1. Which of the following is **not** a characteristic of life?
   A. Reproduction
   B. Metabolism
   C. Inability to respond to stimuli
   D. Growth and development

2. Which kingdom contains multicellular organisms that are heterotrophic and lack cell walls?
   A. Plantae
   B. Fungi
   C. Animalia
   D. Protista

3. What organelle is responsible for modifying and packaging proteins?
   A. Ribosome
   B. Golgi apparatus
   C. Endoplasmic reticulum
   D. Lysosome

4. Which structure controls the movement of materials in and out of a cell?
   A. Cytoplasm
   B. Cell wall
   C. Nucleus
   D. Cell membrane

5. Prokaryotic cells lack which of the following?
   A. DNA
   B. Cell membrane
   C. Ribosomes
   D. Membrane-bound organelles

6. Which statement best defines osmosis?
   A. Active transport of ions
   B. Diffusion of solutes
   C. Movement of water across a semi-permeable membrane
   D. Transport requiring ATP

7. Which kingdom includes unicellular organisms that often live in extreme environments?
   A. Bacteria
   B. Protista

C. Archaea
D. Fungi

8. What is the function of the mitochondrion?
   A. Produces glucose
   B. Stores waste products
   C. Synthesizes lipids
   D. Produces ATP through cellular respiration

9. Which process describes the use of energy to move substances against their concentration gradient?
   A. Diffusion
   B. Osmosis
   C. Passive transport
   D. Active transport

10. What component is present in plant cells but absent in animal cells?
    A. Cell membrane
    B. Cytoplasm
    C. Cell wall
    D. Mitochondria

11. What does the endosymbiotic theory suggest?
    A. Cells formed spontaneously
    B. Organelles like mitochondria evolved independently
    C. Eukaryotic cells evolved from prokaryotes via symbiosis
    D. DNA was formed from RNA

12. What is the main function of the chloroplast?
    A. ATP synthesis
    B. Protein production
    C. Glucose synthesis via photosynthesis
    D. Lipid digestion

13. The hierarchical classification system begins with:
    A. Kingdom
    B. Domain
    C. Genus
    D. Order

14. What is the basic unit of life?
    A. Atom

B. Cell
C. Molecule
D. Nucleus

15. Which domain includes organisms with no nucleus?
    A. Bacteria and Archaea
    B. Bacteria and Eukarya
    C. Archaea and Eukarya
    D. Fungi and Protista

16. Which of the following is **not** part of the cell theory?
    A. All cells arise from pre-existing cells
    B. Cells are the basic unit of structure
    C. All living organisms are made of cells
    D. Only animal cells are alive

17. What is the main function of ribosomes?
    A. Store nutrients
    B. Synthesize proteins
    C. Control mitosis
    D. Detoxify substances

18. Which structure allows plant cells to maintain turgor pressure?
    A. Nucleus
    B. Vacuole
    C. Ribosome
    D. Chloroplast

19. The fluid mosaic model describes:
    A. Mitochondrial function
    B. Nuclear structure
    C. Membrane structure
    D. DNA replication

20. Which molecule is the **primary energy currency** of the cell?
    A. Glucose
    B. NADPH
    C. ATP
    D. DNA

Answer the following in complete sentences.

1. Define autotroph and heterotroph, and give one example of each.
2. Describe two differences between plant and animal cells.
3. Explain why the surface area-to-volume ratio limits cell size.
4. Describe the steps of the scientific classification system from Domain to Species.
5. What are three functions of the cell membrane?
6. Briefly compare the functions of mitochondria and chloroplasts.
7. What is passive transport? Provide an example.
8. Identify two types of microscope technologies and their applications.
9. What is binary fission, and which organisms use it?
10. Describe the importance of ATP in cellular processes.

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1. Label 6 organelles in a typical eukaryotic plant cell and describe the function of 3.
2. Explain the role of proteins and lipids in cell membrane function.
3. Identify key structures of a mitochondrion and explain their function in cellular respiration.

Answer the following questions in paragraph format.

1. A student places a potato slice in pure water and another in a salt solution. After 30 minutes, one is firm and the other is soft. Explain why, using osmosis and tonicity concepts.
2. Describe how the invention of the microscope transformed biological science and led to the development of the cell theory.
3. You are a scientist designing a new bio-battery powered by cellular respiration. How could knowledge of mitochondria help improve your design? Discuss structure-function relationships and ATP production.