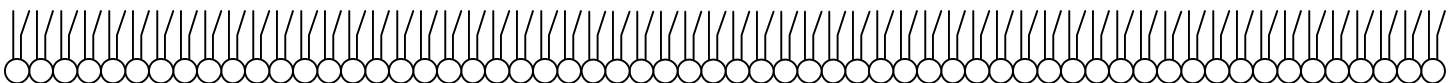
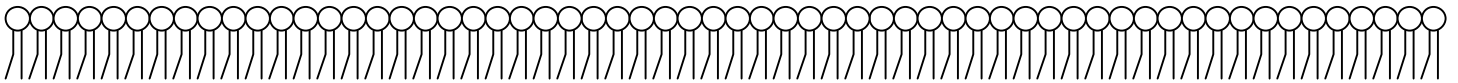


Chapter 7: Membrane Structure and Function  
Campbell, Biology, 7<sup>th</sup> Edition

*Answer each of the following questions on separate paper. All answers may be typed or hand-written... but do your OWN work.*

1. Explain how the amphipathic nature of phospholipids causes them to behave when placed in water.
2. Why were phospholipids first dissolved in benzene and *then* mixed with water in Langmuir's experiments with artificial membranes.
3. Why was it postulated by Gorter and Grendel that the plasma membrane must be a bilayer and not just a single layer of phospholipids?
4. What observations led scientists to incorporate protein molecules into the model of the cell membrane?
5. Describe and sketch the Davson-Danielli model of the cell membrane. What were the two main problems with this model? Which properties of the cell membrane were accurately described by this model?
6. How do membrane proteins tend to differ from proteins dissolved in the cytosol?
7. How does the fluid mosaic model (Singer and Nicolson) of the membrane differ from the Davson-Danielli model? What experimental evidence has supported this idea?
8. How are the molecular interactions (forces of attraction) between phospholipids conducive to a fluid membrane?
9. Which movements of phospholipids are relatively common in plasma membranes? Which type of movement is rare in plasma membrane? Propose a theory why you do not see many of the movements you chose for the second part of this question.
10. What factors affect the fluidity of the plasma membrane (and how do they affect it)? How is cholesterol involved in the membrane fluidity? What is viscosity?
11. What are the two main classes of membrane proteins? Describe the structure of these proteins (be specific).
12. Describe and draw how a transmembrane protein is embedded in the plasma membrane. Describe the major functions that transmembrane proteins perform for the cell.
13. What is the major function performed by sugars in the plasma membrane? (think blood type) Which molecules are the sugars generally associated with in the plasma membrane?
14. What is meant by the term selective permeability?





15. Which substances can easily pass through the phospholipid portion of the cell membrane? Why are they capable of passing? Which substances are not permitted to pass through the phospholipid portion of the membrane and why? How will these substances get across the membrane?
16. Describe the process of passive diffusion in living cells. Explain why it is a *net* movement and what drives this movement.
17. What is osmosis? Explain what hypertonic, hypotonic, and isotonic solutions are. Describe what would happen to a cell placed in each of these solution and explain why we see this happen in each case.
18. A cell has a salt concentration equal to .5 M. It is placed into three different beakers. State which type of solution you have in each case and how the cell will be affected.
  - A: Salt solution with a concentration of 1.5M
  - B: Salt solution with a concentration of .15M
  - C: Salt solution with a concentration of .5M
19. How are paramecium capable of living in environments that are hypotonic to the cell. What is the ideal situation for an animal cell?
20. Explain the conditions that lead to plant cells becoming turgid and flaccid.
21. Describe and diagram the phenomena known as plasmolysis that you observed in class with *Elodea* leaves.
22. How does facilitated diffusion differ from passive diffusion? How does a membrane protein resemble an enzyme?
23. What is active transport? Explain how sodium and potassium are transported across the cell membrane.
24. Why is it said that ions diffuse down an electrochemical gradient rather than simply down their concentration gradient like uncharged atoms and molecules?
25. How does the Na<sup>+</sup>/K<sup>+</sup> pump help generate a membrane potential across animal membranes? How do plant, bacteria, and fungi accomplish this?
26. Explain how electrogenic pumps can be used for cotransport across living membranes.
27. Describe the processes of exocytosis, endocytosis, and phagocytosis, and pinocytosis.
28. How can cells take up larger macromolecules that are not found in high concentrations in the extracellular region of the cell?
29. Explain how vesicles are used in the transport of materials throughout living organisms.
30. Evolution Connection p.140

