

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 the moment you put it in upside down. Predicting: wherever a Part asks you to predict, write a specific number or word and one reason before you touch the tool, in the form “I think ... because ...”. A wrong prediction costs nothing; a prediction made after looking is not a prediction.



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

Build the bilayer

Place the proteins

Walls and boundaries



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. Do at least six. Put one in deliberately upside down and read what the tool says.

1. Label the two regions of a phospholipid, and state whether each is hydrophilic or hydrophobic.

2. Describe where each of those two regions ends up in a finished membrane.

3. You put one in upside down. Explain, in terms of water, why that arrangement does not work.

4. Explain why a phospholipid in water forms a bilayer rather than a single layer.

Part 2 · Fluid, and a mosaic

- Stay on the **Build the bilayer** tab and scroll down to **the What else is in the membrane section**.
- Press **Finish it for me**, then **Start the drift**. Watch carefully for at least ten seconds before answering. Then 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)		

5. Describe exactly what moves during the drift, and what does not.

6. Explain what the word “fluid” refers to in the fluid mosaic model, and what “mosaic” refers to.

Part 3 · Place each protein

Build the bilayer

Place the proteins

Walls and boundaries

 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? <i>circle one</i>	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 at all. Explain why the tool will not let it sit in the interior.

Part 4 · Walls

Build the bilayer

Place the proteins

Walls and boundaries



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



Click through all four cell types.

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

9. State what the three wall materials have in common as a class of molecule.

10. A student says a bacterium does not need a plasma membrane because it has a cell wall instead. Evaluate that claim.

11. Explain how the structure of a membrane results in selective permeability. Refer to the hydrophobic interior and to embedded proteins.

Part 5 · Learning check self-report



Scroll down to the **Learning check** at the bottom of the tool. Type each answer in your own words, check it, and tick 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.