



CELL: THE FUNDAMENTAL UNIT OF LIFE

DISCOVER • UNDERSTAND • EXPLORE • APPRECIATE
THE BUILDING BLOCKS OF LIFE



STRUCTURE
AND ORGANELLES



FUNCTIONS AND
PROCESSES



GROWTH,
DIVISION AND
REPRODUCTION



ESSENTIAL
KNOWLEDGE



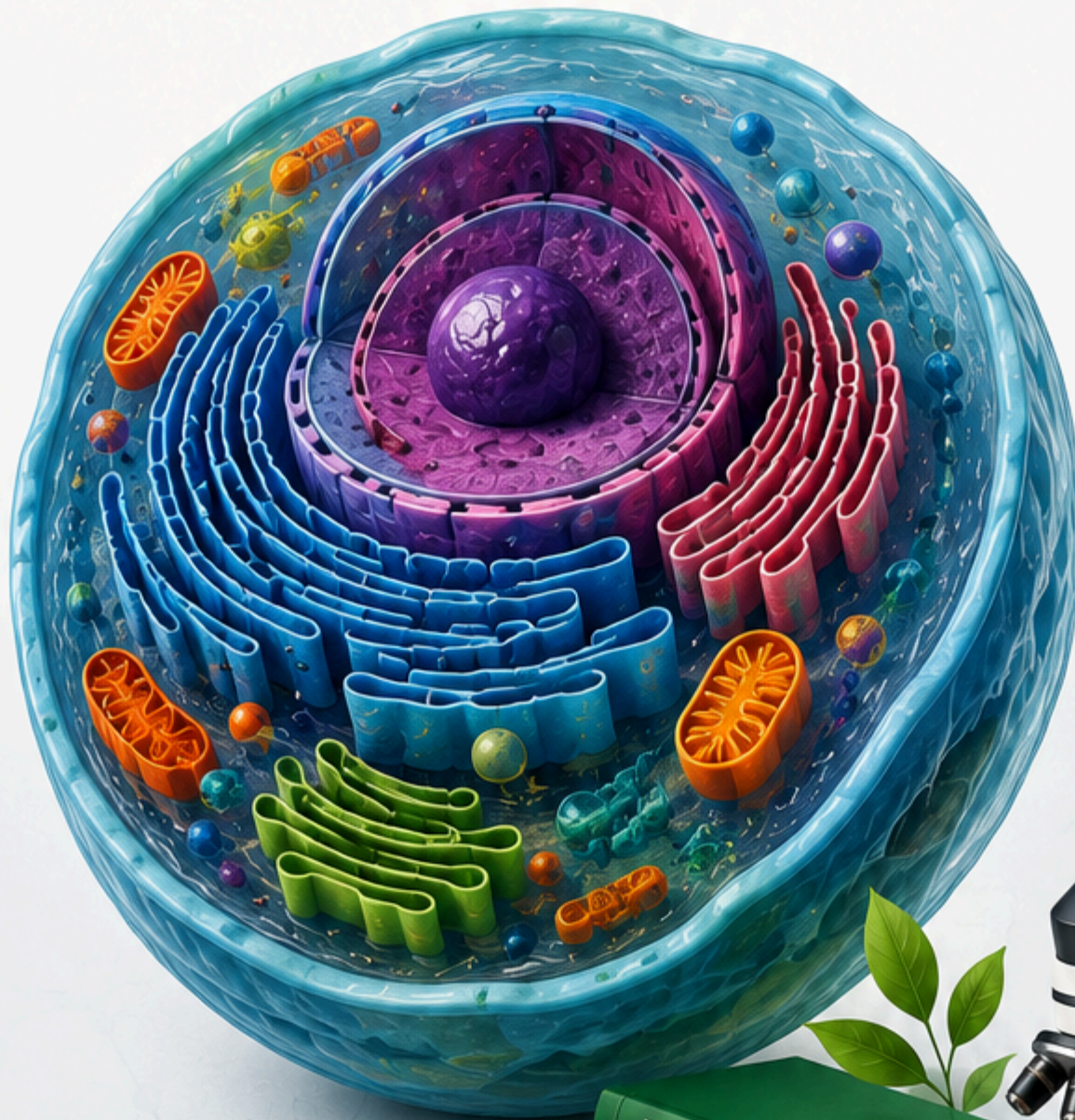
DIAGRAMS &
ILLUSTRATIONS



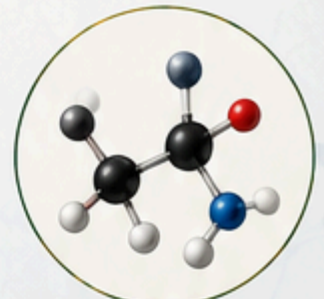
CONCEPT
CLARITY



EXAM
FOCUS



PLANT AND
ANIMAL CELLS



THE BASIS OF
ALL LIVING
ORGANISMS

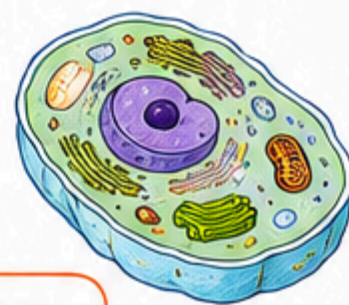


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Cell: The Fundamental Unit of Life



MEANING AND ETYMOLOGY OF CELL



1. MEANING OF CELL

- A cell is the **basic structural, functional and biological unit** of all living organisms.
- It is the smallest unit of life capable of performing all life processes.
- All organisms are composed of one or more cells.

2. ETYMOLOGY OF CELL

- The word "Cell" is derived from the Latin word "Cellula".
- "Cellula" means "small room" or "little chamber".
- It was coined by Robert Hooke in 1665.



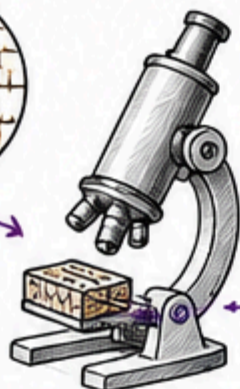
Robert Hooke
(1665)

3. HISTORICAL BACKGROUND

- In 1665, Robert Hooke observed thin slices of cork under a microscope.
- He saw many tiny box-like structures which resembled small rooms.
- He called these structures "cells".
- This was the first time the term "cell" was used in biological context.



Cork cells
(as seen by Hooke)

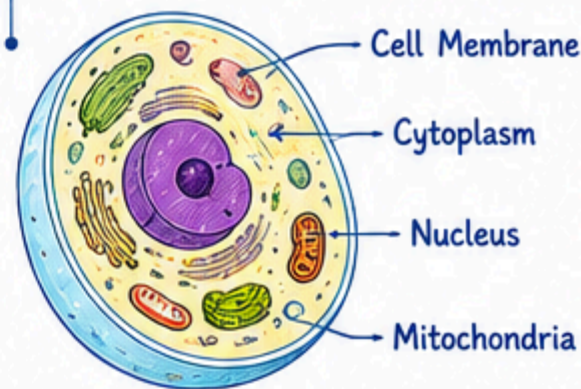


Cork

MEANING AND ETYMOLOGY OF CELL

4. KEY POINTS

- Cells vary in shape, size and function.
- They are the building blocks of life.
- New cells are produced from pre-existing cells.
- Cells contain genetic material (DNA/RNA).
- They are surrounded by a membrane.



(A Typical Cell)

5. TYPES OF CELLS

Prokaryotic Cells

- No true nucleus
- No membrane bound organelles
- Example: Bacteria

Eukaryotic Cells

- Have a true nucleus
- Have membrane bound organelles
- Example: Plants, Animals, Fungi

6. IMPORTANCE OF THE CONCEPT



Helps in understanding the structure and function of living organisms.



Foundation of Biology and all life sciences.



Basis for studying life processes at microscopic level.



Important in medical science, genetics, biotechnology and research.



Essential for understanding life on Earth.

* NOTE

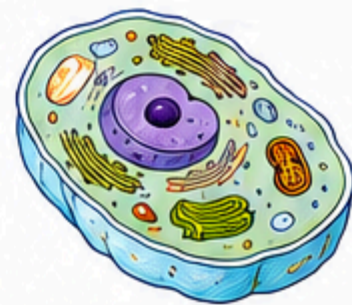
The discovery of cells opened the door to modern biology.



Cell: The Fundamental Unit of Life



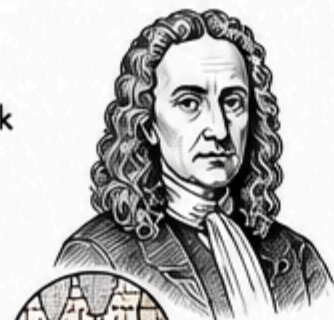
DISCOVERY OF THE CELL AND CELL THEORY



A. DISCOVERY OF THE CELL

1 1665 – ROBERT HOOKE

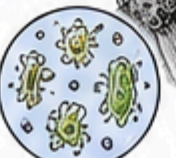
- Observed thin slices of cork under a microscope.
- Saw many tiny box-like structures.
- He called them “cells” (from Latin ‘cellula’ meaning small room).



Cork Cells

2 1674 – ANTON VAN LEEUWENHOEK

- Observed living cells for the first time.
- Saw microorganisms in pond water.
- Called them ‘animalcules’.



Microorganisms

3 1831 – ROBERT BROWN

- Discovered the nucleus in plant cells of orchid.
- The nucleus is the control center of the cell.



Nucleus



4 1838 – MATTHIAS SCHLEIDEN

- Concluded that all plants are made up of cells.
- Father of Cell Theory.

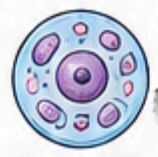


Plant Cells



5 1839 – THEODOR SCHWANN

- Concluded that all animals are made up of cells.
- Along with Schleiden, proposed the Cell Theory.

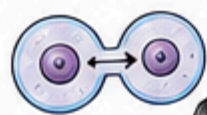


Animal Cells



6 1855 – RUDOLF VIRCHOW

- Added “Omnis cellula e cellula” (All cells arise from pre-existing cells).
- Completed the Cell Theory.



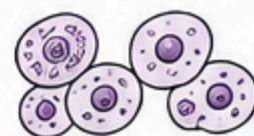
Cell Division



B. CELL THEORY

The Cell Theory is one of the most important theories in biology which states that:

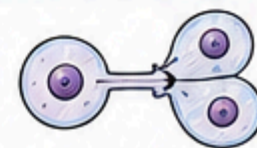
- 1 All living organisms are composed of one or more cells.



- 2 The cell is the basic structural and functional unit of life.



- 3 All cells arise from pre-existing cells.



SIGNIFICANCE OF CELL THEORY



- Unified the knowledge of living organisms.
- Explained growth, development and reproduction at the cellular level.
- Provided the basis for modern biology, medicine, genetics and biotechnology.

EXTENSIONS AND MODERN ADDITIONS

- 1858 – Rudolf Virchow added the 3rd point.
- With the discovery of electron microscope, it was found that cells have organelles performing specific functions.
- Modern cell biology continues to expand our understanding of cells.



TIMELINE AT A GLANCE

- 1665 Robert Hooke – Discovered cells in cork.
- 1674 Anton van Leeuwenhoek – Observed living cells.
- 1831 Robert Brown – Discovered nucleus.
- 1838 Matthias Schleiden – Plants are made of cells.
- 1839 Theodor Schwann – Animals are made of cells.
- 1855 Rudolf Virchow – All cells arise from pre-existing cells.

★ KEY TAKEAWAY

From observing dead cork to understanding complex life, the journey of the cell discovery led to the formation of Cell Theory, which is the foundation of modern biology.



Cork



Microscope



Cells



Cell Theory



Creator Academia

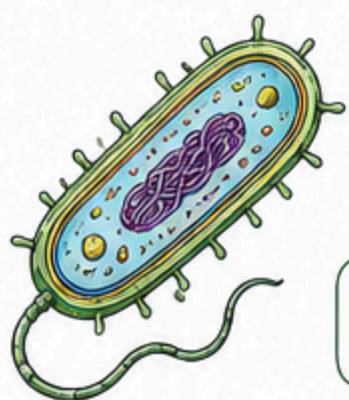


KNOWLEDGE TODAY, SUCCESS TOMORROW



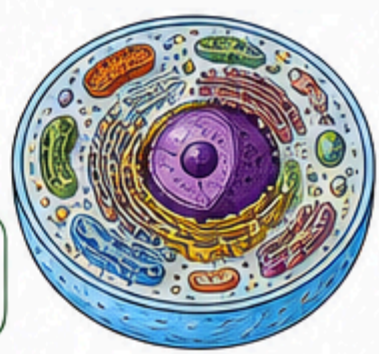
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Cell: The Fundamental Unit of Life

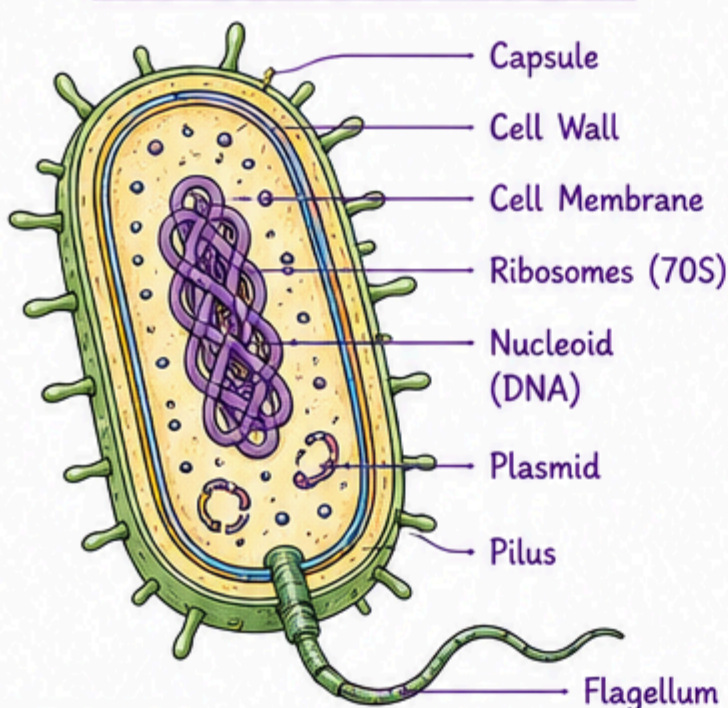


STRUCTURAL CLASSIFICATION: PROKARYOTIC vs. EUKARYOTIC CELLS

Cells are structurally classified into two major types based on the presence or absence of a true nucleus and membrane-bound organelles.



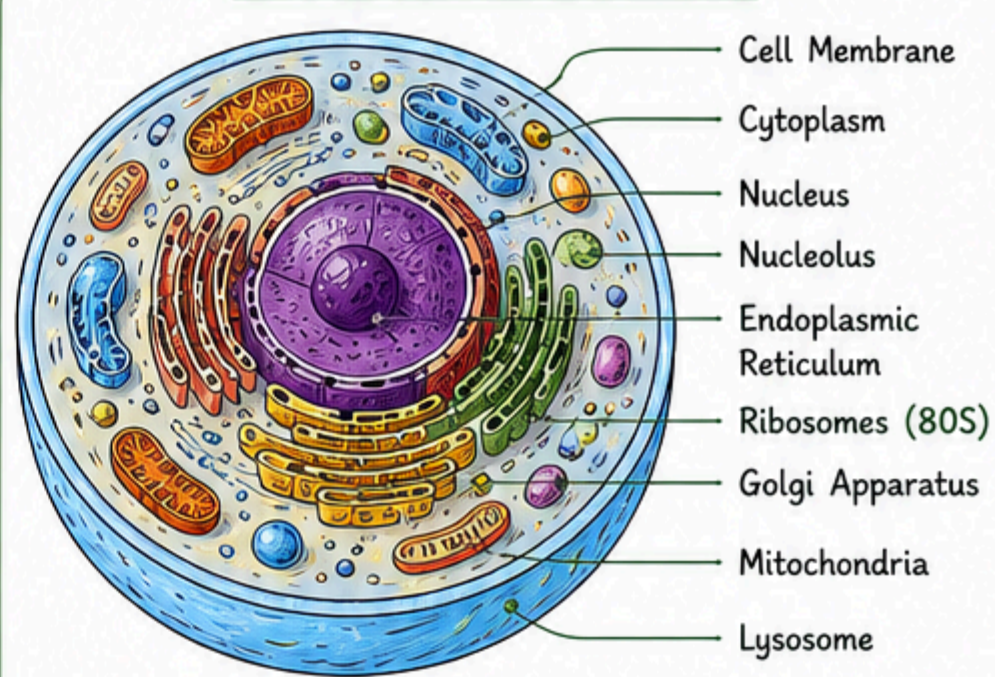
A. PROKARYOTIC CELLS



Key Features

- No true nucleus; DNA lies in nucleoid region.
- No membrane-bound organelles.
- Smaller in size (1–10 μm).
- Single circular DNA molecule.
- 70S ribosomes.
- Cell wall usually present (peptidoglycan).
- Example: Bacteria, Cyanobacteria (Blue-green algae)

B. EUKARYOTIC CELLS



Key Features

- True nucleus enclosed in nuclear membrane.
- Membrane-bound organelles present.
- Larger in size (10–100 μm).
- Multiple linear chromosomes.
- 80S ribosomes.
- Cell wall absent in animals; present in plants (cellulose) and fungi (chitin).
- Example: Plants, Animals, Fungi, Protists

C. KEY DIFFERENCES AT A GLANCE

Feature	Prokaryotic Cells	Eukaryotic Cells
1. Nucleus	Absent (DNA in nucleoid)	Present (true nucleus)
2. Size	Small (1–10 μm)	Large (10–100 μm)
3. DNA	Single circular, naked	Multiple linear, with histone proteins
4. Membrane-bound Organelles	Absent	Present (e.g., mitochondria, ER, Golgi)
5. Ribosomes	70S	80S (70S in mitochondria & chloroplasts)
6. Cell Wall	Usually present (peptidoglycan)	Present in plants (cellulose) & fungi (chitin); Absent in animals
7. Cytoskeleton	Absent	Present
8. Cell Division	Binary fission	Mitosis and Meiosis
9. Flagella	Simple structure	Complex structure (9+2 arrangement)
10. Examples	Bacteria, Archaea, Cyanobacteria	Plants, Animals, Fungi, Protists

D. TYPES OF EUKARYOTIC CELLS

- **1. Plant Cells**
Cell wall (cellulose), chloroplasts, large vacuole.
- **2. Animal Cells**
No cell wall, small vacuoles, centrioles present.
- **3. Fungal Cells**
Cell wall (chitin), no chloroplasts, vacuoles present.
- **4. Protist Cells**
Simple or complex structure; may have cell wall or not.

★ KEY TAKEAWAY

Prokaryotic cells are simple and primitive, while eukaryotic cells are complex and advanced. Both types are essential for life on Earth and exhibit amazing diversity.

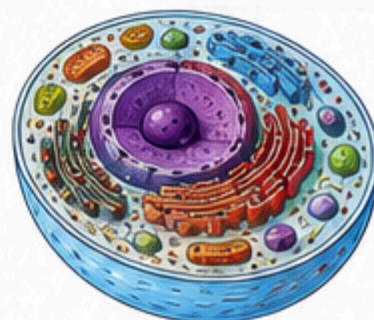


Cell: The Fundamental Unit of Life



DETAILED STRUCTURE OF A EUKARYOTIC CELL

Eukaryotic cells are complex and organized. They contain a true nucleus and many membrane-bound organelles, each performing specific functions.



1 Cell (Plasma) Membrane

Thin, flexible boundary that encloses the cell; regulates movement of substances in and out.

2 Cytoplasm

Jelly-like fluid that fills the cell and suspends organelles; site of many metabolic reactions.

3 Nucleus

Control center of the cell; contains genetic material (DNA). It is enclosed by a double membrane (nuclear envelope).

4 Nucleolus

Dense body inside the nucleus; responsible for ribosome formation.

5 Ribosomes

Tiny particles (free in cytoplasm or attached to RER); site of protein synthesis.

6 Rough Endoplasmic Reticulum (RER)

Membrane network with ribosomes; involved in synthesis and transport of proteins.

7 Smooth Endoplasmic Reticulum (SER)

Lacks ribosomes; involved in lipid synthesis, detoxification and calcium storage.

8 Golgi Apparatus

Modifies, sorts and packages proteins and lipids; forms vesicles and lysosomes.

9 Mitochondria

"Powerhouses of the cell"; produce ATP (energy) through cellular respiration.

10 Lysosomes

Membrane-bound sacs containing digestive enzymes; break down waste and worn-out cell parts.

11 Peroxisomes

Contain enzymes that detoxify harmful substances and break down fatty acids.

12 Cytoskeleton

Network of protein filaments (microtubules, microfilaments, intermediate filaments) that provides shape, support and helps in movement.

13 Centrioles (in animal cells)

Pair of cylindrical structures involved in cell division and formation of spindle fibers.

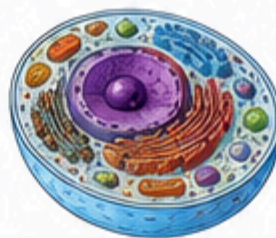
FUNCTIONS AT A GLANCE

No.	Organelle	Function	No.	Organelle	Function
1	Cell Membrane	Protects cell and controls entry and exit.	8	Golgi Apparatus	Modifies, packages and secretes proteins/lipids.
2	Cytoplasm	Site of metabolic reactions; holds organelles.	9	Mitochondria	Produces energy (ATP).
3	Nucleus	Controls all cell activities; stores genetic information.	10	Lysosomes	Digests waste and cell debris.
4	Nucleolus	Produces ribosomes.	11	Peroxisomes	Detoxifies harmful substances.
5	Ribosomes	Protein synthesis.	12	Cytoskeleton	Provides shape, support and involved in movement.
6	RER	Protein synthesis and transport.	13	Centrioles	Helps in cell division.
7	SER	Lipid synthesis and detoxification.			

ANIMAL CELL vs PLANT CELL

Animal Cell

- No cell wall
- Centrioles present
- Small vacuoles
- Lysosomes common
- Irregular shape



Plant Cell

- Cell wall present
- Centrioles usually absent
- One large central vacuole
- Lysosomes rare
- Fixed, rectangular shape



KEY POINTS

- ✓ Eukaryotic cells are larger and more complex than prokaryotic cells.
- ✓ Membrane-bound organelles allow compartmentalization of functions.
- ✓ All organelles work together to maintain life, growth and reproduction.
- ✓ The nucleus contains DNA, which controls all activities of the cell.



NOTE

The structure of eukaryotic cells may vary slightly in different organisms, but the basic components and their functions remain the same.





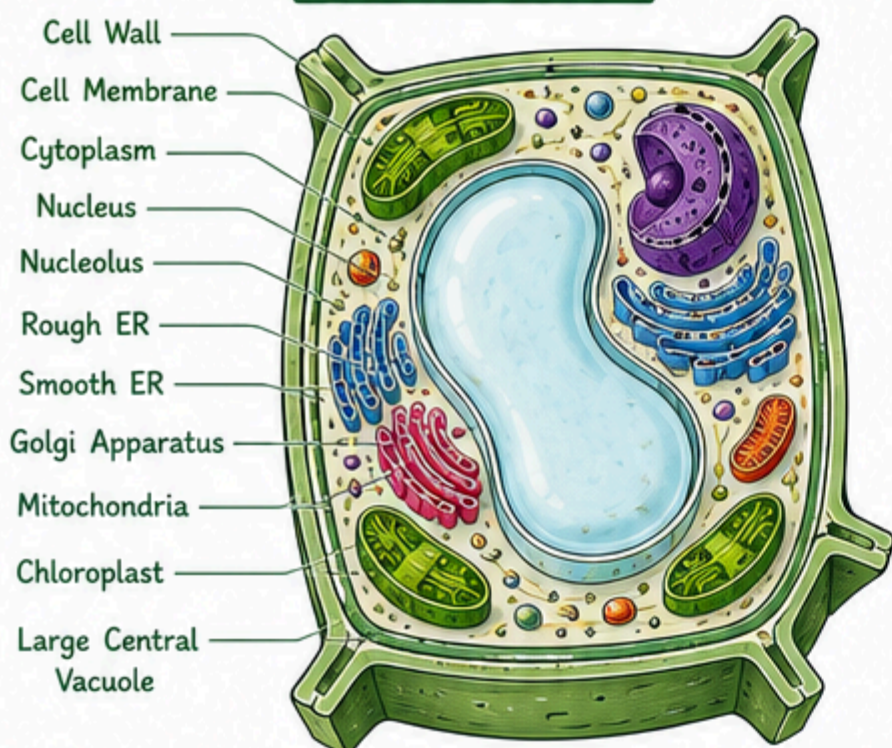
Cell: The Fundamental Unit of Life



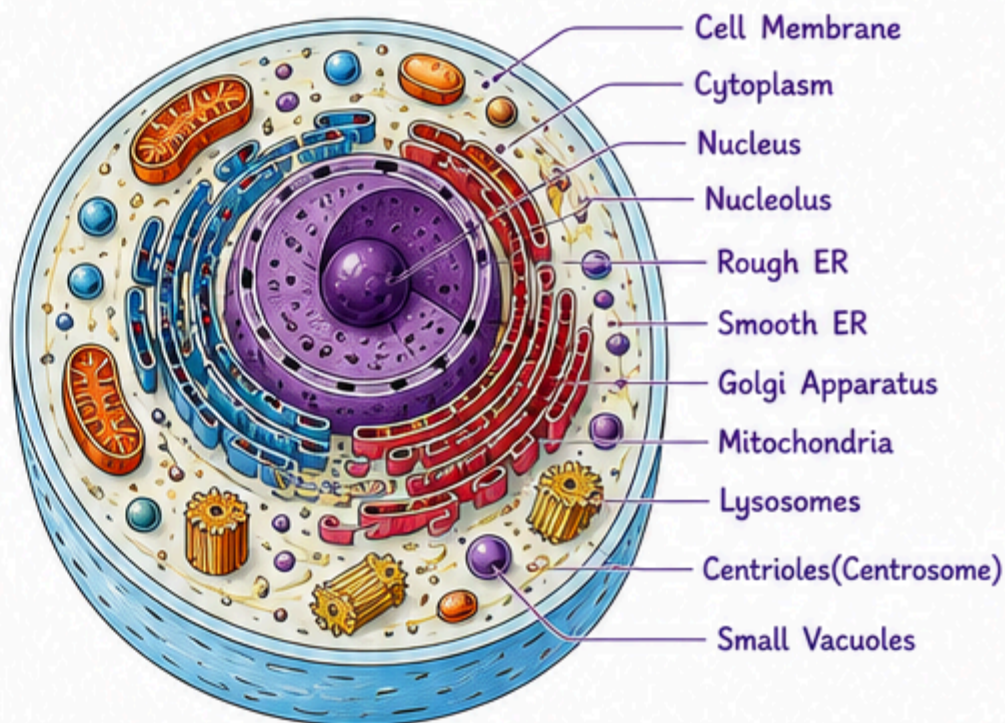
COMPARISON: PLANT CELL vs. ANIMAL CELL

Both plant and animal cells are eukaryotic and share many similarities, but they also have some key structural differences related to their functions.

PLANT CELL



ANIMAL CELL

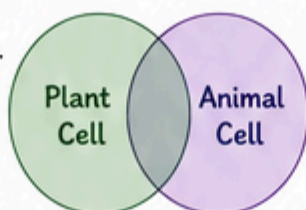


KEY DIFFERENCES AT A GLANCE

Feature	Plant Cell	Animal Cell
1. Cell Wall	Present (made of cellulose)	Absent
2. Shape	Fixed, rectangular or polygonal	Irregular or rounded
3. Cell Membrane	Present (inside cell wall)	Present (outer boundary)
4. Nucleus	Present	Present
5. Chloroplasts	Present (site of photosynthesis)	Absent
6. Vacuoles	One large central vacuole	Many small or temporary vacuoles
7. Centrioles	Usually absent in higher plants	Present (in centrosome)
8. Lysosomes	Rare	Numerous
9. Cytoplasm	Present	Present
10. Mitochondria	Present	Present
11. Golgi Apparatus	Present (called dictyosomes)	Present
12. Storage Material	Starch, oils	Glycogen, fats
13. Mode of Nutrition	Autotrophic (photosynthesis)	Heterotrophic
14. Cell Division	Formation of cell plate	Cleavage furrow

SIMILARITIES (BOTH PLANT & ANIMAL CELLS)

- ✓ Both are eukaryotic cells.
- ✓ Both have cell membrane, cytoplasm and nucleus.
- ✓ Both contain mitochondria, ER, Golgi apparatus and ribosomes.
- ✓ Both perform basic life processes.
- ✓ Both arise from pre-existing cells.



UNIQUE ADAPTATIONS

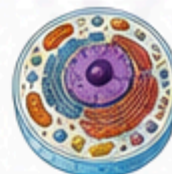
Plant Cell:

- Cell wall for protection and support.
- Chloroplasts for making food.
- Large vacuole for storage and turgor.



Animal Cell:

- Centrioles help in cell division.
- Lysosomes help in intracellular digestion.
- Flexible shape allows movement.



NOTE: Plant cells are adapted for protection, support and photosynthesis, while animal cells are adapted for movement, flexibility and quick response to stimuli.



Cell: The Fundamental Unit of Life



OVERVIEW OF CELL DIVISION

Cell division is the process by which a parent cell divides to form two or more daughter cells. It is essential for growth, repair, reproduction and continuation of life.

TWO MAIN TYPES

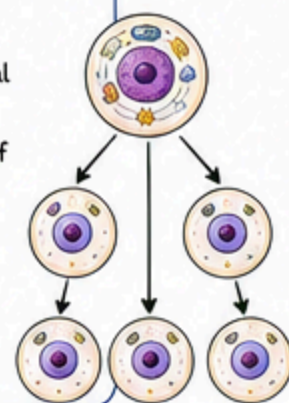
1. MITOSIS (EQUATIONAL DIVISION)

- Occurs in somatic (body) cells.
- Results in two genetically identical daughter cells.
- Chromosome number remains the same ($2n \rightarrow 2n$).
- Responsible for growth, repair and replacement of worn out cells.
- Occurs in one stage.



2. MEIOSIS (REDUCTION DIVISION)

- Occurs in germ (reproductive) cells in gonads.
- Results in four genetically non-identical daughter cells.
- Chromosome number is reduced by half ($2n \rightarrow n$).
- Responsible for gamete formation and maintaining chromosome number in sexual reproduction.
- Occurs in two successive divisions: Meiosis I and Meiosis II.



COMPARISON AT A GLANCE

Feature	Mitosis	Meiosis
Type of Cells	Somatic (body) cells	Germ (reproductive) cells
Number of Divisions	One	Two (Meiosis I & II)
Number of Daughter Cells	Two	Four
Genetic Makeup	Genetically identical	Genetically non-identical
Chromosome Number	Maintained ($2n \rightarrow 2n$)	Reduced to half ($2n \rightarrow n$)
Crossing Over	Absent	Present (in Prophase I)
Function	Growth, repair, replacement	Gamete formation, variation
Where it Occurs	All somatic tissues	Testes, ovaries (gonads)

PHASES OF MITOSIS

- Interphase**
Cell grows, replicates DNA and prepares for division.
- Prophase**
Chromosomes condense, nuclear envelope breaks, spindle forms.
- Metaphase**
Chromosomes align at the cell equator.
- Anaphase**
Sister chromatids separate and move to opposite poles.
- Telophase**
Nuclear envelope reforms, chromosomes decondense, spindle disappears.
- Cytokinesis**
Cytoplasm divides and two daughter cells are formed.

IMPORTANCE OF CELL DIVISION

- Helps in growth and development.
- Repairs damaged tissues and replaces old cells.
- Ensures continuity of life in unicellular organisms.
- Maintains chromosome number across generations.
- Meiosis introduces genetic variation in species.

STAGES OF MEIOSIS

MEIOSIS I (REDUCTION DIVISION)

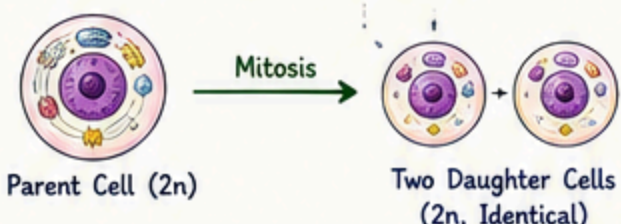
- Prophase I**
Synapsis of homologous chromosomes and crossing over.
- Metaphase I**
Homologous chromosomes align at the equator.
- Anaphase I**
Homologous chromosomes separate and move to opposite poles.
- Telophase I**
Two haploid cells are formed.

MEIOSIS II (EQUATIONAL DIVISION)

- Prophase II**
Spindle forms in each cell.
- Metaphase II**
Chromosomes align at the equator.
- Anaphase II**
Sister chromatids separate and move to poles.
- Telophase II**
Spindle forms in each cell.
- Telophase II & Cytokinesis**
Four haploid daughter cells are formed.

★ KEY TAKEAWAY

Mitosis → Growth, Repair, Replacement



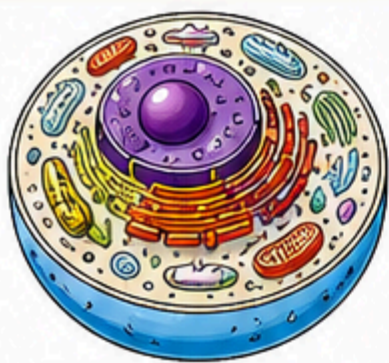
Meiosis → Gamete Formation, Genetic Variation



Cell division is the foundation of life — it ensures growth, survival and diversity of living organisms.



Cell: The Fundamental Unit of Life



QUICK EXAMINATION FACTS

Quick facts are short, important points that help in fast revision and **scoring high** in exams.



CELL STRUCTURE & TYPES

- Cell is the basic structural and functional unit of life.
- Robert Hooke (1665) – First observed cells in cork.
- Anton van Leeuwenhoek (1674) – First observed living cells.
- All living organisms are made up of one or more cells.
- Cells arise only from pre-existing cells.
- Prokaryotic cells lack a true nucleus and membrane-bound organelles.
- Eukaryotic cells have a true nucleus and membrane-bound organelles.
- Plant cells have cell wall, chloroplasts and a large central vacuole.
- Animal cells lack cell wall and chloroplasts.
- Mitochondria is the powerhouse of the cell.
- Nucleus controls all activities and contains genetic material.
- Ribosomes are the site of protein synthesis.
- Cell membrane is selectively permeable.
- Vacuoles store water, nutrients and waste.



CELL FUNCTIONS & PROCESSES

- Cell division occurs in two ways: Mitosis and Meiosis.
- Mitosis produces two genetically identical daughter cells.
- Meiosis produces four genetically non-identical gametes.
- Chromosome number remains same in mitosis ($2n \rightarrow 2n$).
- Chromosome number is reduced by half in meiosis ($2n \rightarrow n$).
- Interphase is the longest phase of cell cycle.
- DNA replication occurs in the S phase of interphase.
- Cytokinesis is the division of cytoplasm.
- Plant cell cytokinesis occurs by cell plate formation.
- Animal cell cytokinesis occurs by cleavage furrow formation.
- The smallest known cells are Mycoplasma.
- The largest cell is the Ostrich egg.
- Cells contain DNA, RNA and proteins as genetic materials.
- Cell theory explains the fundamental properties of all living organisms.



ONE LINE MEMORY TRICKS



Cell
(Structural Unit)

+



DNA
(Genetic Material)

+



Mitochondria
(Powerhouse)

+



Ribosomes
(Protein Factory)

+



Cell Division
(Growth & Repair)

=



Many Cells
(Tissues & Organs)

→



Living Organism
(Life)



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Cell: The Fundamental Unit of Life



MCQs – PAGE 1

Choose the **most appropriate** answer.



1 Which of the following is known as the 'powerhouse of the cell'?

- (A) Ribosome
- (B) Mitochondria
- (C) Golgi apparatus
- (D) Lysosome



Answer: (B) Mitochondria

Explanation:

- Mitochondria produce energy for the cell in the form of ATP through cellular respiration.
- Therefore, they are called the 'powerhouse of the cell'.

2 Who first observed cells in cork?

- (A) Robert Brown
- (B) Anton van Leeuwenhoek
- (C) Robert Hooke
- (D) Matthias Schleiden



Answer: (C) Robert Hooke

Explanation:

- In 1665, Robert Hooke observed thin slices of cork under a microscope and saw small box-like structures which he called 'cells'.
- Hence, he is known as the father of cell.

3 Which of the following statements is a part of cell theory?

- (A) Cells arise from non-living matter.
- (B) All living organisms are composed of one or more cells.
- (C) New cells are formed by the union of two cells.
- (D) Cells contain chlorophyll.



Answer: (B) All living organisms are composed of one or more cells.

Explanation:

- The cell theory states that all living organisms are made up of one or more cells.
- Other statements are either incorrect or not part of the cell theory.

4 Which organelle is responsible for protein synthesis in the cell?

- (A) Lysosome
- (B) Ribosome
- (C) Smooth endoplasmic reticulum
- (D) Peroxisome



Answer: (B) Ribosome

Explanation:

- Ribosomes are tiny granules found in the cytoplasm or attached to rough ER.
- They are the site of protein synthesis.
- Hence, option (B) is correct.

5 Which of the following is present in plant cells but absent in animal cells?

- (A) Mitochondria
- (B) Cell wall
- (C) Nucleus
- (D) Ribosome



Answer: (B) Cell wall

Explanation:

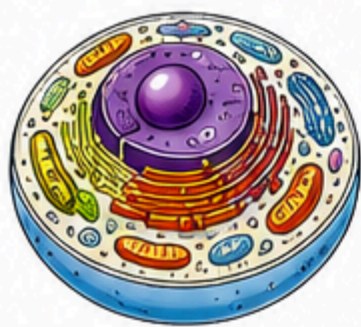
- Plant cells have a rigid cell wall made up of cellulose which provides shape and support.
- Animal cells do not have a cell wall.
- Therefore, option (B) is correct.



QUICK TIP: Revise these key points regularly and practice more MCQs to strengthen your concepts!



Cell: The Fundamental Unit of Life



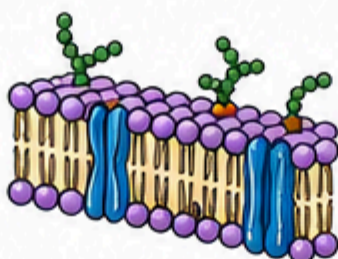
MCQs – PAGE 2

Choose the **most appropriate** answer.



6 What is the main function of the cell membrane?

- (A) To provide energy
- (B) To control the movement of substances in and out of the cell
- (C) To store genetic material
- (D) To carry out photosynthesis



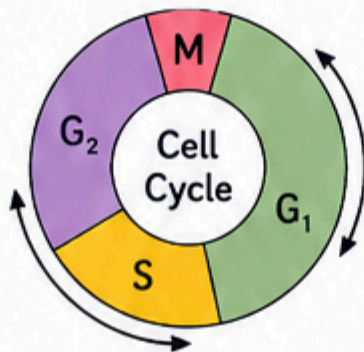
Answer: (B) To control the movement of substances in and out of the cell

Explanation:

- Cell membrane is selectively permeable.
- It regulates what enters and leaves the cell to maintain balance.
- Hence, option (B) is correct.

7 Which phase of the cell cycle is the longest?

- (A) M phase
- (B) G_1 phase
- (C) S phase
- (D) G_2 phase



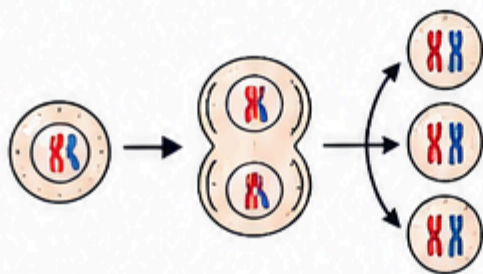
Answer: (B) G_1 phase

Explanation:

- G_1 phase is the gap phase where the cell grows and performs normal functions.
- It is longer than S phase, G_2 phase and M phase.
- Therefore, option (B) is correct.

8 Which process produces gametes in living organisms?

- (A) Mitosis
- (B) Meiosis
- (C) Binary fission
- (D) Asexual reproduction



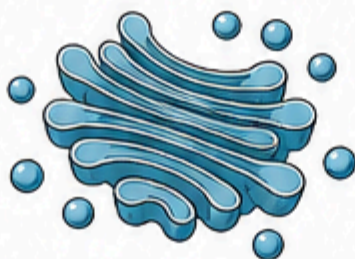
Answer: (B) Meiosis

Explanation:

- Meiosis is a type of cell division that produces four genetically non-identical gametes (sperm or eggs).
- Mitosis produces body cells, not gametes.
- Hence, option (B) is correct.

9 Which organelle is involved in the packaging and secretion of proteins?

- (A) Ribosome
- (B) Golgi apparatus
- (C) Mitochondria
- (D) Lysosome



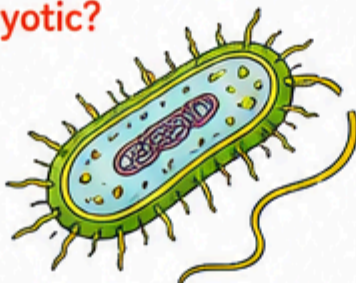
Answer: (B) Golgi apparatus

Explanation:

- Golgi apparatus modifies, sorts, packages and secretes proteins and lipids.
- It also forms secretory vesicles.
- Therefore, option (B) is correct.

10 Which of the following is prokaryotic?

- (A) Amoeba
- (B) Escherichia coli
- (C) Paramecium
- (D) Onion (plant cell)



Answer: (B) Escherichia coli

Explanation:

- E. coli is a bacterium which lacks a true nucleus and membrane-bound organelles.
- It is a prokaryotic cell.
- Hence, option (B) is correct.



QUICK TIP: Practice MCQs daily and revise key concepts for better retention and high scores!



Cell: The Fundamental Unit of Life



MCQs – PAGE 3

Choose the **most appropriate** answer.



11 Which structure in plant cells contains chlorophyll?

- (A) Vacuole
- (B) Chloroplast
- (C) Mitochondria
- (D) Nucleus



Answer: (B) Chloroplast

Explanation:

- Chloroplasts contain chlorophyll which traps light energy for photosynthesis.
- They are present in plant cells.
- Hence, option (B) is correct.

12 Which of the following is not a part of cell theory?

- (A) All living things are made of cells.
- (B) Cells are the basic unit of life.
- (C) Cells arise from non-living materials.
- (D) New cells arise from pre-existing cells.



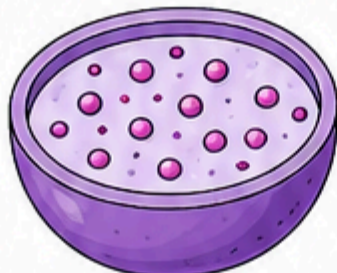
Answer: (C) Cells arise from non-living materials.

Explanation:

- Cell theory states that cells arise only from pre-existing cells, not from non-living materials.
- All living organisms are made of cells and cells are the basic unit of life.
- Therefore, option (C) is not a part of cell theory.

13 Which organelle is responsible for digestion of worn-out cell components?

- (A) Peroxisome
- (B) Ribosome
- (C) Lysosome
- (D) Endoplasmic reticulum



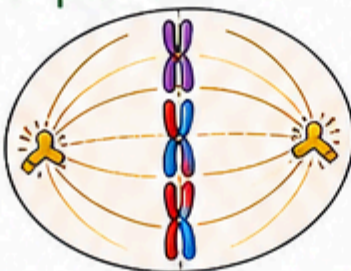
Answer: (C) Lysosome

Explanation:

- Lysosomes contain hydrolytic enzymes that break down worn-out cell parts and foreign materials.
- They help in intracellular digestion.
- Hence, option (C) is correct.

14 During mitosis, chromosomes align at the equator of the cell during which phase?

- (A) Prophase
- (B) Metaphase
- (C) Anaphase
- (D) Telophase



Answer: (B) Metaphase

Explanation:

- In metaphase, chromosomes align at the equatorial plate of the cell.
- This arrangement ensures equal distribution of chromosomes to daughter cells.
- Therefore, option (B) is correct.

15 Which of the following statements about vacuoles is correct?

- (A) Vacuoles are absent in plant cells.
- (B) Vacuoles store water, nutrients and waste materials.
- (C) Vacuoles are the site of protein synthesis.
- (D) Vacuoles contain genetic material.



Answer: (B) Vacuoles store water, nutrients and waste materials.

Explanation:

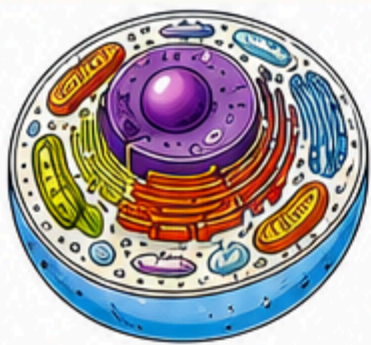
- Vacuoles in plant cells store water, nutrients, pigments and waste products.
- They help in maintaining turgor pressure.
- Hence, option (B) is correct.



QUICK TIP: Solve MCQs regularly, analyze explanations and strengthen your understanding!



Cell: The Fundamental Unit of Life



MCQs – PAGE 4

Choose the **most appropriate** answer.



16 Which of the following is an example of a eukaryotic cell?

- (A) Bacteria
- (B) Cyanobacteria
- (C) Amoeba
- (D) Mycoplasma



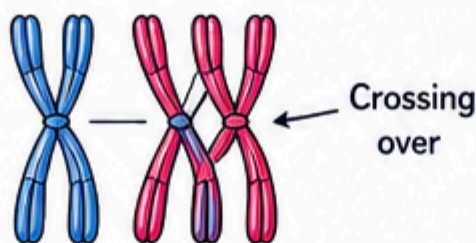
Answer: (C) Amoeba

Explanation:

- Amoeba is a unicellular organism that has a true nucleus and membrane-bound organelles.
- Bacteria, cyanobacteria and mycoplasma are prokaryotic cells.
- Therefore, option (C) is correct.

17 Which phase of meiosis is characterized by crossing over between homologous chromosomes?

- (A) Prophase I
- (B) Metaphase I
- (C) Anaphase I
- (D) Telophase I



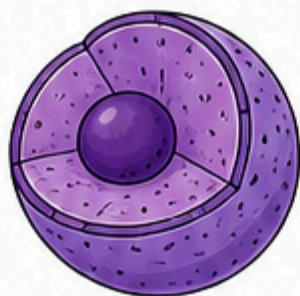
Answer: (A) Prophase I

Explanation:

- During prophase I of meiosis, homologous chromosomes pair up and exchange segments of DNA. This process is called crossing over.
- It increases genetic variation.
- Therefore, option (A) is correct.

18 What is the role of the nucleus in the cell?

- (A) It synthesizes proteins.
- (B) It stores food materials.
- (C) It controls all activities and contains genetic material.
- (D) It digests foreign particles.



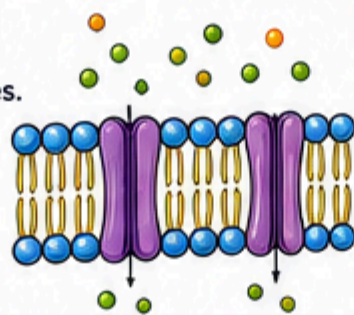
Answer: (C) It controls all activities and contains genetic material.

Explanation:

- The nucleus is the control center of the cell.
- It contains DNA which carries genetic information.
- Protein synthesis is done by ribosomes, digestion by lysosomes and food storage by vacuoles.
- Therefore, option (C) is correct.

19 Which of the following statements is true about the cell membrane?

- (A) It is freely permeable to all substances.
- (B) It is made up of cellulose.
- (C) It is selectively permeable.
- (D) It is present only in plant cells.



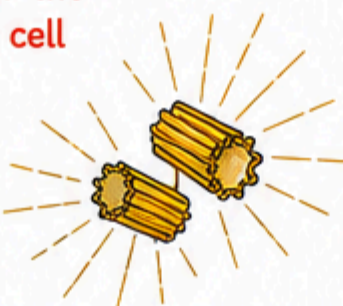
Answer: (C) It is selectively permeable.

Explanation:

- Cell membrane allows some substances to enter or leave the cell while restricting others.
- It is made of lipids and proteins, not cellulose.
- It is present in both plant and animal cells.
- Therefore, option (C) is correct.

20 Which organelle is responsible for the formation of spindle fibers during cell division in animal cells?

- (A) Mitochondria
- (B) Centrosome
- (C) Golgi apparatus
- (D) Endoplasmic reticulum



Answer: (B) Centrosome

Explanation:

- Centrosome contains a pair of centrioles in animal cells.
- It organizes the spindle fibers during mitosis and meiosis.
- Therefore, option (B) is correct.

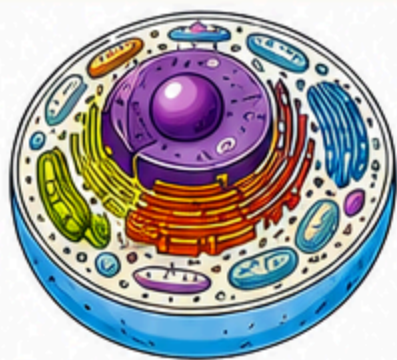


QUICK TIP: Understand concepts clearly, revise regularly and attempt more MCQs for better results!





Cell: The Fundamental Unit of Life



MCQs – PAGE 5

Choose the **most appropriate** answer.



21 Which of the following cell organelles contains its own DNA?

- (A) Nucleus
- (B) Endoplasmic reticulum
- (C) Mitochondria
- (D) Ribosome



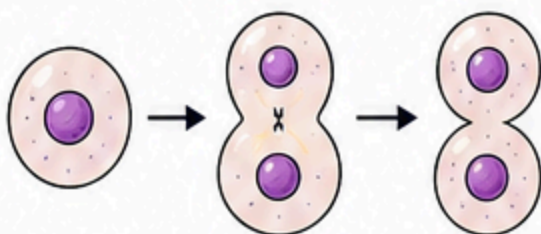
Answer: (C) Mitochondria

Explanation:

- Mitochondria have their own circular DNA.
- This is in addition to the DNA present in the nucleus.
- Therefore, option (C) is correct.

22 Which type of cell division helps in growth and repair of body tissues?

- (A) Meiosis
- (B) Binary fission
- (C) Mitosis
- (D) Budding



Answer: (C) Mitosis

Explanation:

- Mitosis produces two genetically identical daughter cells.
- It is responsible for growth, repair and replacement of worn-out cells.
- Therefore, option (C) is correct.

23 What is the function of ribosomes in the cell?

- (A) Energy production
- (B) Protein synthesis
- (C) Lipid digestion
- (D) Genetic replication



Answer: (B) Protein synthesis

Explanation:

- Ribosomes are the sites of protein synthesis.
- They may be free in the cytoplasm or attached to the rough endoplasmic reticulum.
- Therefore, option (B) is correct.

24 Which of the following is a non-living structure found in plant cells?

- (A) Chloroplast
- (B) Cell wall
- (C) Nucleus
- (D) Mitochondria



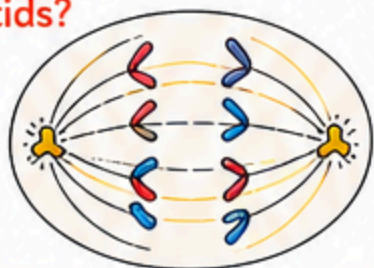
Answer: (B) Cell wall

Explanation:

- Cell wall is a non-living structure made up of cellulose.
- It provides shape, support and protection to the plant cell.
- Therefore, option (B) is correct.

25 Which of the following phases is characterized by separation of sister chromatids?

- (A) Metaphase
- (B) Anaphase
- (C) Prophase
- (D) Telophase



Answer: (B) Anaphase

Explanation:

- During anaphase, centromeres divide and sister chromatids move towards opposite poles.
- This ensures equal distribution of chromosomes to daughter cells.
- Therefore, option (B) is correct.



QUICK TIP: Consistent practice of MCQs improves your concept clarity and exam performance.





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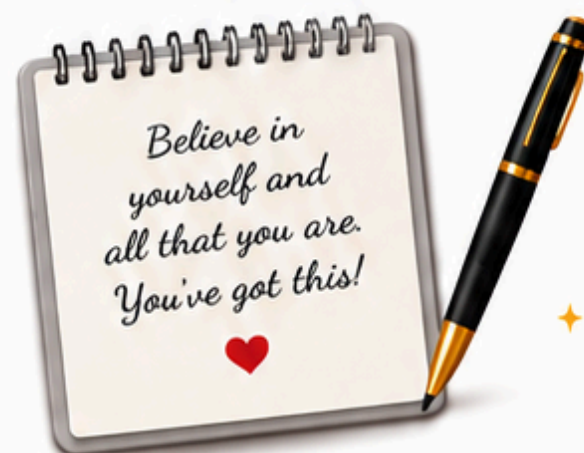
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