

Name: _____ Period: _____ Date: _____

Open **peebedu.com** and navigate to **Membrane Fatty Acid Explorer**. Click the **Introduction** button to read about fish adaptations to cold water and the roles of saturated fatty acids, unsaturated fatty acids, and cholesterol in membrane fluidity. Then close the popup and use the temperature slider to observe how membrane fluidity changes.

Free Response Questions

Question 1 — Conceptual Analysis

Simulation Task: *In the Membrane Fatty Acid Explorer, set the temperature slider to 30°C and observe the phospholipid tails. Then slowly decrease the temperature to -10°C. Watch how the movement of the phospholipid tails changes as the temperature drops. Also note the cholesterol molecule (gold) positioned between the phospholipids.*

(A) (1 pt) **Describe** the change in the movement of the phospholipid tails that the simulation displays as the temperature slider is moved from 30°C down to -10°C.

(B) (1 pt) **Explain** how the movement of the phospholipid tails shown in the simulation contributes to the fluid character of the plasma membrane described by the fluid mosaic model.

(C) (1 pt) **Predict** how the ability of the embedded channel protein to shift position within the bilayer would change if the phospholipid tails stopped moving entirely.

(D) (1 pt) **Justify** your prediction.

Question 2 — Analyze Model / Visual Representation

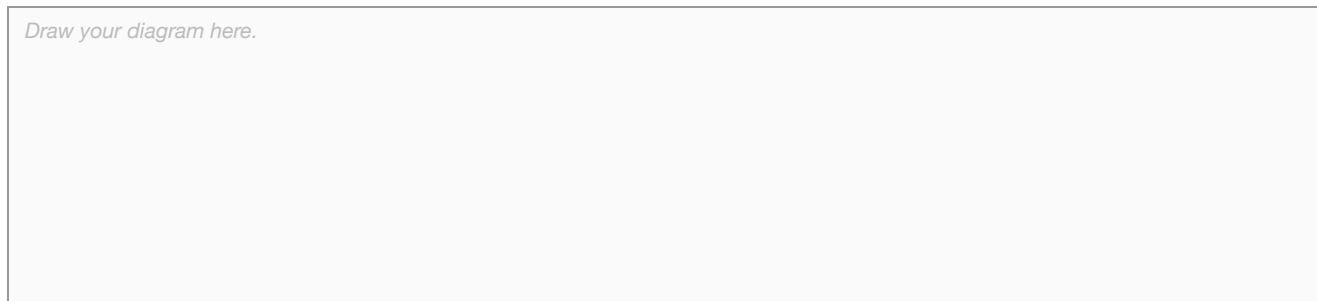
Simulation Task: *In the Membrane Fatty Acid Explorer, click the Introduction button and review the comparison between saturated and unsaturated fatty acids. Then close the popup and set the temperature to 10°C. Observe the positions of the channel protein (purple), the receptor protein (green) with its extensions, and the cholesterol molecule (gold) within the bilayer.*

(A) (1 pt) **Describe** the orientation of the phospholipid heads and tails in the two rows of the bilayer shown in the simulation.

(B) (1 pt) **Explain** why the surface of the channel protein that contacts the interior of the bilayer must be nonpolar.

(C) (1 pt) **Represent** the difference between a membrane rich in saturated fatty acids and a membrane rich in unsaturated fatty acids by drawing two side-by-side cross-section diagrams of a phospholipid bilayer, labeling the phospholipid heads, tails, and cholesterol in each.

Draw your diagram here.



(D) (1 pt) **Explain** why the double bonds in unsaturated fatty acid tails prevent phospholipids from packing as tightly as saturated tails do in the membrane you drew.

2.3.A.1, 2.3.A.2