

## Guided Notes

### Unit 2: Cells

#### Chapter 3: Cell Structure and Function

##### I. Concept 3.1: Cell Theory – Cells are the basic unit of life.

a. The Cell Theory

- i. \_\_\_\_\_
- ii. \_\_\_\_\_
- iii. \_\_\_\_\_

b. Parts of a Compound Light Microscope

- i. Refer to the Prezi and any relevant labs for information.

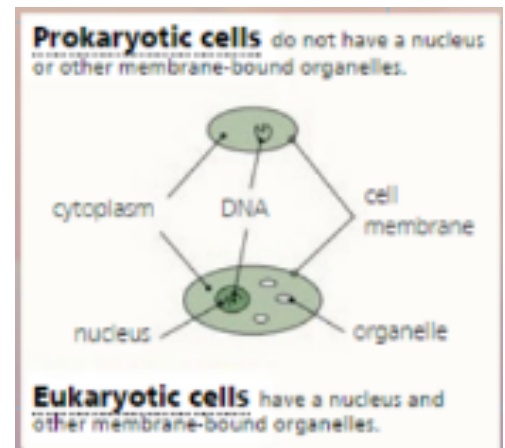
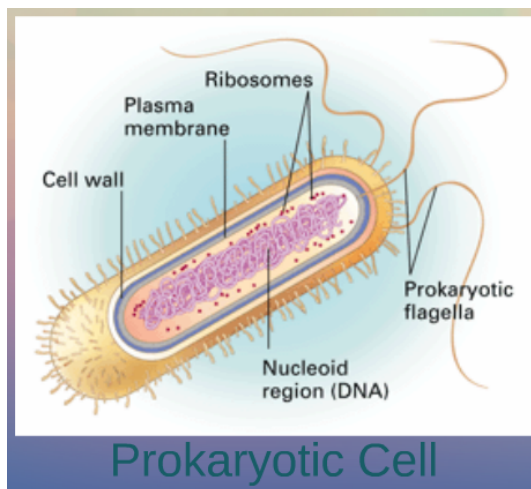
c. Prokaryotic Cells vs. Eukaryotic Cells

- i. prokaryotic cells: \_\_\_\_\_ and most other organelles; its DNA is concentrated in a "nucleoid" region (\_\_\_\_\_ and archaea cells)

- ii. eukaryotic cells:

\_\_\_\_\_ surrounded by its own membrane and other internal organelles bound by membranes (protists, fungi, \_\_\_\_\_, and \_\_\_\_\_)

- 1. These cells appear later in Earth's history.



d. Overview of Animal and Plant Cells

i. Organelle: \_\_\_\_\_  
\_\_\_\_\_

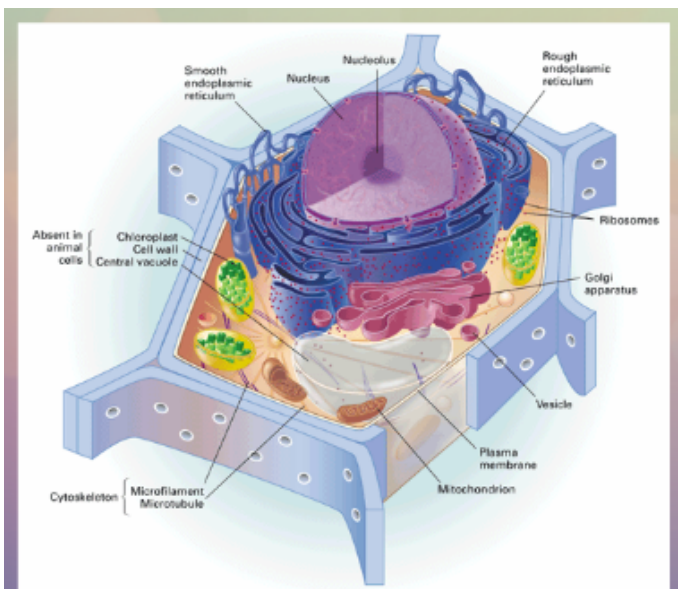
ii. Animal and plant cells have many similarities and differences from one another.

iii. Main Similarities

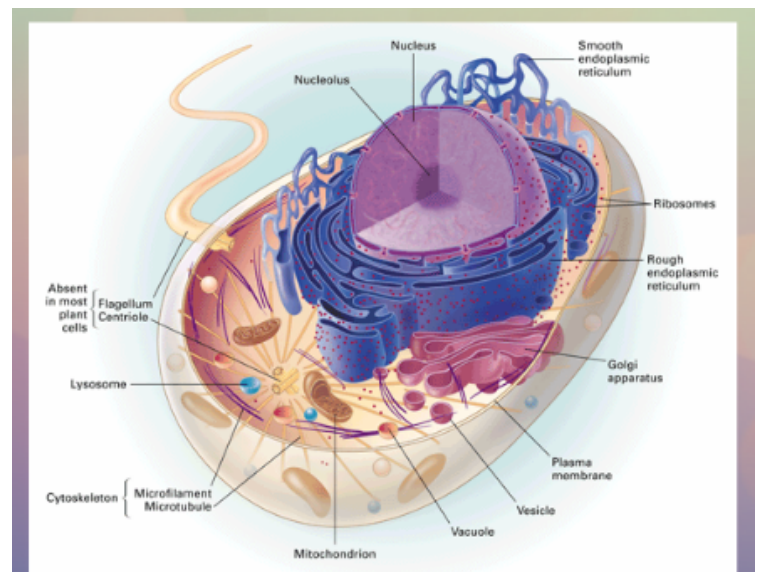
1. \_\_\_\_\_: defines the boundary of the cell and regulates the traffic of chemicals between the cell and its surroundings
2. \_\_\_\_\_: houses the cell's genetic material in the form of DNA
3. \_\_\_\_\_: the entire region of the cell between the nucleus and the plasma membrane (consists of various organelles suspended in fluid)

iv. Main Differences

1. \_\_\_\_\_: (in plant cells only) the organelle in which photosynthesis occurs
2. \_\_\_\_\_: (in plant cells only) encases the plant cell; provides protection to plant cell and maintains its shape



Plant Cell



Animal Cell

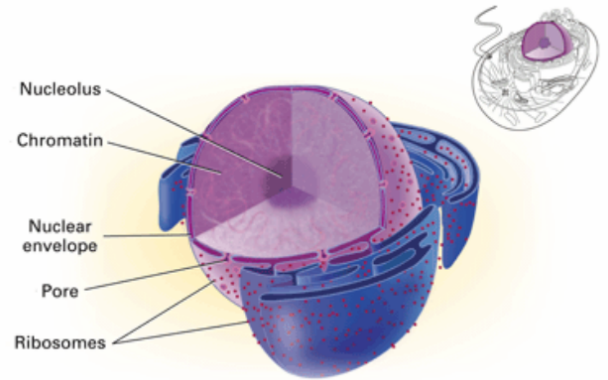
**II. Concept 3.2: Cell Organelles – Eukaryotic cells share many similarities.**

**a. Nucleus**

i. Function: \_\_\_\_\_  
\_\_\_\_\_

ii. Structure

1. Nuclear envelope: membrane that surrounds the nucleus (works like the cell membrane but just for the nucleus)
2. Nucleolus: contains the material to make ribosomes

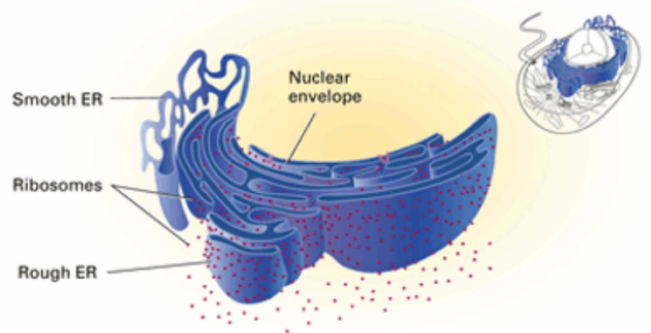


**b. Ribosomes**

i. Function: \_\_\_\_\_  
\_\_\_\_\_

ii. Location

1. some ribosomes are attached to the rough ER; others are freely suspended in the cytoplasm

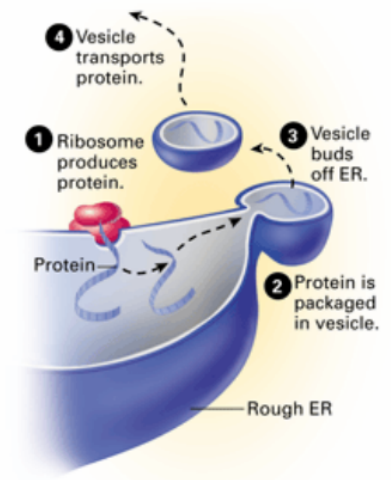


**c. Endoplasmic Reticulum**

i. Function: \_\_\_\_\_  
\_\_\_\_\_

ii. Two Types

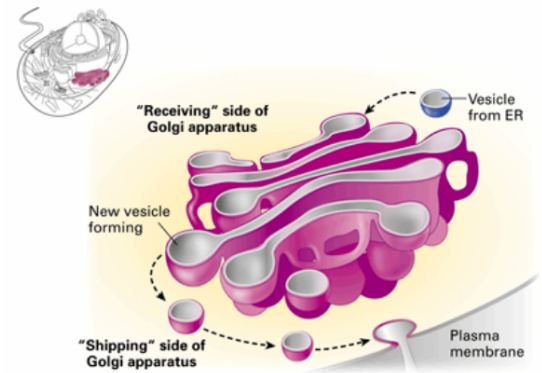
1. rough ER: "rough" because ribosomes attach here; ribosomes make proteins and release them into the rough ER, then the rough ER creates vesicle of protein and sends it out to its destination in the cell
2. smooth ER: "smooth" because there are no ribosomes here; builds lipids and contains enzymes to help with cell functions



d. Golgi Apparatus

i. Function: \_\_\_\_\_

1. One side receives vesicles from the ER.
2. The ER product is refined and modified.
3. The opposite end ships the finished product out to the cell or outside of the cell (exocytosis).



e. Vacuoles

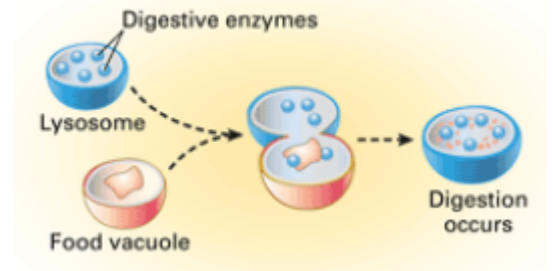
i. Two Types

1. Animal Cell Vacuole: \_\_\_\_\_
2. Plant Cell Vacuole: \_\_\_\_\_

f. Lysosomes

i. Functions

1. Contain \_\_\_\_\_  
\_\_\_\_\_ that can break down  
\_\_\_\_\_



2. Fuse with \_\_\_\_\_ and expose the nutrients to enzymes that digest them
3. Destroy \_\_\_\_\_; engulf and digest damaged organelles to be recycled

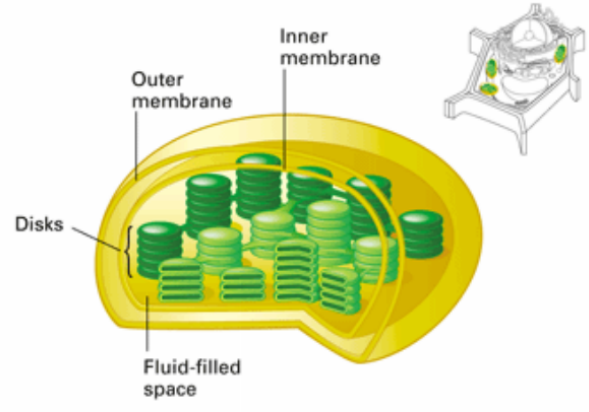
g. The Endomembrane System

The diagram shows the endomembrane system with the following components and processes:

1. Products made in ER bud from the ER in vesicles.
2. The vesicles from the ER fuse to the Golgi.
3. Products can leave the Golgi as:
  - 3 • Lysosomes
  - 4 • Vacuoles
  - 5 • Vesicles (that later fuse to the cell membrane and leave the cell)

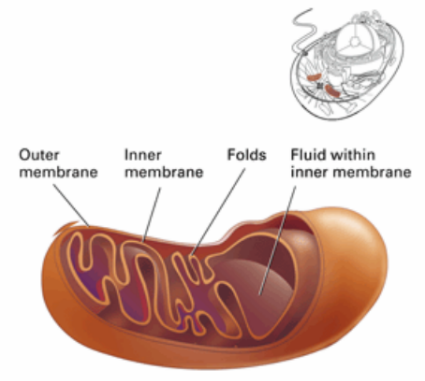
h. Chloroplasts

- i. Function: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- ii. (Its structure allows for it to trap light energy and convert it to chemical energy.)
- iii. Location: \_\_\_\_\_  
\_\_\_\_\_



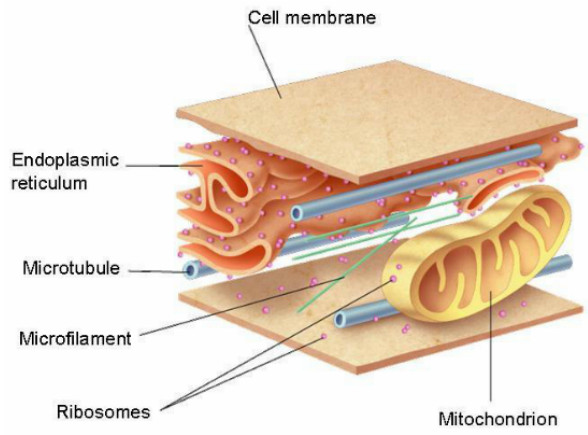
i. Mitochondria

- i. Function: \_\_\_\_\_  
\_\_\_\_\_
- ii. ATP: the main energy source that cells use for most of their work
- iii. the inner membrane folds allow for the mitochondria to increase the surface area where cellular respiration can occur (more folds = more ATP production)
- iv. Location: \_\_\_\_\_  
\_\_\_\_\_



j. Cytoskeleton: Microfilaments and Microtubules

- i. Function: \_\_\_\_\_  
\_\_\_\_\_ - does not keep the same structure all the time, but works as the skeleton of the cell
- ii. Structure
  - 1. made of two types of fibers: \_\_\_\_\_ (straight, hollow tubes of proteins) and \_\_\_\_\_ (thinner, solid rods of protein)



k. Cytoskeleton: Flagella and Cilia

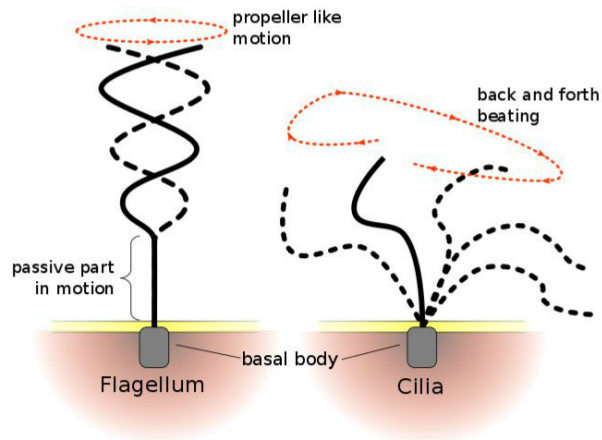
i. Function: \_\_\_\_\_

ii. Flagella

1. \_\_\_\_\_

iii. Cilia

1. \_\_\_\_\_



I. Cell Coordination

i. Remember... None of the cell's organelles work alone.

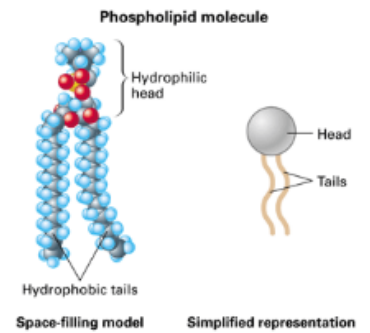
ii. "The cooperation of cellular organelles makes a cell a living unit that is greater than the sum of its parts."



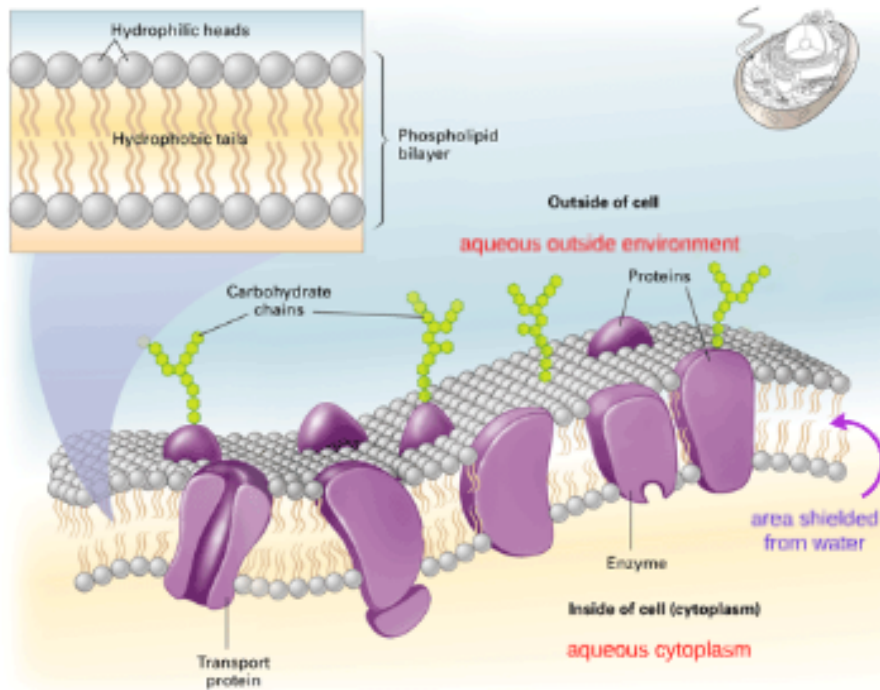
**III. Concept 3.3: Cell Membrane – The cell membrane is a barrier that separates a cell from the external environment.**

a. Cell Membrane Structure

- i. The membrane of a cell is mostly \_\_\_\_\_.
- ii. What do you remember about lipids?
- iii. They are \_\_\_\_\_!

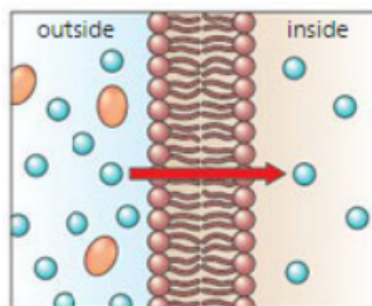


b. Fluid Mosaic Model



c. Selectively Permeable

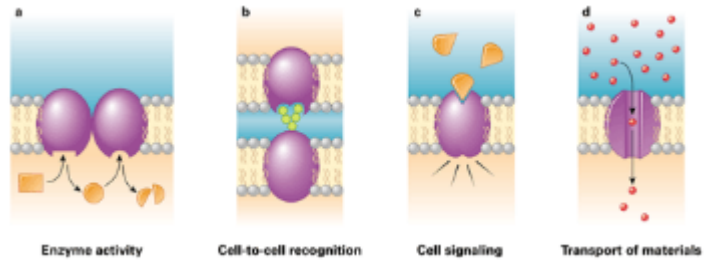
- i. Selective permeability: \_\_\_\_\_
- ii. The cell membrane is selectively permeable – meaning it can allow molecules to enter, while keeping other molecules out. This allows the cell to maintain \_\_\_\_\_.



**FIGURE 3.2** A selectively permeable membrane allows some, but not all, molecules to cross.

d. Membrane Proteins

- i. Proteins in the cell membrane perform the membrane's specific functions.



- ii. Proteins will:

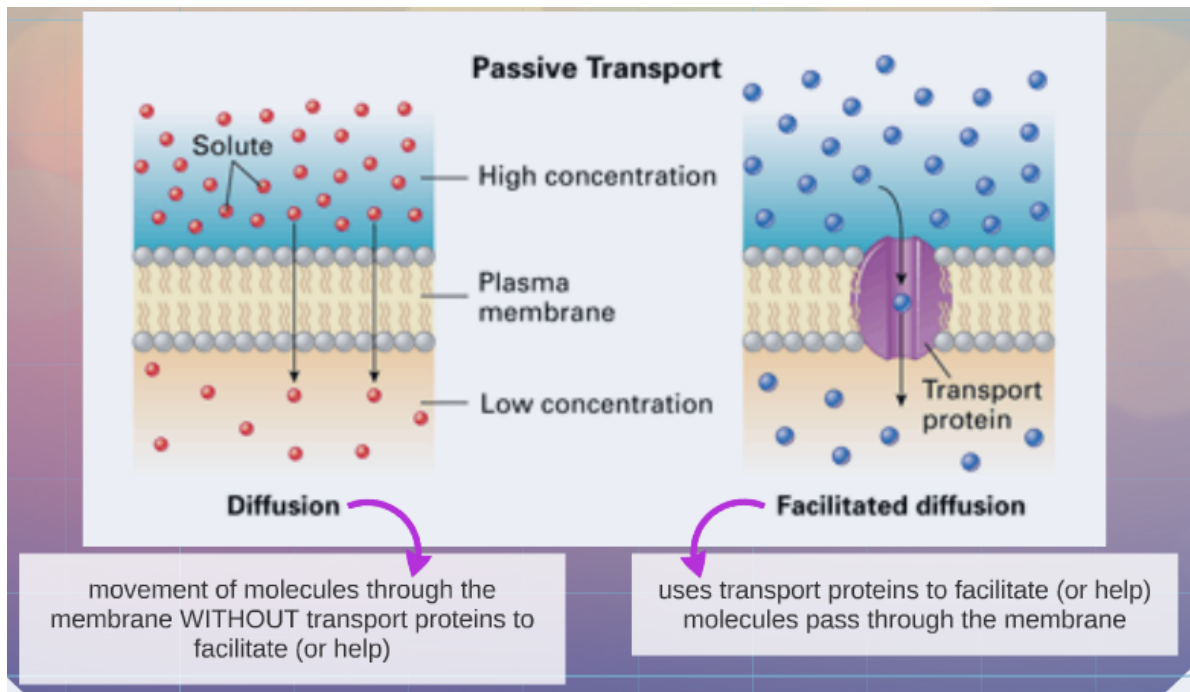
- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_

**IV. Concept 3.4: Diffusion and Osmosis – Materials move across membranes because of concentration differences.**

a. Passive Transport

- i. Passive transport: \_\_\_\_\_

- ii. 2 Types of Passive Transport

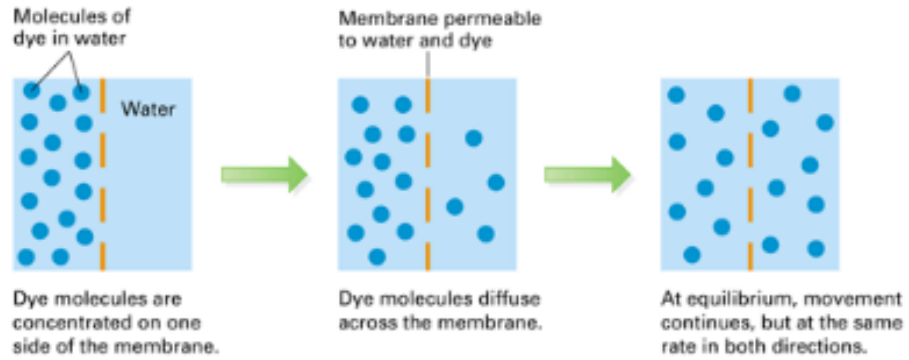


b. Diffusion

- i. Diffusion: \_\_\_\_\_

- ii. Concentration is the number of molecules of a substance in a given volume.



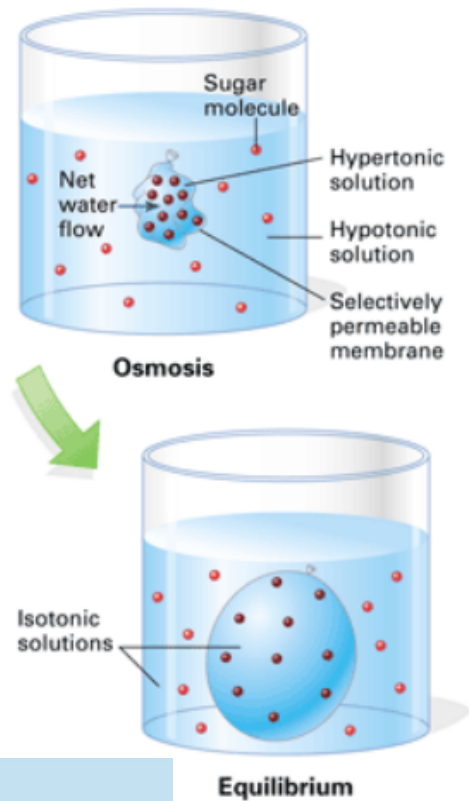


- iii. Concentration gradient: \_\_\_\_\_
- iv. When there is equal movement in both directions across a membrane (meaning the crowded areas are equally crowded), \_\_\_\_\_ is reached.

c. Osmosis

- i. Osmosis: \_\_\_\_\_

- ii. Hypertonic: the solution with the higher concentration of a solute
- iii. Hypotonic: the solution with the lower solute concentration
- iv. Isotonic: solutions in which the concentrations of the solute are equal



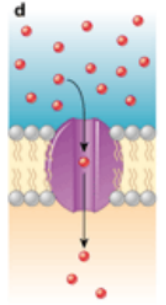
**Osmosis is the diffusion of water across a semipermeable membrane from an area of higher water concentration to an area of lower water concentration.**

1 ISOTONIC SOLUTION	2 HYPERTONIC SOLUTION	3 HYPOTONIC SOLUTION
<p>isotonic</p> <p>isotonic</p>	<p>hypertonic</p> <p>hypotonic</p>	<p>hypotonic</p> <p>hypertonic</p>
<p>A solution is isotonic to a cell if it has the same concentration of solutes as the cell. Equal amounts of water enter and exit the cell, so its size stays constant.</p>	<p>A hypertonic solution has more solutes than a cell. Overall, more water exits a cell in hypertonic solution, causing the cell to shrivel or even die.</p>	<p>A hypotonic solution has fewer solutes than a cell. Overall, more water enters a cell in hypotonic solution, causing the cell to expand or even burst.</p>

d. Facilitated Diffusion

i. Facilitated diffusion: \_\_\_\_\_  
\_\_\_\_\_

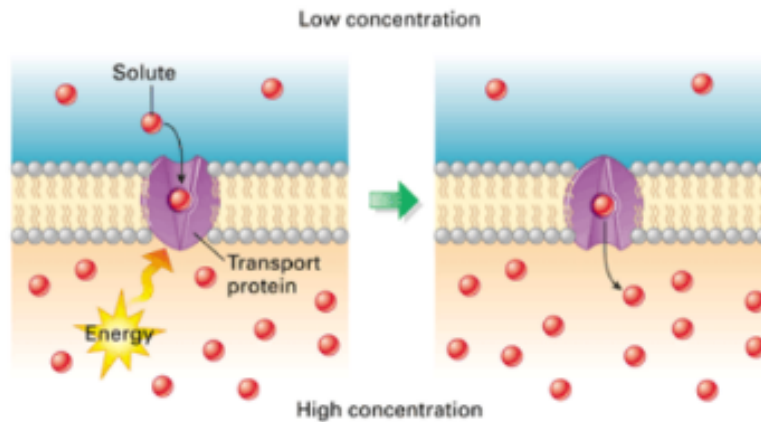
ii. *Proteins make it easier for molecules to enter or exit, but **the process is still passive transport**, as no energy is being used.*



Transport of materials

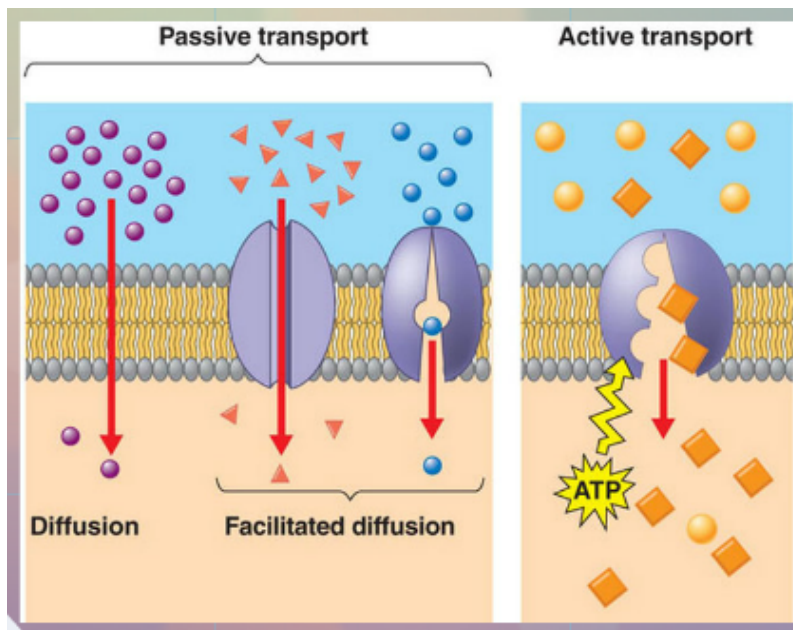
V. **Concept 3.5: Active Transport, Endocytosis, and Exocytosis – Cells use energy to transport materials that cannot diffuse across a membrane.**

a. Active Transport



iii. Active Transport: \_\_\_\_\_  
\_\_\_\_\_

b. Overview: Difference Between Passive and Active Transport



c. Endocytosis vs. Exocytosis

- i. Vesicles: \_\_\_\_\_  
\_\_\_\_\_
- ii. Exocytosis: a vesicle fuses with the membrane and spills its contents \_\_\_\_\_ the cell  
(how a protein product is exported out of the cell)
- iii. Endocytosis: the reverse of exocytosis - vesicles bud \_\_\_\_\_ from the membrane  
(how food particles are ingested)

