SOLUTIONS TO THE STUDY GUIDE FOR MODULE #6

1. a. Absorption – The transport of dissolved substances into cells

b. Digestion – The breakdown of absorbed substances

c. Respiration – The breakdown of food molecules with a release of energy

d. Excretion – The removal of soluble waste materials

e. Egestion – The removal of nonsoluble waste materials

f. Secretion – The release of biosynthesized substances

g. Homeostasis – Maintaining the status quo

h. Reproduction – Producing more cells

i. Cytology – The study of cells

j. Cell wall – A rigid structure on the outside of certain cells, usually plant and bacteria cells

k. Middle lamella – The thin film between the cell walls of adjacent plant cells

l. Plasma membrane – The semipermeable membrane between the cell contents and either the cell wall or the cell's surroundings

m. Cytoplasm – A jellylike fluid inside the cell in which the organelles are suspended

n. Ions – Substances in which at least one atom has an imbalance of protons and electrons

o. Cytoplasmic streaming – The motion of cytoplasm in a cell that results in a coordinated movement of the cell's contents

p. Mitochondria – The organelles in which nutrients are converted to energy

q. Lysosome – The organelle in animal cells responsible for hydrolysis reactions that break down proteins, polysaccharides, disaccharides, and some lipids

r. Ribosomes – Non-membrane-bound organelles responsible for protein synthesis

s. Endoplasmic reticulum – An organelle composed of an extensive network of folded membranes that performs several tasks within a cell

t. Rough ER – ER that is dotted with ribosomes

u. Smooth ER – ER that has no ribosomes

v. Golgi bodies – The organelles in which proteins and lipids are stored and then modified to suit the needs of the cell

w. Leucoplasts – Organelles that store starches or oils

x. Chromoplasts – Organelles that contain pigments used in photosynthesis

y. Central vacuole – A large vacuole that rests at the center of most plant cells and is filled with a solution that contains a high concentration of solutes

z. Waste vacuoles – Vacuoles that contain the waste products of digestion

aa. Phagocytosis – The process by which a cell engulfs foreign substances or other cells

bb. Phagocytic vacuole – A vacuole that holds the matter which a cell engulfs

cc. Pinocytic vesicle – Vesicle formed at the plasma membrane to allow the absorption of large molecules

dd. Secretion vesicle – Vesicle that holds secretion products so that they can be transported to the plasma membrane and released

ee. Microtubules – Spiral strands of protein molecules that form a tubelike structure

ff. Nuclear membrane – A highly-porous membrane that separates the nucleus from the cytoplasm

gg. Chromatin – Clusters of DNA, RNA, and proteins in the nucleus of a cell

hh. Cytoskeleton – A network of fibers that holds the cell together, helps the cell to keep its shape, and aids in movement

ii. Microfilaments – Fine, threadlike proteins found in the cell's cytoskeleton

jj. Intermediate filaments – Threadlike proteins in the cell's cytoskeleton that are roughly twice as thick as microfilaments

kk. Phospholipid – A lipid in which one of the fatty acid molecules has been replaced by a molecule that contains a phosphate group

ll. Passive transport – Movement of molecules through the plasma membrane according to the dictates of osmosis or diffusion

mm. Active transport – Movement of molecules through the plasma membrane (typically opposite the dictates of osmosis or diffusion) aided by a process that requires energy

nn. Isotonic solution – A solution in which the concentration of solutes is essentially equal to that of the cell that resides in the solution

oo. Hypertonic solution – A solution in which the concentration of solutes is greater than that of the cell that resides in the solution

pp. Plasmolysis – Collapse of a walled cell's cytoplasm due to a lack of water

qq. Cytolysis – The rupturing of a cell due to excess internal pressure

rr. Hypotonic solution – A solution in which the concentration of solutes is less than that of the cell which resides in the solution

ss. Activation energy – Energy necessary to get a chemical reaction going

2. The ribosome makes proteins, the smooth ER and rough ER both make molecules like polysaccharides and lipids, the Golgi bodies package products of biosynthesis, the chloroplasts are involved in photosynthesis, the leucoplasts store products of biosynthesis, and the nucleus participates in the production of proteins through the DNA that it contains. You could also add secretion vesicles, as they move products of biosynthesis to the plasma membrane for secretion. You could add cytoplasm as well, but that is not generally considered an organelle.

3. The cytoskeleton and the endoplasmic reticulum help the cell hold its shape.

4. The cell has a central vacuole that expands as the cell absorbs water. This causes turgor pressure in the cell, which counteracts osmosis.

5. It is an animal cell. Plant cells do not have those organelles. Some plant cells have centrioles, but not very many.

6. The secretion product must go to the Golgi bodies to be packaged, at which point it is put in a secretion vesicle. It must then travel to the plasma membrane, where it is released. If the cell has a cell wall, it must pass through the cell wall as well. Once again, you could put cytoplasm in here as well.

7. The cytoplasm does cytoplasmic streaming, the smooth ER and rough ER deal with movement, the Golgi bodies package things for movement, secretion vesicles and waste vacuoles move things to the plasma membrane, the centrioles produce microtubules which produce movement, and the cytoskeleton as a whole is involved with movement. You could add the plasma membrane here, as it deals with the movement of things into and out of the cell.

8. As discussed in the first section, the are: absorption, digestion, respiration, biosynthesis, excretion, egestion, secretion, movement, irritability, homeostasis, and reproduction.

9. The plasma membrane is composed of phospholipids, cholesterol, and proteins. There are carbohydrates attached to certain proteins (making them glycoproteins) and lipids (making them glycolipids), but they are considered a part of the glycoprotein or glycolipid to which they are attached.

10. A phospholipid has two fatty acid molecules and a small molecule with a phosphate group, whereas a normal lipid just has 3 fatty acid molecules. This makes the phospholipid have a hydrophilic end, which the regular lipid does not.

11. Since the phospholipids have a hydrophilic end and a hydrophobic end, they always "know" how to reassemble.

12. Active transport requires energy from the cell, whereas passive transport does not. Thus, the active transport would slow down.

13. a. phospholipid (You could be very precise and say the hydrophilic end of a phospholipid.)
b. protein (You could say active transport site) c. glycoprotein d. carbohydrate e. cholesterol
f. filaments of the cytoskeleton g. glycolipid

14. Since it died by implosion, the cell lost water. Water is lost by osmosis when the cell is in a solution which has a higher concentration of solutes than the inside of the cell. Thus, this was a hypertonic solution.

15. The four stages are: glycolysis (two ATPs), the formation of acetyl coenzyme A (no ATPs), the Krebs cycle (two ATPs), and the electron transport system (32 ATPs).

16. ATP supplies a package for the energy produced in cellular respiration. It releases its energy gently, so that the energy does not destroy the cell.

17. The only stage that can run is glycolysis. After that, the cell forms lactic acid or alcohol with the products. The cell can only make two ATPs per molecule of glucose this way.

18. With no ADP, the cell will not be able to make ATP in which to store the energy from cellular respiration. Thus, the cell could make energy, but it could never use the energy!

19. The lysosome performs hydrolysis which breaks down large molecules (like polysaccharides) into small molecules (like monosaccharides).