**Cell Structures**

**True or False** *Write true if the statement is true or false if the statement is false.*

\_\_\_\_\_ 1. The water-hating hydrophobic tails of the phospholipid bilayer face the outside of the cell membrane.

\_\_\_\_\_ 2. The cytoplasm essentially acts as a “skeleton” inside the cell.

\_\_\_\_\_ 3. Roundworms have organ system-level organization, in which groups of organs work together to do a specific job.

\_\_\_\_\_ 4. Plant cells have special structures that are not found in animal cells, including a cell membrane, a large central vacuole, and plastids.

\_\_\_\_\_ 5. Centrioles help organize chromosomes before cell division.

\_\_\_\_\_ 6. Ribosomes can be found attached to the endoplasmic reticulum.

\_\_\_\_\_ 7. ATP is made in the mitochondria.

\_\_\_\_\_ 8. Many of the biochemical reactions of the cell occur in the cytoplasm.

\_\_\_\_\_ 9. Animal cells have chloroplasts, organelles that capture light energy from the sun and use it to make food.

\_\_\_\_\_ 10. Small hydrophobic molecules can easily pass through the plasma membrane.

\_\_\_\_\_ 11. In cell-level organization, different cells are specialized for different functions.

\_\_\_\_\_ 12. The flagella on your lung cells sweep foreign particles and mucus toward the mouth and nose.

\_\_\_\_\_ 13. Mitochondria contains its own DNA.

\_\_\_\_\_ 14. The plasma membrane is a single phospholipid layer that supports and protects a cell and controls what enters and leaves it.

\_\_\_\_\_ 15. The cytoskeleton is made from thread-like filaments and tubules.

**Critical Reading** *Read these passages from the text and answer the questions that follow.*

**Plasma Membrane**

The plasma membrane forms a barrier between the cytoplasm inside the cell and the environment outside the cell. It protects and supports the cell and also controls everything that enters and leaves the cell. It allows only certain substances to pass through, while keeping others in or out. The ability to allow only certain molecules in or out of the cell is referred to as selective permeability or semipermeability. To understand how the plasma membrane controls what crosses into or out of the cell, you need to know its composition.

**Phospholipid Bilayer**

The plasma membrane is composed mainly of phospholipids, which consist of fatty acids and alcohol. The phospholipids in the plasma membrane are arranged in two layers, called a phospholipid bilayer. As shown in the figure below, each phospholipid molecule has a head and two tails. The head “loves” water (hydrophilic) and the tails “hate” water (hydrophobic). The water-hating tails are on the interior of the membrane, whereas the water-loving heads point outwards, toward either the cytoplasm or the fluid that surrounds the cell.

Molecules that are hydrophobic can easily pass through the plasma membrane, if they are small enough, because they are water-hating like the interior of the membrane. Molecules that are hydrophilic, on the other hand, cannot pass through the plasma membrane — at least not without help — because they are water-loving like the exterior of the membrane.



The phospholipid bilayer consists of two layers of phospholipids (left), with a hydrophobic, or water-hating, interior and a hydrophilic, or water-loving, exterior. A single phospholipid molecule is depicted on the right.

**Other Molecules in the Plasma Membrane**

The plasma membrane also contains other molecules, primarily other lipids and proteins. The green molecules in the figure above, for example, are the lipid cholesterol. Molecules of cholesterol help the plasma membrane keep its shape. Many of the proteins in the plasma membrane assist other substances in crossing the membrane.

**Extensions of the Plasma Membrane**

The plasma membrane may have extensions, such as whip-like flagella or brush-like cilia. In single-celled organisms, the membrane extensions may help the organisms move. In multicellular organisms, the extensions have other functions. For example, the cilia on human lung cells sweep foreign particles and mucus toward the mouth and nose.

*Questions*

1. What is the plasma membrane?

2. What is the meaning of *semipermeability*?

3. Discuss why the plasma membrane must be a bilayer.

4. What are some of the “other” molecules in the plasma membrane? Describe their function.

5. What are cilia and flagella?

**Multiple Choice** *Circle the letter of the correct choice.*

1. The “power plant” of the cell is the
	1. nucleus.
	2. ribosome.
	3. chloroplast.
	4. mitochondria.
2. Which organelle ensures that after cell division each daughter cell has the correct number of chromosomes?
	1. the nucleus
	2. the endoplasmic reticulum
	3. the centriole
	4. the cytoskeleton
3. Structures specific in plant cells but not in animal cells include
	1. a large central vacuole.
	2. the mitochondria.
	3. the cell membrane.
	4. the cytoplasts.
4. Having tissues that digest food, such as in the jellyfish, is an example of
	1. cell-level organization.
	2. tissue-level organization.
	3. organ-level organization.
	4. organ system-level organization.
5. The plasma membrane contains which of the following?
	1. phospholipids
	2. cholesterol molecules
	3. many proteins
	4. all of the above
6. Which of the following is true of the nucleus?
	1. The nucleus is considered the control center of the cell.
	2. The nucleus contains all the cell's DNA.
	3. All cells have a nucleus.
	4. all of the above
7. Which structure determines what molecules can enter and leave the cell?
	1. the plasma membrane
	2. the cell wall
	3. the nucleus
	4. all of the above
8. Which organelle may have allowed early eukaryotes to make food and produce oxygen?
	1. the Golgi apparatus
	2. the central vacuole
	3. the plastids
	4. the cell wall

**Matching** *Match the vocabulary word with the proper definition.*

**Definitions**

\_\_\_\_\_ 1. the arrangement of phospholipids in the plasma membrane

\_\_\_\_\_ 2. helps make and transport proteins and lipids

\_\_\_\_\_ 3. stores and transports protein and lipid molecules

\_\_\_\_\_ 4. helps the cell maintain its shape and holds cell organelles in place within the cytoplasm

\_\_\_\_\_ 5. layer that surrounds the plasma membrane of a plant cell

\_\_\_\_\_ 6. help organize the chromosomes before cell division

\_\_\_\_\_ 7. organelle that processes proteins and prepares them for use inside and outside the cell

\_\_\_\_\_ 8. larger of the sac-like organelles that store and transport materials in the cell

\_\_\_\_\_ 9. describes the formation of eukaryotic cells

\_\_\_\_\_ 10. energy-carrying molecule

\_\_\_\_\_ 11. stores substances such as water, enzymes, and salts in plant cells

\_\_\_\_\_ 12. “power plant” of the cell

**Terms**

a. ATP

b. cell wall

c. central vacuole

d. centriole

e. cytoskeleton

f. endoplasmic reticulum

g. endosymbiotic theory

h. Golgi apparatus

i. mitochondria

j. phospholipid bilayer

k. vacuole

l. vesicle

**Fill in the Blank** *Fill in the blank with the appropriate term.*

1. The \_\_\_\_\_\_\_\_\_\_\_\_ is often considered to be the cell’s control center.

2. The \_\_\_\_\_\_\_\_\_\_\_\_ consists of everything inside the plasma membrane of the cell.

3. The plasma membrane forms a \_\_\_\_\_\_\_\_\_\_\_\_ between the inside and outside of the cell.

4. The \_\_\_\_\_\_\_\_\_\_\_\_ is essentially a “skeleton” inside the cell.

5. The rough endoplasmic reticulum is covered with \_\_\_\_\_\_\_\_\_\_\_\_.

6. Lysosomes use \_\_\_\_\_\_\_\_\_\_\_\_ to break down foreign matter and dead cells.

7. \_\_\_\_\_\_\_\_\_\_\_\_ cells specifically have a cell wall, a large central vacuole, and chloroplasts.

8. The endoplasmic reticulum is an organelle that helps make and transport \_\_\_\_\_\_\_\_\_\_\_\_ and lipids.

9. Mitochondria are sometimes referred to as the \_\_\_\_\_\_\_\_\_\_\_\_ of the cell

10. Human beings have \_\_\_\_\_\_\_\_\_\_\_\_-level organization, in which groups of organs work together to do a certain job.

11. Centrioles help make sure each daughter cell has the correct number of \_\_\_\_\_\_\_\_\_\_\_\_ after the cell divides.

12. Cilia and \_\_\_\_\_\_\_\_\_\_\_\_ are extensions of the plasma membrane of many cells.

**Critical Writing** *Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.*

Discuss the properties of the plasma membrane that allow it to act as a barrier around the cell. Include the specifics of the phospholipid bilayer.