

NCERT SOLUTIONS

CLASS IX SCIENCE

CHAPTER 5- THE FUNDAMENTAL UNIT OF LIFE

1) *Who discovered cells, and how was it discovered ?*

Answer:

Robert Hooke discovered cells in 1665 while examining a thin slice of cork through a self-designed microscope. He saw that the cork resembled the structure of a honey comb consisting of many little compartments. Those small boxes are called cells.

2) *Why the cell is called the structural and Junctional unit of life?*

Answer:

A cell is capable of carrying out all necessary activities of life independently. So, they are called functional or basic unit of life.

3) *How do substances like CO₂ and water move in and out of the cell? Discuss.*

Answer:

CO₂ moves by diffusion and H₂O move by osmosis through cell membrane.

4) *Why is the plasma membrane called a selectively permeable membrane?*

Answer:

It is so called selectively permeable membrane because it allows only the entry and exit of some substances, not all.

5) *Provide the differences between prokaryotic and eukaryotic cells.*

Prokaryotic Cell

- Size Generally small (1-10 gm)
- 2. Nuclear region is poorly defined due to absence of a nuclear membrane and known as nucleoid.
- 3. There is a single chromosome.
- 4. Membrane-bound cell organelles absent.

Eukaryotic Cell

- 1. Size: Generally large (5-100 gm)
- 2. Nuclear region well defined and surrounded by a nuclear membrane.
- 3. There are more than one chromosomes.
- 4. Membrane-bound cell organelles present.

6) *Name two organelles we have studied that contain their own genetic material?*

Answer:

The two organelles which have their own genetic material are:

- 1. Mitochondria
- 2. Plastids

7) *If the organisation of a cell is destroyed due to some physical or chemical influence, what will that result in?*

Answer:

The cell will not be able to revive and lysosomes will digest it.

8) *Why are lysosomes known as suicide bags?*

Answer:

When the cell gets damaged, lysosomes may burst, and the enzymes digest their own cell. Therefore lysosomes are known as suicide bags.

9) *Where are proteins synthesised inside the cell?*

Answer:

The proteins are synthesised in the ribosomes that are also known as protein factories.

10) Provide the difference for prokaryotic cell for its difference with eukaryotic cell?

Answer:

Prokaryotic cell is generally smaller in size (1-10 μm), nuclear region is poorly defined and the cell organelles are not membrane-bound and has a single chromosome. Eukaryotic cell is generally larger in size (5-100 μm), nuclear region is well defined with nuclear membrane. Membrane-bound cell organelles are present and it has more than one chromosome.

11) What would happen if the plasma membrane ruptures or breaks down?

Answer:

If plasma membrane ruptures or breaks down then molecules of some substances will freely move in and out.

12) What would happen to the life of a cell if there was no Golgi apparatus?

Answer:

Golgi apparatus has the function of storage, modification and packaging of the products in vesicles. If there were no Golgi bodies, packaging and dispatching of materials synthesised by the cell will be stocked.

13) Which organelle is known as the powerhouse of the cell? Why?

Answer:

Mitochondria is known as powerhouse of the cell because it releases the energy required for different activities of life.

14) Where do the lipids and proteins constituting the cell membrane get synthesised?

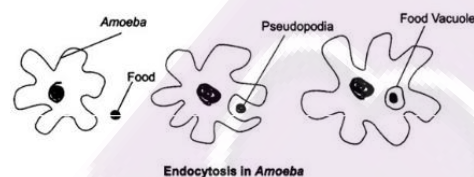
Answer:

Lipids and proteins are synthesised in ER [Endoplasmic Reticulum].

15) How does Amoeba obtain its food?

Answer:

Amoeba take its food by the cell membrane which forms the food vacuole.



16) What is osmosis?

Answer:

Osmosis is the process of movement of water molecule from a region of higher concentration through semi-permeable membrane to a region of lower water concentration.

SHORT ANSWER TYPE QUESTIONS

1) What are plastids? Name the different types of plastids found in plant cell.

Answer:

Plastids are organelles found only in plants. They are:

- (a) Chloroplast-Containing chlorophyll
- (b) Chromoplast-Containing carotenoids and xanthophyll (coloured plastids)
- (c) Leucoplast-White or colourless plastids

2) What is plasma membrane made up of?

Answer:

Plasma membrane is made up of proteins and lipids.

3) What did Robert Hooke observed first in cork cell?

Answer:

Robert Hooke observed that cork consists of box like compartments which formed a honeycomb structure.

4) Name the autonomous organelles in the cell.

Answer:

Chloroplasts and mitochondria are the autonomous organelles in the cells.

5) What does protoplasm refer to?

Answer:

Protoplasm refer to cytoplasm and nucleus.

6) Name two cells which keep changing their shape.

Answer:

Amoeba and white blood cells.

7) Name the smallest cell and the longest cell in human body.

Answer:

The smallest cell is the red blood cell or sperm cell in male. Longest cell is the nerve cell.

8) Name 3 features seen/present in almost every cell.

Answer:

Plasma membrane, nucleus and cytoplasm.

9) What is diffusion?

Answer:

When gases like CO₂, O₂, move across the cell membrane, this process is called diffusion.

10) What is osmosis? How does it take place ?

Answer:

The movement of water molecules through a selectively permeable membrane is called osmosis. This takes place from high water concentration to low water concentration.

11) What is the full form of DNA?

Answer:

DNA → Deoxyribo Nucleic Acid.

12) What is the function of chromosome?

Answer:

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

13) Name the organelles present in liver of animals which detoxifies many poisons and drugs.

Answer :

In the liver of animal cells smooth endoplasmic reticulum helps in detoxifying many poisons and drugs.

14) What is the energy currency of the cell?

Answer : ATP—Adenosine Triphosphate.

15) What is the function of ribosome?

Answer: Ribosomes help in protein synthesis.

16) Where are genes located in the cell?

Answer: Genes are located in the chromosomes in the nucleus of the cell.

17) Name the cell organelles that helps in packaging?

Answer: Golgi apparatus.

18) Name the cell organelle which helps in the transportation of material.

Answer : Endoplasmic reticulum.

19) Name the cell organelle due to which leaves, flowers and fruits get their colour.

Answer: Chromoplast.

20) Name the cell organelle which helps in the formation of lysosome.

Answer : Golgi apparatus.

21) Name the cleansing organelle in the cell.

Answer: Lysosomes.

22) Name two cells with cell wall.

Answer : Onion cell (plant cell) and fungi.

23) Why does mitochondria have largely folded inner membrane?

Answer:

Mitochondria is the site for cellular respiration and provides energy to the cell. The largely folded inner membrane provides the increased surface area for ATP-generating chemical reactions.

24) Which organelle makes the digestive enzyme of lysosome?

Answer: Rough endoplasmic reticulum makes the digestive enzyme of lysosomes.

25) What are cisterns?

Answer:

The golgi bodies consist Of a system of membrane-bound vesicles arranged in stacks called cisterns.

Short Answer Type Questions

1) State two conditions required for osmosis.

Answer:

- (i) The difference in the concentration of water, one should have higher concentration than the other.
- (ii) Semi-permeable membrane is also required through which water will flow.

2) What is plasmolysis?

Answer:

There is shrinkage or contraction of the contents of the cell away from the cell wall, through osmosis , when a living plant cell loses water. This is known as plasmolysis.

3) How do fungi and bacteria can withstand much greater changes in the surrounding medium than animal cells?

Answer:

The cell wall present in fungi and bacteria permits these cells to withstand very dilute externalmedium without bursting. The cells take up water by osmosis, swells, and builds the pressure against the cell wall. Then wall exerts an equal pressure against the swollen cell. It is because of the cell wall, such type of cells can withstand greater changes in the surrounding medium than that of animal cells.

4) Give the function of nuclear membrane.

Answer:

The nuclear membrane present as outer covering in the nucleus allows the transfer of material inside and out of the nucleus to cytoplasm.

5) Name the cell-organelles that have their own DNA and ribosomes.

Answer :

The cell organelles with their own DNA and ribosomes are mitochondria and plastids.

6) What is endocytosis?

Answer:

The cell membranes flexibility allows the cell engulf in food and other material from its external environment. This process is known as endocytosis.

7) What is the function of vacuoles?

Answer:

Vacuoles are storage sacs for solid or liquid content. In plant cells it provides turgidity and rigidity to the cell. In single-celled organisms vacuoles store food, e.g., Amoeba.

8) When we put raisins in water, why do they swell?

Answer:

Raisins are dry with less water inside, when they are kept in water, osmosis takes place, water flows through the cell wall, cell membrane of the raisins and therefore it swells.

9) Why are lysosomes called suicidal bags?

Answer:

Lysosomes contain digestive enzymes in it and helps in the cleaning of cell by digesting any foreign materials entering the cell, such as bacteria, food and old cell organelles. When the lysosomes burst, the digestive enzyme digest its own cell. Hence it is called as suicidal bag.

10) What is nucleoid?

Answer:

The nuclear region in some cells are poorly defined due to the absence of a nuclear membrane, it contains only nucleic acid. This undefined nuclear region with nucleic acid in it is called nucleoid.

11) What is the role of cell organelles in the cell?

Answer:

Each kind of cell organelles performs a specific function such as making new material, clearing of the waste, transporting material, etc.

12) What is the function of nucleus in a cell?

Answer:

The nucleus plays a very important role in the reproduction of cells. It also helps the single cell to divide and form two new daughter cells. It plays an important role in determining how the cell will develop and what form it will exhibit at maturity, by directing the chemical activities of the cell.

13) What is the function of plastids?

Answer:

Plastids are present only in plant cells. There are two types of plastids chromoplasts (coloured plastids) and leucoplasts (white or colourless) Chromoplast—Consists of coloured pigments and gives different colours to flowers, fruits and leaves. The green colour pigment present in leaf is called chlorophyll which helps in the photosynthesis and a plastid with chlorophyll is called chloroplast. Leucoplast—It stores starch, oil and protein granules in it.

14) Do vacuoles store some material? If yes, name them.

Answer:

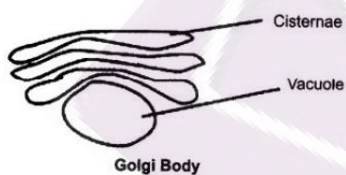
Yes, vacuoles also store some important substances required in life of the plant cell. These are amino acids, sugars, various organic acids and some proteins. In some unicellular organisms, e.g. Amoeba, vacuoles also store food.

15) Explain the structure and function of Golgi bodies.

Answer:

Structures: Golgi bodies consist of a system of membrane-bound vesicles arranged in stacks parallel to each other called cisternae. These membranes have connections with the membrane of endoplasmic reticulum (ER). Functions:

- (1) It also stores, modifies and helps in the packaging of products in vesicles.
- (2) In some cases, complex sugars may be made from simple sugars in it.
- (3) It also helps in the formation of lysosomes.



16) What are ribosomes? Where are they located in the cell? What is their function?

Answer:

Ribosomes are spherical organelles present in the cell which are either freely distributed in the cytoplasm or may be attached to the endoplasmic reticulum. It consists of ribosomal RNA (Ribonucleic acid) and proteins. Functions of Ribosomes: It helps in the synthesis of proteins.

17) What is the difference in chromatin, chromosomes and gene?

Answer:

- (1) Chromatin: It is a fine network of thread-like structure made up of DNA or RNA. It gets condensed to form chromosomes.
- (2) Chromosome: The chromosomes are made from chromatin material and are located in the cell.

(3) Genes are found in chromosomes.

18) Why do plant cells have more in number and big-sized vacuoles as compared to the animal cells?

Answer:

Plant cells attain turgidity and rigidity due to the more number of vacuoles as well as large-sized vacuoles help the plant cells to withstand the wear and tear, external environmental conditions. They also help in the storage of essential material required by plants for their growth like amino acids, sugar and various organic substances.

19) Explain the following (a) Plasma membrane (b) Cytoplasm (c) Nucleus.

Answer:

(a) Plasma membrane: It is a thin membrane which controls the passage of materials in and out of the cell. It is otherwise called as selectively permeable membrane. It makes the outer boundary of the cell and is made up of lipo-protein

(b) Cytoplasm: It is transparent jelly-like thick substance present inside the cell. It forms the ground of the cell within which all the cell organelles are suspended.

(c) Nucleus: It is a double-layered membrane structure which contains chromosomes required for the inheritance of characteristics from one generation to the other.

20) What is membrane biogenesis?

Answer:

The endoplasmic reticulum helps in the manufacture of proteins and fat molecules which are important for function of the cell. These proteins and lipids help in the building of the cell membrane. This process is known as membrane biogenesis.

21) Which is known as powerhouse of the cell?

Answer:

Mitochondria is known as powerhouse of the cell because they store energy in the form of ATP. [Adenosine Triphosphate]

22) What is meant by gene?

Answer:

It is a segment of DNA. They are located on chromosomes in linear fashions. One gene may perform one or more function. Genes are carrier of genetic codes.

23) State two conditions which are required for osmosis.

Answer:

(i) The difference in the concentration of water, one should have higher concentration than the other.

(ii) Semi-permeable membrane is also required through which water will flow.

24) How does bacteria and fungi can withstand much great changes in surrounding medium than that of animal cells?

Answer:

The cell wall present in fungi and bacteria permits these cells to withstand very dilute external medium without bursting. They take up water by osmosis, and builds the pressure against the cell wall. This is because of the cell wall, such cells could withstand great changes in surrounding medium than that of animal cells.

25) Give the function of nuclear membrane.

Answer :

The nuclear membrane present as outer covering of nucleus allows transfer of material inside and also out of the nucleus to cytoplasm.

26) Name the cell-organelles that have their own DNA and ribosomes.

Answer:

The cell organelles with their own DNA and ribosomes are mitochondria and plastids.

27) What is endocytosis?

Answer:

The cell membranes flexibility allows the cell engulf in food and other material from its external environment. This process is called as endocytosis. Example : Amoeba acquires its food through such processes.

28) What is the function of vacuoles?

Answer:

Vacuoles are storage sacs for solid otherwise liquid content. In the plant cells it provides rigidity and turgidity to the cell. In single celled organisms vacuoles store food, e.g., Amoeba.

29) When we put raisins in water, why do they swell?

Answer:

Raisins are dry due to less water inside, but when they are kept in water, osmosis takes place, water flows through the cell wall, cell membrane of the raisins and therefore it swells.

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Answer:

When the lysosomes burst, the digestive enzyme digest its own cell. Hence it is called as suicidal bag.

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Answer:

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Answer:

Yes, vacuoles store some important substances required in life of the plant cell. These are amino acids, sugars, various organic acids and also some proteins.Example., Amoeba, vacuoles also store food.

36) Explain the structure and function of Golgi bodies.

Answer:

Structures: Golgi bodies are bodies which consist of membrane bound vesicles arranged in form of stacks parallel to each other called cisterns. These membranes have connections with the membrane of endoplasmic reticulum (ER).

Functions:

- (1) Material synthesized near the ER is packed and then dispatched to the target inside and outside the cell through Golgi apparatus.
- (2) It also helps in the formation of lysosomes.

37) What are ribosomes? Where are ribosomes located in the cell? What is their function?

Answer:

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Value Based Questions

1) Sanjay was helping his mother in laying the table when they had some guest for dinner. Sanjay was about to sprinkle salt on salad for dressing. His mother stopped him from doing so and told him that it is too early to sprinkle salt on the salad, he should do so only when they are seated for having the dinner.

- (a) What would happen if salt is sprinkled on the salad?**
- (b) Which property of cells is seen in adding salt to it?**
- (c) What value of Vasu is seen?**

Answer:

- (a) On sprinkling of some salt on the salad, the salad will release water.
- (b) The salt outside the salad acts as hypertonic solution as it has less water concentration and therefore the cell loses water by osmosis.
- (c) Sanjay showed the value of being very helpful, caring and responsible.

2) Srinidhi is a five year old girl who joined the swimming classes. After the first class she was worried when she saw her wrinkled fingers. She asked her elder sister about the wrinkling and shrinking of her fingers. Her sister explained Srinidhi why it was so.

- (a) Why did the fingers wrinkle after swimming?**
- (b) What caused the shrinking/wrinkling of fingers?**
- (c) What value of Srinidhi is seen in the above cast?**

Answer:

- (a) Fingers wrinkled because the cells of the skin lost some water.
- (b) This happened because of the difference in the concentration of water in the skin cells and swimming pool's water.
- (c) Srinidhi showed the value of aware citizen and a good learner who clarifies the doubts.

