

Assignment Summary

For this assignment, you will model the fluid mosaic structure of the cell membrane, including phospholipids and membrane proteins.

Background Information

The cell membrane is the gateway into and out of the cell. Its semi-permeability means that some molecules can cross the membrane easily, while others are blocked entirely or can only cross in select circumstances. The fluid mosaic model shows that the cell membrane is a mosaic of proteins embedded in a fluid bilayer of phospholipids. The phospholipids laterally move throughout the membrane at a rapid pace – hence its “fluidity.” Proteins embedded in the membrane move, too, but because they are so much larger than phospholipids, they move at a slower pace.

Phospholipids make up the majority of the cell membrane. They have a polar hydrophilic head and two hydrophobic fatty acid tails. In the cell membrane, phospholipids are arranged in a bilayer with the hydrophilic heads oriented towards the extracellular space and the cytoplasm, both of which are aqueous environments. The hydrophobic tails are oriented toward the interior of the membrane. This structure enables the cell membrane to function as a stable boundary between the watery extracellular space and the watery interior of the cell.

Proteins perform functions for the cell. Peripheral proteins are attached to the cell membrane, and integral proteins penetrate the cell membrane. Five main functions performed by integral proteins include transport, enzymes that facilitate metabolic activity, signal transduction, cell-cell recognition, and intercellular joining.

Materials

- Writing and drawing supplies (colored pencils, paper, etc.)
- Access to the Internet, lesson, student edition, and other reference materials

Assignment Instructions

For this project, you are expected to submit:

1. A completed version of this guide, featuring your labeled diagrams.

Step 1: Prepare for the project.

- a) Read through the guide before you begin so you know the expectations for this project.
- b) If there is anything that is not clear to you, be sure to ask your teacher.

Step 2: Draw a model of the cell membrane.

- a) Make sure you include and label lipids. Label the phosphate head and fatty acid tail portions of the phospholipid. Have some tails be saturated and some be unsaturated, being sure to show and label how this affects their structure. Also, label the hydrophilic and hydrophobic portions of a phospholipid. Finally, include and label cholesterol and glycolipids.
- b) Make sure you include and label the following proteins: transport proteins, enzymes, signal

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- c) receptor proteins, glycoproteins, proteins that facilitate intercellular joining, and proteins involved in cell stability. Be sure to show the difference between a transport protein involved in passive transport, and those involved in active transport.

Step 3: Describe the function of each component of the cell membrane model by answering the questions in the Written Analysis section at the end of this document.

- a) Describe the function of phospholipids.
- b) Describe the function of membrane proteins.
- c) Explain how some membrane proteins facilitate the movement of molecules in and out of the cell.

Step 4: Evaluate your project using this checklist.

If you can check each box below, you are ready to submit your project.

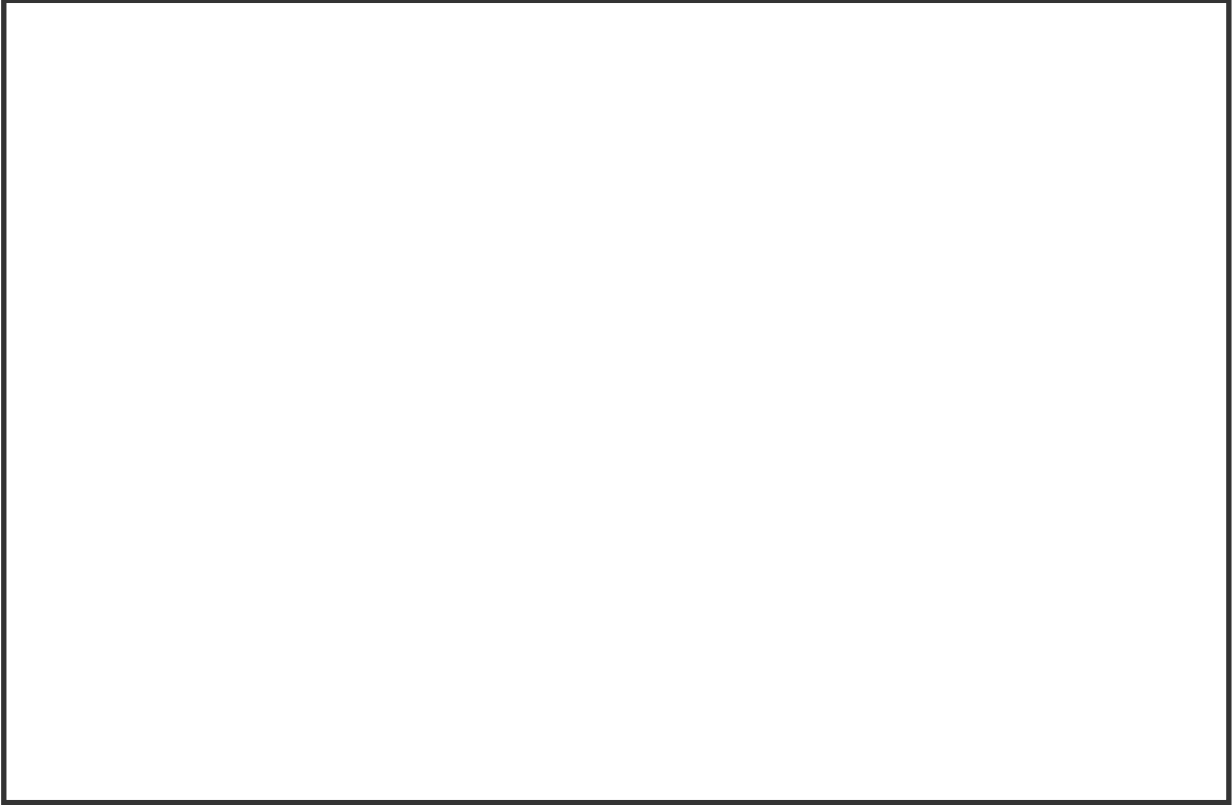
- Did you draw a model of the cell membrane?
- Did your drawing include phospholipids and proteins?
- Did you label the hydrophilic and hydrophobic components of a phospholipid?
- Did you include and label the following proteins: transport proteins, enzymes, signal receptor proteins, glycoproteins, and proteins that facilitate intercellular joining?
- Did you complete the Written Analysis section, including a description of the function of each item shown in your drawing?

Step 5: Revise and submit your project.

- a) If you were unable to check off all of the requirements in the checklist, go back and make sure that your project is complete. Be sure to save your project before submitting it.
- b) Turn in your model and written analysis to your teacher. Make sure that your name is on it.
- c) Congratulations! You have completed your project.

Cell Membrane Model

In the box below, draw a model of the cell membrane. Make sure to label each part of the cell membrane.



Written Analysis

Answer the questions below.

1. Analyze how the structure of phospholipids facilitates three of the functions of the cell membrane.
2. Compare and contrast the structure and function of membrane proteins involved in passive versus active transport in the cell membrane.
3. Explain why there are six different types of membrane proteins in the cell membrane. Be sure to include how their different structures facilitate their functions.