1. Which of the following structures is found in eukaryotic cells but not in prokaryotic cells?
a) Ribosome
b) Nucleus
c) Plasma membrane
d) Cytoplasm

2. What is the primary function of the rough endoplasmic reticulum?
a) ATP production
b) Protein synthesis and transport
c) Lipid synthesis
d) Waste storage

3. Which organelle is responsible for modifying, packaging, and distributing proteins?
a) Mitochondria
b) Lysosome
c) Golgi apparatus
d) Nucleolus

4. In prokaryotic cells, DNA is:
a) Found within a nucleus
b) Circular and free-floating in the cytoplasm
c) Stored in mitochondria
d) Found in multiple chromosomes

5. What is the function of ribosomes in both prokaryotic and eukaryotic cells?
a) Breaking down toxins
b) Synthesizing proteins
c) Transporting nutrients
d) Storing genetic material

6. Which of the following statements about bacterial cells is true?
a) They have a nucleus but lack ribosomes.
b) They reproduce sexually through mitosis.
c) Their cell walls contain peptidoglycan.
d) They have membrane-bound organelles.

7. The mitochondria are often referred to as the "powerhouse of the cell" because:
a) They produce oxygen for cellular respiration.
b) They generate ATP through cellular respiration.
c) They store genetic material.
d) They synthesize proteins.

8. Which organelle is found in plant cells but not in animal cells?
a) Lysosome

b) Chloroplast
c) Golgi apparatus
d) Ribosome

9. What is the function of the plasmid in prokaryotic cells?
a) It stores nutrients for the cell.
b) It carries extra genetic information, often related to antibiotic resistance.
c) It generates ATP through photosynthesis.
d) It allows the cell to carry out mitosis.

10. Which of the following is a correct comparison between prokaryotic and eukaryotic cells?
a) Prokaryotic cells have a nucleus, while eukaryotic cells do not.
b) Eukaryotic cells have membrane-bound organelles, while prokaryotic cells do not.
c) Prokaryotic cells are always larger than eukaryotic cells.
d) Eukaryotic cells lack ribosomes, while prokaryotic cells have them.

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11. Describe two major structural differences between prokaryotic and eukaryotic cells.

12. Explain the role of the cell membrane in maintaining homeostasis.

13. Why do plant cells have both mitochondria and chloroplasts?

14. Describe the function of lysosomes and their importance in animal cells.

15. Identify and explain two structural adaptations that allow bacteria to survive in harsh environments.

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16. You are given two unknown cell samples. One contains a nucleus and mitochondria, while the other has a single circular chromosome and a cell wall made of peptidoglycan.
a) Identify which cell is eukaryotic and which is prokaryotic.
b) Provide two pieces of evidence to support your answer.

17. A scientist discovers a new single-celled organism living in an extreme environment, such as a deep-sea hydrothermal vent. It lacks a nucleus but has a cell wall.
a) Would this organism be classified as a prokaryote or a eukaryote? Explain why.
b) What domain (Bacteria, Archaea, or Eukarya) is this organism most likely part of? Justify your answer.

18. Antibiotics target specific structures in bacterial cells, such as the ribosomes and cell wall.
a) Why do antibiotics typically not harm human cells?
b) How can bacteria become resistant to antibiotics, and why is this a concern for public health?

19. Compare the process of **binary fission** in prokaryotic cells with **mitosis** in eukaryotic cells. How are they similar? How do they differ?

20. Using your knowledge of cell structures and functions, explain why muscle cells contain more mitochondria than skin cells.

In a futuristic experiment, scientists attempt to create an artificial eukaryotic cell. However, the cell fails to function properly. They discover that it lacks ribosomes.

- Predict what effect this would have on the cell's function.
- Explain why ribosomes are necessary for both prokaryotic and eukaryotic cells.