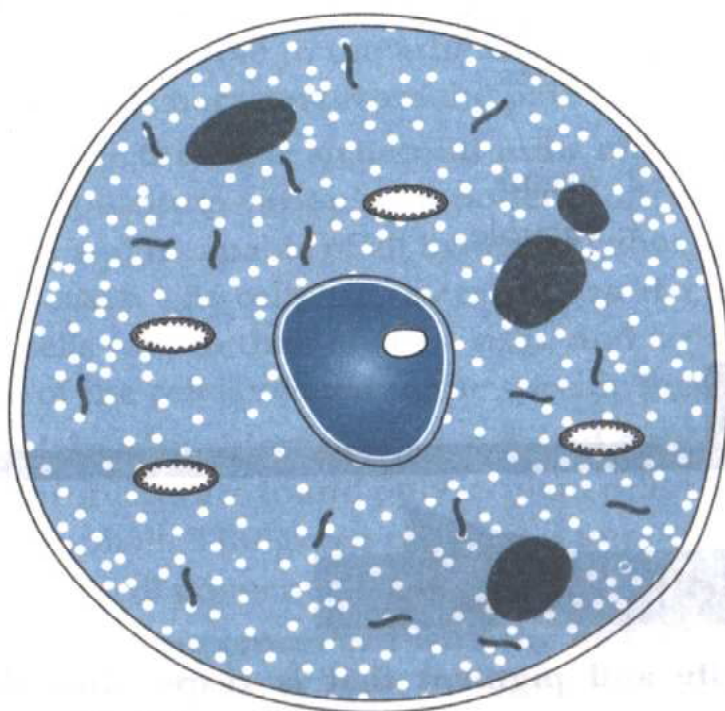
I. Short Answer Type Questions.

1. Why a cell is called the structural and functional unit of living organisms?

Cell is called structural unit because it provides a shape to the body and all the life processes occur inside the cells, so it is called functional unit of living organisms.

Next Generation School

2. Observe the following diagram.



a. Answer the following questions:

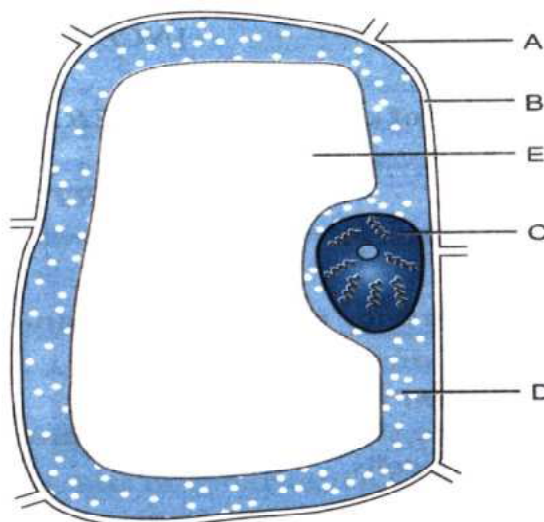
a. Does it represent a plant or an animal cell?

b. Does it represent a prokaryotic cell or a eukaryotic cell?

a. it represents an animal cell.

b. it represents a eukaryotic cell.

3. Label the parts A to E in the diagram given below.



a - Cell wall

b - Cell membrane

c - Nucleus

d - Cytoplasm

e - Vacuole

4. Classify the following terms into cells, tissues and organs and write in the tabular column given below.

RBC, WBC, nerve cell, blood vessels, brain, heart, hand, blood, muscle, nerve

Cell	Tissue	Oragn
_____	_____	_____
_____	_____	_____
_____	_____	_____

Cell	Tissue	Oragn
RBC	Blood	Blood vessels
WBC	Muscle	Heart
Nerve cell	Nerve	Hand
		Brain

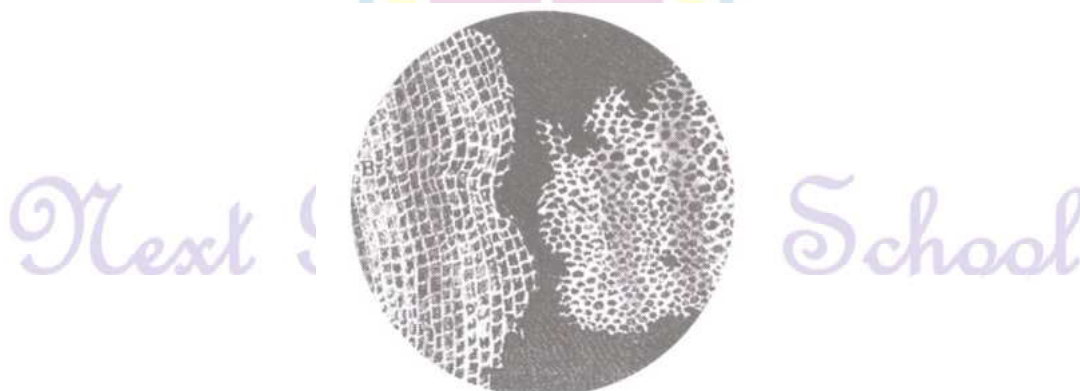
5. Why are mitochondria known as power house of the cell?

Mitochondria are known as power house of the cell because it provides energy from food as a result of cellular respiration.

II. Short Answer Type Questions.

1. Explain the discovery of cell.

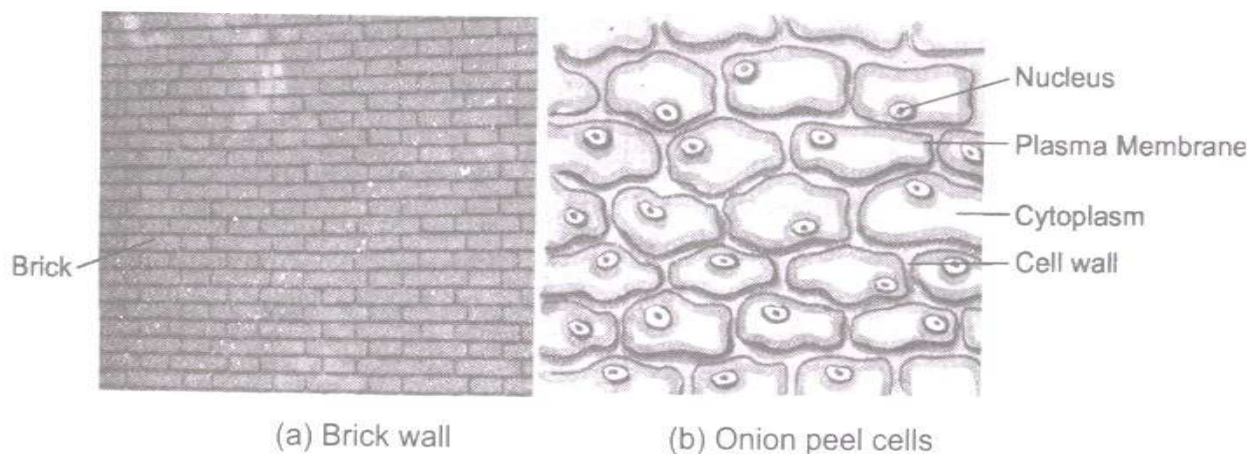
In 1665, Robert Hooke observed slices of cork under a magnifying device. He noticed partitioned boxes or compartments in the cork slice. These boxes appeared like honeycomb. Hooke coined the term cell for each box.



Cork cells as observed by Robert Hooke

2. Cells are the building blocks of the life. Explain.

Cells are the basic structural unit of life like bricks which are basic structural unit of buildings. Buildings are not same at all. In the same way organisms also differ from each other. Both cells and bricks are basic unit of structure. So we can say that cells are building blocks of life.



3. Explain various types of organisms on the basis of number of cells.

There are two types of organisms on the basis of number of cells.

- (i) **Unicellular** : The organisms that contain only single cell in their body are called unicellular organisms. For example : Amoeba and paramecium
- (ii) **Multicellular** : The organisms made up of more than one cell are called multicellular organisms. For example : human , cat , dog , etc.

4. What are the functions performed by single cell organisms?

Single celled organisms capture and digest food, respire, excrete, grow and reproduce like multicellular organisms. The multicellular organisms do these functions by groups of specialised cells forming different tissues.

5. Define the shape of amoeba.

The shape of amoeba appears irregular. Amoeba has no definite shape unlike other organisms. It keeps on changing its shape. It contains finger-like projections called pseudopodia (false feet). These projections appear and disappear as amoeba moves or feeds.

6. Why could cells not be observed before 17th century?

The size of cells is mostly very small. We cannot see them by unaided eyes. They can be seen by high power microscope. Before 17th century the microscope was not discovered. That is why the cells could not be observed before 17th century.



7. Explain the variation of size of cells.

Cells vary in their size. Some cells are very small like bacterial cell whose size is about 0.5 micrometre. Nerve cell is the longest in our body. Ostrich egg is the largest cell. Acetabulum is the largest unicellular algae which is about 10 cm long. In this way size of the cells varies.

8. Explain the structure of a cell.

There are three main components of a cell : (i) Cell membrane (ii) Cytoplasm (iii) Nucleus. The cytoplasm and nucleus are enclosed within the cell membrane. The cell membrane is also called plasma membrane. The membrane separates cells from one another. The plasma membrane is porous and allows the movement of substances or material both inward and outward.

9. Explain the structure of onion cell with the help of a slide.

Observe the slide under a microscope having small piece of onion peel.

(i) **Cell membrane** : The boundary of the onion cell is cell membrane. It is covered by another thick covering called the cell wall.

(ii) **Nucleus** : The central dense round body in the centre is called the nucleus.

(iii) **Cytoplasm** : The jelly-like substance between nucleus and cell membrane is called cytoplasm.

10. Write the functions of cell wall.

In addition to the cell membrane, there is an outer thick layer in cells of plants called cell wall. It gives the shape to the cell. Cell wall provides protection to the cells of the plants. Plant cells need protection against variations in the temperature, high wind speed and atmospheric moisture etc.

11. Explain the structure of cheek cells.

Take a matchstick with the tip broken. Scrape inside your cheek without hurting it. Place it in a drop of water on a glass slide. Add a drop of iodine and cover it with cover slip. Observe it under a microscope. We observe that cheek cells also contain cell membrane, cytoplasm and nucleus. There is no cell wall in the animal cells.

12. What is cytoplasm?

Cytoplasm is the jelly-like substance present between cell membrane and the nucleus. Various other components called organelles are present in the cytoplasm. These are mitochondria, Golgi bodies, ribosomes etc.



13. Write the functions of mitochondria, Golgi bodies and ribosomes.

Mitochondria : It performs the function of respiration and provides the cell with energy. It is called power house of a cell.

Golgi bodies : They synthesise, store and secrete enzymes and proteins.

Ribosomes : They help in the synthesis of proteins.

14. Explain prokaryotic and eukaryotic cells.

Prokaryotic cells : The cells having nuclear material without nuclear membrane are termed as prokaryotic cells and organisms with these kinds of cells are called prokaryotes.

Examples : Bacteria and blue green algae.

Eukaryotic Cells : The cell having well organised nucleus with a nuclear membrane are called eukaryotic cells. The organisms with these kinds of cells are called eukaryotes. For example, all organisms other than bacteria and blue green algae are eukaryotes.

15. What is gene? What is function?

Gene is a unit of inheritance in living organisms. It controls the transfer of hereditary characteristics from parents to offsprings. This means that your parents pass some of their characteristics on to you.

III. Short Answer Type Questions- I

1. We do not sense any pain when we clip our nails or cut out hair. Why?

Nails and hair are made up of dead cells. They do not have protoplasm and nerve cells, hence one does not feel pain, when they are clipped or cut.

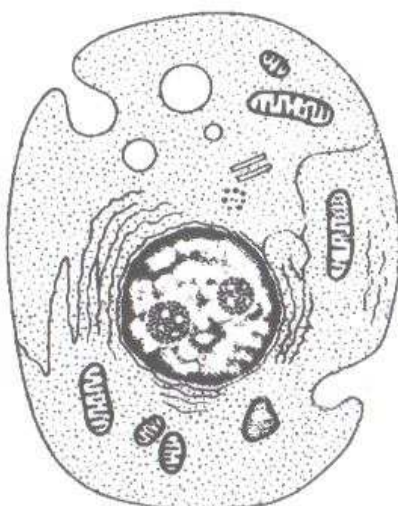
2. What are the functions of cell wall in plant cells?

Cell wall is an additional layer surrounding the plasma membrane that protects cells against variations in temperature, moisture and high wind speed. It also provides shape and rigidity to cells.

3. Is the following statement correct? If it is wrong, correct the statement. "Unicellular organisms do not respire, only multicellular organisms respire." (NCERT Exemplar)

The above mentioned statement is wrong. The unicellular organisms also respire, reproduce and carry out all metabolic functions like multicellular organisms. The difference is that all the functions are performed by cell organelles of a single cell.

4. Observe the following diagram :



Answer the following questions :

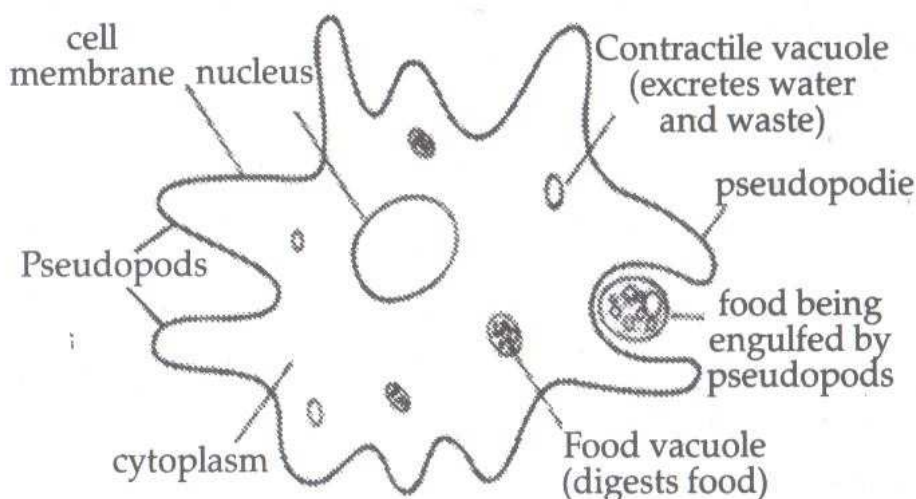
(i) Does it represent a plant cell or an animal cell?

(ii) Does it represent a prokaryotic cell or an eukaryotic cell?

(i) The above diagram represents an animal cell because cell is bound by cell membrane and cell wall is absent.

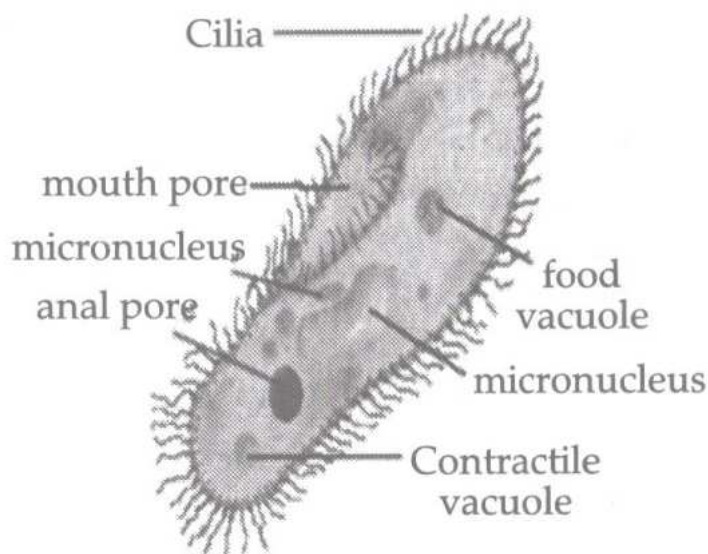
(ii) The above diagram represents a eukaryotic cell as it has a well organized nucleus and other cell organelles in it.

5. Draw a diagram of (i) Amoeba (ii) Paramecium. Name the locomotory organs in both of them. (i)



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(ii)



Amoeba moves with the help of pseudopodia while paramecium moves through cilia.

6. How does an organism begin its life?

An organism with billions of cells begins life as a single cell which is the fertilized egg. This fertilized egg cell multiplies and the number of cells increases as development proceeds.

7. How does amoeba capture the food?

Amoeba captures the food by producing the projections of varying lengths. These are called pseudopodia (false feet).

8. What are the shapes of cells?

Generally, cells are round, spherical or elongated. Some cells are long and pointed at both the ends. They exhibit a spindle shape. Sometimes they are quite long and branched like nerve cell.

9. Write the size of the smallest and largest cell.

The smallest cell measures 0.1 to 0.5 micrometre in bacteria. The largest cell measuring 170 mm x 130 mm, is the egg of an Ostrich.

10. Describe the structure of hen's egg.

In hen's egg a white material surrounds the yellow part. White material is albumin and yellow part is yolk. They are part of a single cell.

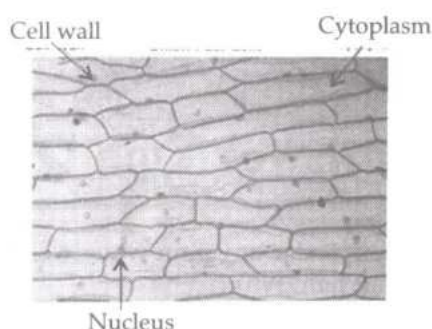
11. What is plasma membrane? What are its characteristics?

The cytoplasm and nucleus are enclosed within the cell membrane, also called plasma membrane. The membrane separates cells from one another and also cells from the surrounding medium. It is porous and allows the movement of substances or materials both inwards and outwards.

12. Why does plant cell need cell wall?

There is an outer thick layer in cells of plants called cell wall. It is required by plant for protection. Plants cells need protection against variations in temperature, high wind speed, atmospheric moisture etc.

13. Draw a diagram of Onion peel and label (i) Cell membrane (ii) Nucleus and (iii) Cytoplasm on it.



III. Short Answer Type Questions-II

1. Fill in the blanks with the terms given below : Nucleus, chromosomes, cell wall, cell membrane, protoplasm, cytoplasm, ribosome, cell organelles. The outermost layer of plant cells is the(a) beneath which is the(b) The term(c)..... refers to the jelly-like substance containing all the. (d) The(e)....contains thread-like structures called ...(f).

(a) Cell wall

(b) Cell membrane

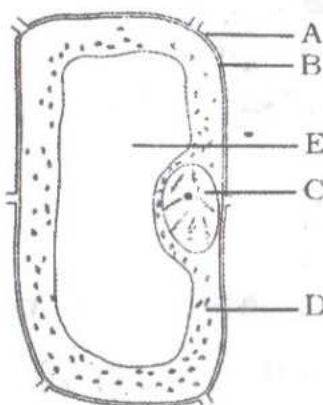
(c) Cytoplasm

(d) Cell Organelles

(e) Nucleus

(f) Chromosomes

2. Label the parts A to E in the given diagram.



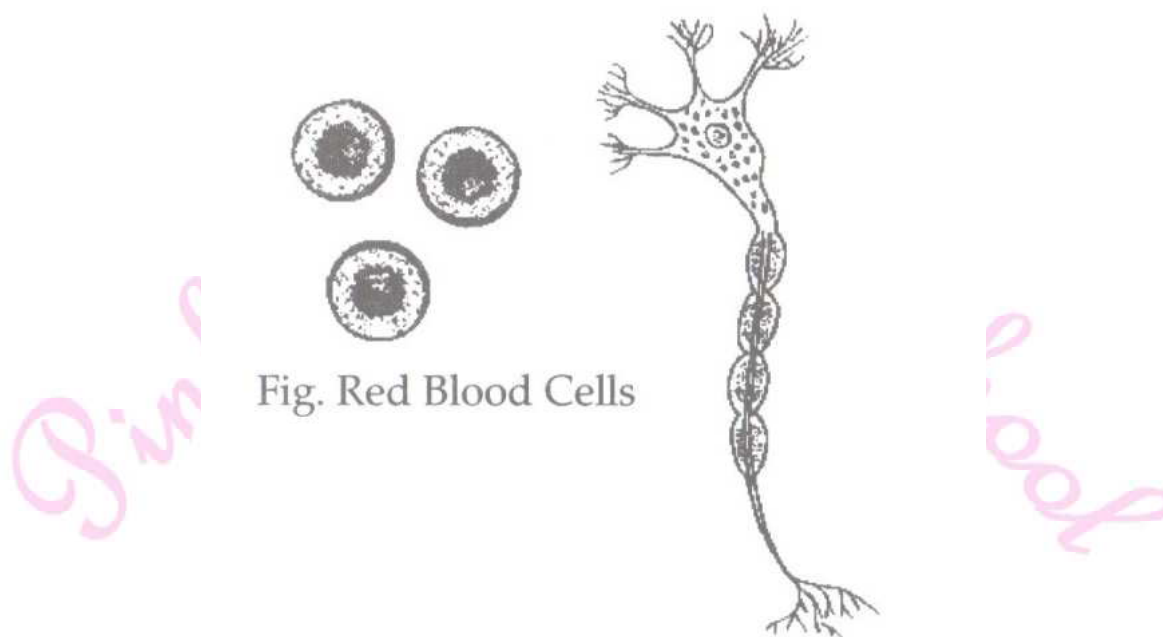
A. Cell Wall

B. Cell membrane

C. Nucleus

D. Cytoplasm E. Vacuole

3. Draw Red blood cell and nerve cell.



4. What is nucleus? Describe it.

Nucleus is an important component of the living cell. It is generally spherical and located in the centre of the cell. It is separated from the cytoplasm by a membrane called nuclear membrane. It is also porous and allows the movement of material between the cytoplasm and nucleus. It has a small spherical body inside it called nucleolus. It contains small thread like structures called chromosomes.

They carry genes and help in transferring the characters from parents to offsprings.

5. Differentiate between :

- (a) Prokaryotic and Eukaryotic
- (b) Animal cell and Plant cell

(a)

S.No.	Prokaryotic Cell	Eukaryotic Cell
(i)	The cells having nuclear material without nuclear membrane.	The cells having well-organised nucleus with nuclear membrane.
(ii)	Organisms termed Prokaryotes e.g., Blue green algae.	Organisms termed Eukaryotes e.g., Onion cell, cheek cells.

(b)

Animal Cell	Plant Cell
(i) Cell wall absent	Cell wall present
(ii) Vacuoles are small in size.	A large vacuole present in the centre of cell.

6. Cells consist of many organelles, yet we do not call any of these organelles as structural and functional unit of living organisms. Explain.

The cell organelles like mitochondria, golgi complex, ribosomes, nucleus etc. carry out specific functions in a cell but they function only when present inside a living cell. They cannot act as independent units. Therefore, we do not call, cell organelles as the structural and functional units of living organisms.

7. Read the following statements and write the appropriate term against each statement.

(i) I control the functions of a cell. Who am I?

(ii) I am like a policeman. I do not allow anything and everything to get in and out of the cell. Who am I?

(iii) I transfer characters from parents to offsprings. Who am I?

(i) Nucleus controls the functions of a cell.

(ii) Cell membrane is like a policeman which does not allow anything and anything into and out of the cell.

(iii) Genes of chromosomes transfer characters from parents to offsprings.

I. Long Answer Type Questions.

1. What is a gene? What are its functions?

Gene is a unit of inheritance in living organism. It controls the transfer of hereditary characteristics from parents to offsprings. This means that your parents pass some of their characteristics to you. If your father has brown eyes, you may have brown eyes. However, the different combination of genes from parents results in different characteristics.

2. Describe the various parts of a cell.

Parts of the Cell : The basic components of a cell are:

(i) Cell membrane

(ii) Cytoplasm



(iii) Nucleus

(i) **Cell membrane** : The cytoplasm and nucleus are enclosed within the cell membrane. It is also called plasma membrane. It separates cell from another cell and from the surrounding medium. It is porous in nature and allows movement of substance or material both inward and outward.

(ii) **Cytoplasm** : It is the jelly like substance present in between the cell membrane and the nucleus. Various other components, or organelles of cells are present in the cytoplasm. These are mitochondria, golgi bodies, ribosomes etc.

(iii) **Nucleus** : It is an important component of the cell. It is generally spherical and located in the centre of the cell. It is surrounded by nuclear membrane. It is porous in nature. It has a smaller spherical body called nucleolus. The nucleus contains thread like structures called chromosomes. They carry genes and help in transferring the characteristics from parents to offsprings.

3. Why do plants have an additional layer surrounding the cell membrane? What is the layer known as? (NCERT Exemplar)

The additional layer surrounding the cell membrane of plant cells is called cell wall. The plants do not show physical movement and cannot escape from extreme climatic conditions, therefore cell wall protects the plant cells from temperature variation, high wind speed, atmospheric pressure etc.

4. The size of the cells of an organism has no relation with the size of its body. Do you agree? Give reasons for your answer.

The size of the cells of an organism is not related to the size of organism. This can be understood with the example of an elephant and a rat. The cells in elephant are not bigger in size as compared to the cells of small animal like rat. Hence, cells are not related to the size of organism.

However, the size of a cell is related to the function that a cell performs. The nerve cells in both rat and elephant are long and branched and perform the function of transferring and receiving messages and also help in co-ordination of different functions of body parts.

5. Explain the functions of plastids.

The small coloured bodies in the cytoplasm are called plastids. These are found only in plant cells but not in animal cells. Plastids are of different colours. Some of them contain green pigment called chlorophyll. The plastids having other than green colour are called chromoplast.



Some plastids are colourless called leucoplast. These coloured plastids provide various colours to flowers and fruits. The chloroplasts having chlorophyll help in the formation of food by leaves through the process called photosynthesis. 6. Explain the position and functions of nucleus in a cell.

Nucleus is the most important component of the living cell. It is round or spherical in shape and situated in the centre of the cell. Nucleus is separated from cytoplasm by a membrane called nuclear membrane. This membrane is porous and allows the movement of materials between the cytoplasm and inner side of the nucleus. There is a small and spherical body in the nucleus. It is called nucleolus. Nucleus contains thread-like structures called chromosomes. These carry genes and help in inheritance or transfer of characters from the parents to the offspring. Nucleus also acts as a control centre of the activities of the cell.

II. Long Answer Type Questions.

1. Explain the position and functions of nucleus in a cell.

Nucleus is the most important component of the living cell. It is round or spherical in shape and situated in the centre of the cell. Nucleus is separated from cytoplasm by a membrane called nuclear membrane. This membrane is porous and allows the movement of materials between the cytoplasm and inside of the nucleus. There is a small and spherical body in the nucleus. It is called nucleolus. Nucleus contains thread-like structures called chromosomes. These carry genes and help in inheritance or transfer of characters from the parents to the offspring. Nucleus also acts as a control centre of the activities of the cell.

2. Compare the plant cell and animal cell.

S.No	Part	Plant Cell	Animal Cell
1	Cell membrane	Present	Present
2	Cell wall	Present	Absent
3	Nucleus	Present	Present
4	Nuclear membrane	Present	Present
5	Cytoplasm	Present	Present
6	Plastids	Present	Absent
7	Vacuole	Present and big	Absent or small

3. What are main function regions of cell? Write their functions.

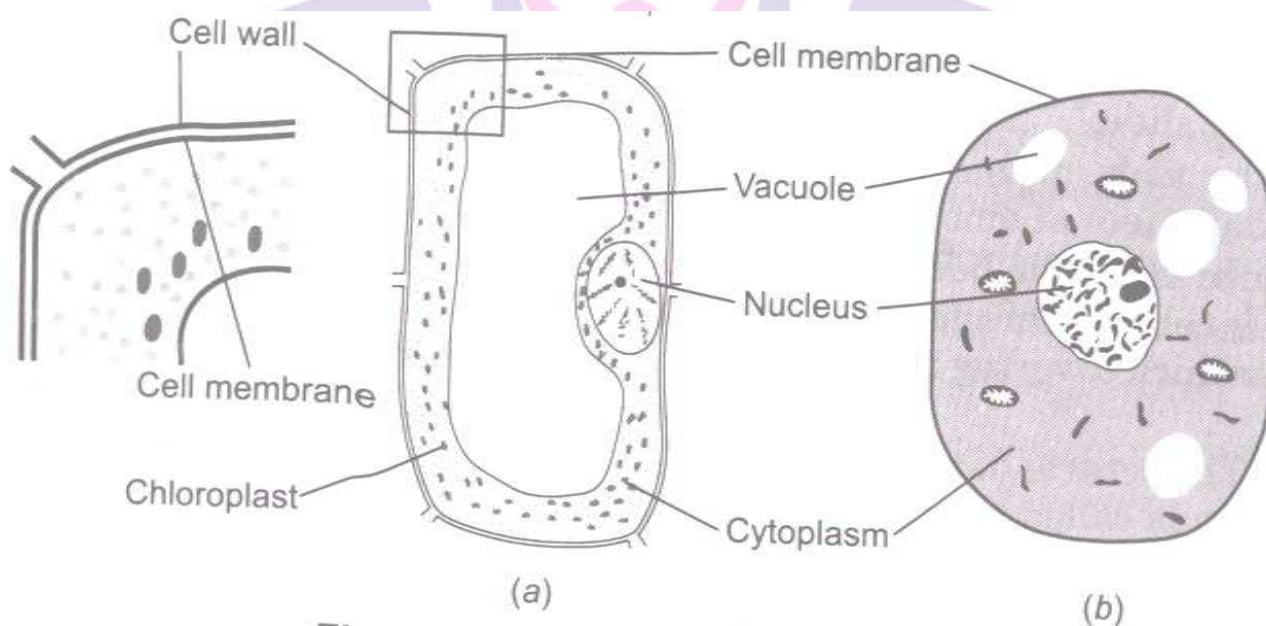
There are main three regions of the cell:

- (i) Cell membrane (ii) Cytoplasm (iii) Nucleus

(i) Cell Membrane : It separates cells from one another. It also separates the cell from the surrounding medium. The plasma membrane is porous which allows movement of substances from inside to outside and vice versa.

(ii) Cytoplasm : It presents between cell membrane and nucleus. Various other components of cell are present in the cytoplasm. These are mitochondria, Golgi bodies, ribosomes and plastids etc.

(iii) Nucleus : It controls various activities of cell. It contains chromosomes which carry genes. Genes are the unit of inheritance, which transfer the characteristics from one generation to other generation.



4. Explain the functions of Plastids.

The small coloured bodies in the cytoplasm are called plastids. These are found only in plant cells but not in animal cells. Plastids are of different colours. Some of them contain green pigment called chlorophyll. The plastids having other than green colour are called chromoplast, some plastids are colourless called leucoplast. These coloured plastids provide various colours to flowers and fruits. The chloroplast having chlorophyll helps in the formation of food by leaves through the process called photosynthesis.

III. Long Answer Type Questions.

1. Cells consist of many organelles, yet we do not call any of these organelles as structural and functional unit of living organisms. Explain.

Although cell organelles have specific structures and perform specific functions but they cannot be called structural and functional unit of living organisms. This is so because they can perform their functions only when they are within a living cell. They cannot function outside the cell as an independent unit.

2. Why do plant cells have an additional layer surrounding the cell membrane? What is this layer known as?

As plants cannot move they need protection against variations in temperature, high wind speed, atmospheric moisture, etc, these variations damage the plant cell to an extent of killing them. The cell membrane is a flexible and semi-permeable membrane and cannot fight the adverse climatic changes in its own. Therefore, a stiffer outer covering is present which protects and gives shape to the plant cell. This layer is called the cell wall.

3. The size of the cells of an organism has no relation with the size of its body. Do you agree? Give reason for your answer.

I agree because the cells in the body of an elephant is not necessarily bigger than those in a rat, it is not true that bigger organisms have cells of bigger size in their body. The size of the cell in an organism is related to the function it performs. For example, the nerve cells in both, the elephant and the rat are long and branched. They perform the same function, that of transferring message.

I. High Order Thinking Skills (HOTS) Questions

1. A hen's egg can be seen easily. Is it a cell or a group of cells?

A hen's egg is a single cell that is big enough to be seen easily by unaided eye.

2. Various substances form cell membrane and cell wall. Name their main constituents.

Cell membrane is made up of proteins and lipids while cell wall is formed of cellulose.

3. Cells are the building blocks of the life. Explain.

Cells are the basic structural unit of life like bricks which are basic structural unit of buildings. Buildings are not same at all. In the same way organisms also differ from each other. Both cells and bricks are basic units of structure. So, cells are building blocks of life.



4. What is gene? What is its function ?

Gene is a unit of inheritance in living organisms. It controls the transfer of hereditary characteristics from parents to offsprings. This means that your parents pass some of their characteristics to you.

5. Mitochondria are important organelles of cell, often called 'powerhouse' of the cell.

Give reason.

Mitochondria are called the 'powerhouse' of the cell because they provide energy for all the activities of the cell by oxidizing food.

6. A cell requires water, minerals etc. to stay alive and function efficiently. But every cell is covered with a cell membrane. How do these substances move in and out of the cell?

The movement of substances is through cell membrane. The cell membrane has tiny pores on it for the movement of substances. It allows some substances to pass through but not others. For this reason, it is also referred to as selectively or partially permeable.

7. In a multicellular organism, all cells have the ability to perform all life functions. State whether it is true or not. Give reason for your answer.

In a multicellular organism, all cells do not have the capability to perform all life functions. Thus, the given statement is wrong. Although each cell can carry out the important functions of life, it is not capable of existence on its own. e.g., a muscle cell cannot obtain its own food or oxygen. Other specialized cells in the body collect food or oxygen. All the cells do not perform all the jobs; different tasks or functions are divided among different groups of cells.

8. Nucleus is removed from a cell. What is most likely to happen?

It is said that the nucleus controls all the metabolic activities as well as formation of various cell organelles. Thus, if the nucleus is removed, it will adversely affect the organism. In an organism such as Amoeba, removal of nucleus may even lead to death.

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II. High Order Thinking Skills (HOTS) Questions

1. What is meant by 'division of labour' in multicellular organisms?

In unicellular organisms, the only cell present will have to complete all tasks necessary for survival. Whereas in multicellular organisms, certain cells specialize in their function and divide the labour between multiple different cell groups.

2. Does the number of cells depend upon the size of the organism?

Yes, the bigger organisms have more number of cells than organisms which are smaller in size.

Value Based Questions

1. Niharika's teacher told in class that food provides us energy. However, she remembered the previous class in which a part of cell was said as powerhouse because it provides energy she got very confused and decided to ask her teacher about it. The teacher smiled and explained her dearly.

(i) Name the cell organelle that is called as powerhouse of the cell.

(ii) The powerhouse is related to energy. How is energy obtained?

(iii) Mention the values displayed by Niharika.

(i) Mitochondria is the powerhouse of the cell.

(ii) The energy from the food is released into the mitochondria, from where it is used by cell for various activities.

(iii) Niharika is intelligent, attentive and has scientific attitude and knowledge.

2. To study the cell and its structure, microscope is needed. Explain to the students brief history of microscope and how it works.

Invention of microscope brought many advantages in study of science, such as regarding microscopic animals and internal structure of various animals and plants. Microscope is an instrument which makes an object look many times bigger than its original size. It has one eye piece, draw tube, body tube, objective lens, stage and mirror as main parts. Tiny structures are kept on stage under objective lens. Light is adjusted by mirror. Then structure is watched through eye piece. Much bigger structure is visible. So students can easily and clearly understand the microscopic structures.

Skill Based Questions

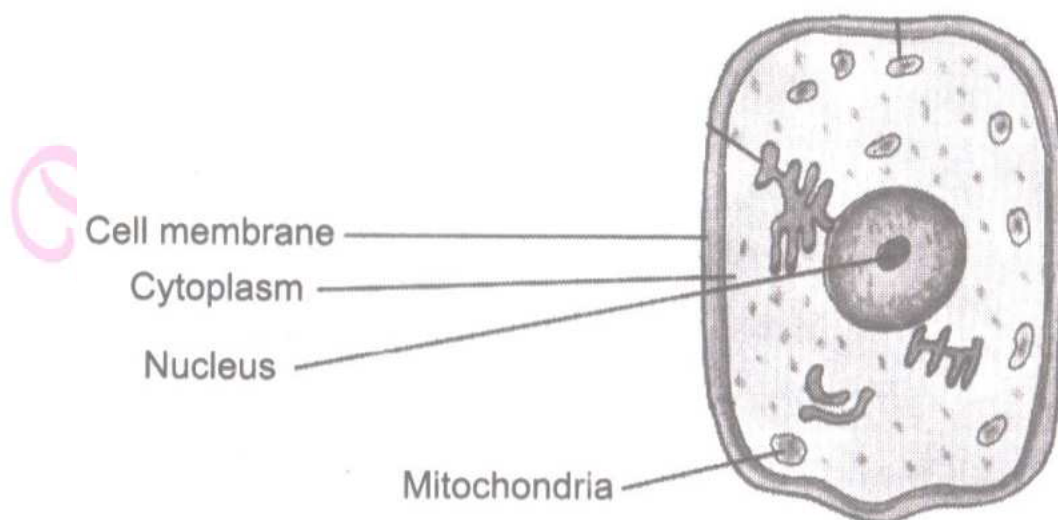
1. Draw a diagram of an animal cell and label the following parts:

(i) Cell membrane

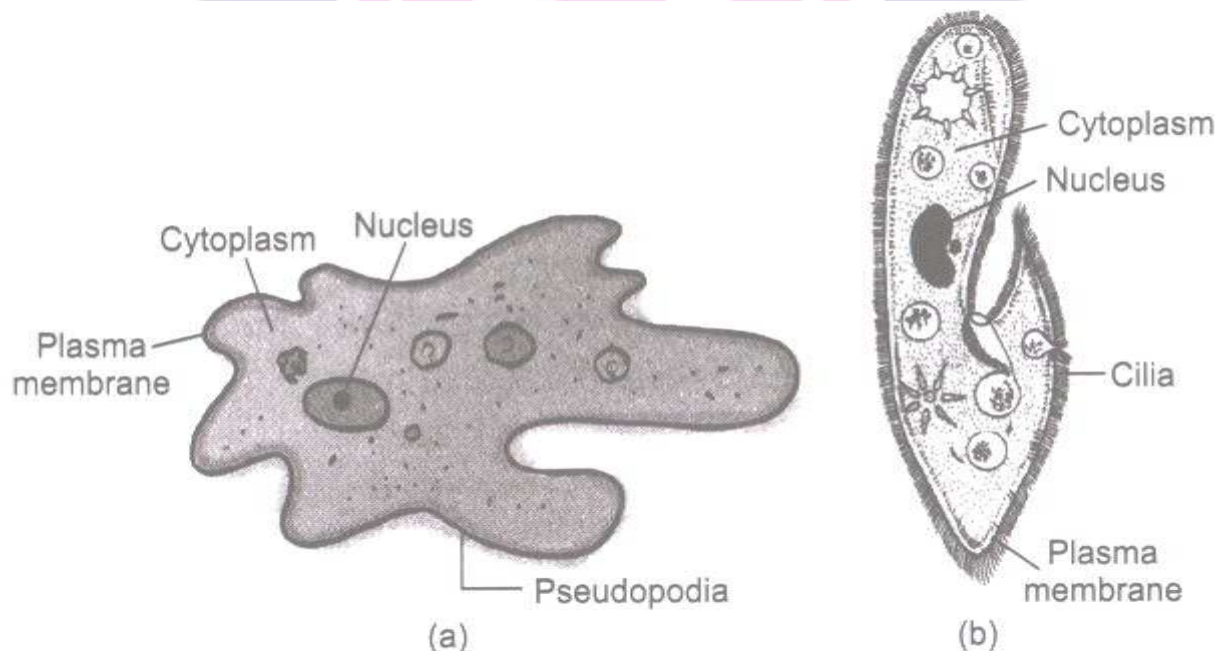
(ii) Mitochondria

(iii) Nucleus

(iv) Cytoplasm

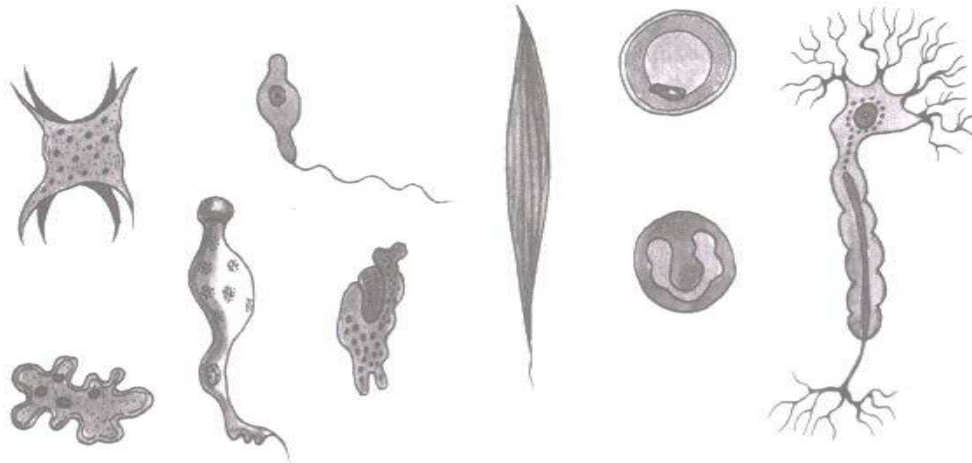


2. Draw a diagram of (a) Amoeba (b) Paramecium. Name the locomotory organs in both of them.

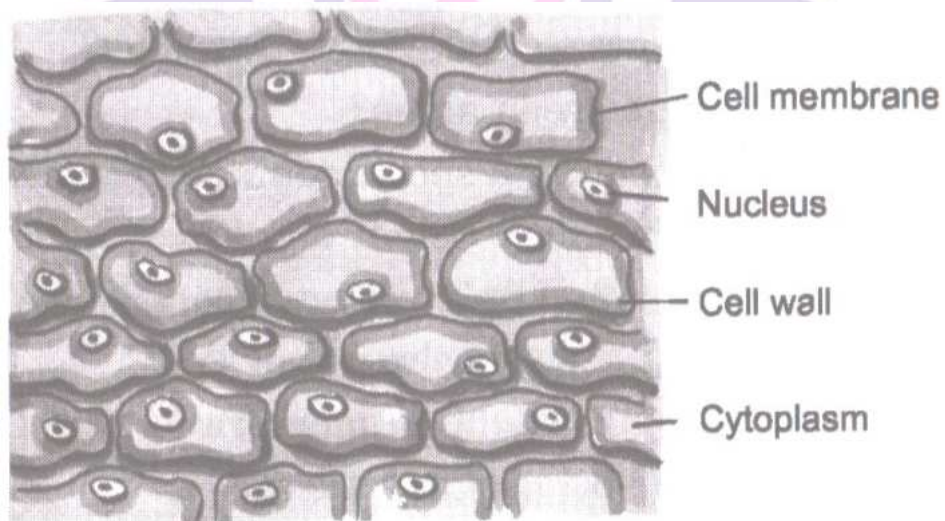


Amoeba moves with the help of pseudopodia while paramecium moves through cilia.

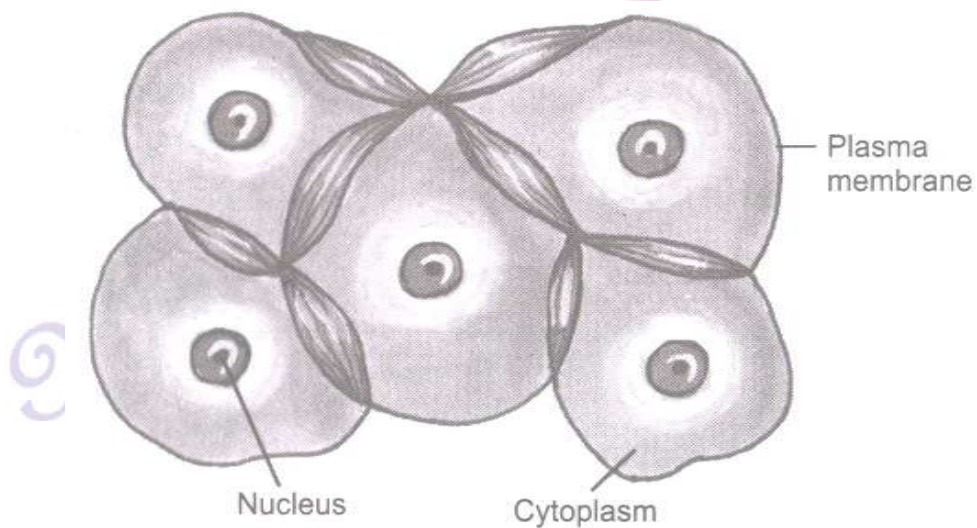
3. Draw diagram to show different types, shapes and sizes of cells.



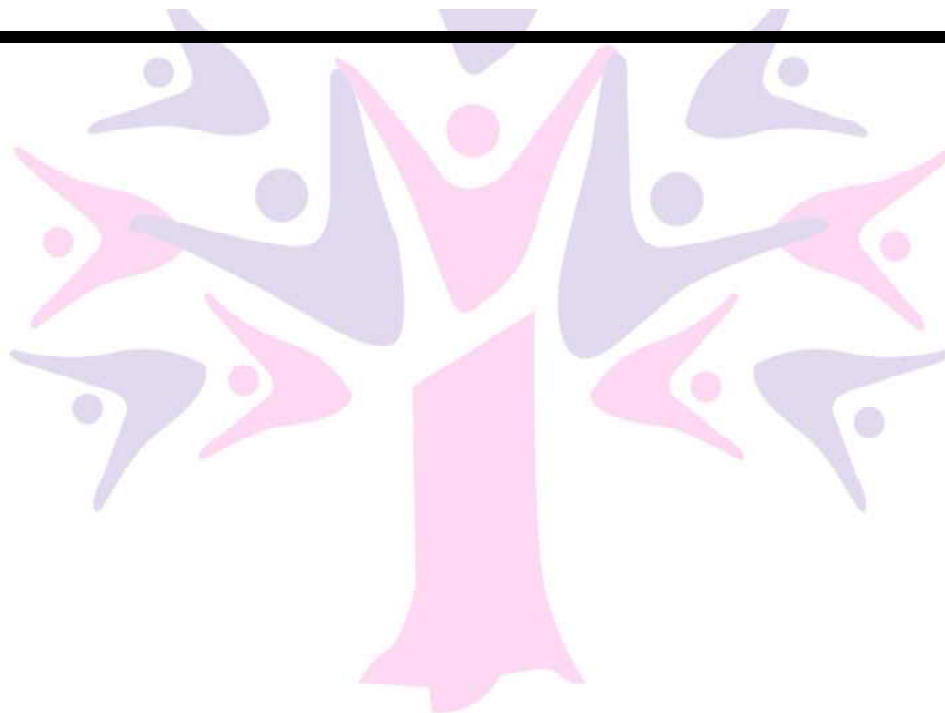
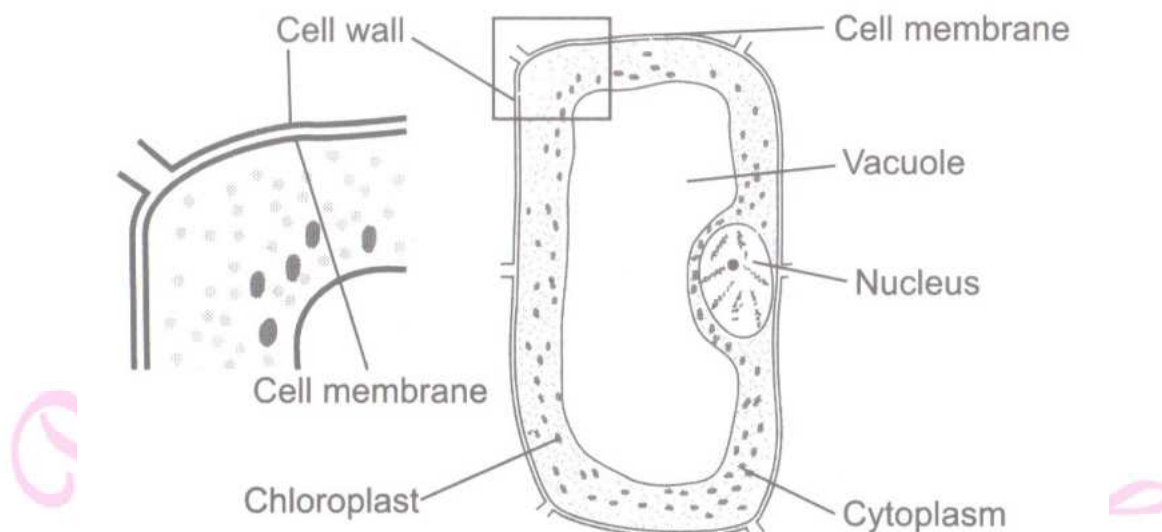
4. Draw a diagram of onion peel and label (i) Cell membrane (ii) Nucleus and (iii) Cytoplasm on it.



5. Draw a labelled diagram of human cheek cells.



6. Draw a labelled diagram of plant cell.



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