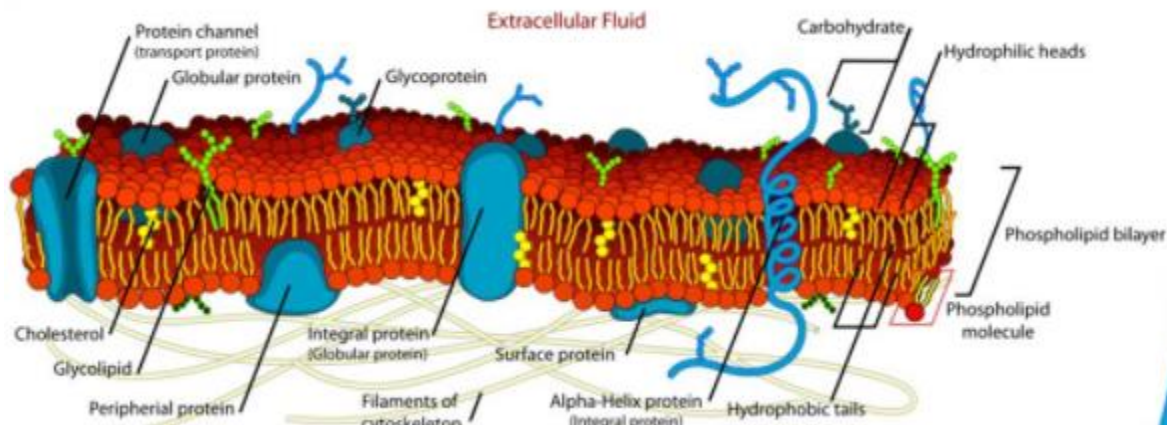




CELL BOUNDARIES

CELL BOUNDARIES

- Cells create boundaries through:
 - Cell Membranes made of the phospholipid bilayer
 - Cell Walls made of cellulose in plants

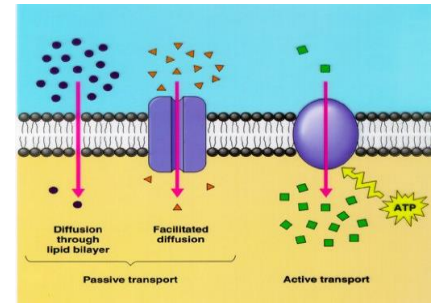


TYPES OF MEMBRANES

- Some substances = too large or too strongly charged to cross the lipid bilayer.
- Substance can diffuse across a membrane, the membrane = *permeable* to it.
- Substance cannot diffuse = *impermeable* to it.



CELL TRANSPORT



- In order for cells to maintain homeostasis they have to control what enters and leaves the cell.
 - Homeostasis-maintaining an internal balance. Stability.

Types of cellular transport

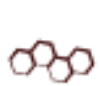
- Passive Transport- the movement of materials into and out of the cell without the use of energy.
- Active Transport- movement of materials into and out of the cell with the use of energy.



DEMO

- Beaker = Liquid outside of a cell
 - Baggie= Cell membrane
 - Inside Baggie = Inside a cell
-
- Hypothesis ? How will our cell membrane react to the iodine?





Cell Membrane: Structure and Function



Matching: Match the cell membrane component with a description of its function.

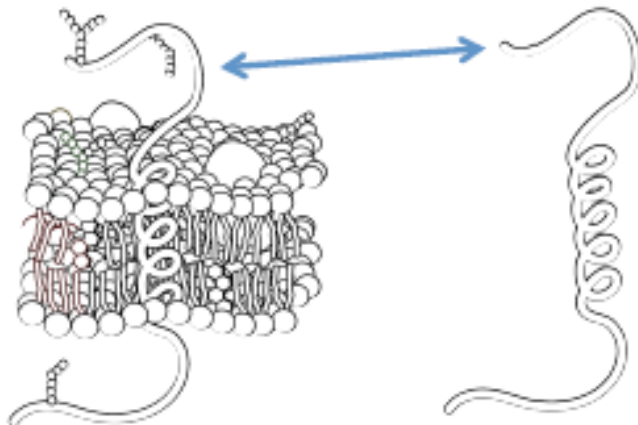
- | | |
|--------------------------------------|---|
| ____1. Membrane Protein | A. Lipids with carbohydrate chains that serve as cell recognition markers |
| ____2. Cytoskeleton Filaments | B. Proteins with carbohydrate chains that can serve as cell recognition markers and can help neighboring cells interact or stick to each other |
| ____3. Cholesterol | C. Proteins that can send to nearby cells or receive signals from outside their cell. They can also serve as anchors for other proteins inside the cell. |
| ____4. Phospholipid | D. Proteins that help carry substances across the membrane or allow molecules to pass through a channel. |
| ____5. Transport or Channel Proteins | E. Lipids with hydrophobic tails and hydrophilic heads that form two layers in the membrane |
| ____6. Glycolipid | F. A hydrophobic lipid molecule that changes the fluidity of the membrane |
| ____7. Glycoprotein | G. Long protein chains that help the cell hold its shape. Organelles and other large molecules can travel along these chains like super highways in the cell. |



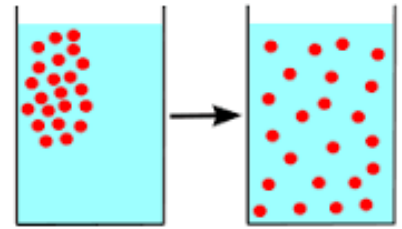
Short Answer Questions:

8. Explain the differences between integral, peripheral, and surface proteins.

9. Look at the protein below. Label the diagram on the right and show which part of the protein has hydrophobic amino acid residues and what part of the protein has hydrophilic amino acid residues. Explain how you know.



DIFFUSION

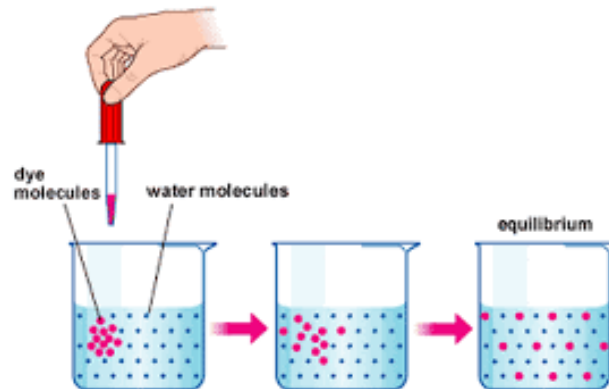


- Diffusion-A type of passive transport where molecules move from an area of high concentration to an area of lower concentration.
- The difference in the concentration of molecules across a distance is call the concentration gradient.
- The molecular movement that occurs is a result of kinetic energy. The molecular collisions that result from the movement cause the molecules to move from areas where they are highly concentrated.

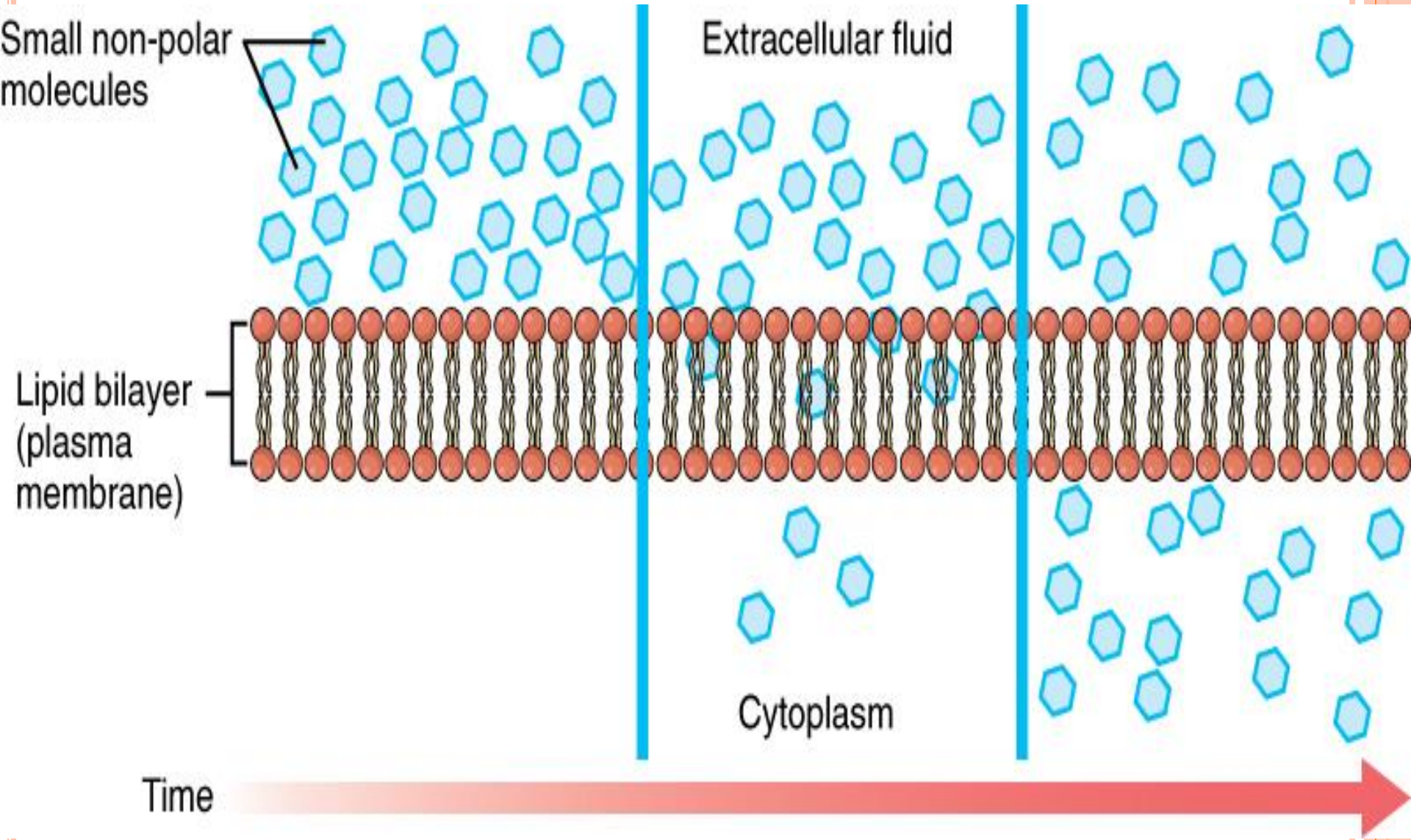


EQUILIBRIUM

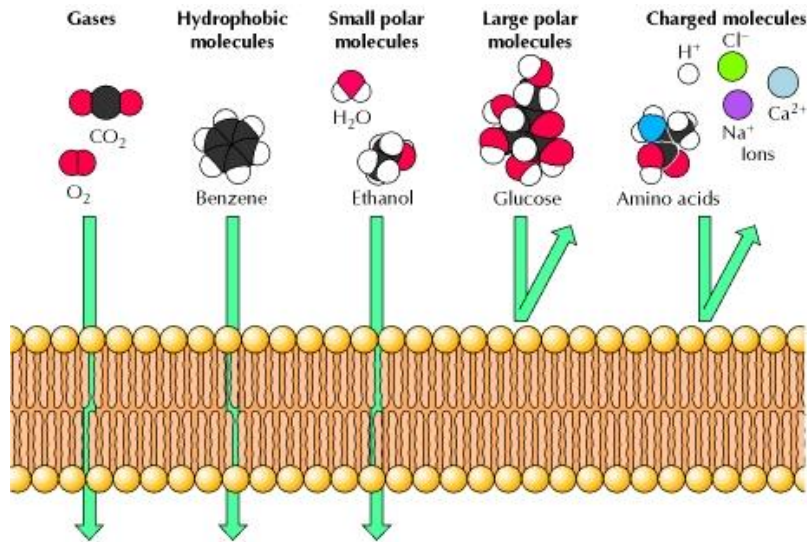
- Molecules will eventually reach equilibrium if they are able to move free of other influences.
- Equilibrium occurs when the concentration and distribution of the molecules is the same throughout the entire space.



DIFFUSION



DIFFUSION ACROSS THE CELL MEMBRANE



The cell membrane allows some molecules to pass through freely.

- Those molecules will move from an area of high concentration on one side of the membrane to an area of low concentration on the other side.

Examples of molecules that diffuse freely are carbon dioxide and oxygen.



DIFFUSION COLOURING PAGES

- What kinds of molecules can diffuse easily across the cell membrane? What kinds of molecules cannot diffuse easily across the cell membrane? Why?
- List 3 examples of the molecules that can diffuse easily across the cell membrane.
- Define:
 - Concentration
 - Concentration gradient
 - Equilibrium
 - Selectively permeable



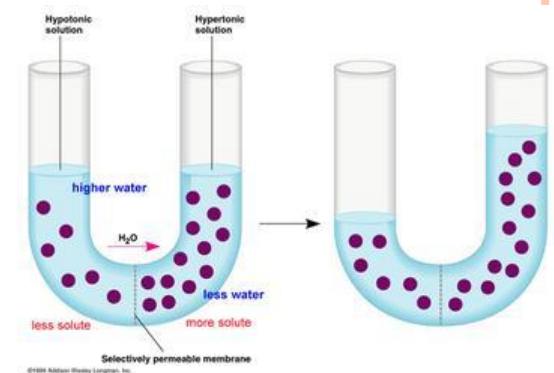
CONT'D

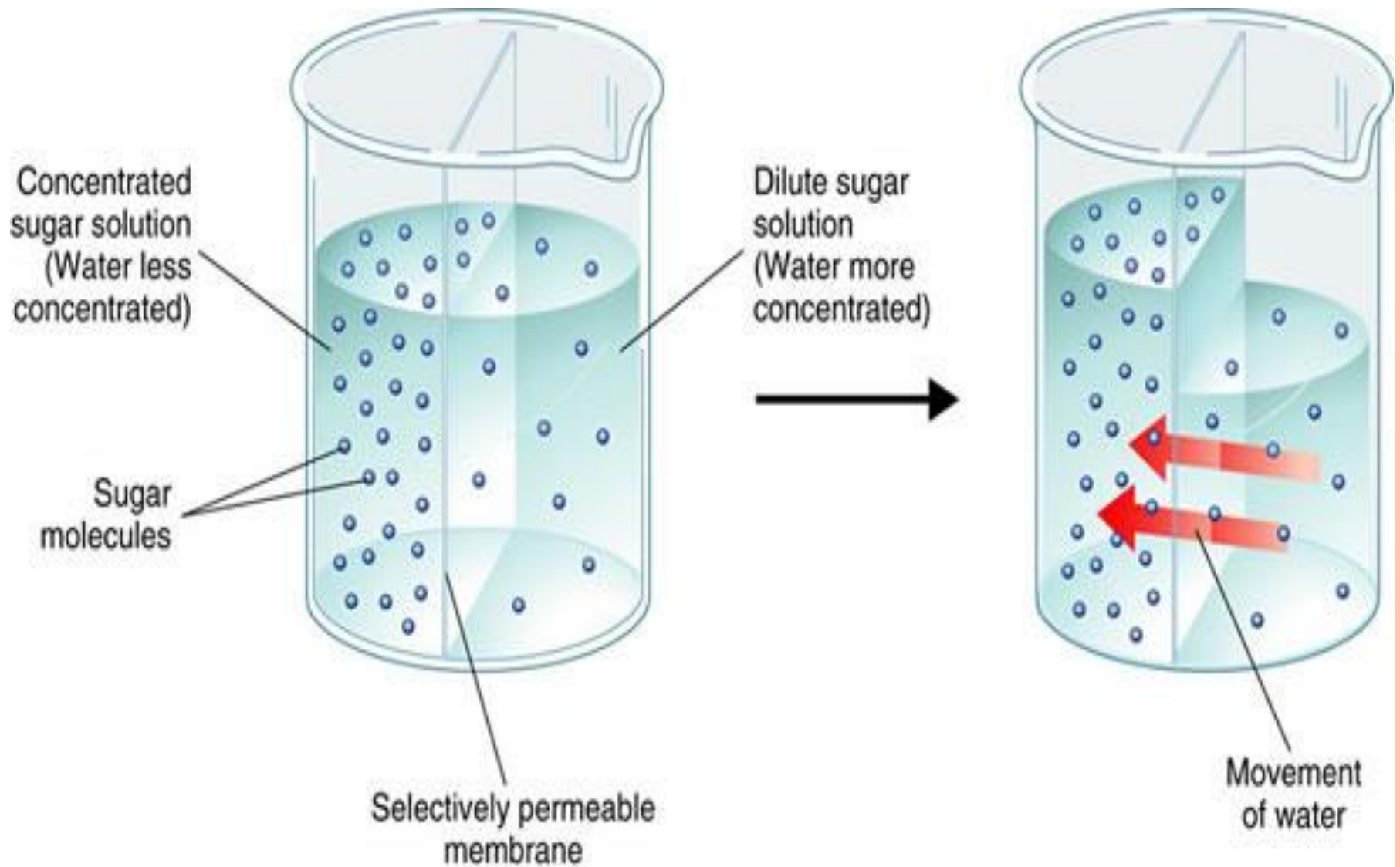
- What causes diffusion? Does it require energy?
- When the concentration of a particular molecule is equal on both sides of the membrane does it stop moving across the membrane? Explain your answer.



OSMOSIS-PASSIVE TRANSPORT (NO ENERGY)

- Osmosis is the diffusion of **water** molecules from an area of high concentration to an area of lower concentration.
- In some cases, large solutes cannot diffuse across the membrane of the cell, however the water will.





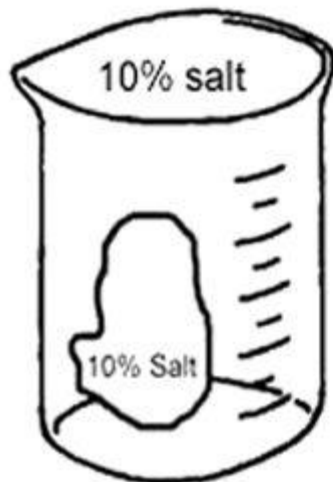
PREDICTING THE DIRECTION OF OSMOSIS

- A solution is composed of a solute and a solvent.
 - Solvent-the substance that dissolves the solute. (ex. water)
 - Solute-the substance that is being dissolved. (ex. salt, sugar)
- The direction of osmosis depends on the relative concentrations of the solutions in the cell compare to their environment.



OSMOSIS PRACTICE PROBLEM

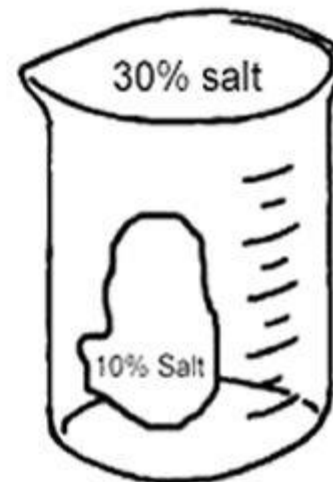
- For each beaker, determine whether water will go into the cell or out the cell with 10% salt.



Beaker A



Beaker B



Beaker C



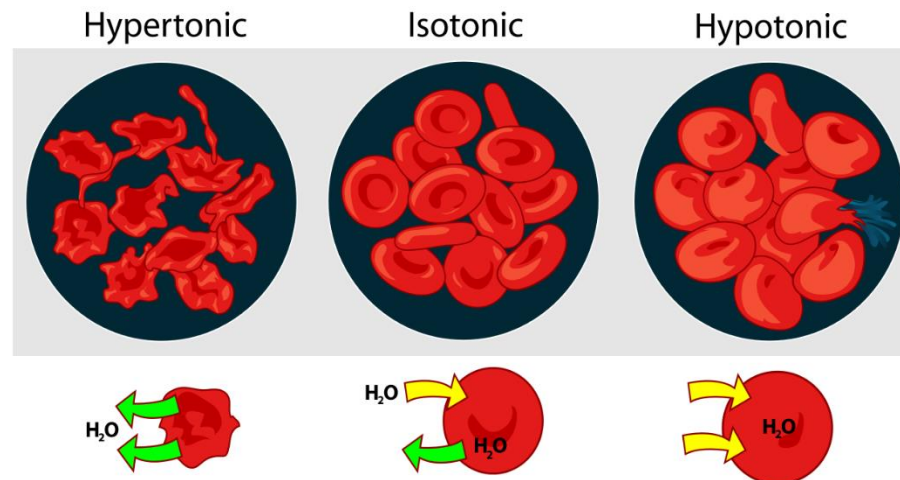
PREDICTING THE DIRECTION OF OSMOSIS

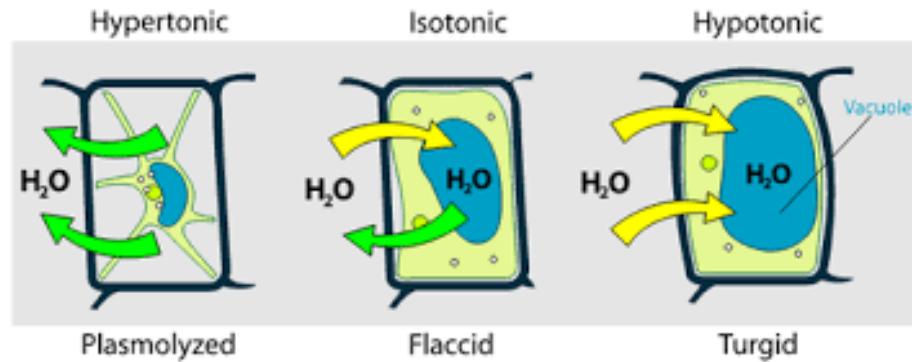
- Hypertonic-higher concentrations of solutes in the solution than the cell.
 - (cell will lose water-shrivel)
- Hypotonic-lower concentrations of solutes in the solution than what is in the cell.
 - (cell will gain water)
- Isotonic-equal concentrations of solutes inside and outside of the cell.
 - (water will moved equally in both directions)



IMPACT ON VERTEBRATE ANIMAL CELLS

- In a hypertonic environment animal cells will experience crenation and will undergo shrinkage.
- In a hypotonic environment a animal cell will eventually burst experiencing plasmolysis.
- Isotonic the cell will stay them same





- Turgor pressure is the pressure exerted on the plant cell wall.
 - This occurs when plant cells are in a hypotonic environment. In this state, plant cells are turgid.
- In a hypertonic environment a plant cell will experience plasmolysis and the plant cell will lose turgor pressure. This causes a plant to wilt.

IMPACT ON PLANT CELLS

OSMOSIS – DIFFUSION

- They sound similar but they ARE NOT!
- [Watch this video](#)
- Complete Questions Re: Osmosis
- Review



What was the point of
the demonstration
yesterday?



CELL MEMBRANE AND TRANSPORT

- Crash Course



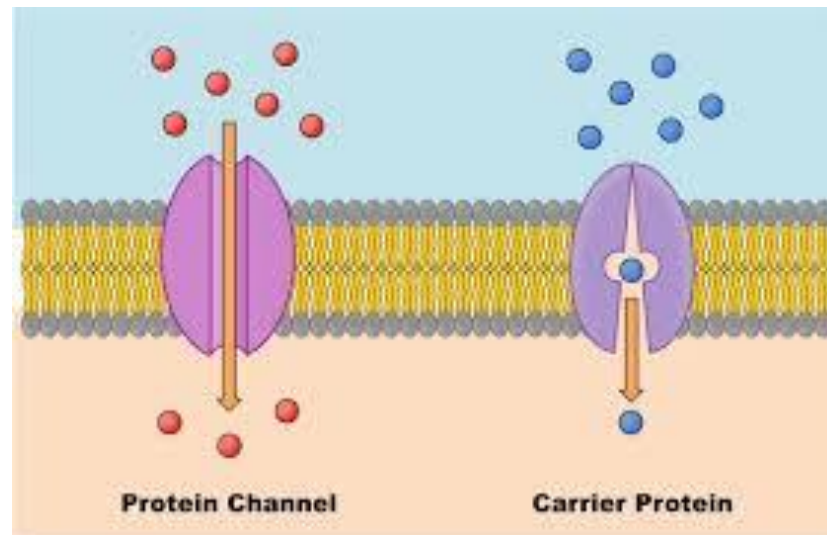
FACILITATED DIFFUSION

- Water molecules can cross a membrane through the lipid bilayer, but how do other molecules cross?
- Cell membranes have protein channels that act as carriers, making it easy for certain molecules to cross!



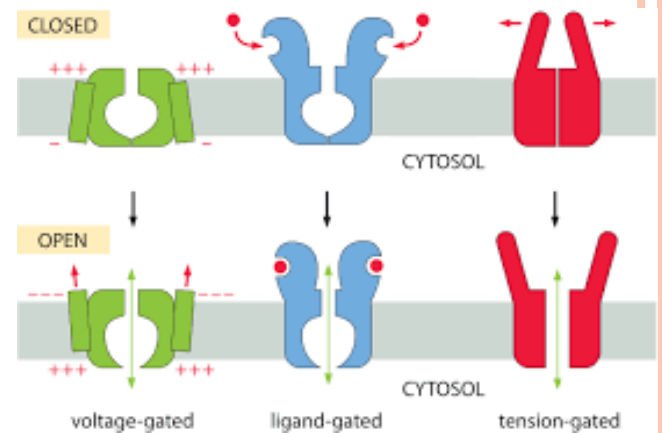
FACILITATED DIFFUSION-PASSIVE TRANSPORT

- Some molecules are too large or are not soluble in lipids and cannot diffuse freely across the membrane.
- These molecules will require the help of a specific protein in the cell membrane called a carrier protein.



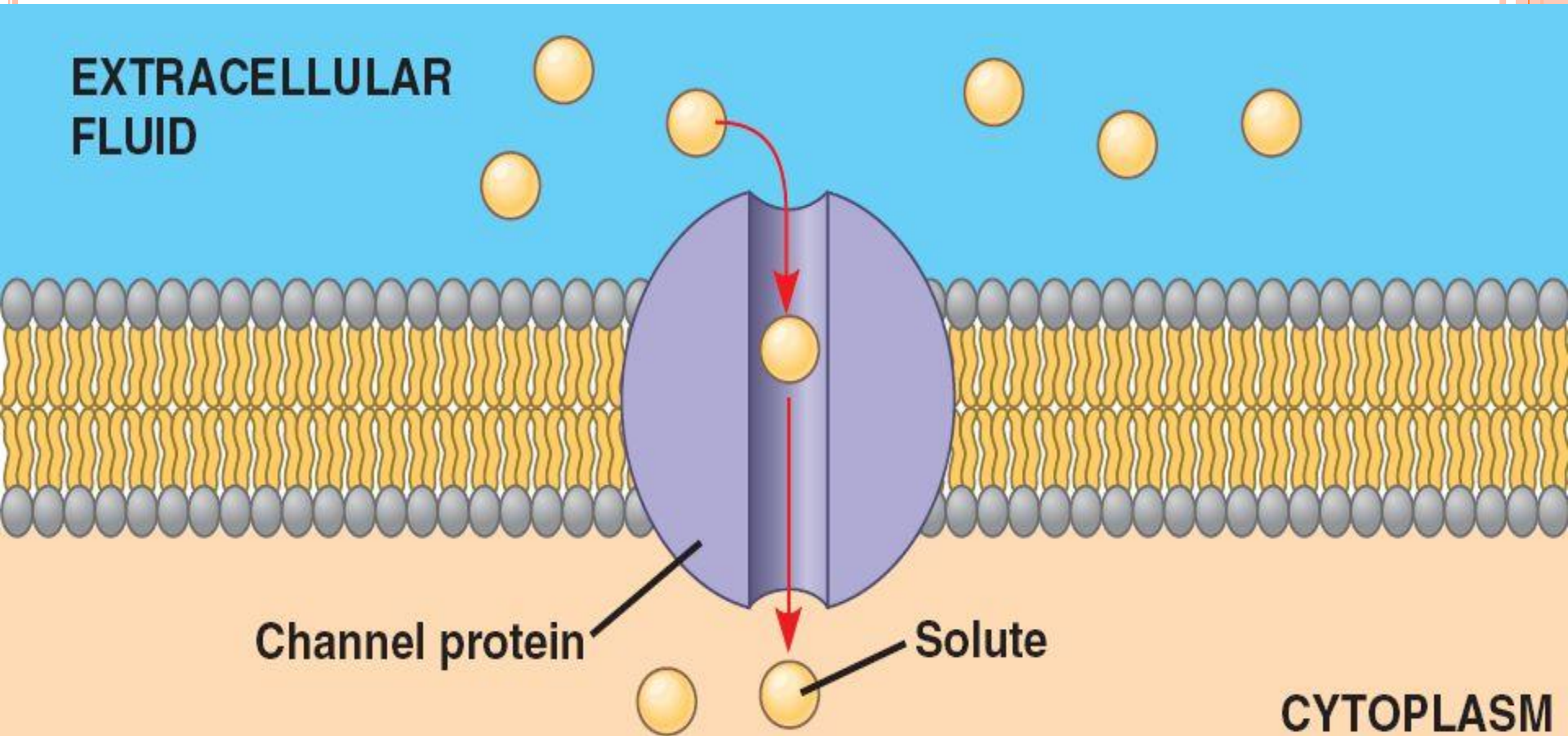
ION CHANNELS-PASSIVE TRANSPORT

- Ion channels are type of proteins that allow specific ions into or out of the cell.
- Each ion channel is specific a particular ion.
- Ion channels can be always open or can be gated.
- Gated ion channels can open 3 ways
 - Stretching the cell membrane
 - Electrical signals
 - Chemicals in cytosol or environment



Facilitated diffusion= glucose (cannot diffuse across the lipid bilayer on their own)

R-> move through protein channels instead.



ACTIVE TRANSPORT

- Active transport is the movement of material up the concentration gradient from a low concentration to a high concentration.
 - It requires energy (ATP)!!!
- Ion channels and carrier protein that assist in active transport are called cell membrane pumps.

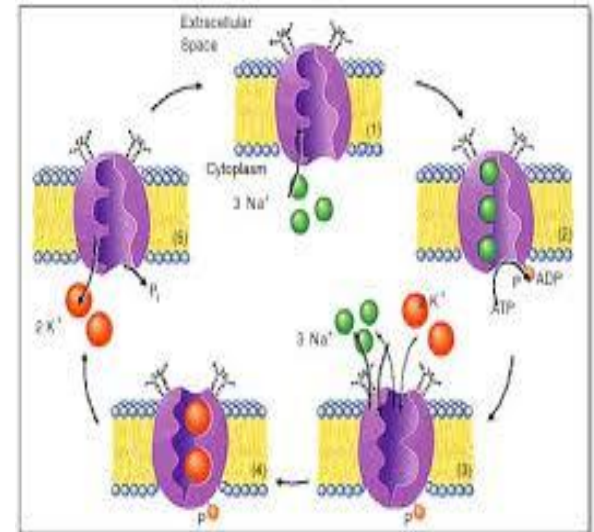
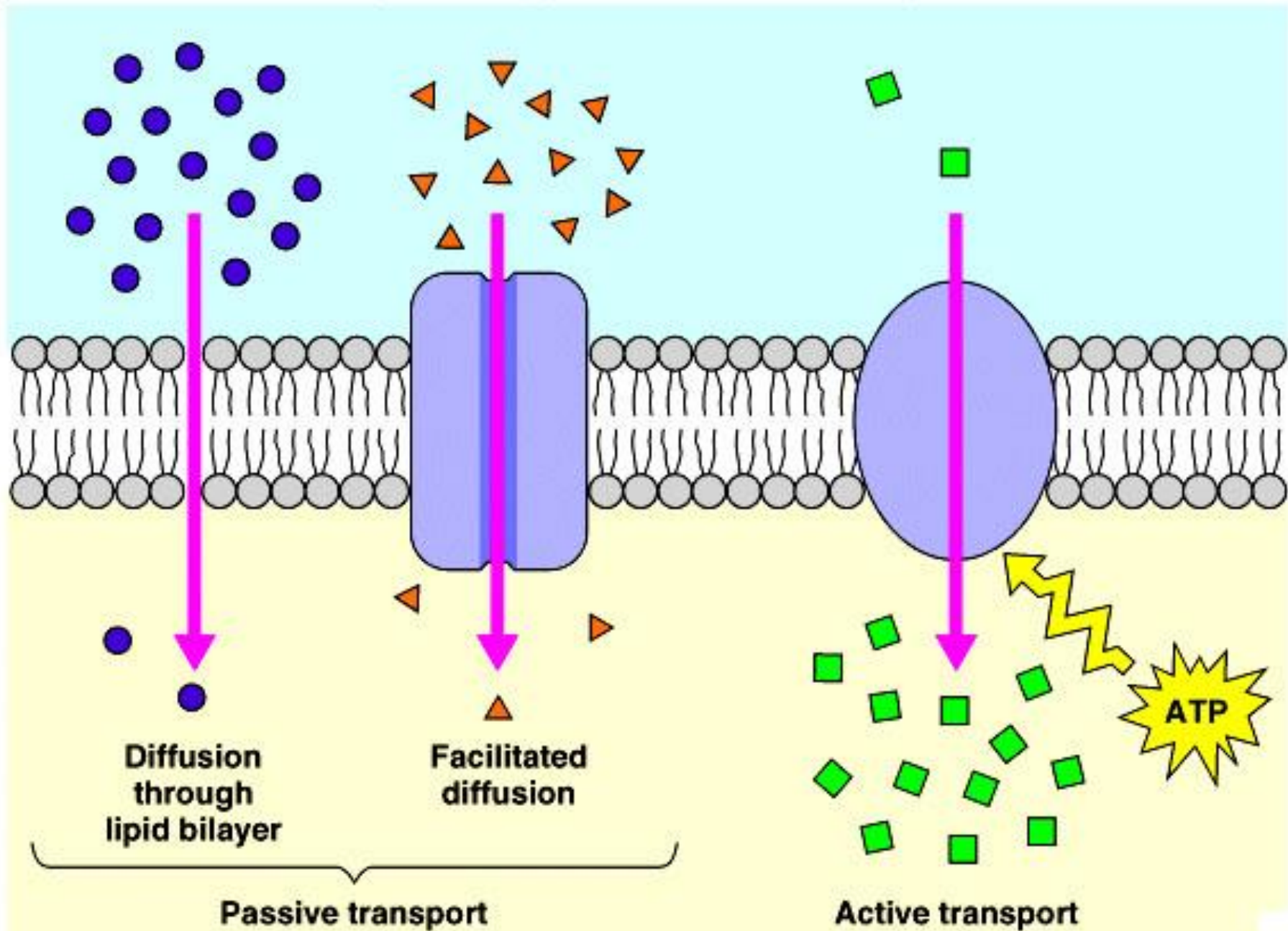
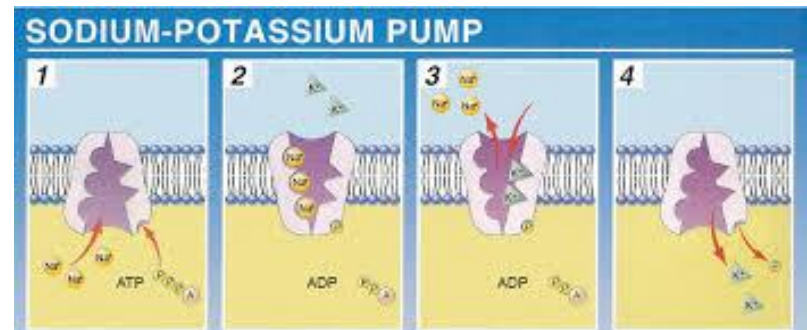


Figure 8.14 Review: A comparison of passive and active transport



SODIUM POTASSIUM PUMP-ACTIVE TRANSPORT

- A type of cell membrane pump that transport Na^+ and K^+ ion up (low to high) their concentration gradients.
- Some animal cells need to have a higher concentration of Na^+ outside of the cell and a higher concentration of K^+ inside of the cell.
- [Sodium Potassium Pump Video- Khan Academy](#)



ACTIVE TRANSPORT- COLOURING PAGE

- Complete Primary and Secondary Active Transport Questions
- Review in class

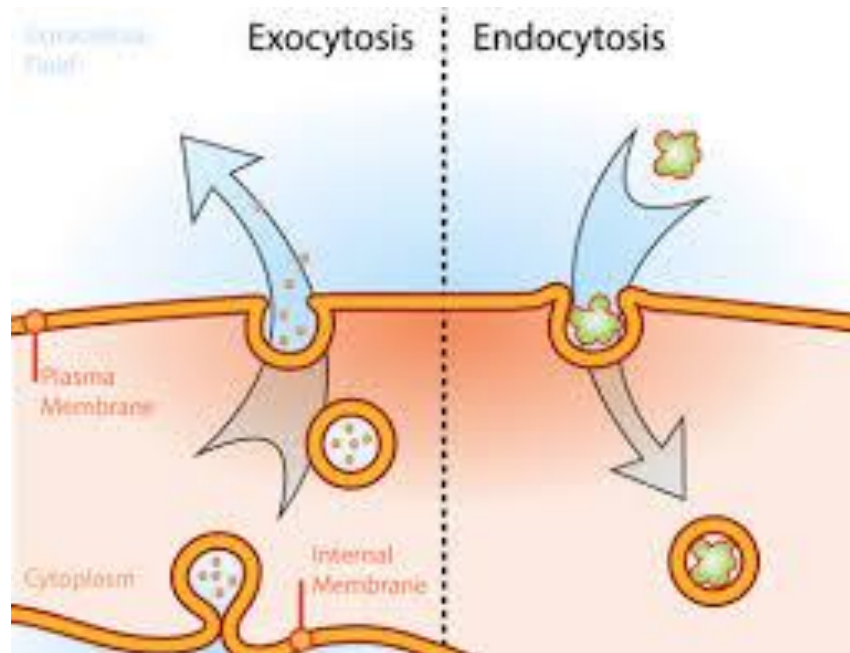


ENDOCYTOSIS & EXOCYTOSIS

- The active transport of small molecules / ions across a cell membrane = transport proteins or “pumps” found in the membrane itself.
- Larger molecules and clumps of materials can be actively transported
- endocytosis and exocytosis.



- The transport involves changes in the shape of the cell membrane.
- Also requires energy!

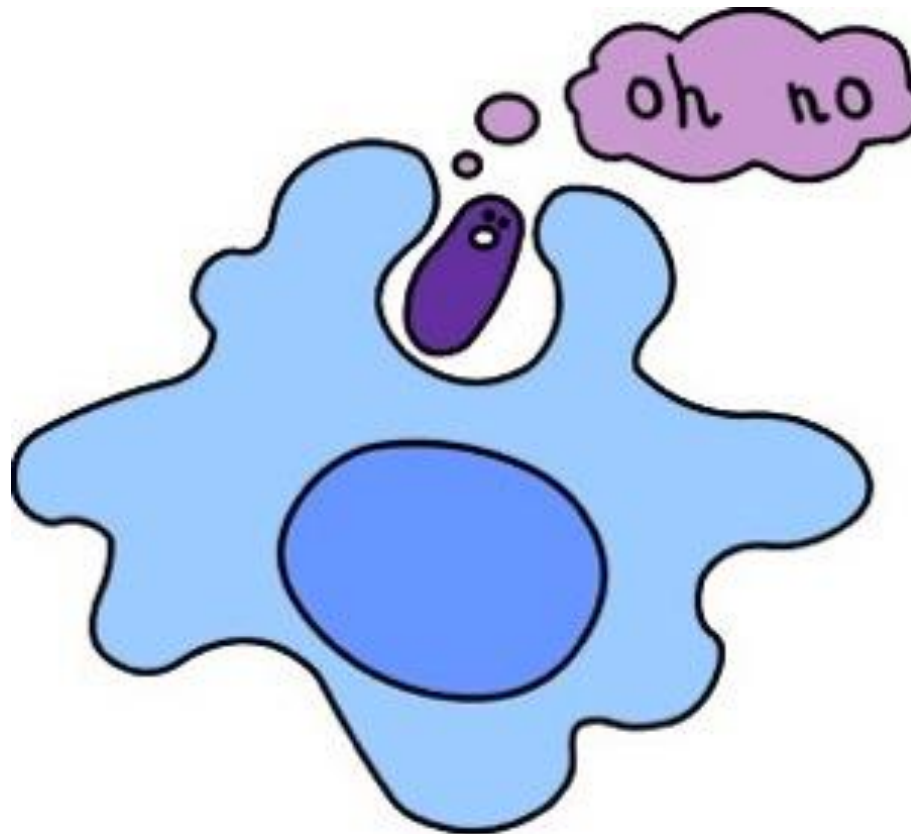


ENDOCYTOSIS

- Taking materials into the cell by means of pockets of cell membrane.
- The pocket breaks loose from the outer portion of the cell membrane and forms a vacuole in the cytoplasm.

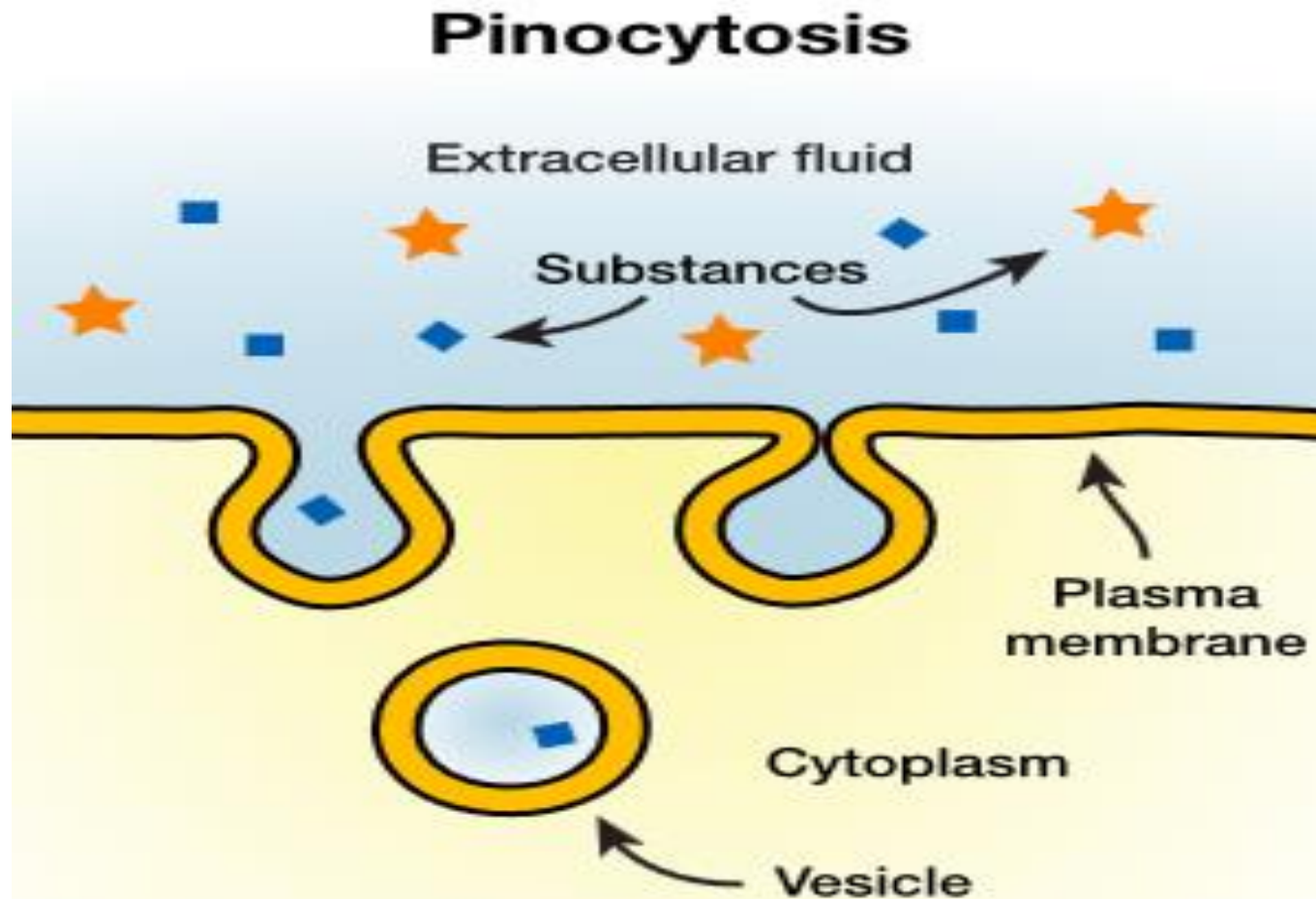


- One example of Endocytosis is:
 1. **Phagocytosis:** cytoplasm surrounds a particle and packages it within a food vacuole. The cell then engulfs it!



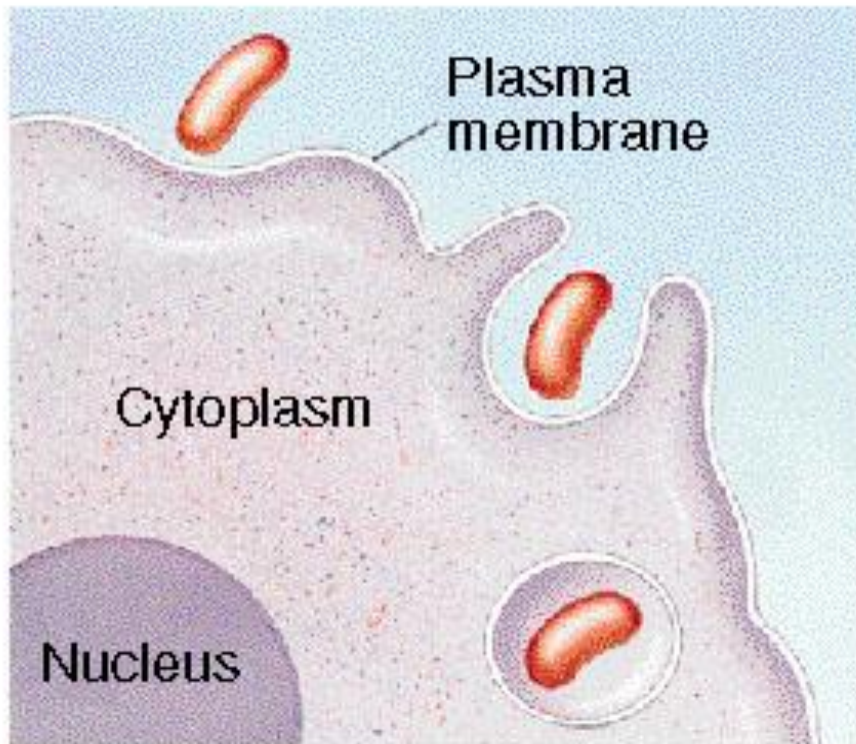
- Another example of Endocytosis is:

2. Pinocytosis: Tiny pockets form along cell membrane, fill with fluid and pinch off to form a vacuole within the cell.

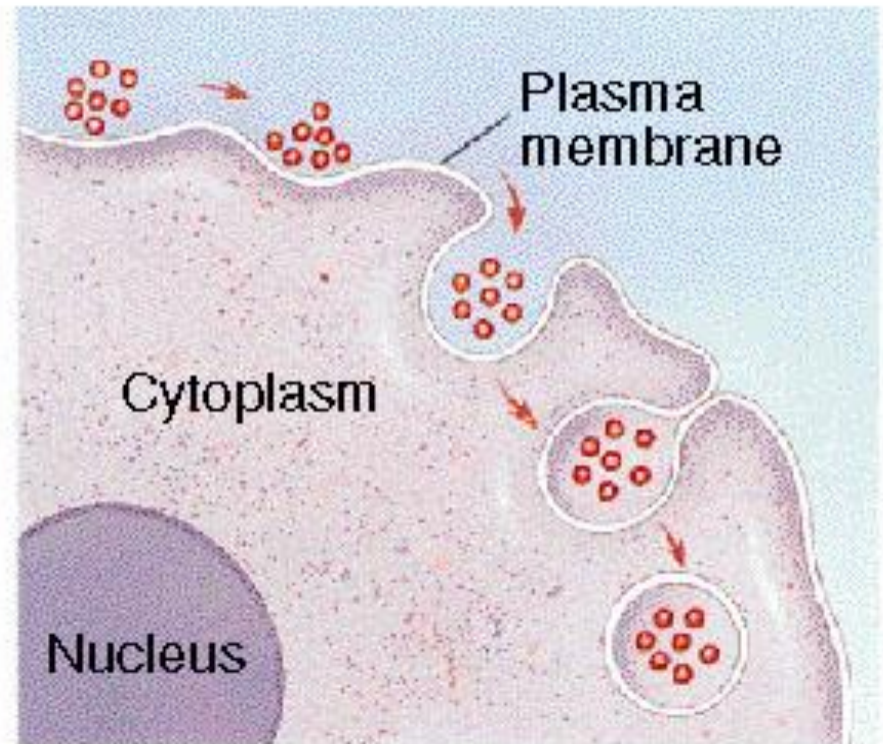


WHAT'S THE DIFFERENCE?

Endocytosis



(a) PHAGOCYTOSIS



(d) PINOCYTOSIS

EXOCYTOSIS

- Large amounts of material released from the cell.
- The membrane of the vacuole surrounding the material fuses with the cell membrane, forcing the contents out of the cell.

