

Q1W5-Bio10-A view of the cell-Qs Bank

True/False

Indicate whether the statement is true or false.

- ___ 1. The structure and properties of the cell wall allow it to be selective and maintain homeostasis.
- ___ 2. The plasma membrane is a bilayer of lipid molecules with protein molecules embedded in it.
- ___ 3. A phospholipid molecule has a nonpolar, water-insoluble head attached to a long polar, soluble tail.
- ___ 4. The fluid mosaic model describes the plasma membrane as a structure that is liquid and very rigid.
- ___ 5. Eukaryotic plasma membranes can contain cholesterol, which tends to make the membrane more stable.
- ___ 6. Transport proteins span the cell membrane, allowing the selectively permeable membrane to regulate which molecules enter and leave a cell.
- ___ 7. Proteins at the inner surface of the plasma membrane attach the membrane to the cell's support structure, making the cell rigid.

Matching

Match each item with the correct statement below.

- | | |
|------------------------------|--------------------|
| a. Schleiden | d. Schwann |
| b. compound light microscope | e. Hooke |
| c. electron microscope | f. van Leeuwenhoek |
-
- ___ 8. The first scientist to describe living cells as seen through a simple microscope
 - ___ 9. Uses two or more glass lenses to magnify either living cells or prepared slides
 - ___ 10. A scientist who observed that cork was composed of tiny, hollow boxes that he called cells
 - ___ 11. A scientist who concluded that all plants are composed of cells
 - ___ 12. A scientist who concluded that all animals are composed of cells
 - ___ 13. The microscope that allowed scientists to view molecules

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ___ 14. Which of the following organisms do not have cell walls?
 - a. plants
 - b. fungi
 - c. bacteria
 - d. animals
- ___ 15. Which of the following is NOT true of plasma membranes?
 - a. Folded membranes increase surface area for efficiency.
 - b. Folded membranes do not form compartments in the cell.
 - c. Endoplasmic reticulum is made up of folded membranes.
 - d. Ribosomes are sometimes attached to folded membranes.
- ___ 16. Folded membranes are an advantage to a cell because _____.
 - a. cell processes can be more efficient
 - b. the membranes provide a large surface area
 - c. the membranes form interconnected compartments
 - d. all of these

- ____ 17. Who concluded that all plants are made of living cells?
- Virchow
 - Hooke
 - Schwann
 - Schleiden
- ____ 18. All living things are made up of ____.
- cells
 - cork
 - wastes
 - cellulose
- ____ 19. What do electron microscopes use to focus and magnify an image?
- glass lenses
 - X rays
 - electron beams
 - light
- ____ 20. Each of the following is a main idea of the cell theory except ____.
- all organisms are composed of cells
 - the cell is the basic unit of organization of organisms
 - all cells are similar in structure and function
 - all cells come from preexisting cells
- ____ 21. The scientist who first described living cells as seen through a simple microscope was ____.
- van Leeuwenhoek
 - Schleiden
 - Hooke
 - Schwann
- ____ 22. One advantage of electron microscopes over light microscopes is their ____.
- size
 - higher magnification
 - two-dimensional image
 - use of live specimens
- ____ 23. If a cell contains a nucleus, it must be a(n) ____.
- plant cell
 - eukaryotic cell
 - animal cell
 - prokaryotic cell
- ____ 24. In a chloroplast, the stacks of membranous sacs are called ____.
- stroma
 - grana
 - plastids
 - thylakoid membrane
- ____ 25. Because cells have a watery environment both inside and outside, the polar ends of the phospholipids in the plasma membrane form ____ layers
- several
 - mosaic
 - double
 - single
- ____ 26. The fluid mosaic model describes a structure with ____.
- polar layers on the outside and nonpolar layer on the inside
 - nonpolar layers on the outside and a polar layer on the inside
 - polar layers on both inside and outside
 - nonpolar layers on both inside and outside
- ____ 27. Because the phospholipid molecules and some proteins are free to move, the plasma membrane is said to be a ____.
- bilayer
 - solid
 - fluid mosaic
 - fatty acid
- ____ 28. Which of the following might be a result of a disease that causes a thickened plasma membrane?
- increased movement of molecules entering the cell
 - decreased movement of molecules within the cell
 - decreased movement of molecules entering the cell
 - increased movement of molecules leaving the cell
- ____ 29. A cell's contents would be the same as its surrounds, were it not for ____.
- plasmolysis
 - selective permeability
 - phagocytosis
 - dynamic equilibrium
- ____ 30. A plasma membrane is made up of a(n) ____.

- a. cholesterol layer
- b. enzyme bilayer
- c. lipid bilayer
- d. protein layer

____ 31. Which is not a way that Figure 7-2 is a model of cellular theory?

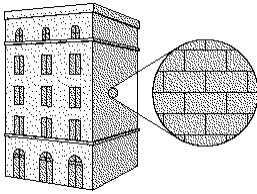


Figure 7-2

- a. bricks are small units in a building
- b. bricks are solid
- c. there are many bricks in a building
- d. bricks are organized to make a larger unit

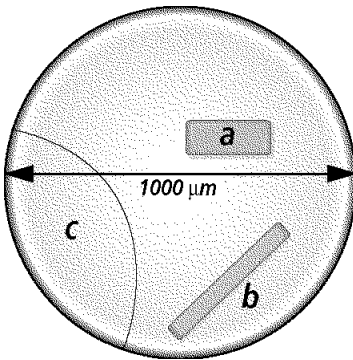


Figure 7-3

- ____ 32. What is the approximate size of A in Figure 7-3?
- a. 400 μm
 - b. 500 μm
 - c. 700 μm
 - d. 1000 μm
- ____ 33. What is the approximate size of B in figure 7-3?
- a. 400 μm
 - b. 500 μm
 - c. 700 μm
 - d. 1000 μm
- ____ 34. What would be the best way to estimate the size of C in Figure 7-3?
- a. increase magnification
 - b. decrease magnification
 - c. estimate by what you can see
 - d. assume it is 2000 μm

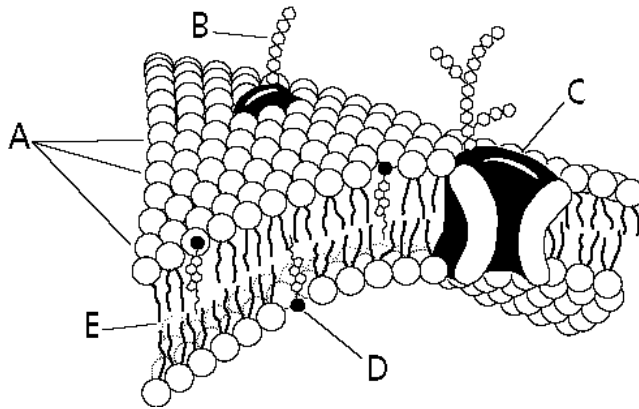


Figure 7-4

- ___ 35. What would happen to the structure in Figure 7-4 if part D is completely removed?
- | | |
|--------------------------|-----------------------------------|
| a. it would become solid | c. it would have holes in it |
| b. it would disintegrate | d. it would collapse in on itself |
- ___ 36. What structure is analogous to a sewage system?
- | | |
|------|------|
| a. A | c. C |
| b. B | d. D |
- ___ 37. Where are you least likely to find water in the structure shown in Figure 7-4
- | | |
|------|------|
| a. A | c. C |
| b. B | d. E |
- ___ 38. Which of the following pictures in Figure 7-5 most likely approximate the motion phospholipids make in a plasma membrane?

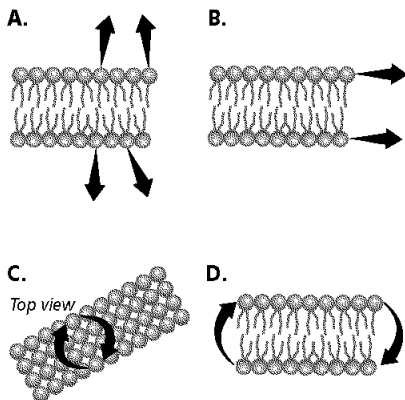


Figure 7-5

- | | |
|------|------|
| a. A | c. C |
| b. B | d. D |

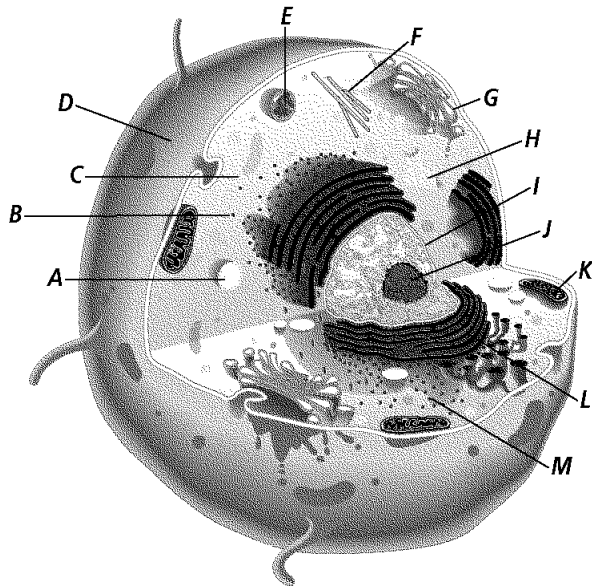


Figure 7-6

- ___ 39. Which structure in Figure 7-6 is the cell control center?
- | | |
|------|------|
| a. A | c. I |
| b. G | d. M |
- ___ 40. Which structure in Figure 7-6 maintains homeostasis?
- | | |
|------|------|
| a. B | c. H |
| b. D | d. L |
- ___ 41. Which structure in Figure 7-6 is responsible for chemical reactions?
- | | |
|------|------|
| a. A | c. J |
| b. E | d. L |
- ___ 42. Which structure in Figure 7-6 transforms energy?
- | | |
|------|------|
| a. C | c. J |
| b. G | d. K |
- ___ 43. Which structure in Figure 7-6 sorts and transports?
- | | |
|------|------|
| a. B | c. I |
| b. G | d. M |
- ___ 44. Which parts of Figure 7-6 are in a prokaryotic cell?
- | | |
|------------|------------|
| a. D and M | c. C and J |
| b. A and K | d. G and L |
- ___ 45. A cell contains the structure shown in Figure 7-7. What other cell structure that is not found in all eukaryotic cells is likely to be found in this cell?

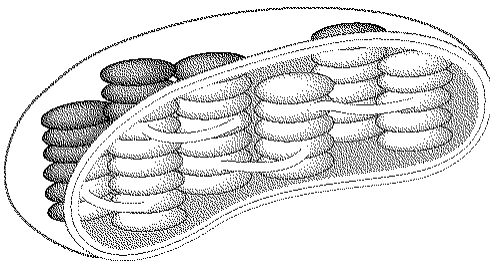


Figure 7-7

- | | |
|-----------------|--------------|
| a. mitochondria | c. cell wall |
|-----------------|--------------|

b. ribosomes

d. plasma membrane

Completion

Complete each statement.

46. Cell structures that contain digestive enzymes are _____.
47. In a cell, the sites of protein synthesis are the _____.
48. The small, membrane-bound structures inside a cell are _____.
49. The movement of materials into and out of the cells is controlled by the _____.
50. An organism with a cell that lacks a true nucleus is a(n) _____.
51. Short, hairlike projections used for locomotion are _____.
52. In plants, the structures that transform light energy into chemical energy are called _____.
53. The pigment that gives plants their green color is _____.
54. In a cell, the tangles of long strands of DNA form the _____.
55. A structure outside the plasma membrane in some cells is the _____.

Short Answer

56. In plants, cells that transport water against the force of gravity are found to contain many more mitochondria than do some other plant cells. What is the reason for this?

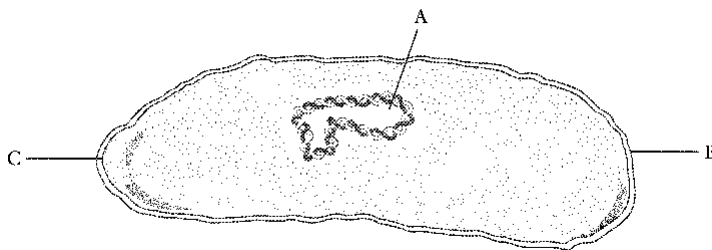


Figure 7-1

57. Figure 7-1 shows a light area with no surrounding membrane in the center of the cell. This area contains a single large DNA molecule. Would scientists classify this cell as a prokaryote or a eukaryote? Explain.
58. Identify the structures labeled A, B, and C in Figure 7-1.
59. The inner membrane of the mitochondria is folded many times. What advantage does this folding provide?
60. At one time people believed that organisms could be formed spontaneously from nonliving matter. Evaluate this belief in light of the cell theory.
61. What is the difference between an electron microscope and a compound microscope?
62. Explain why scientists have only recently begun to understand how the cytoskeleton functions in the cell.
63. Based on what you know about cells, why are microscopes important to the study of cells?

64. Between which cell types is the difference greater--plant and animal cells or prokaryotic and eukaryotic cells? Give reasons for your answer.

For many years, scientists thought of the nucleus as "a bag of chromatin floating in a sea of cytoplasm." Using electron microscopes, scientists saw that the nucleus was much more complex. The nuclear envelope was two layered and covered with pores.

Scientists began further research. Scientist S punched small holes in the nuclear envelope, allowing the contents to pour out. He observed that the nucleus retained its spherical shape. From this, scientist S hypothesized that the nucleus had some other structural framework, beyond the membrane itself. The next experiment performed by scientist S revealed that the nucleus indeed had a fibrous protein framework, now called the nuclear matrix.

Three other scientists repeated this experiment, but each changed one part of it. Scientist X used detergents and salt to remove the nuclear contents. Scientist Y used chemicals, and scientist Z used enzymes. All three observed that a nuclear matrix remained.

Further electron microscopy revealed that the chromatin strands were anchored to a fibrous layer that lines the inner layer of the nuclear envelope.

65. What was the variable in the experiments by scientists X, Y, and Z?
66. Why did scientists X, Y, and Z carry out their experiments?
67. What observation from scientist S's second experiment supported the original hypothesis?
68. What was the hypothesis of scientist S in his first experiment?
69. Why is it important that some proteins extend all the way through the bilayer of a plasma membrane?

In the 1890s, E. Overton performed experiments to determine the structure of the plasma membrane. After many years and various procedures, he determined that large, uncharged molecules enter a cell at a rate proportional to their solubility in lipids. This observation was the first indication that the plasma membrane is probably made up of lipids. Many scientists began to pursue the question of how the lipids were arranged.

In 1925, two Dutch scientists determined that the area covered by the lipids from a single red blood cell is twice the area of the surface of the cell. From this, they reasoned that the cell is covered by a double layer of lipid molecules. Based on this work, various scientists hypothesized that the membrane was like a "fat sandwich" with two outer layers of protein on the surface of the lipid layer.

None of the ideas seemed a satisfactory explanation until microscopic studies of membranes prepared by a new technique of "freeze-fracture" revealed that the proteins are actually embedded in the lipid layer. In 1972, on the basis on these results and other evidence, two American scientists proposed the fluid-mosaic model.

70. Why was it almost 50 years between the Dutch scientists' research and the proposal of a fluid mosaic model?
71. What model of the plasma membrane was based on the Dutch scientists' results?
72. What inference did the Dutch scientists make to reach their conclusion?
73. What conclusion did the Dutch scientists reach?
74. Is Overton's hypothesis stated in the discussion above? If so, what was it?
75. What was the problem that Overton was trying to solve with his experiment?

Q1W5-Bio10-A view of the cell-Qs Bank Answer Section

TRUE/FALSE

- | | |
|-----------|--------|
| 1. ANS: F | PTS: 1 |
| 2. ANS: T | PTS: 1 |
| 3. ANS: F | PTS: 1 |
| 4. ANS: F | PTS: 1 |
| 5. ANS: T | PTS: 1 |
| 6. ANS: T | PTS: 1 |
| 7. ANS: F | PTS: 1 |

MATCHING

- | | |
|------------|--------|
| 8. ANS: F | PTS: 1 |
| 9. ANS: B | PTS: 1 |
| 10. ANS: E | PTS: 1 |
| 11. ANS: A | PTS: 1 |
| 12. ANS: D | PTS: 1 |
| 13. ANS: C | PTS: 1 |

MULTIPLE CHOICE

- | | | | |
|---------------------------------|--------|--------|----------|
| 14. ANS: D NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-8 |
| 15. ANS: B NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-7 |
| 16. ANS: D NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-7 |
| 17. ANS: D NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-3 |
| 18. ANS: A NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-3 |
| 19. ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-2 |
| 20. ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-3 |
| 21. ANS: A NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-1 |
| 22. ANS: B NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-2 |
| 23. ANS: B NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-8 |
| 24. ANS: B NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-6 |

| | | | | |
|-----|-----------------------------|--------|--------|----------|
| 25. | ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-5 |
| 26. | ANS: A NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-5 |
| 27. | ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-5 |
| 28. | ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-4 |
| 29. | ANS: B NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-4 |
| 30. | ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-5 |
| 31. | ANS: B NAT: C1 C5 G1 | PTS: 1 | DIF: A | OBJ: 7-3 |
| 32. | ANS: A NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-1 |
| 33. | ANS: B NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-1 |
| 34. | ANS: B NAT: C1 C5 G1 | PTS: 1 | DIF: A | OBJ: 7-1 |
| 35. | ANS: D NAT: C1 C5 G1 | PTS: 1 | DIF: A | OBJ: 7-3 |
| 36. | ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: A | OBJ: 7-3 |
| 37. | ANS: D NAT: C1 C5 G1 | PTS: 1 | DIF: A | OBJ: 7-3 |
| 38. | ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: A | OBJ: 7-4 |
| 39. | ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-5 |
| 40. | ANS: B NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-5 |
| 41. | ANS: D NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-5 |
| 42. | ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-5 |
| 43. | ANS: B NAT: C1 C5 G1 | PTS: 1 | DIF: B | OBJ: 7-5 |
| 44. | ANS: A NAT: C1 C5 G1 | PTS: 1 | DIF: A | OBJ: 7-5 |
| 45. | ANS: C NAT: C1 C5 G1 | PTS: 1 | DIF: A | OBJ: 7-7 |

COMPLETION

| | | | | |
|-----|----------------|--------|----------|-------------------|
| 46. | ANS: lysosomes | | | |
| | PTS: 1 | DIF: B | OBJ: 7-6 | NAT: C1 C5 G1 |

47. ANS: ribosomes

PTS: 1 DIF: B OBJ: 7-6 NAT: C1 | C5 | G1

48. ANS: organelles

PTS: 1 DIF: B OBJ: 7-6 NAT: C1 | C5 | G1

49. ANS: plasma membrane

PTS: 1 DIF: B OBJ: 7-4 NAT: C1 | C5 | G1

50. ANS: prokaryote

PTS: 1 DIF: B OBJ: 7-1 NAT: C1 | C5 | G1

51. ANS: cilia

PTS: 1 DIF: B OBJ: 7-6 NAT: C1 | C5 | G1

52. ANS: chloroplasts

PTS: 1 DIF: B OBJ: 7-6 NAT: C1 | C5 | G1

53. ANS: chlorophyll

PTS: 1 DIF: B OBJ: 7-6 NAT: C1 | C5 | G1

54. ANS: chromatin

PTS: 1 DIF: B OBJ: 7-6 NAT: C1 | C5 | G1

55. ANS: cell wall

PTS: 1 DIF: B OBJ: 7-6 NAT: C1 | C5 | G1

SHORT ANSWER

56. ANS:

Mitochondria are organelles that produce energy for cell reactions; active cells usually have more mitochondria than do less active cells. It would be reasonable to conclude that the number of mitochondria is in direct relation to the amount of work done by the cells.

PTS: 1 DIF: A OBJ: 7-6 NAT: C1 | C5 | G1

57. ANS:

Scientists would classify this bacterium as a prokaryote because it has no membrane-bound internal structures and it does not have a distinct nucleus, even though it does contain a nucleoid with DNA.

PTS: 1 DIF: B OBJ: 7-1 NAT: C1 | C5 | G1

58. ANS:

A is the nucleoid; B is the cell wall; C is the plasma membrane.

PTS: 1 DIF: B OBJ: 7-1 NAT: C1 | C5 | G1

59. ANS:

The folds provide more surface area for cell reactions in a small space.

PTS: 1 DIF: A OBJ: 7-7 NAT: C1 | C5 | G1

60. ANS:
According to the cell theory, such a belief is unfounded. This is because all cells must come from preexisting cells, not from nonliving matter.
- PTS: 1 DIF: A OBJ: 7-3 NAT: C1 | C5 | G1
61. ANS:
An electron microscope aims electrons at the specimen and uses magnets to focus the beam. A compound microscope aims light at the specimen and uses glass lenses to focus the light.
- PTS: 1 DIF: A OBJ: 7-2 NAT: C1 | C5 | G1
62. ANS:
Until recently, the cytoskeleton could not be seen with existing microscopes. As more sophisticated microscopes were built, scientists were able to see the microtubule and microfilament structure in greater detail and determine their functions.
- PTS: 1 DIF: A OBJ: 7-1 NAT: C1 | C5 | G1
63. ANS:
Because cells are tiny, they cannot be seen with the naked eye. Microscopes enlarge the image so that the parts of a cell can be identified.
- PTS: 1 DIF: A OBJ: 7-1 NAT: C1 | C5 | G1
64. ANS:
The difference between prokaryotic and eukaryotic cells is greater because these two types of cells differ in basic cell organization. Eukaryotic cells are characterized by membrane-bound organelles. Prokaryotic cells do not have membrane-bound organelles and must carry on all essential life processes without them. Plant and animal cells are both eukaryotic and have many organelles in common (for example, nucleus, mitochondria, ER, Golgi apparatus, lysosomes). Animal cells lack a cell wall and the plastids found in plant cells.
- PTS: 1 DIF: A OBJ: 7-8 NAT: C1 | C5 | G1
65. ANS:
The variable was the method and substance used to remove the contents of the nucleus. Each scientist used a different substance.
- PTS: 1 DIF: A OBJ: 7-6 NAT: C1 | C5 | G1
66. ANS:
to verify or disprove the presence of a nuclear matrix reported by scientist S
- PTS: 1 DIF: A OBJ: 7-6 NAT: C1 | C5 | G1
67. ANS:
A fibrous protein network (nuclear matrix) was observed to be present in the nucleus.
- PTS: 1 DIF: A OBJ: 7-6 NAT: C1 | C5 | G1
68. ANS:
that the nucleus would retain its shape even when its contents were removed
- PTS: 1 DIF: A OBJ: 7-6 NAT: C1 | C5 | G1
69. ANS:
These proteins provide a means by which small dissolved particles that cannot diffuse through the lipid bilayer can cross the cell membrane.

- PTS: 1 DIF: A OBJ: 7-5 NAT: C1 | C5 | G1
70. ANS:
A new procedure, "freeze-fracture," had to be developed before scientists could observe the actual arrangement of lipids and proteins.
- PTS: 1 DIF: A OBJ: 7-5 NAT: C1 | C5 | G1
71. ANS:
the "fat sandwich" model
- PTS: 1 DIF: A OBJ: 7-4 NAT: C1 | C5 | G1
72. ANS:
Because the surface area of the red blood cell was only half the surface area of the lipids from that cell, the cell covering must be a double layer of lipids.
- PTS: 1 DIF: A OBJ: 7-4 NAT: C1 | C5 | G1
73. ANS:
that the membrane consists of a double layer of lipid molecules
- PTS: 1 DIF: A OBJ: 7-4 NAT: C1 | C5 | G1
74. ANS:
No
- PTS: 1 DIF: A OBJ: 7-4 NAT: C1 | C5 | G1
75. ANS:
He was trying to determine the structure of the plasma membrane.
- PTS: 1 DIF: A OBJ: 7-4 NAT: C1 | C5 | G1