AP Biology Practice Test: Chapter 4 - Tour of the Cell

Instructions: Answer all questions to the best of your ability. For the short answer questions, provide a complete response with clear explanations.

Short Answer Questions (1-5)

1. **Describe the main differences between prokaryotic and eukaryotic cells. Provide at least three distinguishing features.**
2. **What is the function of the plasma membrane in a cell? How does its structure facilitate this function?**
3. **Explain the role of ribosomes in the cell. How do they contribute to protein synthesis?**
4. **Discuss the significance of the endoplasmic reticulum (ER) in eukaryotic cells. Differentiate between the rough ER and smooth ER.**
5. **Describe the function of lysosomes and explain how they contribute to cellular homeostasis.**

Multiple Choice Questions (6-20)

6. Which of the following is found only in eukaryotic cells?
    - A) Ribosomes
    - B) DNA
    - C) Nucleus
    - D) Cell membrane
7. What structure regulates the passage of materials in and out of the cell?
    - A) Cell wall
    - B) Cytoplasm
    - C) Plasma membrane
    - D) Ribosome
8. Which organelle is known as the "powerhouse of the cell"?
    - A) Ribosome
    - B) Golgi apparatus
    - C) Mitochondrion
    - D) Lysosome
9. The function of the Golgi apparatus is to:
    - A) Produce ATP.
    - B) Modify, package, and distribute proteins.
    - C) Synthesize lipids.
    - D) Store genetic information.
10. Which structure is responsible for protein synthesis?
    - A) Nucleus

    - B) Ribosome
    - C) Endoplasmic reticulum
    - D) Golgi apparatus
11. What is the primary function of the cytoskeleton?
    - A) Energy production
    - B) Structural support and cell shape
    - C) Protein synthesis
    - D) DNA replication
12. The primary role of chloroplasts is to:
    - A) Generate ATP.
    - B) Synthesize carbohydrates through photosynthesis.
    - C) Store genetic information.
    - D) Digest macromolecules.
13. Which of the following organelles contains enzymes that break down waste materials and cellular debris?
    - A) Peroxisome
    - B) Lysosome
    - C) Ribosome
    - D) Golgi apparatus
14. The term “selective permeability” refers to:
    - A) The ability of the plasma membrane to allow all substances to pass through.
    - B) The ability of the plasma membrane to allow certain substances to enter or leave the cell.
    - C) The cell's ability to create new organelles.
    - D) The rigidity of the cell wall.
15. Which of the following statements about the nucleus is true?
    - A) It is the site of protein synthesis.
    - B) It contains DNA and is surrounded by a double membrane.
    - C) It is found in both prokaryotic and eukaryotic cells.
    - D) It is involved in energy production.
16. The rough endoplasmic reticulum is studded with which of the following?
    - A) Lysosomes
    - B) Ribosomes
    - C) Golgi bodies
    - D) Mitochondria
17. The main function of the vacuole in plant cells is to:
    - A) Aid in cellular respiration.
    - B) Provide structural support and storage.
    - C) Synthesize proteins.
    - D) Generate energy.
18. Which of the following structures is unique to plant cells?
    - A) Cell wall
    - B) Ribosomes
    - C) Nucleus

    - D) Plasma membrane
19. Which of the following best describes the function of the plasma membrane?
    - A) It is a rigid barrier that protects the cell.
    - B) It acts as a selective barrier that regulates the movement of substances.
    - C) It provides energy for the cell.
    - D) It stores genetic information.
20. Which organelle is involved in the synthesis of lipids and detoxification of drugs?
    - A) Rough ER
    - B) Smooth ER
    - C) Golgi apparatus
    - D) Ribosome

True/False Questions (21-30)

21. **True/False:** Prokaryotic cells do not have a nucleus.
22. **True/False:** Mitochondria are involved in photosynthesis.
23. **True/False:** The Golgi apparatus modifies and packages proteins for secretion.
24. **True/False:** All eukaryotic cells have chloroplasts.
25. **True/False:** Ribosomes can be found free-floating in the cytoplasm or attached to the rough endoplasmic reticulum.
26. **True/False:** The cell membrane is composed primarily of nucleic acids.
27. **True/False:** Vacuoles are larger and more prominent in plant cells compared to animal cells.
28. **True/False:** Lysosomes are responsible for synthesizing lipids.
29. **True/False:** The cytoplasm is the jelly-like substance that fills the cell and holds organelles in place.
30. **True/False:** The plasma membrane is primarily composed of carbohydrates.

ANSWERS

Answers to Short Answer Questions (1-5)

1. Describe the main differences between prokaryotic and eukaryotic cells. Provide at least three distinguishing features.
    - Prokaryotic cells:
        - Lack a true nucleus; genetic material is in a nucleoid region.
        - Generally smaller and simpler in structure.
        - Lack membrane-bound organelles (e.g., mitochondria, Golgi apparatus).
    - Eukaryotic cells:
        - Have a true nucleus enclosed by a nuclear membrane.

        - Generally larger and more complex.
        - Contain membrane-bound organelles.
2. What is the function of the plasma membrane in a cell? How does its structure facilitate this function?
    - The plasma membrane regulates the movement of substances in and out of the cell, maintaining homeostasis. Its structure, composed of a phospholipid bilayer with embedded proteins, allows for selective permeability, enabling certain molecules to pass while blocking others.
3. Explain the role of ribosomes in the cell. How do they contribute to protein synthesis?
    - Ribosomes are the sites of protein synthesis. They read mRNA (messenger RNA) and translate the genetic code into polypeptide chains (proteins) by linking amino acids in the order specified by the mRNA sequence.
4. Discuss the significance of the endoplasmic reticulum (ER) in eukaryotic cells. Differentiate between the rough ER and smooth ER.
    - The endoplasmic reticulum is crucial for synthesizing and transporting proteins and lipids within the cell.
        - Rough ER: Studded with ribosomes, primarily synthesizes and processes proteins destined for secretion or for use in the cell membrane.
        - Smooth ER: Lacks ribosomes and is involved in lipid synthesis, metabolism, and detoxification of drugs and poisons.
5. Describe the function of lysosomes and explain how they contribute to cellular homeostasis.
    - Lysosomes contain digestive enzymes that break down waste materials, cellular debris, and macromolecules. They contribute to cellular homeostasis by recycling cellular components and maintaining a balanced internal environment.

Answers to Multiple Choice Questions (6-20)

6. C) Nucleus
7. C) Plasma membrane
8. C) Mitochondrion
9. B) Modify, package, and distribute proteins.
10. B) Ribosome
11. B) Structural support and cell shape
12. B) Synthesize carbohydrates through photosynthesis.

13. B) Lysosome
14. B) The ability of the plasma membrane to allow certain substances to enter or leave the cell.
15. B) It contains DNA and is surrounded by a double membrane.
16. B) Ribosomes
17. B) Provide structural support and storage.
18. A) Cell wall
19. B) It acts as a selective barrier that regulates the movement of substances.
20. B) Smooth ER

Answers to True/False Questions (21-30)

21. True: Prokaryotic cells do not have a nucleus.
22. False: Mitochondria are involved in cellular respiration, not photosynthesis (chloroplasts perform photosynthesis).
23. True: The Golgi apparatus modifies and packages proteins for secretion.
24. False: Not all eukaryotic cells have chloroplasts (only plant cells and some protists do).
25. True: Ribosomes can be found free-floating in the cytoplasm or attached to the rough endoplasmic reticulum.
26. False: The cell membrane is composed primarily of lipids and proteins, not nucleic acids.
27. True: Vacuoles are larger and more prominent in plant cells compared to animal cells.
28. False: Lysosomes contain digestive enzymes, not responsible for synthesizing lipids.
29. True: The cytoplasm is the jelly-like substance that fills the cell and holds organelles in place.
30. False: The plasma membrane is primarily composed of lipids and proteins, with carbohydrates attached to proteins and lipids on its surface.