Name: _____ **Date:** _____ **Per:** _____

Cell Organelle Review

The Cell Theory: Fill in the following statements.

- The cell is the basic unit of _____.
- All organisms are made up of one or more _____.
- New cells arise from other _____ _____.

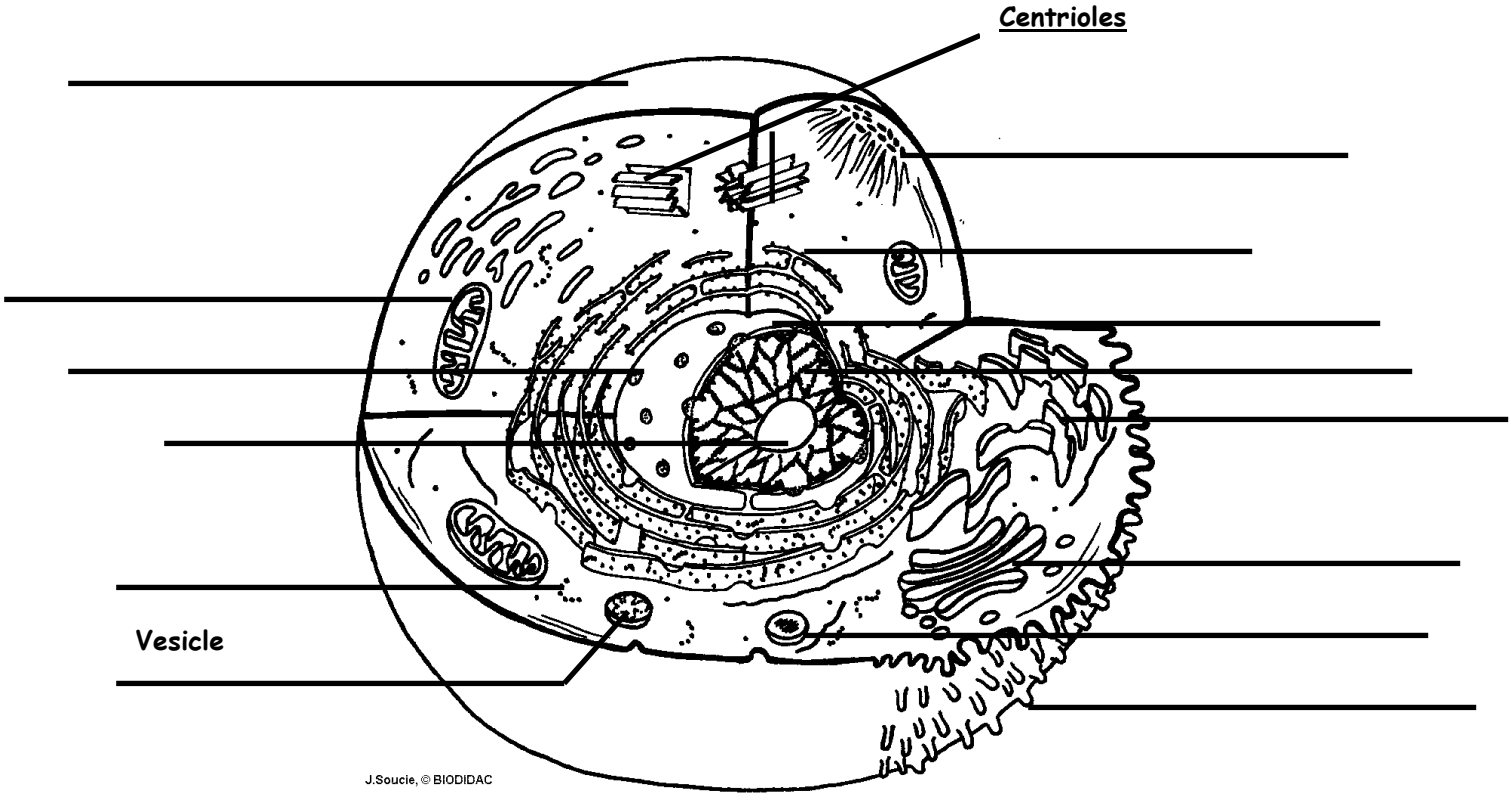
Eukaryotic Cell Structure: Read the following Passage

Every cell is enclosed by a *cell membrane*. Within the membrane are the *nucleus* and the *cytoplasm*. They cytoplasm consists of all the material outside of the nucleus and inside the cell membrane. Within the cytoplasm are organized structures called organelles.

Cells vary greatly in the details of their form and in the special functions they perform. However, most cells have certain features in common. The diagram below represents a generalized animal cell. It is not a drawing of any particular type of cell, but it does show the organelles that are usually present in the cells of animals. Plant cells are somewhat different from animal cells, and we will address some of those differences later in this hand out.

The Generalized Animal Cell: Label the following diagram.

Word Bank: Cilia, Cell Membrane, Chromatin, Cytoskeleton, Nuclear Membrane/Nucleus, Nuclear Pore, Nucleolus, Ribosomes, Mitochondria, Golgi Apparatus, Smooth Endoplasmic Reticulum, Rough Endoplasmic Reticulum, Lysozome



Cell Membrane: Read the passage and answer the questions about the cell membrane.

The *cell* or *plasma membrane* surrounds the cell. It plays an active role in determining which substances enter and which substances leave the cell. Because some substances can pass freely through the cell membrane and others cannot, the membrane is said to be *selectively permeable* or *semipermeable*. The permeability of the

plasma membrane varies from one cell type to another and from time to time in the same type of cell depending on its metabolic activity.

The cell membrane is primarily composed of *lipid* and *proteins*. The lipids are called *phosphoplipids* and they form a double layer of lipid called a lipid bilayer. The hydrophilic, polar phosphate heads of these molecules face outside and inside of the cell while the hydrophobic, nonpolar lipid tails face inward. Protein molecules are either embedded into the lipid and extend through to both sides or they sit on the surface of the inner or outer portions of the membrane. Proteins function to transport materials in or out of the cell, adhere cells to one another, or communicate with molecules that want to enter or leave the cell.

Transport of materials into and out of the cell is regulated by proteins in the cell membrane. Certain molecules that are small and nonpolar can move through the membrane along their *concentration gradients*. This process is called *diffusion*. Movement of water across a membrane on its concentration gradient is a type of diffusion called *osmosis*. Both of these transport mechanisms are examples of *passive transport* because they do not pose an energy cost to the cell. Other large materials or ions may be taken in by *active transport*, and these methods (endocytosis, exocytosis, and ion pumps) occur against a concentration gradient and with an energy cost.

1. Describe 2 functions of the cell membrane:
   _____
   _____
   _____
2. The cell membrane is primarily composed of _____ and _____.
3. Protein molecules are either _____ in the lipid or _____ on the surface of membrane.
4. Why is the cell membrane described as "semipermeable"?
   _____
   _____
5. Small, non polar materials may move across cell membranes by a process called _____.
6. _____ transport occurs with a concentration gradient and at no energy cost to a cell while _____ transport costs a cell energy to carry out.

Cytoplasm: Read the passage and answer the questions about the cytoplasm.

The material in the cell but outside the nucleus is called the cytoplasm. Although it contains thousands of substances, the cytoplasm consists mainly of water. Within in the cytoplasm are the various organelles of the cell. The cytoplasm provides the environment in which the organelles carry on the life processes for the cell.

1. What is the main function of the cytoplasm?
   _____
   _____
2. The cytoplasm consists mainly of _____.

Nucleus: Read the passage and answer the questions about the nucleus.

The nucleus is the control center for cell functions. It is surrounded by its own semipermeable membrane which has *nuclear pores* to allow materials to pass through. Within the nucleus are the *chromatin* threads and at least one *nucleolus*. Nucleoli are involved in the production of *ribosomes*.

1. The control center of the cell is the _____.
2. The _____ is involved in the production of ribosomes.
3. During cell division, chromatin threads coil into tightly packed DNA pieces called _____.

Endoplasmic Reticulum: Read the passage and answer the questions about the ER.

The *endoplasmic reticulum* is a membrane-bound system of fluid filled channels or tubes through which materials are transported inside a cell. The membranes of the endoplasmic reticulum may also serve as sites of biochemical reactions. There are two types of endoplasmic reticulum – *smooth* and *rough*. The rough appearance of some endoplasmic reticulum is due to the presence of *ribosomes* on the surface of the endoplasmic reticulum membranes. Ribosomes on the rough endoplasmic reticulum aid in production of proteins that will be exported from the cell. Proteins made here move from the endoplasmic reticulum to the *Golgi apparatus* where they are packaged and sent out of the cell membrane by exocytosis. Smooth endoplasmic reticulum has no ribosomes on its membranes, and it is important for synthesis of lipids for organelle membranes and transport vesicles. Smooth endoplasmic reticulum also aids a cell in breakdown of accumulated toxins.

1. What are the functions of the endoplasmic reticulum?

   _____

   _____

   _____

2. The two types of endoplasmic reticulum are the _____ and the _____.
3. What is significant about proteins produced by ribosomes on the rough endoplasmic reticulum?

   _____

Golgi Bodies: Read the passage and answer the questions about the Golgi body/apparatus.

A Golgi body is made up of a series of membrane-enclosed sacs. It is usually found near the nucleus. This organelle is associated with the packaging and processing of cell products to be secreted by the cell. As portions of the endoplasmic reticulum become filled with products, small sections break off forming small spherical sacs called vesicles. The vesicles become a part of a Golgi body's complex or membranes. The vesicles eventually move toward the cell membrane and release their products outside of the cell.

1. What is the role of the Golgi apparatus?

   _____

   _____

Mitochondria: Read the passage and answer the questions about the mitochondria.

Mitochondria are slipper-shaped organelles found in the cytoplasm of animal and plant cells. They are enclosed by a membrane, and they also have a highly folded inner membrane with a large surface area. *Aerobic cellular respiration* occurs in the mitochondria, and the folded inner membrane is the site of the electron transport chain where *ATP synthesis* takes place.

1. What is the overall function of the mitochondria?

   _____

2. What is ATP?

   _____

   _____

The Generalized Plant Cell: Read the passage and answer the questions about plant cells.

Plant cells are eukaryotic cells that are specialized for an autotrophic lifestyle. Plant cells contain almost all of the same organelles as animal cells, but they have additional specialized structures including a *cell wall*, a central *vacuole*, and *chloroplasts*. Chloroplasts are where photosynthesis takes place. *Photosynthesis* consists of a light dependent portion where energy is captured and a light independent process – the Calvin Cycle – where energy is used to fix carbon dioxide gas into usable carbohydrates.

1. What are three structural differences between a typical animal cell and a typical green plant cell?

   _____

   _____

2. What is the role of the chloroplast?

   _____

3. Organisms that make their own food are classified as _____ while those that must consume others for nutrients are called _____.

Cell Walls: Read the passage and answer the questions about cell walls.

The *cell wall* is a structure found just outside the cell membrane in plant cells. It is considered to be a nonliving part of the cell since it does not take place in any of the life functions of the cell. The cell wall is made up chiefly of *cellulose*, is relatively rigid, and provided general protection as well as protection from water loss to the cell.

1. What are the functions of the cell wall?

   _____

   _____

2. The cell wall is primarily composed of _____.

Vacuoles: Read the passage and answer the questions about vacuoles.

Vacuoles are membrane enclosed structures that are generally filled with water containing various dissolved substances. Large, central vacuoles are generally present in plant cells. The pressure created by the central vacuole as it fills with water helps to maintain the rigid structure of the plant cell and of the plant.

Some animal cells may have smaller vacuoles called *food vacuoles* or *contractile vacuoles*. These are basically lipid bound vesicles and serve special needs for organisms in challenging environments. In simple organisms like the amoeba, the food vacuole is a chamber where large food molecules are digested for use by the cell. In some fresh water protozoa like the paramecium, there are contractile vacuoles that remove excess water from the cell and discharge it back into the environment. Often the discharge of water results in movement of the cell.

1. What is the function of the large, central vacuole in green plants?

   _____

   _____

2. In simple organisms like the amoeba, digestion occurs within the _____ _____.
3. How is excess water removed from freshwater organisms like the paramecium?

   _____

   _____