

## Cell Biology Practice Questions

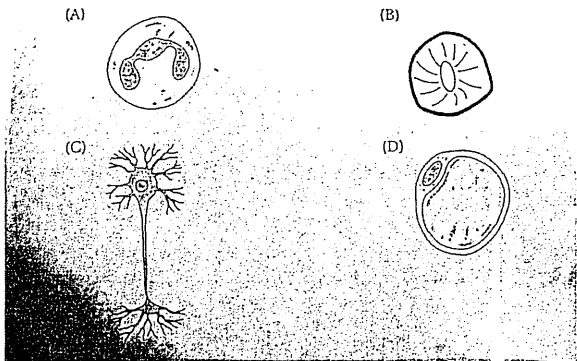
1. Which of the following characteristics would allow you to distinguish a prokaryotic cell from an animal cell?

- a) ribosomes
- b) cell membrane
- c) chloroplasts
- d) cell wall

2. Which aspects of cell structure best reveals the unity of all life?

- a) All cells are surrounded by a plasma membrane.
- b) All cells have at least one nucleus.
- c) All cells carry out cellular respiration in mitochondria.
- d) The surface to volume ratio of all cells is the same.

3. Which cell type is most likely involved in storage?



4. Which of the following structures is present in all cells?

- a) nucleus
- b) cell wall
- c) plasma membrane
- d) mitochondria

5. A plant cell's central vacuole may store the following substances EXCEPT for which?

- a) cytosol
- b) proteins
- c) pigments
- d) inorganic ions

6. Which two subcellular organelles contain unique DNA similar to that of bacteria and are thought to have evolved from prokaryotic symbionts of the first eukaryotic cells?

- a) The nucleus and the endoplasmic reticulum
- b) the chloroplast and the mitochondrion
- c) the nucleolus and the mitochondrion
- d) the chloroplast and the ribosomes

7. In general, animal cells differ from plant cells in that animal cells have

- a) a cell wall made of cellulose
- b) lysosomes
- c) large vacuoles that store water
- d) centrioles within centrosomes

8. Which of the following would most likely describe the fate of a vesicle formed as a result of phagocytosis?

- a) the vesicle merges with a mitochondrion.
- b) the vesicle merges with a lysosome.
- c) the vesicle is shuttled to the nucleus, and its contents become part of the nucleolus.
- d) the vesicle releases its contents to the cytoplasm to be digested.

9. In cells, which of the following can catalyze reactions involving hydrogen peroxide, provide cellular energy, and make proteins, in that order?

- a) peroxisomes, mitochondria, and ribosomes.
- b) peroxisomes, mitochondria, and lysosomes.
- c) peroxisomes, mitochondria, and Golgi apparatus.
- d) Lysosomes, chloroplasts, and ribosomes.

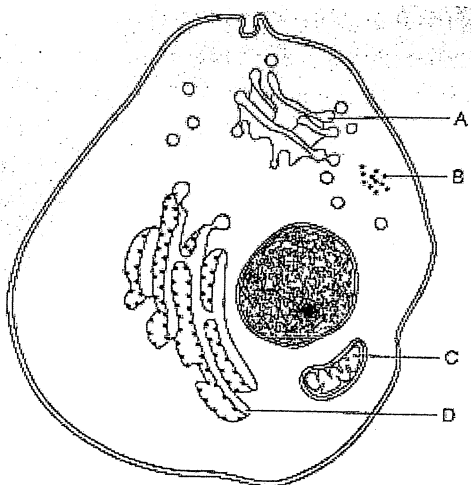
10. Apoptosis is caused by the action of

- a) lysosomes
- b) peroxisomes
- c) ribosomes
- d) toxins

11. All of the following are true of cells except
- They come from pre-existing cells
  - they all perform aerobic respiration to make ATP
  - They all contain DNA and ribosomes
  - Their small size permits the largest surface area to volume ratio for gas exchange.

12. Which of the following is the best match between the research technique and its use?
- Light microscopy: to see the structure of bacteria and viruses
  - electron microscopy: to study the interaction between protists in a sample of pool water.
  - Cell fractionation: to determine the metabolic functions of particular organelles.
  - Gel Electrophoresis: to determine the source of DNA in the cell.

Questions 13 and 14 refer to the following diagram. The diagram shows a mucus cell, a specialized cell of the intestines that secretes mucus (a glycoprotein substance that protects the lining of the intestines).



13. Which structure is responsible for synthesizing the glycoprotein?
14. Which structure is responsible for modifying the glycoprotein before it is secreted?

15. The process of creating a secretory protein involve which sequence of organelles?
- nucleolus – Golgi apparatus – ribosome – plasma membrane
  - nucleus – rough ER – Golgi apparatus – plasma membrane
  - nucleus – rough ER – lysosome – plasma membrane
  - ribosome – Golgi apparatus – nucleolus – plasma membrane

16. Which of the following characteristics would allow you to distinguish a prokaryotic cell from an animal cell?
- ribosomes
  - cell membrane
  - chloroplasts
  - cell wall

17. Which of the following is NOT a characteristic of bacteria?
- Circular double-stranded DNA
  - Membrane-bound cellular organelles
  - Plasma membrane consisting of lipids and proteins
  - Ribosomes that synthesize polypeptides

18. The plasma membrane consists principally of
- proteins embedded in a carbohydrate layer
  - phospholipids embedded in a protein layer
  - proteins embedded in a phospholipid layer
  - proteins embedded in a nucleic acid layer

19. The cellular structure that is involved in producing ATP during aerobic respiration is the
- ribosomes
  - mitochondrion
  - chloroplast
  - nucleolus

20. All of the following are known to be components of cell walls EXCEPT:

- phospholipids
- chitin
- polysaccharides
- peptidoglycans

21. Which of the following best characterizes the structure of the plasma membrane?
- rigid and unchanging
  - rigid but varying from cell to cell
  - fluid but unorganized
  - very active
22. Which organelle contains DNA?
- ribosomes
  - mitochondria
  - Golgi body
  - lysosomes
23. The best definition of a cell is
- a unit of life that moves.
  - a unit of biological activity bounded by a semipermeable membrane and capable of independent self-replication
  - the part of an animal or plant that has DNA, RNA, and protein in a polymorphic arrangement within the nucleus
  - the unit of mitochondria, lysosomes, golgi apparatus, and vesicles arranged in concentric rings.
24. Powerful protolytic enzymes will be found in
- golgi apparatus
  - mitochondria
  - lysosomes
  - endoplasmic reticulum
25. Mitochondrion is to energy production as
- cell is to tissue
  - lysosome is to intracellular digestion
  - lysosome is to intracellular digestion
  - mitochondria is to cristae
26. The cell organelle characterized by stacked membranes called grana would most likely be involved in
- cellular respiration
  - protein synthesis
  - photophosphorylation
  - intracellular digestion
27. Mitochondria are thought to be descendants of endosymbiotic bacterial cells. Which of the following statements best supports this statement?
- Mitochondria and bacteria possess different ribosomes and DNA
  - Mitochondria and bacteria possess similar ribosomes and DNA
  - Both mitochondria and bacteria have cristae
  - Neither mitochondria nor bacteria possess chloroplasts
28. Which of the following best describes the theory of serial endosymbiosis?
- a prokaryotic cell takes up genes from the surrounding environment.
  - An organism will benefit from a symbiotic relationship, while neither is harmed.
  - Some organelles were once small prokaryotes.
  - Prokaryotes mediate the return of elements from the nonliving components of the environment.
29. Prokaryotic cells lack
- DNA
  - cell membranes
  - ribosomes
  - mitochondria
30. Which of the following features are present in both prokaryotic and eukaryotic cells?
- Nucleus
  - Endoplasmic reticulum
  - ribosomes
  - mitochondria
31. Prokaryotes differ from eukaryotes in that only eukaryotes
- include bacteria
  - have naked DNA without proteins
  - have a nucleus
  - have flagella

32. A small circle of DNA found outside the main chromosome in bacteria is called a
- a) retrovirus    b) plasmid  
c) gene          d) mitochondrion
33. Prokaryotes may contain each of the following structures EXCEPT
- a) lysosomes    b) cell membrane  
c) cell wall    d) photosynthetic apparatus
34. A cell lacking microtubules has problems
- a) synthesizing DNA    b) storing molecules  
c) maintaining its shape    d) synthesizing RNA
35. Which of the following organelles is involved in storage, modification, and packaging of secretory enzymes produced by the ribosomes?
- a) The lysosome          b) the mitochondrion  
c) the nucleolus        d) the Golgi apparatus
36. Centrioles are
- a) contained within microtubule organizing centers  
b) a period in which DNA is replicated  
c) DNA-protein complexes making up eukaryotic chromosomes  
d) a period of renewed protein synthesis
37. Animal cells can be generally distinguished from plant cells by
- a) presence of cell walls          b) presence of chloroplasts  
c) lack of central vacuoles        d) lack of lysosomes
38. Cell fractionation can be accomplished using
- a) ultracentrifuge          b) hydrochloric acid  
c) scanning electron microscope    d) scalpel
39. Which of the following contains oxidative enzymes and are important in intracellular digestion?
- a) peroxisomes                  b) ribosomes  
c) plastids                        d) Golgi apparatus
40. Which of the following does NOT have a membrane in an animal cell?
- a) vacuole          b) mitochondria  
c) nucleus         d) microtubules
41. Which is NOT a component in animal cell membranes?
- a) nucleotides                  b) proteins  
c) cholesterol                 d) carbohydrates
42. Cell surface carbohydrates are important for
- a) cell-cell recognition    b) structural integrity  
c) fluidity                      d) selectivity of the membrane
43. All of the following statements about the digestive properties of a lysosome are correct EXCEPT
- a) the Golgi apparatus sends vesicles filled with hydrolytic enzymes to the lysosome  
b) lysosomes fuse with food vacuoles formed from phagocytosis  
c) lysosome contents can kill a cell upon first contact with the cytosol  
d) lysosomes can program the death of the cell in which it is contained.
44. Passage through the nuclear membrane is regulated by
- a) microtubules                  b) nucleolus RNA  
c) rough ER  
d) embedded proteins in ring conformation
45. The need for cellular efficiency limits
- a) cellular respiration    b) numbers of organelles  
c) surface:volume ratio    d) types of organelles

## Cell Biology Sample Free Response Questions

1. The following data were collected by observing subcellular structures of three different types of eukaryotic cells.

RELATIVE AMOUNTS OF ORGANELLES IN THREE CELL TYPES

Cell Type	Smooth ER	Rough ER	Mitochondria	Cilia	Golgi Bodies
X	Small amount	Small amount	Large number	Present	Small amount
Y	Large amount	Large amount	Moderate number	Absent	Large amount
Z	Absent	Absent	Absent	Absent	Absent

Based on an analysis of the data, **identify** a likely primary function of each cell type and **explain** how the data support the identification. (3)

2. The membranes of the rough endoplasmic reticulum have a very large surface area.

In one or two sentences, describe how a large surface area aids the activities of the structure. (2)

3. Glycoproteins produced in the rough endoplasmic reticulum may ultimately be exported from the cell.

In two or three sentences, describe the pathway of the glycoprotein from the ER to the outside of the cell. (3)

4. Living cells are highly organized and regulated.

- Describe the structure of the plasma membrane.
- Explain how the plasma membrane contributes to the regulation of the cell.

5. What evidence supports the theory that chloroplasts and mitochondria are evolved from prokaryotic cells?

6. The idea of surface area is an important concept in biology.

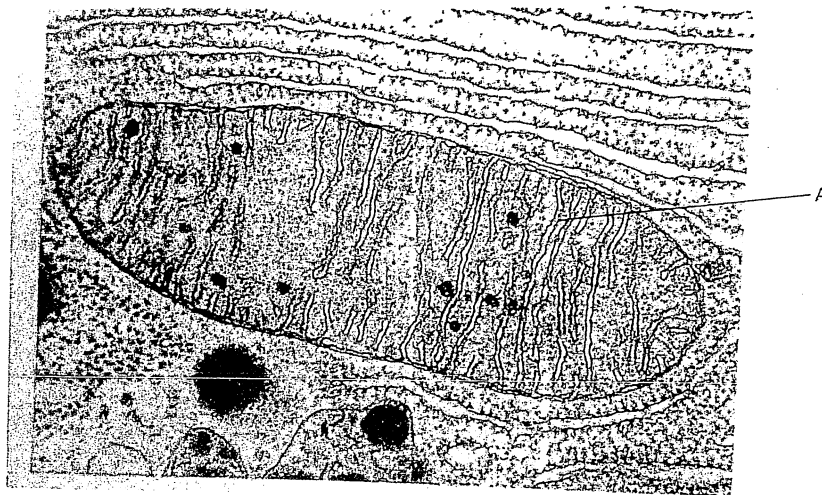
Explain how surface area plays a critical role in the digestive system.

7. In 1941, Davson and Danielli proposed a trilaminar structure of the cell membrane. The model consisted of a layer of lipid with a layer of protein on either side.

Describe the current model for the cell membrane.

8. Describe and discuss THREE differences between prokaryotic and eukaryotic cells.

9. Identify the cell organelle shown in the micrograph below.



10. Identify the structure labeled A, and explain how it is adapted for the organelle to function efficiently.