Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_ Period:\_\_\_\_

**Plasma (Cell) Membrane Lab**

**Objective:** To learn about cell membranes by using soap bubbles as a model

**Background:** In this lab, soap bubbles will represent a plasma (cell) membrane. This analogy works because soap bubbles are a phospholipid bilayer, similar to the plasma membrane of a real cell. Both the soap bubble and the plasma membrane are made of a double layer of fat (lipid) molecules. Use your notes or the text (pg. 177) to label the Plasma Membrane below:

 

**Word Bank:**

-Phospholipid Bilayer

-Phospholipid

-Hydrophilic Head (polar)

-Hydrophobic Tails (nonpolar)

-Transport Protein Molecules

-Carbohydrate Chains

**Materials:** Lemon fresh joy bubble mixture, small rubber bands, bucket, plastic sheet, straws

**Experimental Design:**  In each of these demonstrations, you will want to get a soap film in you bubble holder. To do this, place the bubble holder into your bubble mixture and gently lift the holder by both straw handles. Gently open the handles over the bucket

**Part A: Cell Membrane Behavior** Fill the bubble holder and then twist it into a Figure 8 pattern. Try to do other shapes and patterns with the soap. The soap is actually less flexible than one of your plasma membranes in your skin cells!

1. **Describe the flexibility of the soapy film when twisted. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part B: Movement of Substance Into and Out of Cell** Make a big bubble floating on the surface of the soap solution by first dipping the straw into the soapy water and then pulling it out of the water. Now, holding the tip of the straw above the surface of the pan, gently blow a bubble onto the solution. Carefully lift the straw out of the bubble. Now try to pass soapy objects (soapy pencil, soapy clip, etc.) through the surface of the bubble (remember that it is really a phospholipid bilayer… a plasma membrane). The bubble should not pop if you do this right, because the soap film seals itself as each soapy object is removed.

**1. Why/how does the lipid bilayer (soapy bubble) seal itself after soapy objects have passed through? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 **2. Material going into a real cell is surrounded by a layer as it goes in and forms a sac, or a vesicle. How does this compare to the soap bubble? (Hint: What was done to the objects prior to passing them through the bubble?) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part C: Protein Function in the Cell Membrane** Proteins are part of the plasma membrane. Place some objects in the pan of soapy water. These will represent the proteins. Try using pens, pencils, straws, or other plastic items. Fill your bubble holder in the pan of soapy water and lift the bubble holder **just a little** out of the water. Move the proteins around on the surface of this bilayer.

**1. Can the proteins of a plasma membrane move around between the phospholipids? (Remember that the bubble represents a plasma membrane). Explain your answer. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part D: Movement of Large Molecules through a Membrane** A real plasma membrane has tiny pores which allow materials to pass into and out of the cell. Place a small rubber band into the pan with the soapy mixture. Fill the bubble holder and carefully place the rubber band onto this bilayer. If you do this right, the bubble holder should not pop. Take the corner of a dry paper towel and pop the soap film inside the rubber band. If you did this right, the rest of the bubble holder should still have a soap film in it and the rubber band should form a hole through the holder. This is like a pore in a plasma membrane. If you stick your finger through the pore, you should be able to move the pore around the surface of the bubble holder without popping the rest of the bubble holder. This same thing can happen in a real cell.

1. **What process occurs through the pores of a plasma membrane? (Hint: Use your notes!)**

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 **2. Can the pores, themselves, move in a plasma membrane? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part E: Additional Phospholipid Bilayers** Our cells are surrounded by a double layer, called a phospholipid bilayer. Other organelles also contain this same double layer, such as a mitochondria and the nucleus. The closest we can come to creating this is to make a bubble inside of a bubble! Fill the bubble holder and gently move it through the air while twisting it. If you do this right, a big bubble should form which you can balance on the bubble holder. Now, gently blow on the surface of the big bubble. You are trying to blow a smaller bubble inside the large one. This is tricky and may require some patience☺

**Part F: 3 Dimensional Cells** Make a tube from a sheet of a plastic overhead transparency. Hold the tube about an inch over the bubble pan and place the straw under the tube, at an angle. Blow bubbles in the mixture, using the straw, and let them collect inside the tube. Continue until the tube is entirely filled. The bubbles represent cells and the way they fit together is how cells form.

1. **Are individual bubbles that you created perfectly round, or some other shape? Draw that shape.**

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1. **How is the shape of the cell (soap bubble) affected by the cells around it? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **How many layers thick is the site where two bubbles come together? Explain (Careful, remember that this is a bilayer!). \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. **Write a paragraph explaining how the structure of the cell membrane is related to its function. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**