

## CHAPTER TWO

### Answers to WHAT DID YOU LEARN?

1. TEM provides greater magnification and resolution than LM, allowing details of structures inside cells and attachments to the cell surface to be studied.
2. The basic functions of cells are covering, lining, storage, movement, connection, defense, communication, and reproduction.
3. The three main regions of a cell are (1) the plasma membrane, a vital boundary around the cell; (2) cytoplasm, composed of all cellular contents between the plasma membrane and the nucleus; and (3) the nucleus, the cell's control center.
4. Phospholipids, cholesterol, and glycolipids are found in the plasma membrane.
5. Ions, nutrients, wastes, and secretory products may cross a selectively permeable membrane.
6. Diffusion is the tendency of molecules to move down their concentration gradients (from regions of higher concentration to regions of lower concentration).
7. Osmosis is a special type of passive transport by which water diffuses from one side of the selectively permeable membrane to the other side of the membrane.
8. Both facilitated diffusion and receptor-mediated endocytosis require a transport protein within the plasma membrane.
9. Cytosol is the viscous, syruplike fluid of the cytoplasm that contains many solutes (ions, nutrients, proteins, carbohydrates, lipids, and other small molecules).
10. Lysosomes are membrane-bound sacs that contain catalysts (digestive enzymes) used by the cell to digest waste products and other macromolecules.  
Mitochondria are double-membrane-bound organelles that produce large amounts of ATP. Centrioles are responsible for organizing microtubules that attach to chromosomes during cell division (mitosis).
11. Proteins synthesized by free ribosomes remain within the cell and function for cellular activities. Proteins synthesized on fixed ribosomes (1) are exported outside of the cell, (2) are incorporated into the plasma membrane, or (3) form enzymes within a new lysosome.
12. Cilia are cytoplasmic projections whose beating-like movement moves materials along the exposed cell surface.
13. The nuclear envelope is the boundary around the nucleus that controls the entry and exit of materials between the nucleus and the cytoplasm.
14. Chromatin is a strand of unwound DNA and its associated proteins.  
Chromosomes are the highest level of organization of genetic material. Within them, the molecule of DNA and associated proteins are tightly wound.
15. The parts of interphase are: the G<sub>1</sub> phase, characterized by cell growth, protein production, and metabolic activities; the S phase, during which DNA is replicated prior to cell division and growth activities continue; and the G<sub>2</sub> phase, characterized by completion of centriole replication, organelle production, and synthesis of proteins needed for cellular division.

16. Mitosis stages: In Prophase, chromosomes appear after chromatin coils; the nucleolus breaks down; elongated microtubules grow from centrioles; and the nuclear envelope disappears. In Metaphase, chromosomes align in the equatorial middle of the cell. In Anaphase, microtubule strands pull sister chromatids apart at the equatorial middle of the cell. In Telophase, new chromosomes arrive at each pole of the new cells.
17. Programmed cell death is called apoptosis.
18. Cancer's main characteristic is uncontrolled cell growth.