

Cell Theory Reading

What is cell theory?

Until the 1600s, no one knew cells existed because there was no way to see them. Around 1590, the invention of the first microscope allowed people to look at very small objects. A **microscope** is an instrument that makes small objects look larger. Over the next 200 years, this new technology revealed that cells came in many shapes and sizes, depending on their function in an organism. Also, depending on what organism was under study, cells had different organelles. But despite these differences, scientists determined that cells had many things in common. These studies led to the development of cell theory.

Cell Theory The cell theory is a widely accepted explanation of the relationship between cells and living things. The cell theory states the following:

- All living things are composed of cells.
- Cells are the basic units of structure and function in living things.
- All cells are produced from other cells.

Living things differ greatly from one another, but all are made of cells. The cell theory holds true for all living things, no matter how big or how small. Because cells are common to all living things, cells can provide clues about the functions that living things perform. And because all cells come from other cells, scientists can study cells to learn about growth and reproduction.

1.Recognize According to the cell theory, what are all organisms composed of? _____

Cells and Function An organism's functions are the processes that enable it to live, grow, and reproduce. Those functions include obtaining oxygen, food, and water and getting rid of wastes. Cells are involved in all these functions. For example, cells in your digestive system absorb food. The food provides your body with energy and materials needed for growth. Cells in your lungs help you get oxygen. Your body's cells work together, keeping you alive.

How do cells carry out their functions?

In order for each cell to stay alive, it must carry out many of the same functions as the entire organism. Recall that the organelles carry out functions inside a cell. Each organelle is specialized for processes such as consuming water and food, changing food into energy for the cell, eliminating wastes, and exchanging gases.

Water The cell membrane controls movement of water into and out of a cell. Water moves from areas of higher concentration to those of lower concentration. Ideally, a cell stays in a state of equilibrium with the same number of water molecules entering and leaving the cell at any given time.

Obtaining Food Organisms that have chloroplasts in their cells make their own food through photosynthesis. Sugar molecules produced by this process are then processed by mitochondria in the cell to provide energy. Organisms that do not have chloroplasts cannot perform photosynthesis. Instead, small food particles pass through their cell membranes into the cell. Some food particles are too large to cross the cell membrane.

Using Food Some form of sugar is the basic food for all cells, whether it comes from photosynthesis or from food particles. In animals, lysosomes (LY suh sohms) break down large food particles into simple sugars and other nutrients. Mitochondria release the energy stored in sugar through a process called **cellular respiration**. Cellular respiration uses oxygen and releases carbon dioxide.

2.Recognize Which organelles extract energy from sugar to sustain the life of a cell? _____

Handling Wastes Lysosomes digest more than just food particles in animal cells. They also break down old cell parts into substances that can be used again. Vacuoles store wastes that the cell cannot use. These waste-filled vacuoles fuse with the cell membrane and release wastes from the cell through **exocytosis** (ehk soh sigh TOH sihs), which is the reverse of endocytosis. Small waste products can leave a cell by passing directly out through the cell membrane. Plant cells produce few wastes. The wastes they do produce are stored in their vacuoles, released as a gas into the air, or leach out of roots or leaves.

Gas Exchange Plant cells must obtain carbon dioxide to perform photosynthesis, and they must eliminate the excess oxygen that photosynthesis produces. The cell membrane allows passage of carbon

dioxide into and oxygen out of the plant's cell. Animal cells have opposite needs for exchanging gases. Animal cells must obtain oxygen for cellular respiration and must rid themselves of the carbon dioxide they produce. As in plants, the cell membrane allows these gases to pass into and out of the cell.

3. Recognize What cell part controls the movement of life-sustaining gases into and out of a cell?

4. Recognize According to cell theory, which organisms are composed of cells?

5. Identify Name three basic needs that organisms and cells share.

6. Recognize According to cell theory, what do all cells have in common?

- A They are the same size.
- B They have the same organelles.
- C They carry on similar functions to live.
- D They have about the same shape.

7. Recognize All cells must have a way of extracting energy from food to sustain life.

a. How do plant cells obtain the energy they need to live?

b. Which organelle present in both plants and animals is responsible for transforming simple sugars into the energy cells need to sustain life? _____

8. Recognize What are the three components of the cell theory?

9. Recognize Like organisms, cells must exchange gases with the environment.

a. Describe the movement and use of these gases in a plant cell. Include the terms *cell membrane* and *photosynthesis* in your description.

b. Describe the movement and use of these gases in an animal cell. Include the terms *cell membrane* and *cellular respiration* in your description.

10. Identify Mitochondria are present in all plant and animal cells. In which cell process are mitochondria important?

- A gas exchange
- B production of energy
- C getting food
- D waste elimination

11. Compare You have read that cells and organisms have similar functions that meet similar needs. For each life function listed below, make a checkmark in the correct column to indicate whether it is a need of cells or organisms or both.

Meeting Needs			
Need	In Cells?	In Organisms?	In Both?
a. Gas exchange			
b. Getting food and water			
c. Changing food into energy			
d. Eliminating wastes			