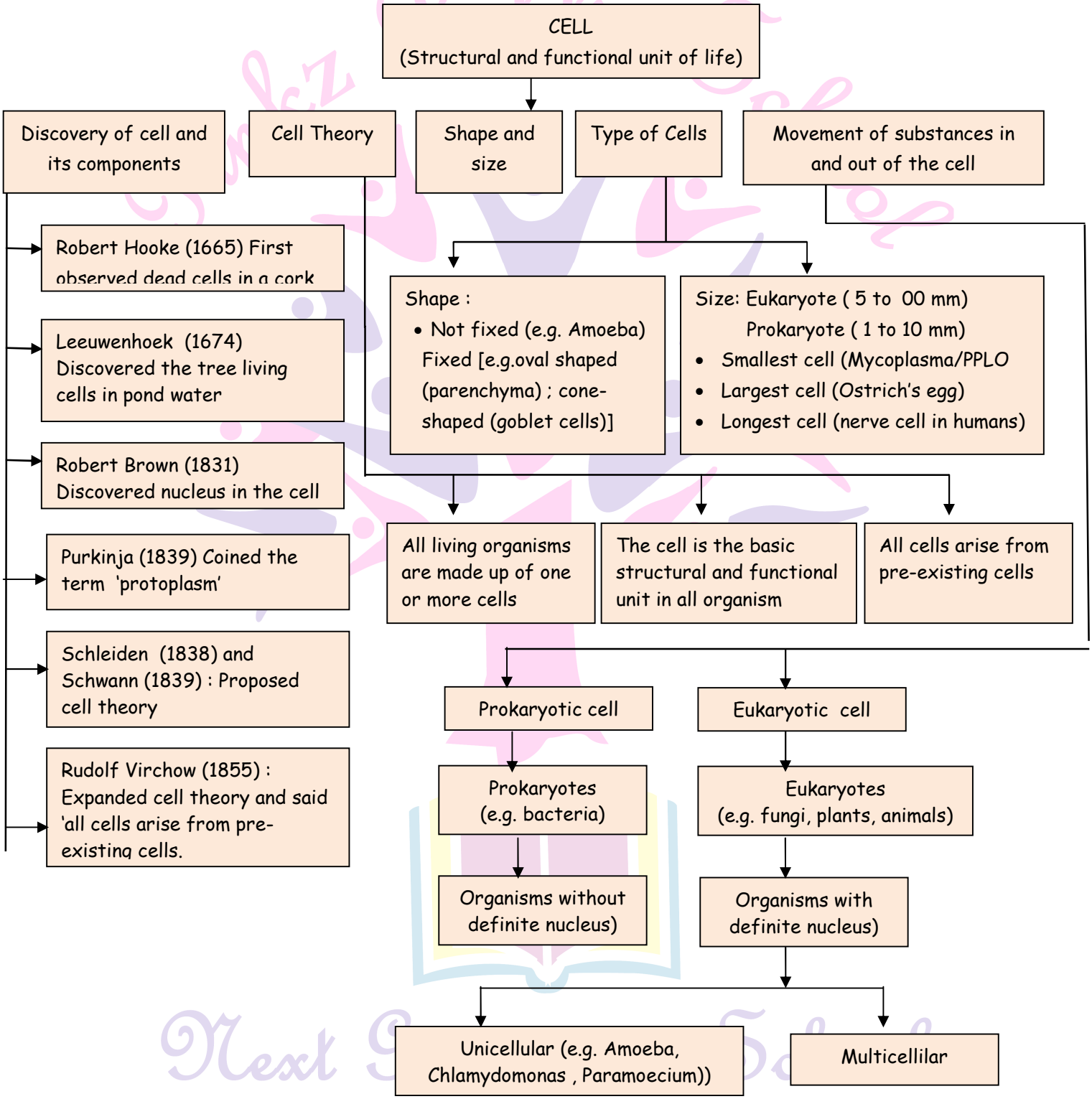
Grade IX

Lesson : 5 The fundamental Unit of life



Multicellular

Animals

Animal cell

Plants

Plant cell

Cell Membrane /Plasma Membrane:
- Made up of proteins and lipids
- Selectively permeable membrane
- Gives shape to the cell
- Segregates cell content from surroundings

Nucleus: Oval or spherical prominent structure

- Nuclear membrane
- Nucleoplasm
- Chromatin material
- Nucleolus

Cytoplasm: Fluid content of the cell which occurs between plasma membrane and nuclear membrane
Membrane – bound cell organelles are present in the cytoplasm

Cell Wall :
Rigid, non-living, freely permeable and mainly composed of cellulose
- Provides structural strength
- Gives definite shape to the cell
- Protects from pathogen and mechanical injury

Plastids:
Major cell organelle in plants

Leucoplasts
- Colourless
- Performs the function of storage of starch, oil and protein granules

Chromoplasts
- Coloured plastid
- Provide colour to fruits and flowers
- Green coloured plastid is called chroroplast ('kitchen of the cell'). It contains a green pigment called chlorophyll that helps in the process of photosynthesis. They have their own DNA and ribosomes

Endoplasmic Reticulum

Structure :
Large network of membrane bound tubes and sheets extending from outer nuclear membrane to the plasma membrane
Functions :
- Gives mechanical support to the cell
- Serves as a channel for the transport of materials (especially proteins)

(RER) Rough Endoplasmic Reticulum : Have ribosomes attached to the membrane

(SER) Smooth Endoplasmic Reticulum : Ribosomes not attached to the

Golgi Apparatus

Structure :
A set of membrane-bound smooth, flattened cisternae, have small fluid-filled vesicles. They have their own DNA and ribosomes.
Function:
Storage, modification and packaging of products in vesicles.

Mitochondria (Power-house of the cells)

Structure :
Rod- shaped structures present in the cytoplasm
Functions:
- Site of cellular respiration
- Provides energy (in the form of ATP)

Lysosomes (digestive bags / suicidal bags)

Structure :
Membrane-bound vesicular structures in the cytoplasm.
Functions:
- Destroy any foreign material which enters the cell (like bacteria, virus)
- Removes dead and worn out cell organelles by digesting them

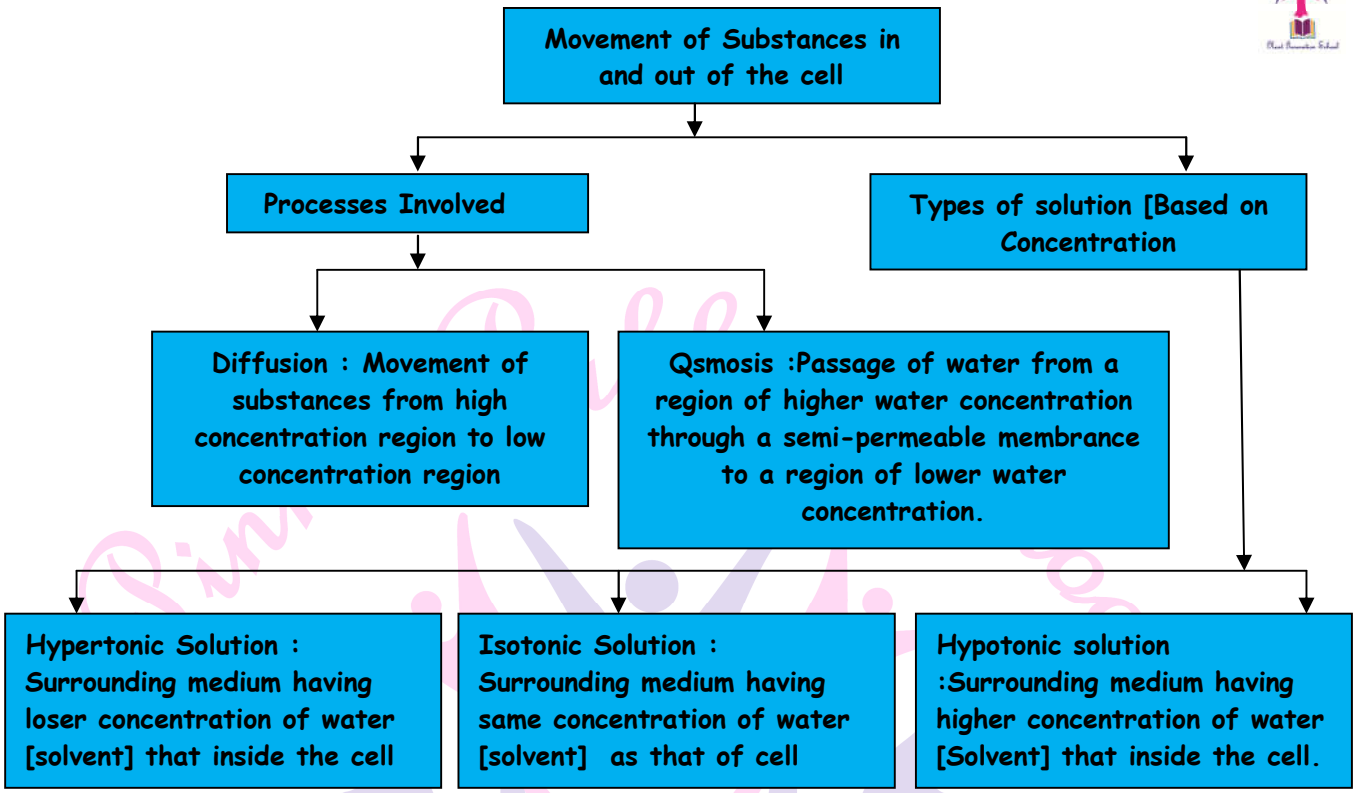
Vacuoles

Storage sacs for solid or liquid content

Ribosomes

Structure :
Dense, spherical and granular particles which occur freely and also remain attached to ER..
Functions:
Sites of protein synthesis

Protoplasm (Physical basis of life) :
Viscous, colourless, transparent material and a life giving substance of a cell



CELL DIVISION

It is a process where new cells are produced from the existing ones in order to help in growth, replacement, repair and reproduction in all living organisms.

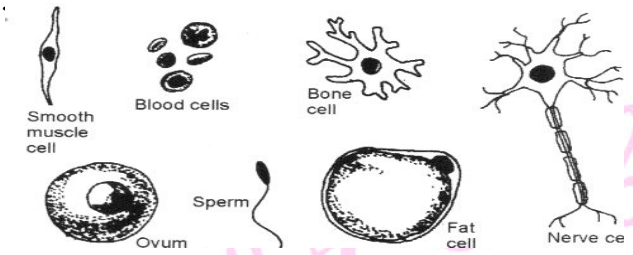
TYPES OF CELL DIVISION

Mitosis: It is a type of cell division in which a cell divides into two daughter cell, each containing same number of chromosomes similar to the parent cell.

Meiosis: It is a type of cell division in which a diploid cell divides into four new cells in two successive divisions. The new cells have only half the number of chromosome in comparison to parent cell,

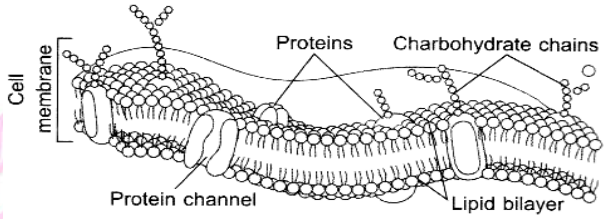
Important Diagrams

1.



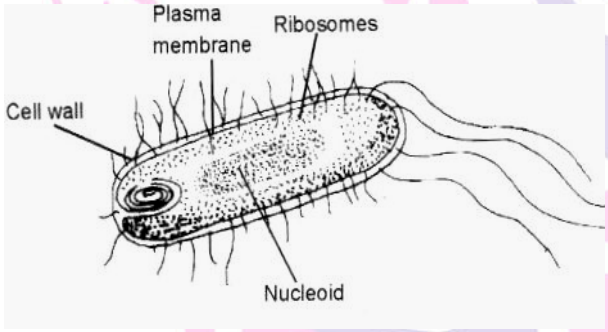
Various cells from the human body

2.



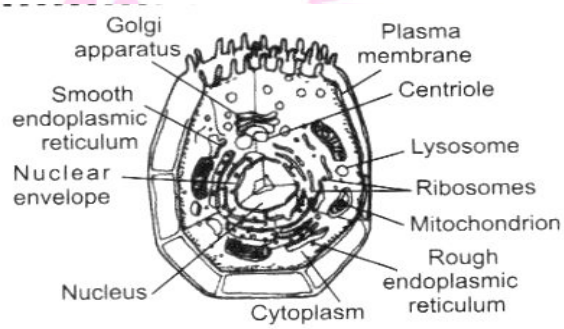
Plasma membrane

3.



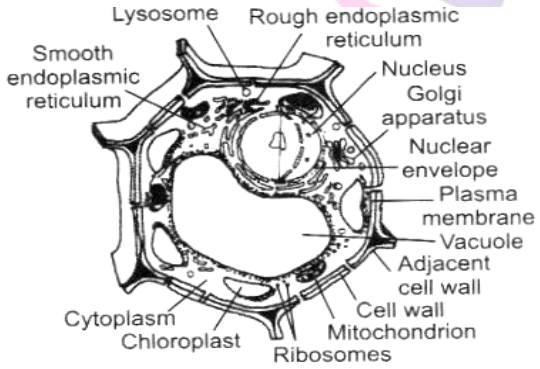
Prokaryotic Cell

4.



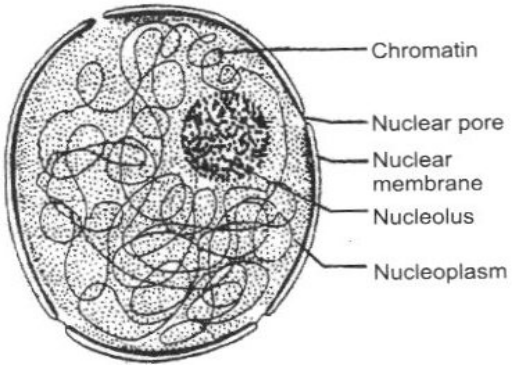
Animal Cell

5.



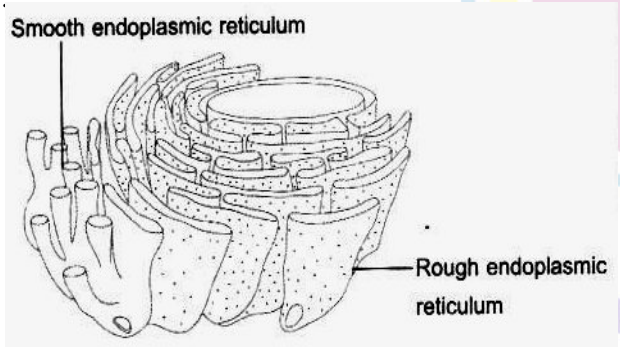
Plant Cell

6.



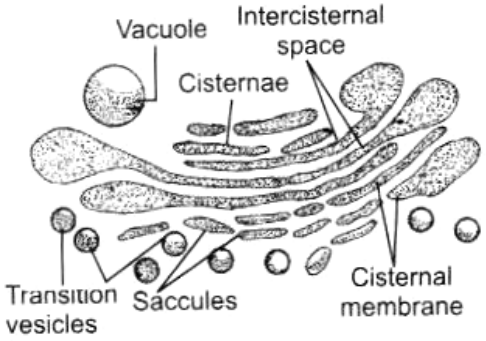
Structure of a Nucleus

7.

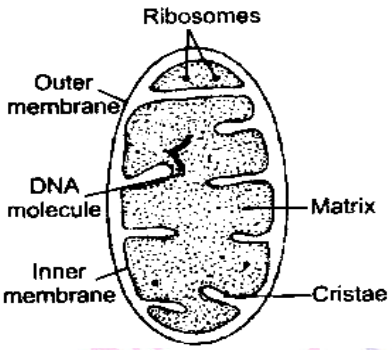
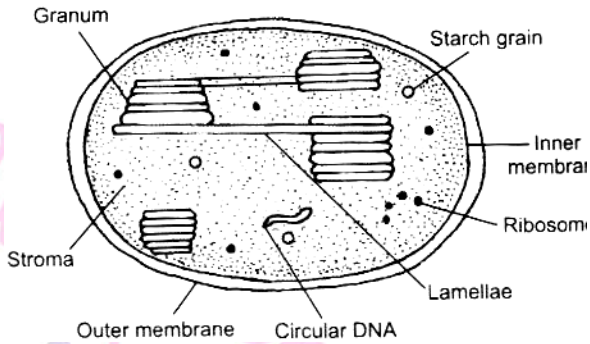
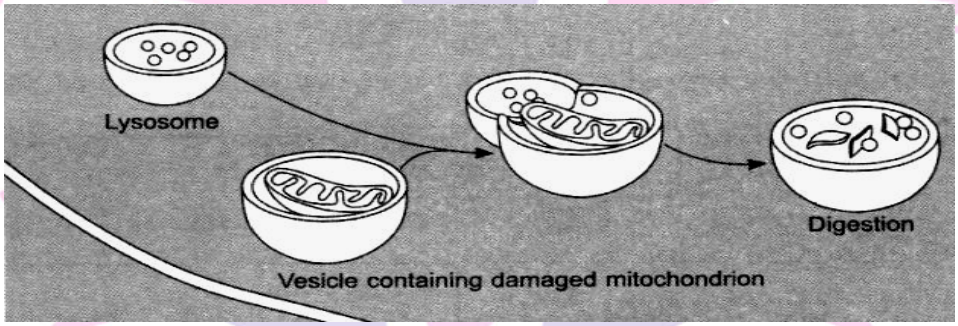


Endoplasmic Reticulum

8.



Golgi Apparatus

9. 	10. 
Internal Structure of Mitochondria	**Internal Structure of Chloroplast**
11. 	
Lysosome	

NCERT BASED ACTIVITIES

Activity/Project 1:

Objective : To enable the students to –

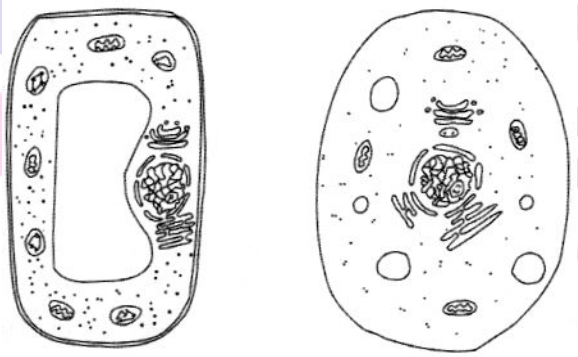
- ❖ Learn the names of parts of plant cell and animal cell
- ❖ Identify the cell organelles based on their structure and location
- ❖ Recognize the similarities between plant and animal cell

Time Required : 15 minutes

Procedure :

1. The worksheet with the diagram of plant and animal cell is given to the students.
2. The students may label the parts that are common in both plant and animal cell

Instructions : Given below are the diagrams representing plant cell and an animal cell, Label any five organelles common in plant cell and animal cell.



Plant cell Animal cell

Activity/Project 2 :

Objective : To enable the students to –

- ❖ Recognize the structure and location of organelles in plant cell and animal cell,
- ❖ Explain the role of cell organelles based upon their function.
- ❖ Correlate the structure and function of some organelles

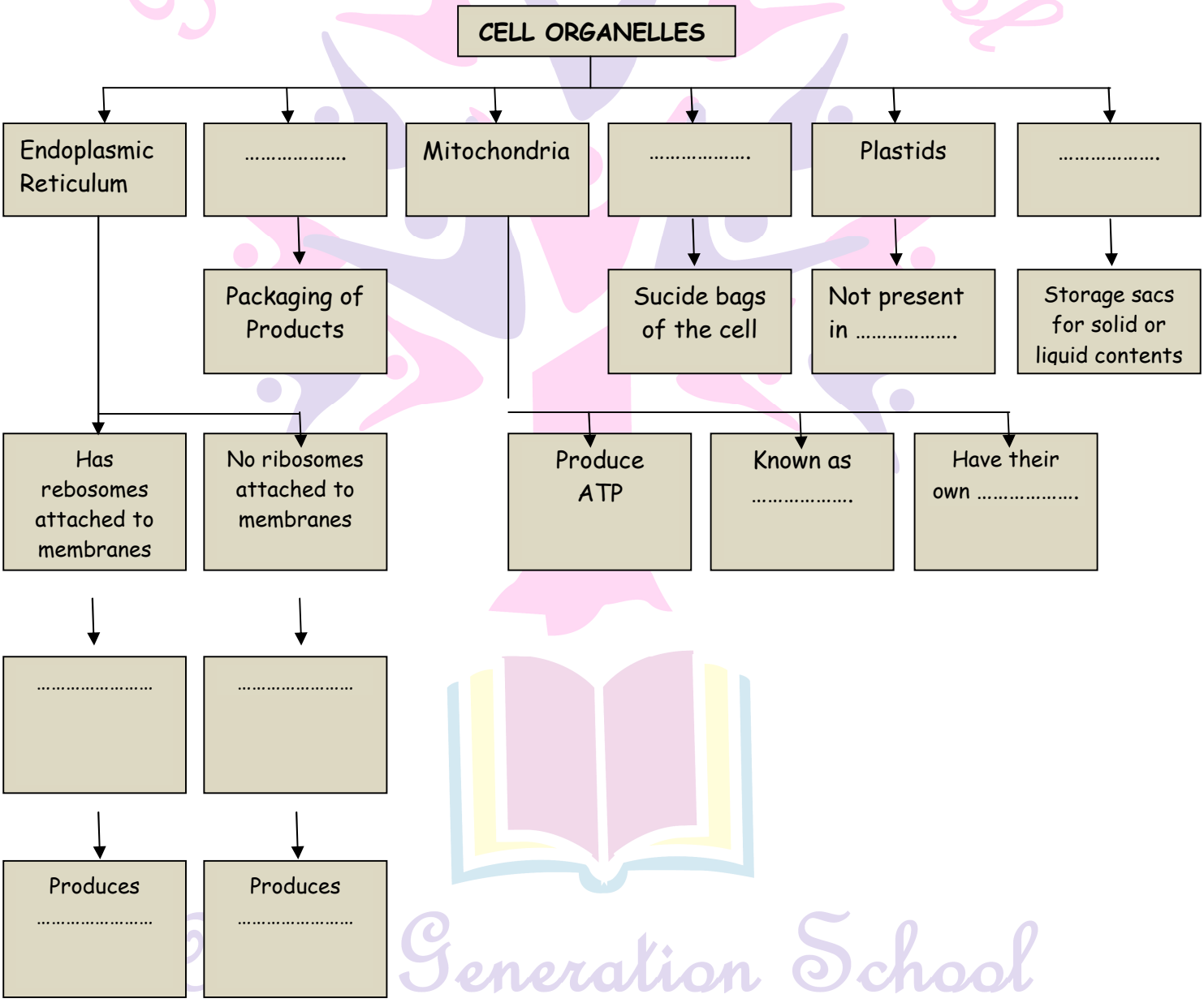
Time Required : 10 minutes

Procedure :

1. The structure, location and function of various cell organelies may be explained to the students in the previous periods.

2. The students will be given the worksheet with flowchart of cell organelles. The students will fill up the plank spaces in the flow chart to complete it.

Instruction : Given below is an incomplete flow – chart on cell organelles. Some boxes / spaces in the flow – chart have been left blank. Complete the flow – chart adding terms/names/functions as and where required.



Objective Type Questions

I. Multiple choice questions

1. The structure / organelle of a cell that functions as a passage for intracellular transport as well as a manufacturing surface, is.

   a) Ribosome b. endoplasmic reticulum

   b) Plastids d. plasma membrane

2. If a plant cell is kept in a hypotonic solution, it will

   a) increase in its volume b) maintain the same volume

   c) decrease in its volume d) burst

3. Analyse the statements and pick up the right one regarding mitochondrial membrane from the following :

   a) The inner membrane is longer than the outer membrane

   b) The outer membrane is longer than the inner membrane

   c) Both the inner and the outer membranes are almost equal I length

   d) Mostly mitochondria have a single membrane.

4. The cell organelles (outer than the nucleus) which contain DNA are.

   a) plastids and lysosomes b) mitochondria and Golgi apparatus

   c) Golgi apparatus and lysosomes d) plastids and mitochondria

5. The primary function of smooth endoplasmic reticulum in liver cells is

   a) protein synthesis b) catabolism of proteins

   c) detoxification d) carbohydrate metabolism

6. Engulfing of food materials or foreign bodies by cell like Amoeba is called

   a) diffusion b) endocytosis c) osmosis d) plasmolysis

7. In plant cells, many substances important for life are stored in

   a) plastids b) mitochondria c) vacuoles d) lysosomes

8. A prokaryotic cell does not possess

a) cell membrane b) cell wall

c) nuclear membrane d) both a and c

9.The most abundant material in plain cell wall is

a) cellulose b) lipids c) proteins d) wax

10. The membrane of Golgi apparatus has connections with those of

a) nuclear membrane b) endoplasmic reticulum

c) cell membrane d) mitochondria

11. The major function of Golgi apparatus is

a) detoxification b) fermentation c) translocation d) secretion

12. The site of detoxification in liver cells is :

a) lysosome b) Rer c) Ribosomne d) SER

13. The cell organelles with digestive enzymes are

a) ribosomes b) food vacuoles c) lysosomes e) Golgi s

14. The statement 'cells arise only from pre-existing cells' was given by

a) Schleiden b) Rudolf Virchow c) Schwann d) Louis Pasteur

15. The term 'protoplasm' was coined by

a) Schleiden b) Purkinje c) Schwann d) Robert Brown

16.70-80 % of volume of a mature plant cell is occupied by

a) endoplasmic reticulum b) nucleus

c) cytoplasm d) vacuole

17. Rough endoplasmic reticulum helps in the synthesis of

a) glycogen b) starch c) steroids d) protoplasm

18. The fluid in the vacuole of a plant cell, is called

a) cell sap b) tonoplasm c) cytoplasm d) protoplasm

19. Lysosomes are formed by

a) RER b) plasma membrane c) SER d) Golgi apparatus

20. Most of the substances in the living world are transported across the cell membrane by the process of

a) Osmosis b) endocytosis c) diffusion d) plasmolysis

21. The proteins and lipids, essential for building the cell membrane, are manufactured by

a) rough endoplasmic reticulum b) Golgi apparatus

c) plasma membrane d) mitochondria

22. The undefined nuclear region of prokaryotes are also known as

a) nucleus b) nucleolus c) nucleic acid d) nucleoid

23. The cell organelle involved in forming complex sugars from simple sugars are

a) endoplasmic reticulum b) ribosomes

c) plastids d) Golgi apparatus

24. Amoeba acquires its food through a process termed

a) exocytosis b) endocytosis c) plasmolysis

d) exocytosis and endocytosis both

25. Cell wall of which one of these is not made up of cellulose?

a) Bacteria b) Hydrilla c) Mango tree d) Cactus

26. Silver nitrate solution is used to study.

a) endoplasmic reticulum b) Golgi apparatus

c) nucleus d) mitochondria

27. Organelle other than nucleus, containing DNA is

a) endoplasmic reticulum b) Golgi apparatus

c) mitochondria d) lysosome

28. Kitchen of the cells

a) mitochondria b) endoplasmic reticulum

c) chloroplast d) Golgi apparatus

29. Lipid molecules in the cell are synthesized by

a) smooth endoplasmic reticulum b) rough endoplasmic reticulum

c) Golgi apparatus d) plastids

1. 1. B	2. a	3. a	4. d	5. c	6. b	7. c	8.c	9.a	10. b
11.d	12. d	13. c	14. b	15. b	16. d	17. d	18. a	19.d	20. a
21.a	22.b	23. d	24. b	25. a	26. b	27. c	28. c	29. a	

I. Match the following

31. Match the items of column A with those of column B

i) Hypertonic solution	1. Nucleoid
ii) Selectively	2. Little roomer permeable
iii) Cell	3. Cork
iv) Robert Brown	4. Plasmolysis
v) Suberin	5. Plasma membrane
vi) Promaryotic cell	6. Nucleus
	7. Lysosome

i) 4	ii) 5	iii) 2	iv) 6	v) 3	vi) 1

I. Fill in the blanks

32. There is no net movement of water when a cell is placed in a/an_____medium

Isotonic

33. The basic building units of an onion bulb, are called _____.

Cells

34. Membrane-bound cell organelles are not found in _____ cells.

Prokaryotic

35. _____ are sites of protein synthesis

Ribosomes

36. Centrosome helps in _____division

Cell

I. True of False

37. Lysosomes are called as 'suicide bags' of a cell.

True

38. The folds of inner membrane of mitochondria increase the area for ATP generating chemical reactions.

True

39. Lysosomes are produced by endoplosmic reticulum

False

40. Chlamydomonas is a multicellular organism

False

Direction (Q41- to Q 43) : In the following Questions, the Assertion and Reason have been put forward. Read the statements carefully and choose the correct alternative from the following:

a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.

b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

c) Assertion is true but the Reason is false

d) The statement of the Assertion is false but the Reason is true.

41. Assertion : In both plant and animal cells, the main area of cellular activities is cytoplasm.

Reason : Various chemical reactions occur in cytoplasm to keep the cell in living state.

b)The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

42. Assertion : Living organisms are composed of cells and products of cells.

Reason : All cells arise from pre-existing cells

b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

43. Assertion : Plant cells contain two types of plastids, chromoplasts and leucoplasts.

Reason : Animal cell contains only 1 type of plastid i.e. leucoplast.

b) Assertion is true but the Reason is false

44. Name the cell organelle which is termed as powerhouse of the cell

Mitochondria

45. Which part of the plant cell permits it to withstand very dilute external medium without bursting?

Cell wall permits cells to withstand very dilute external medium without bursting.

46. Identify the single celled organisms from the following :

Cockroach, Chlamydomonas, snake, mosquito , bacteria

Chlamydomonas and bacteria are single called organisms

47. What are the basic functions of a cell?

The basic functions of a cell are respiration nutrition, reproduction, etc, which are essential for survival.

48. When a living plant cell loses water through osmosis, there is contraction of the contents of the cell away from the cell wall. What is this phenomenon called?

The phenomenon is known as plasmolysis.

49. List the constituents of plasma membrane.

Plasma membrane is made up of proteins and lipids.

50. Name the process in which diffusion take place through a selectively permeable membrane

Osmosis

51. Define diffusion

Diffusion is the spontaneous movement of a substance from a region of high concentration to a region of low concentration.

52. Name two factors on which shape of the cell depends.

Shape of the cell depends upon functional adaptations and viscosity of the protoplasm.

53. What is the chemical composition of cell wall in plants and fungi?

Cell wall in plants is made up of cellulose whereas in fungi it is made up of chitin.

54. State the function of chromosome in a cell.

Chromosomes contain information for inheritance o features from parents to next generation in the form of DNA molecules.

55. Name the functional unit of DNA that carries genetic information.

Genes are functional units of DNA.

56. Give the term for the incipient nucleus of prokaryotes.

Nucleoid

57. Why is nucleus called " director of the cell"?

The nucleus controls and coordinates all the metabolic functions of the cell.

58. Name two cell organelles that have their own genetic material.

Two cell organelles that have their own genetic material are mitochondria and plastids.

59. Name the cell organelle which is able to destroy a damaged cell.

Lysosomes.

60. Give one word answer to the following :

i) Organelle containing chlorophyll ii) Living matter of the cell

iii) Cell without membrane bound nucleus iv) An organelle with cristae.

i) Chloroplast ii) Protoplasm iii) Prokaryotic cell iv) Mitochondria

61. Name the process by which unicellular freshwater organisms and most plant cells fend to gain water

Osmosis

62. In which parts of the plant are chromoplasts found?

Chromoplasts are found in petals of flowers and in fruits.

63. Which cell organelle is responsible for the release of energy as ATP?

Mitochondria

64. Which type of ribosomes are found in prokaryotes and eukaryotes?

Prokaryotes have 70 S ribosomes and eukaryotes have 80S ribosomes.

65. Why are ribosomes called 'protein factories'?

These are sites of protein synthesis

66. Name the substance which gives green colour to the leaves of plants

Chlorophyll

67. What is the name of Golgi apparatus in a plant cell?

Dictyosome

68. 'Every multicellular organism has arisen from the single cell'. Justify this statement

Cells divide to produce cells of their own kind. Thus, all cells come from preexisting cells and hence every multi cellular organism has arisen from a single cell.

69. The shape and size of cells are related to the specific function they perform. Justify given statement with a suitable example.

Amoeba can change its shape to perform its functions.

Nerve cell is elongated and has a typical shape to suit its function of transmission of signals.

Thus, shape and size of cells are related to the specific function they perform.

70. What is plasmolysis?

When a living plant cell is kept in a hypertonic solution, it loses water through osmosis, there is shrinkage or contraction of the content of the cell away from the cell wall. This phenomenon is known as plasmolysis.

71. What would happen, if there is an absence of cell wall in a plant cell?

Plant cell wall is made up of cellulose which provides strength. In the absence of cell wall the plant will not have this structural strength.

72. Give a reason why plastids are able to make their own protein

Plastids have their own DNA and hence can make their own protein.

73. Which is the smallest cell in human body?

Human sperm is the smallest cell in human body.

74. Name the largest cell in human body?

Female ovum or egg is the largest cell in human body.

75. Give two examples of organisms in which a single cell performs all the functions.

OR

Name two unicellular organisms

Amoeba and Paramoecium

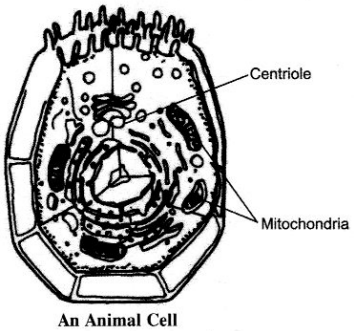
76. What is cell division?

It is a process where new cells are produced from the pre-existing ones I order to growth, replacement of dead cells and for forming gametes for reproduction.

77. Can you think as to why the chromosome number has reduced to half in during daughter cells during meiosis?

Meiosis is a process of cell division in which the parent cell undergoes two successive cell division forming four daughter cells each containing half the number of chromosomes (haploid-n) of the parent cell (diploid – 2n)

78. Draw a diagram of animal cell and label centriole and mitochondria on it.



An Animal Cell

79. What is the functional unit of life? Define it

Cell is the functional unit of life.
It can be defined as the basic structural and functional unit of all life forms.

80. Give one example each of prokaryotic and eukaryotic cells.

Example of prokaryotic cell is bacteria.
Example of eukaryotic cell is plant cell.

81. What are the various functions performed by cell?

Cells perform various functions like synthesis of substances (e.g. proteins), secretion of enzymes, digestion to generate energy (in the form of ATP), etc.

82. Give one difference nucleus and nucleoid

Nucleus	Nucleoid
Nucleus is the largest cell structure which is spherical or oval, usually located in the centre of the cell	Nucleoid is the part of a bacterium having undefined nuclear region containing only nucleic acids.

83. What are the functions of centrosome?

Centrosome helps in cell division. They form asters at poles during cell division.

84. What is the function of Golgi body?

Golgi body is the secretory organelle of the cell. It is involved in the formation of lpysosomes and peroxisomes.

85. In which form does the mitochondria release energy? Write its full form

Mitochondria releases energy in the form of ATP (Adenosine triphosphate)

86. The inner membrane of mitochondria is deeply folded. What is the advantage of these folds?

These folds create a large surface area for ATP generating chemical reactions.

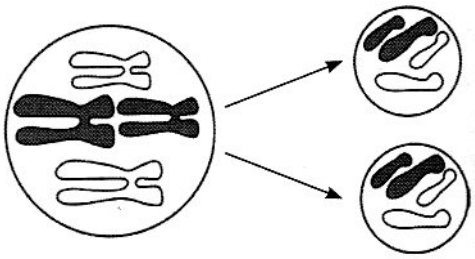
87. Name the cell organelle in which the following structures are present:

i) Cristae ii) Stroma

i) Mitochondria ii) Plastids (Chloroplasts)

88. With the help of self explanatory diagram discuss the process of mitosis.

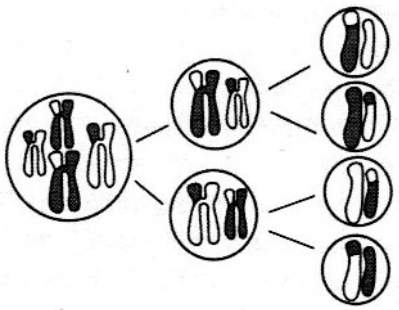
It is the division of a cell into two identical daughter cells with each cell having the same number of chromosomes as in the parent cell. It occurs in somatic (body) cells. Thus, it is also called equational cell division.



Mitosis

89. With the help of self explanatory diagram, discuss the process of meiosis.

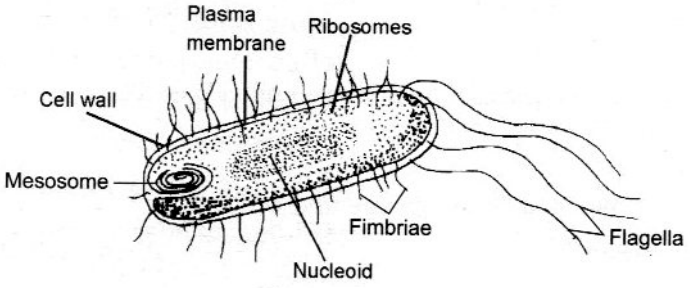
It is the kind of cell division that occurs in the reproductive cells to produce the gametes. The number of chromosomes is reduced to half. Thus, it is also called reductional division. It occurs in reproductive cells or germ cells



Meiosis

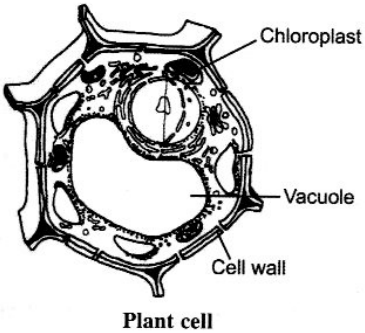
I. Short answer

90. Draw a neat and well labelled diagram of a typical prokaryotic cell.



Prokaryotic cell

91. Draw the diagram of a plant cell and label any three parts which make it different from an animal cell.



Plant cell

Label : cell wall, large vacuole, chloroplast.

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

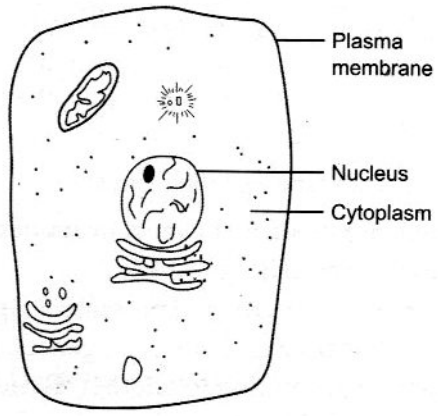
Hypotonic Solution : If the medium surrounding the cell has a higher water concentration than the cell, i,e, if the solution is very dilute, the cell will gain water by osmosis. Such a dilute solution is called hypotonic solution.

Isotonic Solution: If the medium has exactly the same water concentration as the cell, there will be no net movement of water across the cell membrane. Such a solution is known as an isotonic solution.

Hypertonic Solution : If the medium surrounding the cell has a lower concentration of water than the cell, i.e., if it is a very concentrated solution the cell will lost water by osmosis. Such a solution is called hypertonic solution.

93. What are the main functional regions of a cell? Explain with the help of a diagram.

There are three main functional regions of a cell, as shown in the diagram



The main functional regions of a cell

The main functional regions of a cell.

a) **Plasma membrane (PM)** : IT is flexible and made up of phospholipid bilayer that consists of proteins and lipids which surrounds the cell and is semipermeable in nature.

b) **Cytoplasm:** It is an amorphous and homogeneous colloidal ground substance present between the PM and nucleus.

c) **Nucleus** : It is centrally located, sphericalprominent organelle surrounded by two unit membranes, which is responsible for controlling all vitas activities of a cell. It also contains the genetic material .

94. Describe the complexity in structure of organisms

In organisms, there is much complexity in structure. Some organisms are single-celled and they are called as unicellular organisms such as Amoeba and Paramecium. In such organisms single cell performs all the functions.

Some organisms have many cells in their structure. They are called as multicellular organisms such as human, animals, trees, etc. In multicellular organisms, special structures perform special functions. Example : n plants, green leaves synthesise food, roots absorb water.

95. What is the difference between plasma membrane and cell wall? Give the functions of each one.

OR

State three differences between cell membrane and cell wall.

Cell wall	**Plasma or cell membrane**
i. It is present in plant cells only	i. It is present in both animal and plant cells
ii. It is the outermost covering of plant cells.	ii. It is the outermost covering of animal cells.
iii. It is present outside the plasma membrane	iii. It is present outside the cytoplasm
iv. It is non-living and permeable	iv. It is living and selectively permeable
v. It is made up of cellulose	v. It is made up of lipids and proteins

Function of plasma membrane: It acts as a semipermeable membrane which allows only selective sub

Function of cell wall : It provides rigidity and protection to the cell

96. a) Write two points of difference between nuclear region of a bacterial cell and nuclear region of an animal cell.

b) Which structure present in the nuclear region of a living cell bear genes?

a) Difference

Nuclear region of a bacterial cell (Prokaryotic Cell)	Nuclear region of an animal cell (Eukaryotic Cell)
i) Nuclear region is poorly defined due to the absence of membrane, and known as nucleoid.	i) Nuclear regions is well-defined and surrounded by a nuclear membrane
ii) Nucleolus is absent	ii) Nucleolus is present

b) Chromosomes bear genes

97. Which organelle is the most prominent and important structure in a cell, and also acts as the control centre of the cell and why?

The most important and prominent structure in a cell, which also acts as the control centre is nucleus. It is so called because it contains genetic material which is responsible for carrying hereditary information from the generation to antother. Besides this, it also regulates and controls various metabolic and vital activities of the cell.

98. Define the following terms:

Protoplasm, cytoplasm, nucleoplasm

Protoplasm: It refers to the living substance present in the living cells consisting of cytoplasm and nucleoplasm.

Cytoplasm : It is a part of protoplasm filled within the space between nuclear membrane and cell membrane having cell organelles. It is viscous and homogenous containing water, glucose, oxygen, amino acids, etc.

Nucleoplasm: The space between the nuclear membrane and nucleolus is filled with a transparent semi- fluid substance called nucleoplasm. It consists of nucleic acids, basic and acidic proteins lipids and minerals.

99. Name the cell organelles which are called 'suicide bags' and 'power-house' of the cell Why are they so called ? Give reason

Lysosomes are called 'suicide bags' of the cell as they can diges the entire damaged or dead cell containing them.

Mtochondria are called 'power house' of the cell as they are sites for synthesis of energy rich ATP (Adenosine triphosphate) molecules by cellular respiration.

100. What are lysosomes, peroxisomes and centrosomes? Write their functions.

Lysosomes : They are single-membraned small vesicular structures found in the cytoplasm of all the eukaryotic cells except mammalian RBC's . They contain enzymes and are formed by Golgi apparatus.

Functions : They are involved in intracellular digestion of foreign food or microbes and are also involved in autolysis or self-digestion of cells or self-digestion of cells after their death.

Peroxisomes : They are found in photosynthetic cells of plants, liver and kidney cells of the vertebrates and contain two types of oxidative enzymes: oxidase and catalase, bounded by a unit membrane.

Functions : These aare involved in removal of toxic substances by oxidative reactions . In plant cells, these also help in photorespiration.

Centrosome : A centrosome is a light microscopic organelle formed of two darkly coloured granules called centroles surrounded by a transparent cytoplasmic area called centrospheres. It lies near the nucleus and is commonly called cell centre.

Functions : Centrosome helps in cell division in animal cells. They also help in the formation of cilia and flagella of the cells.

101. Name the different living and non-living parts of a cell or cell organelles.

The different living and non-living parts of a cell or cell organelles are:

Living Parts Of a cell	Non-Living Parts Of a Cell
a) Plasma membrane	Cell wall (plants only)
b) Cytoplasm contains	Vacuoles
i. Endoplasmic reticulum [ER]	
[Smooth ER and Rough ER]	
ii. Mitochondria	
iii. Golgi apparatus	
iv. Ribosomes	
v. Lysosomes	
vi. Centrioles [animals only]	
vii. Plastids [Plants only]	
c. Nucleus	c. Granules [cell inclusions]

102. What will happen if we put an animal ell or a plant cell into a solution of sugar in water?

If we put an animal cell into a solution of sugar, one of the following three things may happen:

i. If the medium surrounding the cell has higher water concentration that the cell, then the cell will gain water by osmosis.

ii. If the medium has exactly the same water concentration as the cell, there will be no net movement of water across the cell membrane.

iii. If the medium has a lower concentration of water than the cell, then the cell will loose water by osmosis.

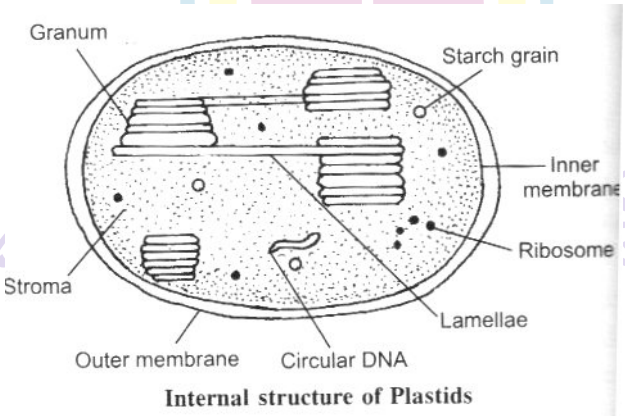
103. Grass looks green, papaya appears yellow, which cell organelie is responsible for this.

These are found in plant cells only, Plastids are the major cell organelles in plants. On the basis of pigments present in plastids, they are divided into two types (i) the colourless leucoplasts and (ii) the pigmented chromoplasts. The colourless leucoplasts store starch, oil and protein granules whereas the pigmented chromoplasts have different colours and can be of several types. The most important ones are those containing the pigment chlorophyll, known as chloroplasts. Which is responsible for the preparation of food by photosynthesis, other chromoplasts contain non-green pigments, which are responsible for the characteristic colours of fruits and flowers.

104. Where are chromosomes located? What are they composed of ? What is chromatin material and how does it change just before the cell divides?

Chromosomes are located in the nucleus of plant and animal cells.

They are composed of DNA and protein. Chromatin material is entangled mass of thread – like structures. The chromatin materials gets organised into chromosomes just before the cell divides.



Internal structure of Plastids

105. What does DNA molecule contain? Name the functional segment of DNA. In which form is the DNA present in a cell when the cell is not dividing?

DNA molecules contain the informations necessary for construction and organisation of cells.

Functional segments of DNA are called genes. In a cell which is not dividing. DNA is present as a part of chromatin materials.

106. Differentiate between diffusion and osmosis.

Diffusion	Osmosis
i. Diffusion takes place in any medium	i) Osmosis occurs only in liquid medium
ii. It is the movement of a substance from the area of its higher concentration to the area of its lower concentration.	ii) It is the movement of water from the area of its higher water concentration to the area of lower concentration
iii. The diffusing molecules many be solids, liquids or gases	iii) It involves movement of solvent molecules only
iv. It does not require a semi-permeable membrane.	iv) It requires a semi-permeable membrane

107. a) An organelle which has its own genetic material

b) An organelle rich in digestive enzymes

c) Nucleic acid present in nucleus of cell

a) Mithochondria b) Lysosomes c) DNA (Dexoyribonucleic acid)

108. How does a living cell performs the basic functions?

Each cell has specific cell organelle to perform various functions. Some cell organelle makes new materials in the cell, some clears waste material from cell and so on. These organelles together constitute the basic unit called cell. A cell is able to live and perform all its functions because of these organelles.

109. Differential between the cell division process of mitosis and meiosis

Mitosis	Meiosis
a) It occurs in somatic cells b) The daughter cells contain same number of chromosomes (diploid) as that of the parent cells c) Two daughter cells are formed d) Only one division occurs	a) It occurs in reproductive cells. b) The daughter cells have half the number of chromosomes (haploid) as that of the parent cells c) Four daughter cells are formed d)Two divisions occur.

I. Long answer type

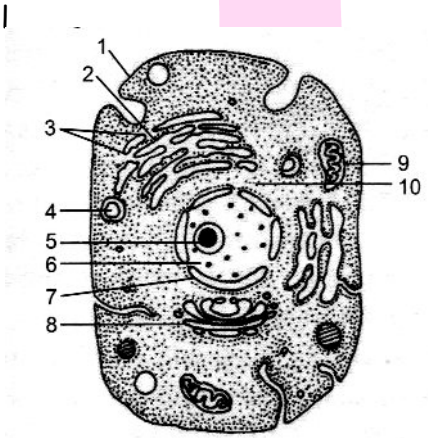
110. Given below is a diagrammatic sketch of electron microscopic view of an animal cell:

a) Label the parts indicated by lines as 1 to 10

b) Give two reasons to support that it is an animal cell.

c) How many mitochondria are shown in the diagram?

A type of animal cell



a) 1. Cell membrane

2. Rough Endoplasmic Reticulum (RER)

3. Smooth Endoplasmic REcticulum (SER)

4. Lysosome 5. Nucleolus 6. Nucleus 7.Nuclear envelope

8. Golgi body 9. Mitochondrion 10. Cytoplasm

b) It is an animal cell because :

i) A cell wall of cellulose is absent.

ii) It has no definite shape but with prominent ans well-developed Golgi bodies.

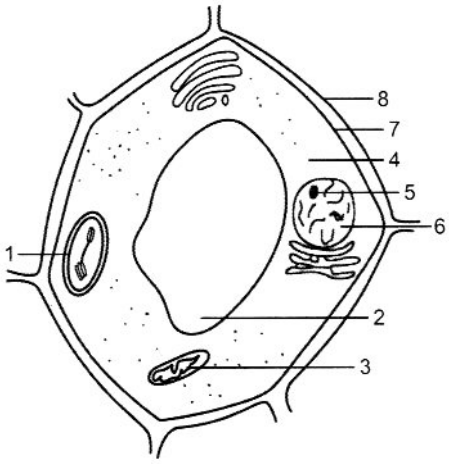
c) Two mitochondria are shown in the diagram.

111. Given below is a diagrammatic sketch of a certain generalised cell.

a) Name the parts numbered as 1 to 8

b) Is i t a plant cell or an animal cell? Give two reasons in support of your answer.

c) Give the functions of parts marked as 1,6 and 8.



a)

1.	-	Chloroplast		2	-	Vacuole
3	-	Mitochondrion		4.	-	Cytoplasm
5	-	Nucleolus		5	-	Nucleolus
6	-	Cell membrane		8	-	Cell wall

b) It is a plant cell because:

i) It has a definite shape with cell wall.

ii) Chloroplast are present

c) Functions:

1 - Chloroplast : They synthesise food by trapping solar energy so they are called " kitchen of the cell".

6 – Nucleus: It controls all thee activities of the cell so it is called "control centre of the cell"

8 - Cell wall: It protects the plasma membrane and internal structures of the cell and helps in transporting various substance in and out of the cell.

112. What are the main functions of each of the following cell components?

a) Plasma membrane **b) Chromosomes**

c) Lysosomes **d) Ribosomes**

e) Nucleus **f) Mitochondria**

g) Nucleolus **h) Cell wall**

i) Chloroplast **j) Peroxisomes**

a) Plasma membrane : It acts as a semipermeable membrane and allows only selective substances to pass through it.

b) Chromosomes : They carry hereditary characters from parents to off springs, i.e. from one generation to another.

c) Lysosomes : They act as ;digestive bags' which fight against any infection inside the cell.

d) Ribosomes : They help in protein synthesis

e) Nucleus : It controls all metabolic activities of the cell.

f) Mitochondria : It is the 'power – house' of the cell which stores and releases energy in the form of ATP.

g) Nucleolus : It acts as a platform for protein synthesis

h) Cell wall : It provides rigidity and protection to te cell.

i) Chloroplast : It carries out photosynthesis inplants and synthesises food by trapping solar energy. So, they are called "kitchen" of the cell"

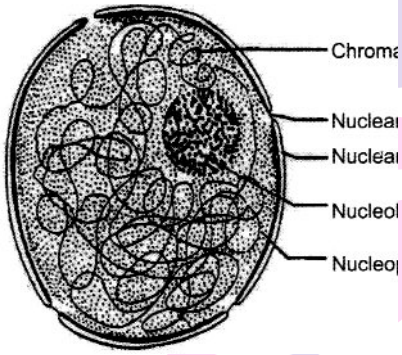
j) Peroxisomes : It carries out oxidative reactions, which also remove the toxic substances.

113. Describe the structure of nucleus

Or

Explain in detail what do you know about the structure of nucleus.

Robert Brown in 1831 discoverd the nucleus in the cell. Nucleus is the largest cell structure. It is spherical or oval in shape and is a prominent structure. I It is usually located in the centre of the cell. Nucleus has the following important parts.



Structure of a Nucleus

i) Nuclear membrane: It is a double alyered membrane, which separates nucleus from the cytoplasm.

ii) Nucleplasm : It is a homogeneous and granular dense fluid present inside the nucleus, In which chromatin and nucleolus are suspended.

iii) Chromatin material : It consists of long coiled network of thread-like structures. The chromatin material is made up of deoxyribonucleic acid (DNA) which is responsible for storing and transmitting the herediatary information from one generation to the other. It condenses into compact rod-like bodies called chromosomes at the time of cell division.

iv) Nucleolus: It is more or less round structure found inside the nucleus. The nucleolus contains RNA (ribonucleic acid) and proteins. RNA is helpful in protein synthesis in the cytoplasm.

114. How many membranes are present in mitochondria? Give the characteristic features of these membranes. What is the advantage of such features?

A mitochondrion contains outer and inner membranes. The two membranes have different properties.

Characteristic feature :

Outer membrane : The outer mitochondrial membrane , which encloses the entire organelle is 60 to 75 angstrom thick. It contains large numbers of porins which allow smaller molecules to diffuse from one side of the membrane to the other. Disruption of the outer. Disruption of the outer membrane permits proteins in the intermembrane space to leak into the cytosol, leading to certain cell death. The mitochondrial outer membrane can associate with the endoplasmic reticulum(ER)

Inner membrane: : I has a very high protein to p-phospholipid ratio. The inner membrane is home to around 1/5 of the total protein in a mitochondrion. In adition the inner membrane is rich in cardiolipin. It makes inner membrane impermeable. All ions and molecules require special membrane transporters to enter or exit the matrix.

Advantages: Mitcochonria are shaped perfectly to maximize their productivity. The folding of the inner membrane increases the surface area inside the organelle. Since many of the chemical reactions happen on the inner membrane, the increased surface area creates more space for reaction to occur.

115. Why is mitochondria called 'Power – house of cell'? Give three similarities and one difference between mitochondria and plastid.

Mitochondria is called the 'Power-house of cell' because energy required by various chemical activities needed for life is released by mitochondria in the form of ATP. Body uses energy stored in ATP for making new chemical compounds and for mechanical work.

Three similarities between mitochondira and plastid are:

i. both mitochondira and plastids have their own DNA and ribosomes.

ii. external structure of mitochondria and plastids are same

iii. both mitochondria and plastids have more than one membrance layer.

One difference between mitochondria and plastids is that mitochondria are present in both plant and animal cell whereas plastids are present only in plant cell.

116. Why cell division is necessary?

Cell division is necessary for the formation of new cells which helps in performing the following biological activities:

(a) **Growth of Body:** Both plants and animals life begin with a single cell known as zygote. Zygote undergoes cell division to form large number of cells of different shape and size to form tissues and organs to perform different functions in the organisms. Hence, cell division is necessary for growth.

(b) **Replacing the dead worn-out cells**: About 3 billion cells in our body are destroyed every minute. The same number of cells are replaced by new cells which are produced by cell division in the same period to replace the dead or worn-out cells for survival.

(c) **Replacement:** Apart from normal wounds or wear and tear of the tissues in our body, there can be accidental injuries or fracture of bones. The cells which undergoes cell division helps to cover up the gaps and join the broken ends which helps in repairing of such injuries.

(d) **For forming gametes for reproduction:** Cell division take place during the formation of gametes. It take place inside the reproductive organs of male and female in animals to produce sperms and ova whereas in flowering plants, it take place in anthers to produce pollen grains and ovules to produce eggs.