

## KEY | Cell Review Worksheet | Chapter 3

### Cell Theory

1. What invention was an early step in the discovery of cells? **The microscope**
  - a. Who was the first scientist to identify cells and name them? **Robert Hooke**
2. What are the 3 major principles of the cell theory?
  - a. **All organisms (living or once living) are made of 1 or more cells.**
  - b. **The cell is the most basic unit of life.**
  - c. **Cells come from other cells.**
3. Contrast the 2 major groups of cells:

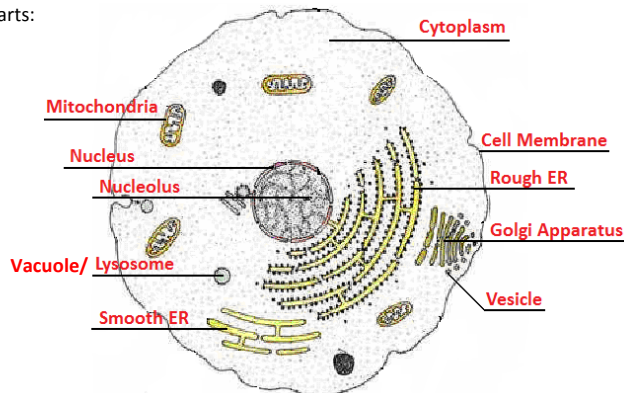
Prokaryotic	Eukaryotic
<b>Does not have a nucleus</b>	<b>Has a nucleus</b>
<b>Does not have membrane bound organelles</b>	<b>Has membrane bound organelles</b>
<b>Prokaryotic organisms are single celled</b>	<b>Eukaryotic organisms are single celled/multicellular</b>
<b>Older (bacteria)</b>	<b>Evolved from prokaryotes</b>

### Cell Organelles

4. Use the word bank below to answer the following questions. Some words may be used more than once:

Cytoskeleton	Vesicle	Nucleus	Nucleolus	rough ER	Ribosome	smooth ER
Golgi apparatus (body)		Mitochondria		Vacuole	Lysosome	
Cell Membrane	Cytoplasm	Chloroplast		Cell wall	Centrioles	

- a. Label the cell parts:



- b. Which organelle creates the energy required by cells? **Mitochondria**
- c. Which organelles create proteins? **Ribosomes**
- d. Which organelles processes and transports proteins? **Golgi Apparatus & vesicles**

- e. Which organelle contains digestive enzymes to break down foreign invaders? **Lysosomes**
- f. Which organelle is a network of fibers that criss-cross to support a cell from the inside? **Cytoskeleton**
- g. Which organelle performs photosynthesis to make sugar? **Chloroplast**
- h. Which organelle is thought to help with cell division in animal cells? **Centrioles**
- i. Which cell part is the internal fluid found in all cells? **Cytoplasm**
- j. Which organelle holds DNA and chromosomes? **Nucleus**
- k. Which cell part is made of cellulose that provides rigid support? **Cell Wall**
- l. Which organelle is studded with ribosomes and is often the site of protein synthesis? **Rough ER**
- m. Which organelle breaks down alcohol, and can also break down and make lipids? **Smooth ER**
- n. Which organelle is responsible for making ribosomes? **Nucleolus**
- o. Which organelle carries materials from one part of the cell to another? **Vesicle**
- p. Which organelle is a sac filled with fluid inside a cell; it stores materials the cell needs? **Vacuole**

5. Fill in the blanks regarding the process of protein synthesis:

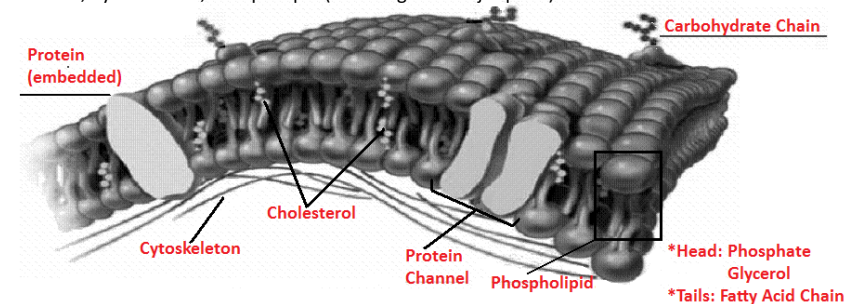
Many organelles are involved in the process of making protein. First the **nucleolus** makes ribosomes, which exit through pores. The ribosomes then travel to the **Rough ER**. This is where ribosomes link **amino acids** to make protein. The protein then travels to the **golgi apparatus**, where the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

6. Explain the theory of Endosymbiosis being sure to cite evidence:

**Chloroplast & mitochondria were freelifving organisms (evidence= own DNA, own ribosomes, can replicate). Both were engulfed by a larger predator cell. Both gave the larger cell an advantage (make food and energy), while the predator cell provided each with protection. Over time, these larger predator cells could not survive without the mitochondria & chloroplast (Eukaryotic evolution).**

### Cell Membrane

7. Using the picture of the cell membrane, label the following: Carbohydrate chain, Protein, Protein Channel, Cholesterol, Cytoskeleton, Phospholipid (including all 3 major parts).



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

Molecule	Function
Cholesterol	<u>Strengthens cell membrane</u>
Proteins	<u>Allow the passage of certain materials</u>
Carbohydrate	<u>Helps to identify the other cells</u>

9. What model have scientists developed to describe the arrangement of molecules that make up a cell membrane? The fluid mosaic model

10. Which part of a phospholipid is polar?

The head is polar

11. Which part of a phospholipid is nonpolar?

The tails are nonpolar

12. What do the terms, selective permeability and semi-permeable, have to do with the cell membrane?

Both mean that only some materials to move in and out of the cell membrane, but not all.

Answer the following questions about chemical signals:

13. A receptor detects a signal molecule and carries out an action in response.

14. A ligand is a molecule that acts as a signal when it binds to a receptor.

15. Ligands that cross the cell membrane, and bind within- bind to an intracellular receptor, while ligands that bind in the cell membrane, bind to a membrane receptor.

#### Passive Transport

16. Define concentration gradient: Difference in concentration from 1 area to another

17. What is passive transport (be sure to mention the concentration gradient)?

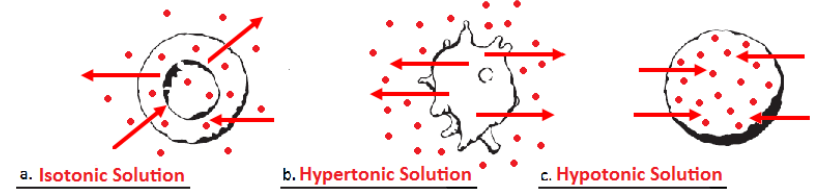
The movement of molecules from an area of high concentration to low concentration – down the concentration gradient. No energy is required.

18. Types of Passive Transport	Explanation
Diffusion	<u>Movement of molecules from an area of high concentration to low concentration, until equilibrium is reached. No energy is required.</u>
Osmosis	<u>Diffusion of water from an area of high to low concentration, until equilibrium is reached. No energy is required.</u>
Facilitative Diffusion	<u>Larger molecules diffuse by entering/exiting with the help of protein channels in, until equilibrium is reached. No energy.</u>

19. What might cause a molecule to move from the outside of the cell to the inside (with no energy)?

Molecules would move from outside of the cell to the inside, if there was a higher concentration of molecules outside of the cell than inside the cell. This would cause the molecules to move down the concentration gradient (no energy required).

20. Label the type of solution each red blood cell is in. Draw dots to show where the solutes are (inside/outside of cell) and arrows on the cell to show the direction of osmosis.



#### Active Transport

21. Define active transport (be sure to mention the concentration gradient): When molecules move from a LOW to a HIGH concentration, they are said to move against their concentration gradient. For this to happen ATP (energy) is required.

22. Compare/Contrast: **Phagocytosis**

**\* When a cell engulfs a solid particle**

**Pinocytosis**

**\*When a cell engulfs a liquid particle**

\* Type of endocytosis  
\* Process of taking in material (large amounts or large particles)  
\* Uses vesicles

23. Label the following type of active transport and then explain what is happening in each picture:

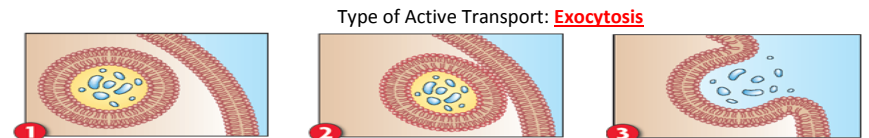


i. Cell membrane folds inward to form vesicle around material.

ii. The pocket pinches off INSIDE the cell, forming a vesicle.

iii. Vesicle breaks down and material is now inside the cell.

24. Label the following type of active transport and then explain what is happening in each picture:



1. The cell forms a vesicle around material that needs to be removed.

2. The vesicle is transported to the cell membrane.

3. The vesicle fuses with the cell membrane and releases the material OUT of the cell.