

Q. 1. What is biology and biological engineers? Name and define its three major branches.

Biology is a branch of science that deals with the study of living organisms (plants, animals and microorganisms).

- i. Botany- It deals with the study of plants.
- ii. Zoology- It deals with the study of animals.

Biological engineers attempt to either mimic biological systems to create products, or to modify and control biological systems. Working with doctors, clinicians, and researchers, bioengineers use traditional engineering principles and techniques to address biological processes, including ways to replace, augment, sustain, or predict chemical and mechanical processes.

Q.2. Differences between Plants and Animals?

Plants	Animals
1. Plants cannot move from one place to another. They are anchored to the soil.	1. Animals can move from one place to another.
2. Plants prepare their food with the help of chlorophyll and sunlight.	2. Animals cannot prepare their own food. They move in search of food from one place to another.
3. Plants grow throughout their life.	3. Animals grow only up to a certain period of their life.
4. Plants respire with the help of microscopic pores present on their leaves and stems.	4. Animals respire with the help of special organs like lungs, gills, trachea, etc.
5. Plants excrete their waste by storing them in the leaves and bark of plants and then shedding them seasonally.	5. Animals excrete their waste with the help of special organs regularly.
6. Plants are only living things which take in carbon dioxide and give out oxygen during photosynthesis.	6. Animals take in oxygen and give out carbon dioxide throughout their life.
7. Plants reproduce with the help of seeds, stems, spores, bulbs, etc.	7. Animals reproduce by laying eggs or giving birth to young ones.

Q.3. Differences between Plants and Animals?

The difference between plant cell and animal cell are listed below:

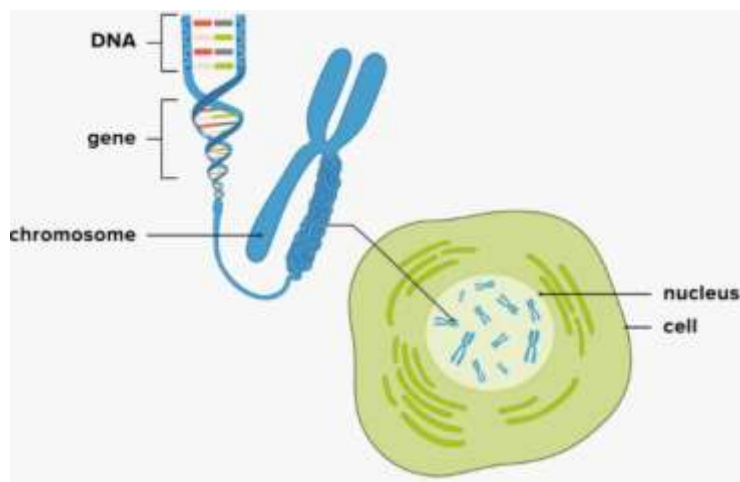
Plant cell	Animal cell
1. A plant cell is surrounded by a rigid cell wall.	1. An animal cell does not have a cell wall.
2. Larger in size.	2. Smaller in size.
3. Plant cells have plastids.	3. Animal cells do not have plastids.
4. Centrosomes are absent in plant cells	4. Animal cells have centrosomes.
5. Plant cells do not have cilia (HELPS IN MOVEMENTS).	5. Animal cells have cilia.
6. Lysosomes are very rare in plant cells.	6. Animal cells have lysosomes.

Q.4. What is a cell and why it is known as the building blocks of life?

A cell is defined as the smallest, basic unit of life that is responsible for all of life's processes.” Cells are the structural, functional, and biological units of all living beings. A cell can replicate itself independently. Hence, they are known as the building blocks of life.

Q.5. What is a gene?

A gene is the basic physical and functional unit of heredity. Genes are made up of DNA.



Q.6. What is natural selection and example?

Natural selection is the process through which species adapt to their environments. It is the engine that drives evolution i.e. Natural selection is a mechanism of evolution. Organisms that are more adapted to their environment are more likely to survive and pass on the genes that aided their success.

Q.7. What is the transfer of energy in trophic levels of an ecosystem?

The amount of energy at each trophic level decreases as it moves through an ecosystem. As little as 10 percent of the energy at any trophic level is transferred to the next level; the rest is lost largely through metabolic processes as heat.

Q.8. What is meant by biological classification?

Biological classification is defined as the process of grouping organisms according to certain similarities.

Organisms are classified according to a system of seven ranks:

Kingdom

Phylum

Class

Order

Family

Genus

Species

Q.9. What is the Difference between Virus and Bacteria?

Let's discuss the difference between bacteria and viruses as follows:

Bacteria	Virus
Bacteria are enormous. The wavelength extends from 900 to 1000nm.	Virus are much smaller than bacteria. The dimensions range from 30 to 50nm.
They are living things.	They can only reproduce in the host cell.
The cytoplasm contains free-floating DNA and RNA.	RNA or DNA is covered in a protein covering.
Bacteria is capable of self-replication.	Reproduction requires a living cell.
Fever is a common symptom of bacterial infections.	Fever may or may not be brought on by a viral infection.

Certain microorganisms are helpful.	Viral infections are harmful.
Meningitis, pneumonia, food poisoning, gastritis, ulcers, etc. are Infections and diseases.	CORONA, AIDS, the flu, the ordinary cold, chicken pox, etc are Infections and diseases.
For example, Vibrio cholera and Staphylococcus aureus.	Viruses like the rhinovirus, hepatitis A, and HIV.

Q.10. Prokaryotes vs Eukaryotes: What Are the Key Differences?

Characteristic features	Prokaryote	Eukaryote
Nucleus	Absent	Present
Membrane-bound organelles	Absent	Present
Cell structure	Unicellular	Mostly multicellular; some unicellular
Cell size	Smaller (0.1-5 μm)	Larger (10-100 μm)
Complexity	Simpler	More complex
DNA Form	Circular	Linear
Examples	Bacteria, archaea	Animals, plants, fungi, protists

MCQs

Q. 1. The control center or brain of the cell is the:

- A. Nucleus
B. Mitochondria
C. Cell membrane
D. Endoplasmic reticulum

Correct Answer

A. Nucleus

Explanation

- The nucleus is considered the control center or brain of the cell because it contains the cell's genetic material, DNA. DNA carries the instructions for the cell's activities, including growth, metabolism, and reproduction.
- The nucleus also regulates the cell's functions by controlling the synthesis of proteins and other molecules.

- Additionally, the nucleus plays a crucial role in cell division, as it directs the replication and distribution of DNA during mitosis and meiosis. Therefore, the nucleus is essential for maintaining the cell's overall structure and function.

Q. 2. Select the item that is not present in plant cells:

- A. Cell wall B. Nucleus C. Chloroplast D. Centrioles

Correct Answer D. Centrioles

Explanation

- Centrioles are not present in plant cells. Centrioles are small, cylindrical structures that are typically found in animal cells and are involved in cell division.
- They play a crucial role in organizing the microtubules during cell division, but they are absent in plant cells.
- Plant cells have a rigid cell wall, a nucleus that contains genetic material, and chloroplasts that are responsible for photosynthesis.

Q. 3. What has the Rough ER attached to it?

- A. Nucleolus B. Golgi apparatus C. Ribosomes D. Chromosomes

Correct Answer C. Ribosomes

Explanation

- The Rough ER, or rough endoplasmic reticulum, is a network of membranes in the cell that is studded with ribosomes.
- These ribosomes are responsible for protein synthesis. Therefore, the correct answer is ribosomes, as they are attached to the Rough ER.

Q. 4. The thin, flexible barrier around a cell is called the:

- A. Plasma membrane B. Cell wall C. Nuclear envelope D. Cytoplasm

Correct Answer A. Plasma membrane

Explanation

- The thin, flexible barrier around a cell is called the plasma membrane. This membrane is composed of a phospholipid bilayer that separates the interior of the cell from its external environment.
- It regulates the movement of substances in and out of the cell, allowing for selective permeability.
- The plasma membrane also plays a crucial role in maintaining the cell's shape and providing support.
- Unlike the cell wall, which is rigid and found only in plant cells, the plasma membrane is flexible and present in all types of cells.
- The nuclear envelope, on the other hand, surrounds the nucleus, while the cytoplasm refers to the fluid-filled region inside the cell.

Q.5. The main function of the cell wall is to:

- | | |
|---------------------------------|--------------------------------------|
| A. Support and protect the cell | B. Store DNA |
| C. Help the cell move | D. Direct the activities of the cell |

Correct Answer: A. Support and protect the cell

Explanation

- The cell wall is a rigid structure that surrounds the cell membrane in plant cells and some prokaryotic cells.
- Its main function is to provide support and protection to the cell, as it helps maintain the shape of the cell and prevents it from bursting under osmotic pressure.
- The cell wall also acts as a barrier against external factors, such as pathogens and physical damage, thus protecting the cell from harm.

Q.6. Which of the following is the "powerhouse" of the cell that breaks down food into energy that the cell needs?

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|-----------------|------------|--------------------------|----------------|
| A. Mitochondria | B. Vacuole | C. Endoplasmic reticulum | D. Chloroplast |
|-----------------|------------|--------------------------|----------------|

Correct Answer: A. Mitochondria

Explanation

- Mitochondria are known as the "powerhouse" of the cell because they are responsible for breaking down food molecules and converting them into energy in the form of ATP. This process, called cellular respiration, occurs in the mitochondria's inner membrane.

- The energy produced by mitochondria is essential for the cell to carry out its various functions and activities.