NAME_____

DATE_____ PERIOD_____

Cell Membrane & Tonicity Worksheet

Composition of the Cell Membrane & Functions

The cell membrane is also called the _____ membrane and is made of a phospholipid _____. The phospholipids have a hydrophilic (water attracting) _____ and two hydrophobic (water repelling) _____. The head of a phospholipid is made of an alcohol and _____ group, while the tails are chains of _____. Phospholipids can move _____ and allow water and other _____ molecules to pass through into or out of the cell. This is known as simple _____ because it does not require _____ and the water or molecules are moving _____ the concentration gradient.

SKETCH AND LABEL a phospholipid coloring the heads red and the tails blue.

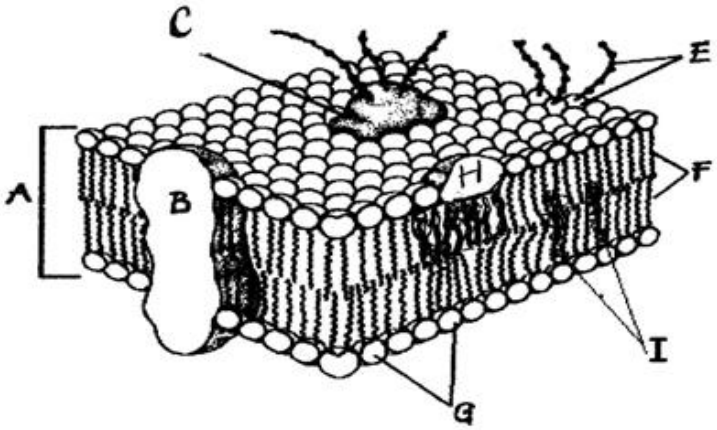
Another type of lipid in the cell membrane is _____ that makes the membrane more fluid. Embedded in the phospholipid bilayer are _____ that also aid in diffusion and in cell recognition. Proteins called _____ proteins go all the way through the bilayer, while _____ proteins are only on one side. Integral proteins are also called _____ proteins. Large molecules like _____ or carbohydrates use proteins to help move across cell membranes. Some of the membrane proteins have carbohydrate _____ attached to help cells in recognize each other and certain molecules.

List 4 functions of the cell or plasma membrane:

a. _____
b. _____
c. _____
d. _____

Correctly ***color code and identify*** the name for each part of the cell membrane.

Letter	Name/Color	Letter	Name/Color
_____	Phospholipid bilayer (no color)	_____	Peripheral protein (red)
_____	Integral protein (pink)	_____	Cholesterol (blue)
_____	Fatty acid tails (orange)	_____	Glycoprotein (green)
_____	Phosphate heads (yellow)	_____	Glycolipids (purple)



Match the cell membrane structure or its function with the correct letter from the cell membrane diagram.

Letter	Structure/Function	Letter	Structure/Function
_____	**Attracts water**	_____	**Repels water**
_____	**Helps maintain flexibility of membrane**	_____	**Make up the bilayer**
_____	**Involved in cell-to-cell recognition**	_____	**Help transport certain materials across the cell membrane**

Define osmosis. _____
In which direction does water move across membranes, up or down the concentration gradient?

_____

Define these 3 terms:
a. isotonic- _____
b. hypertonic _____
c. hypotonic _____

Use arrows to show the direction of water movement into or out of each cell. ***Color and label*** the cell in an isotonic environment light blue, the hypotonic environment yellow, and the hypertonic environment light green.

Match the description or picture with the osmotic condition:

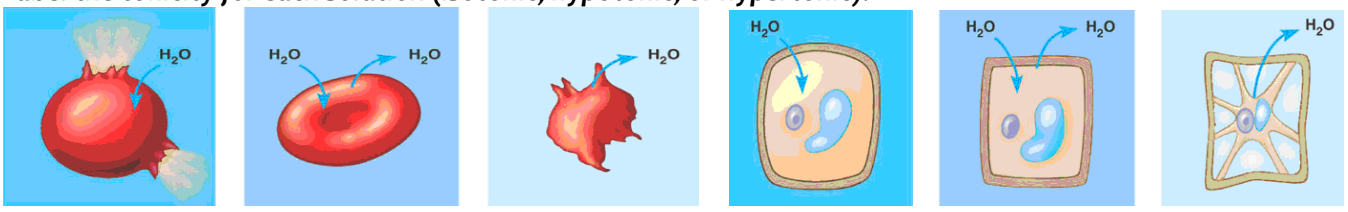
A. Isotonic

B. Hypertonic

C. Hypotonic

_____ solution with a lower solute concentration
_____ solution in which the solute concentration is the same
_____ condition plant cells require
_____ condition that animal cells require
_____ red blood cell bursts (cytolysis)
_____ plant cell loses turgor pressure (Plasmolysis)
_____ solution with a higher solute concentration
_____ plant cell with good turgor pressure
_____ solution with a high water concentration

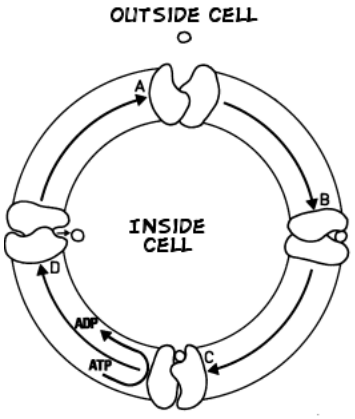
Label the tonicity for each solution (isotonic, hypotonic, or hypertonic):



_____ _____ _____ _____ _____ _____

Transport Requiring Energy

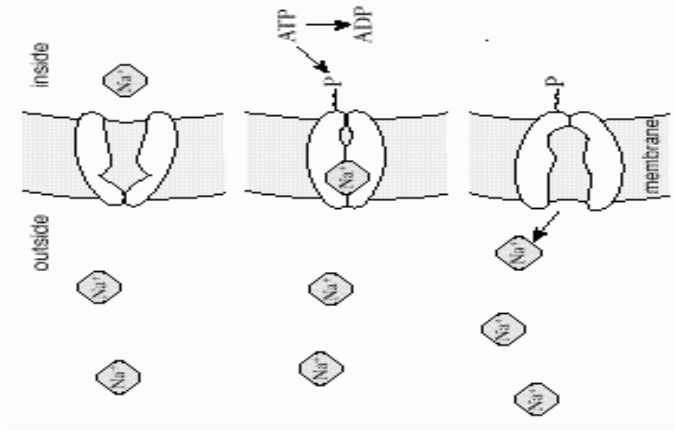
What type of transport is represented by the following picture? _____
What energy is being used? _____
In which direction (concentration gradient), is the movement occurring? _____



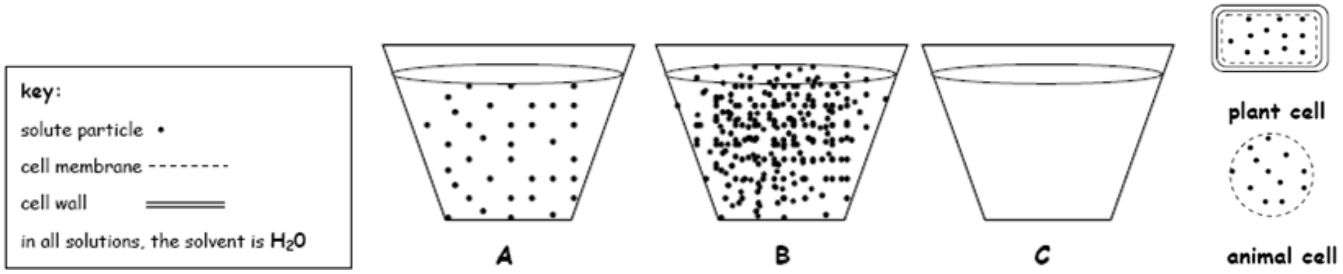
Color the internal environment of the cell yellow.
Color and Label the transport proteins red and the substance being moved blue.

One type of active transport is called the _____ pump which helps muscle cells contract. This pump uses _____ to move ions _____ the concentration gradient. The protein that is used to pump the ions through is called a _____ protein and it changes its _____ to move the ions across the cell membrane.

Label and color the carrier proteins red and the ions green.



TONICITY AND OSMOSIS



Part I – Fill in the blanks.

A _____ is a fluid in which a substance is dissolved.
A _____ is a substance dissolved in a solvent.
A _____ is a combination of solute and solvent.
The process by which water diffuses across a membrane called _____.

Part II – Look at the solutions illustrated above and fill in the blanks.

1. **Solution B** is _____ to **Solution A**. This is because **Solution B** has a greater concentration of _____ in it than does **Solution A**. **Solution C** has no solutes dissolved in it, therefore it is _____ to both **Solutions A and B**.

2. As a relative concentration of solutes in two solutions increases, of necessity the concentration of water in the same two solutions _____. **Solution A** has a lower concentration of _____ than does **Solution C; Solution A** is also **hypertonic** to **Solution C**.

3. If you wanted to make **Solution A isotonic** to **Solution B**, you could add water to **Solution** ____ or you could add solute to **Solution** ____. If you took all three solutions, put them into a large container and mixed them thoroughly, then redistributed the solution among three containers, **Solution A** would be _____ to **Solution B**. **Solution A** would also be _____ to **Solution C,** and **Solution C** would be _____ to **Solution B**.

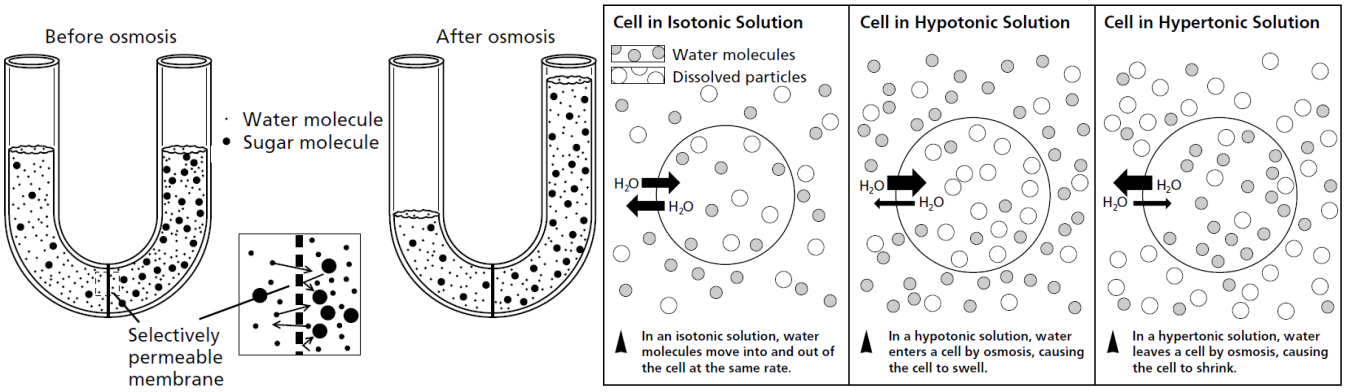
Part III – Look at the solutions and cells illustrated above and fill in the blanks.

1. Because the **cytoplasms** of the plant and the animal cell have **equal** concentrations of solutes, we can say their cytoplasms are _____ to each other. If we put both the plant and the animal cells into

Solution A, we would expect **no change** in the cells, because **Solution A** is _____ to the cytoplasm of each cell.

2. Let's put both cells into **Solution B**. Because **Solution B** is **hypertonic** to the cytoplasms of the cells, we would expect **water** to _____ the cells through the process of _____. This would result in the cytoplasm of both cells shrinking.

3. Now we'll put both the plant and animal cell into **Solution C**, which, because it contains **no solutes** at all, is _____ to the cytoplasm of both cells. _____ will enter both cells through **osmosis**. The **animal cell** is likely to _____, unfortunately. The **plant cell**, however, is protected from this because of the presence of its _____ _____.



Refer to the U-tube pictures above when answering the questions below.

1. Why did the number of water molecules on each side of the membrane change, whereas the number of sugar molecules stayed the same?

2. How does the plasma membrane of a cell compare with the membrane in the U-shaped tube?

3. Explain the behavior of water molecules in the isotonic solution.

4. Does osmosis occur if a cell is placed in an isotonic solution?

5. Why does water enter a cell that is placed in a hypotonic solution?

6. What happens to the pressure inside a cell that is placed in a hypertonic solution?

7. What can happen to animal cells when placed in a hypotonic solution? Explain.

8. What causes a plant to wilt?