

Cell Unit Review Worksheet | Part I

KEY

Directions: Answer the following questions the BEST you can without any help. After you have finished, notice what you don't know and make note of this by highlighting the question. Lastly, use your notes/etc to finish.

Cell Theory

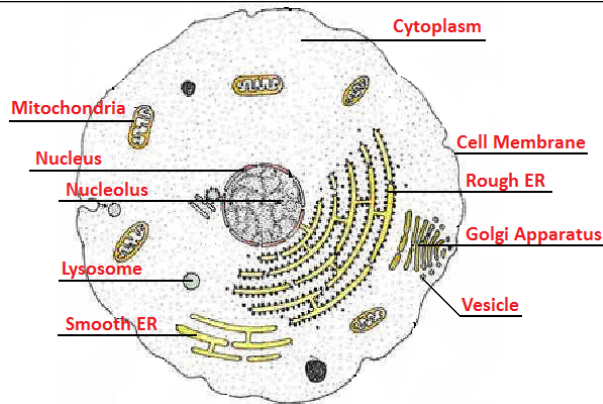
- What invention was an early step in the discovery of cells? **The microscope**
 - Who was the first scientist to identify cells and name them? **Robert Hook (dead plant cells: cork)**
- What are the 3 major principles of the cell theory?
 - All organisms (living or once living) are made of cells.**
 - The cell is the most basic unit of life.**
 - Cells come from other cells.**
- Compare and Contrast the 2 major groups of cells:

Prokaryotic Cell Characteristics	Eukaryotic Cell Characteristics
DNA is not in a membrane bound nucleus	DNA is housed in a membrane bound nucleus
Does not have membrane bound organelles	Has membrane bound organelles
Prokaryotic organisms are single celled	Eukaryotic organisms are single celled/multicellular
Oldest form of life on Earth (Bacteria and Archaea)	Evolved from prokaryotes (Animals, Plants, Fungi, Protists)

Cell Organelles

- Use the word bank to answer the following questions and to LABEL THE CELL below:

Cytoskeleton	Vesicle	Nucleus	Nucleolus	Rough ER	Ribosome	Smooth ER
Golgi apparatus (body)		Mitochondria	Vacuole	Lysosome		Cell Membrane
Cytoplasm	Cilia/Flagella		Chloroplast	Cell wall		Centrioles



- Which organelle helps to create the energy required by **both** plant and animal cells? **Mitochondria**
- Which organelles create proteins? **Ribosomes**
- Which organelles help cells with locomotion (movement)? **Cilia/Flagella**
- Which organelles processes and transports proteins? **Golgi apparatus (body)**
- Which organelle contains digestive enzymes to break down foreign invaders? **Lysosomes**
- Which organelle is a network of fibers that criss-cross to support a cell from the inside? **Cytoskeleton**
- Which organelle performs photosynthesis to make sugar? **Chloroplast**
- Which two organelles are ONLY found in plant cells? **Central Vacuole, Chloroplasts**
- Which organelle is thought to help with cell division in animal cells? **Centrioles**
- Which organelle is responsible for making ribosomes? **Nucleolus**
- Which cell part is the internal fluid found in all cells? **Cytoplasm**
- Which organelle holds DNA (chromatin) and chromosomes? **Nucleus**
- Which cell part is made of cellulose that provides rigid support? **Cell wall**
- Which organelle is studded with ribosomes & is the site of protein synthesis? **Rough ER**
- Which organelle breaks down alcohol, and can make lipids? **Smooth ER**
- Which organelle carries materials from one part of the cell to another? **Vesicle**
- Which organelle is a sac filled with fluid inside a cell; it stores materials the cell needs? **Vacuole**
- Which cell part is found in plant cells and is OUTSIDE the cell membrane? **Cell wall**
- Which organelle will destroy an aging cell through a process called autolysis? **Lysosomes**

Chloroplasts can also be found in some protists.

Remember plant cells have a central vacuole and animal cells have smaller more numerous vacuoles.

- Compare and Contrast Plant Cells and Animal Cells:

Plant Cell	Similarities	Animal Cell
<ul style="list-style-type: none"> - Have a cell wall made of cellulose (polysaccharide) - Have chloroplasts which perform the process of photosynthesis - Have a central vacuole - Do not have centrioles - Have few lysosomes 	<ul style="list-style-type: none"> - Have a plasma membrane - Have mitochondria which perform the process of cellular respiration - Eukaryotes (Eukaryotic cells) 	<ul style="list-style-type: none"> - Do not have a cell wall made of cellulose - Do not have chloroplasts which perform photosynthesis - Have many smaller vacuoles - Have centrioles - Have many lysosomes

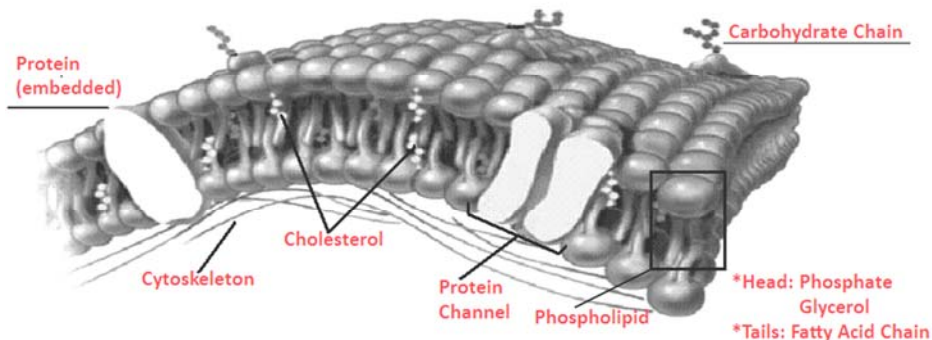
- Fill in the blanks regarding the process of protein synthesis:
Many organelles are involved in the process of making protein. First the **nucleolus** makes ribosomes, which exit through pores. The ribosomes then travel to the **Rough ER**. This is where ribosomes link **amino acids** to make protein. The protein then travels to the **Golgi apparatus**, where the proteins are packaged into **vesicles** which can transport the proteins out of the cell by fusing with the **cell membrane**.

Explain the theory of Endosymbiosis being sure to cite the evidences mentioned in class:

Chloroplasts and mitochondria were once free-living (lived outside of a cell) bacteria. Both were engulfed by a larger predator bacterium. The mitochondria and chloroplasts gave the larger predator bacterium an advantage (be able to make their own food/energy – not have to hunt for food), while the larger predator bacterium provided the chloroplasts and mitochondria with shelter/protection. Eventually, the mitochondria and chloroplasts replicated and divided within these larger predator bacterium, and the larger predator bacterium replicated and divided with the chloroplast or mitochondria within them. Over time, the larger predator bacterium could not survive without the mitochondria and chloroplast; and the mitochondria and chloroplast could not survive without the larger predator bacterium. Evidence: Mitochondria & chloroplasts contain their own DNA similar to bacteria, replicate on their own like bacteria, and contain own ribosomes similar to bacteria.

Cell Membrane

- What model have scientists developed to describe the arrangement of molecules that make up a cell membrane? The fluid mosaic model
- What do the terms selective permeability and semi-permeable have to do with the cell membrane? These terms refer to the fact that the cell membrane allows some materials to move in and out of the membrane, but not all.
- Using the picture of the cell membrane: OUTLINE/SHADE and LABEL the following: Carbohydrate chain, Embedded Protein, Protein Channel, Cholesterol, Cytoskeleton, Phospholipid (including all of its 3 major parts).



- List a function of each type of molecule that is embedded in the phospholipid bilayer below:

Molecule	Function
Cholesterol	<u>Strengthens and gives flexibility to the cell membrane</u>
Proteins	<u>Allow the passage of certain materials/chemical signals, make up the cytoskeleton</u>
Carbohydrate	<u>Serves as id tags to help identify/distinguish one cell type from another</u>

- Which part of a phospholipid is polar? The head (glycerol & phosphate)
- Which part of a phospholipid is hydrophobic? The fatty acid tails
- Which part of a phospholipid is hydrophilic? The head (glycerol & phosphate)
- Which part of a phospholipid is nonpolar? The fatty acid tails
- Explain in your own words:

Why do the phospholipids that make up the plasma membrane form a **bilayer** (why do the tails face the middle/heads face out)?

The heads of a phospholipid bilayer face towards the outside of the cell and the inside of the cell because they are polar (have a slightly positive and negative charge, like water, and therefore they are hydrophilic (attracted to water)). Because both the heads of phospholipids and water are polar they form hydrogen bonds between each other causing the phospholipid heads to face the water. The tails of phospholipids face inward, towards each other, because they are nonpolar making them hydrophobic. Because of these characteristics this causes the phospholipids to be arranged in two layers.

Answer the following questions about chemical signals:

- Any chemical signal that binds to a receptor is called a ligand
 - Give two examples of these chemical signals: neurotransmitters & hormones
- List the two types of receptor proteins and describe how they work:
 - Intracellular receptors are found inside the cell. Ligands (molecules) have to cross the cell membrane to attach to the receptors proteins. Once attached, the receptor proteins take the message to the nucleus so it can make the necessary proteins.
 - Membrane receptors are found embedded (within) the cell membrane. Ligands bind to the receptor proteins outside the cell (they never enter the cell), then the receptor protein changes shape which creates a message for the cell. This message will tell the cell a task it needs to perform.
- How is a receptor protein different from a protein channel?

A receptor protein detects and receives a MESSAGE/SIGNAL in the form of a ligand, and then communicates that signal/message to the cell. A protein channel allows for large or polar molecules to pass through the plasma membrane.

Microscope

- Create your own quiz question about the microscope. It **CANNOT** be a true or false question. It **CAN** be a fill in the blank, labeling, matching, short answer, or multiple choice question (If you create answer choices there must be at least 5 distracters (answer choices)).
Answers will vary