Plasma Membrane

Learning objectives 2.3.A Describe the roles of each of the components of the cell membrane in maintaining the internal environment of the cell. 2.3.B Describe the fluid mosaic model of cell membranes.

Name: Date: Period:

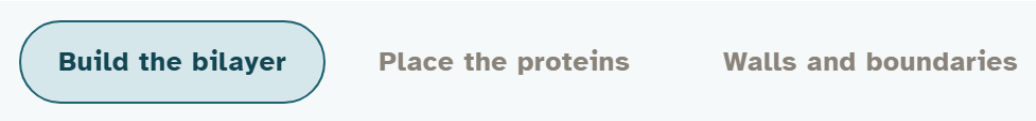
Use the tool **Build the Bilayer**. Work on the **Build the bilayer** tab for Parts 1 and 2, **Place the proteins** for Part 3, and **Walls and boundaries** for Part 4. Drag things with the mouse. The tool marks a phospholipid wrong as soon as it is placed upside down.

switch tab *scroll down* *record from the tool*

score yourself

The purple bar in the margin names the AP science practice a question uses.

Part 1 · Build it by hand



Use the **Build the bilayer** tab. It is the one showing when the tool opens.

Press **Add a phospholipid** and drag it into the membrane band. Place at least six. Then turn one over (double-click it, or press Turn it over), place it upside down, and read the tool's message.

SP 1 · CONCEPT EXPLANATION

1. (a) Identify the two regions of a phospholipid.

(b) Identify whether each region is hydrophilic or hydrophobic.

2. Describe the position of each region of a phospholipid in a finished membrane.

3. The tool marks a phospholipid placed upside down as wrong. Explain, in terms of how each region interacts with water, why an upside-down phospholipid is not a stable arrangement.

4. Explain why phospholipids in water form a bilayer rather than a single layer.

Part 2 · Fluid, and a mosaic

Stay on the Build the bilayer tab.

Press **Finish it for me**, then **Start the drift**. Watch carefully for at least ten seconds before answering. Then scroll down and open the What else is in the membrane section.

Component	What it is	What it does in the membrane
Phospholipid		
Protein		
Glycoprotein		
Glycolipid		
Steroid (cholesterol)		

SP 1 · CONCEPT EXPLANATION

5. (a) Describe the movement of the phospholipids during the drift.

(b) Describe one movement that the phospholipids do not make during the drift.

6. (a) Describe what “fluid” refers to in the fluid mosaic model.

(b) Describe what “mosaic” refers to in the fluid mosaic model.

Part 3 · Place each protein



Click the **Place the proteins** tab at the top of the tool.

For each protein, drag it until the tool reports **Correct**, then record where its nonpolar band ended up.

Protein	**Spans the membrane?** *circle one*	**Where the nonpolar band sits**
Channel protein	yes / no	
Carrier protein	yes / no	
Glycoprotein receptor	yes / no	
Peripheral protein	yes / no	

7. Explain why a protein that spans the membrane must have nonpolar side groups in the middle of its length.

8. The peripheral protein has no nonpolar band. Explain why the peripheral protein cannot sit in the interior of the membrane.

Part 4 · Walls



Click the **Walls and boundaries** tab at the top of the tool.

Click through all four cell types.

Cell type	**Cell wall?** *circle one*	**Made of**	**Plasma membrane?** *circle one*
Animal cell	yes / no		yes / no
Plant cell	yes / no		yes / no
Bacterium	yes / no		yes / no
Fungal cell	yes / no		yes / no

9. Identify the class of molecule to which all three cell wall materials belong.

SP 6 · ARGUMENTATION

10. A student claims that a bacterium does not need a plasma membrane because it has a cell wall. Evaluate the student's claim.

SP 1 · CONCEPT EXPLANATION

11. Explain how the structure of a membrane results in selective permeability. In your answer, refer to the hydrophobic interior and to embedded proteins.

Part 5 · Learning check self-report

Click the Place the proteins tab and scroll down to the Learning check. Type an answer to each question, check it against the rubric, and check off the points you earned. Then record your score here and, for every point you did not earn, write what the rubric asked for that your answer left out.

Question	Points possible	Points I earned	Missed opportunities (what the rubric wanted that I left out)
1	2		
2	2		
3	2		
4	3		
Total	**9**		

What the model simplifies

The membrane is drawn flat and in cross-section. A real plasma membrane is a closed surface wrapped around the whole cell.

A phospholipid is drawn as one circle and two lines. A real one has a glycerol backbone, a phosphate group with a variable head, and two fatty acid chains that may differ in length and saturation.

Proteins are drawn as blocks with a marked nonpolar band. In a real protein the nonpolar amino acid side groups simply happen to lie together in the region that crosses the interior. The CED places the molecular structure of amino acids beyond the scope of the exam, so the tool models regions rather than residues.

The drift is much faster than reality, and the tool never lets a phospholipid change leaflet. Real ones flip occasionally, but rarely and usually with help.