1. Would the following changes in the structure and/or composition of membrane lipids favor the liquid-ordered or liquid-disordered state?
2. Unsaturated hydrocarbon chains are replaced by saturated hydrocarbon chains. Ordered
3. The hydrocarbon chains are shortened. Disordered
4. Cholesterol and sphingolipid content are increased. Ordered

In questions 2-7, decide whether the statement is true or false, then explains your answer.

1. Proteins and lipids account for almost all of the mass of biological membranes. T

Proteins and lipids are meanly components of membrane.

1. Proteins and lipids are the only components of biological membranes. F

There also be saccharides located on plasma membrane.

1. The relative proportions of protein and lipid are the same in all biological membranes. F

Membrane is fluid.

1. All the cellular membranes in a particular organism contain the same lipids and the same percentage of lipid to protein. F

Because membranes across different cells assume different functions, the kind and content of lipids and proteins are required to undertake these functions.

1. Membranes with different functions have different proteins. T

Because membranes across different cells assume different functions, the kind and content of lipids and proteins are required to undertake these functions.

1. Plasma membranes commonly include proteins with covalently bound carbohydrate moieties. T

Carbohydrate moieties undertake multiple functions in glycoproteins on membranes.

1. Which of the following is not a membrane lipid? Why? B Because triacylglycerol is not amphiphilic.
2. cholesterol
3. triacylglycerol
4. phosphatidylglycerol
5. cerebrosides
6. sphingomyelin
7. Which of the following is not a reason why the term “fluid” is appropriate to describe the fluid mosaic model of the biological membrane? D
8. many proteins found in membranes are not stationary, but undergo constant lateral motion.
9. The fatty acid chains of the membrane lipids are able to move by rotation about their carbon-carbon single bonds.
10. Individual lipid molecules can diffuse laterally in the plane of the bilayer.
11. Individual lipid molecules often flip-flop from one side of the bilayer to the other.
12. Cells undergo mitosis without leaking cytoplasmic components into the extracellular space.
13. Proteins A, B and C are membrane proteins associated (either as peripheral or integral proteins) with the intact biological membranes of a culture of cells. After the cells containing these proteins are exposed to a severe drop in ionic strength of the cell culture medium, only protein A remains associated with the cells. One can conclude that: E
14. B and C are peripheral proteins
15. B and C are integral proteins.
16. A is a peripheral protein
17. A is either an integral protein or a protein covalently attached to membrane lipid.
18. Both answers A and D apply.
19. Which of the following statement is true concerning integral membrane proteins? A
20. hydrophobic interactions anchor them within the membrane.
21. Ionic interactions and hydrogen bonds occur between the protein and the fatty acyl chains of the membrane lipids.
22. These proteins can be solubilized by a solution of high ionic strength.
23. Hydropathy plots can be used to determine the amino acid sequence of the protein.
24. All of the above.
25. Ruptured biological membranes are “self-sealing” due to all of the following EXCEPT: E
26. the amphipathic character of the lipids.
27. Hydrophobic interactions between lipids.
28. Hydrogen bonding between the head groups of the lipids and H2O.
29. An increase in entropy of the system upon sealing.
30. Covalent interactions among lipids.
31. The Na+ K+ ATPase: E
32. mediates active transport.
33. Mediates cotransport of Na+ and K+
34. Is an integral membrane protein.
35. Creates a transmembrane potential.
36. Has all of the characteristics above.
37. You are investigating the function of the Na+ K+ ATPase in the cell membranes of cultured cells. You supply your cells with an analog of ATP (ATP γ-s), which binds to the protein but from which the terminal phosphate cannot be hydrolyzed due to the presence of the sulfate group. According to the model presented in your text, this drug would have which of the following effects on the transporter? A
38. Na+ would bind but would not be transported across the membrane.
39. Na+ would bind and be transported across the membrane, but K+ would not bind.
40. Na+ would be transported, and K+ would bind but would not be transported.
41. K+ would bind and be transported but would not be released from its binding site.
42. The transporter would remain in the inactive state with no ions bound.
43. Arctic animals would be expected to have a higher cholesterol content in the cell membranes in their extremities because: C
44. Cholesterol increases hydrogen bonding between long-chain fatty acids in adjacent lipids, decreasing membrane fluidity at low temperature.
45. Increased noncovalent interactions between cholesterol’s rigid, steroid ring structure and adjacent integral membrane proteins will increase membrane fluidity at low temperatures.
46. Cholesterol’s steroid nucleus prevents close packing of long-chain fatty acids in adjacent lipids, increasing membrane fluidity at low temperatures.
47. Cholesterol’s polar head group can form extensive interactions with water molecules, increasing membrane fluidity at low temperatures.
48. There are more van der Waals interactions between a molecule of cholesterol and glycerophospholipid than can be formed between two glycerophospholipid molecules, increasing membrane fluidity at low temperatures.
49. Describe the lipid and protein content of the following membranes that are discussed in the text. How do these differences relate to their corresponding functions?
50. the myelin sheath: 30% of the membrane mass in myelin sheath are proteins.
51. plasma membrane of an erythrocyte: Half of the membrane mass in human red blood cells are proteins.

The low protein content in myelin sheath is respond to the function of insulation which requires lots of sphingolipid. And the high protein content in erythrocyte is respond to functions of adhesion, transportation, and structure.

1. What is the experimental evidence described in this chapter that supports the lipid bilayer as the basic structure of biological membranes?

Directly observe membrane through electron microscope.

1. Describe the effect of each of the treatments below on the various types of membrane proteins. Would the treatment release a peripheral protein from the membrane? An integral protein? A peripheral protein covalently attached to a lipid anchor?
2. changes in pH Release a peripheral protein
3. changes in ionic strength Release a peripheral protein from the membrane
4. detergent Release all of three.
5. Urea Release a peripheral protein
6. phospholipase C Release a peripheral protein covalently attached to a lipid anchor
7. Describe the similarities and differences between transporter-mediated facilitated diffusion and transport via an ion-selective channel.
8. For each of the inhibitors listed below, describe first their direct effect, and then indicate the type of transport mechanism(s) that they block.
9. Vanadate Mimic phosphate when under nucleophilic attract. P-type pump
10. Cyanide Inhibit the formation of ATP. Active transport.
11. valinomycin Shuttle ions across membrane. Secondary active transport process.