**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Key Terms:

Plasma membrane homeostasis

phospholipid bilayer hydrophilic head Hydrophobic tail fatty acid cholesterol semi-permeable

Selectively permeable

carbohydrate ion

polar/nonpolar Channel protein simple diffusion facilitated diffusion

Concentration gradient

passive diffusion active transport carrier proteins ATP

glycoproteins immune system

**PART ONE: Model Analysis.**

*Directions: Observe what is going on in the diagrams and fill in the table with your assessments.*

|  |
| --- |
| ***Simple Diffusion (Passive) – non-carrier mediated diffusion*** |
| Along which **concentration gradient** do the molecules move (from *low to high* or from *high to low* concentration) |  |
| Which molecules can cross the membrane freely?(water, glucose, polar, non-polar) |  |
| Which types of molecules are unable to cross the membrane freely? (water, glucose, polar, non-polar) |  |
| Are membrane transport proteins needed for these molecules to cross (yes/no) |  |
| Where in the body would you predict this might happen? |  |

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| ***Osmosis*** |
| Along which **concentration gradient** do the molecules move (from *low to high* or from *high to low* concentration) |  |
| Which molecules can cross the membrane freely?(water, glucose, polar, non-polar) |  |
| Types of solutions. Does water enter or leave or both the inside of the cell? | *Diagram A:**Diagram B:**Diagram C:* |
| How might this be different between animal and plant cells (you saw plant cells the other day!) |  |
| Where in the body would you predict this might happen? Why do you say this? |  |
|  ***Passive Transport – Facilitated Diffusion*** |
| Along which **concentration gradient** do the molecules move (from *low to high* or from *high to low* concentration) |  |
| Which molecules can cross the membrane freely?(water, glucose, polar, non-polar) |  |
| Are membrane transport proteins needed for these molecules to cross (yes/no). What types of membrane proteins are needed, if present? |  |
| What are examples of molecules that use a protein channel? Look at diagram… |  |
| What are examples of molecules that use a carrier protein? Again…diagram. |  |
| What unique set of steps do you see in the membrane proteins? Which protein does this and what do you observe about this action? |  |
| Where in the body might this take place? (Research) |  |

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| ***Active Transport*** |
| Along which **concentration gradient** do the molecules move (from *low to high* or from *high to low* concentration) |  |
| Which molecules can cross the membrane freely?(water, glucose, polar, non-polar) |  |
| Are membrane transport proteins needed for these molecules to cross (yes/no) |  |
| What new molecule is present during active transport? Where do you remember seeing this molecule this year? |  |
| What are the similarities/differences between the proteins in active transport vs. facilitated diffusion? |  |
| Where in the body would you predict this might happen? |  |

**PART TWO. Comparing Passive vs. Active Transport** ([video link here](https://youtu.be/Ptmlvtei8hw)) or ([webpage link here](1.%09https%3A/www.khanacademy.org/test-prep/mcat/cells/transport-across-a-cell-membrane/a/passive-transport-and-active-transport-across-a-cell-membrane-article))

RULE: Active transport moves substances from an area of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ concentration to an area of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ concentration that requires the use of \_\_\_\_\_\_\_\_\_\_\_ to do so.

Label the diagram below:

A: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ A1:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

A2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ B: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ D: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

E: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ F: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

G: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ H: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

I: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PART THREE: Cell Defense: The Plasma Membrane Simulation (**[**Link to simulation**](https://biomanbio.com/HTML5GamesandLabs/Cellgames/celldefensehtml5page.html)**)**

**Directions:** Read the steps here and all the information on the screen. Follow all the steps carefully filling in all the blanks.

**Step 1:** Use the link on the class website to go to the “Cell Defense” Simulation. You want to move to the “**Choose Your Challenge!”** menu. From the menu choose **“Build a Membrane!”** Dr. Vial has a vile weapon (note the play on words) that destroys plasma membranes. Without a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells of living things will die because they are unable to maintain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Step 2:** Zoom in on the plasma membrane. From the **“Urgent Message”** you learn that phospholipids made up of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ head and two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tails.

The heads are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The tails are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The heads face out towards the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the tails facing \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_.

**Draw and label** the phospholipid in the box:

**Step 3:** Repair the phospholipid membrane.

How many phospholipids did it take? \_\_\_\_\_\_\_

**Step 4:** What do you have to put into

 the membrane to help stabilize it? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. How many did you add? \_\_\_\_\_

**Step 5:** What is another word for selectively permeable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

What does that mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 6:** What 2 molecules easily pass through the membrane? Record why for each.

|  |  |
| --- | --- |
| Molecule 1 | Molecule 2 |

**Step 7:** What 3 molecules cannot easily pass through the membrane? Record why for each.

|  |  |  |
| --- | --- | --- |
| Molecule 1 | Molecule 2 | Molecule 3 |

What does polar mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 8:** Insert channel proteins into the membrane. Transport substances across the membrane. Note: You can only transport substances using channel proteins until there were \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. What is this process called? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 9:** Moving from \_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_ concentration requires the use of energy to \_\_\_\_\_\_\_\_\_ substances. This is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ transport and uses: (place answer in table)

|  |  |
| --- | --- |
| 1.  | 2. Which is cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Step 10:** Carbohydrates are like identification badges. Cells that have different membrane carbohydrates do different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The immune system uses the carbohydrates to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that your cells belong to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and are not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or other foreign cells.

What does the immune system do to foreign invaders? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What kind of cell does this? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 11:** Next take the “Membrane Structure Challenge!”

**Step 12:** Take the “Diffusion Challenge!”

**Step 13:** Take the “Energy and Transport Challenge!”

How many ATP did you use? \_\_\_\_\_\_ What type(s) of protein(s) were used? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Explain when each type was used. \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 14:** Take the “Osmosis Challenge!”

What is Osmosis? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the name of the special proteins that let water pass through? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Is this passive or active transport? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 15:** From your Scores Sheet record the following:

Lab Score (% correct): \_\_\_\_\_\_\_ Number Correct: \_\_\_\_\_\_\_ Number Incorrect: \_\_\_\_\_\_\_

**Reflection:**

The chemical that was responsible for the Chicago Tylenol murders we covered was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Discuss your thoughts on what type of molecule that was and why it was able to do so much harm to the 8 people who were murdered. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_