

Name _____ Period _____

Chapter 7: Membrane Structure and Function

Concept 7.1 Cellular membranes are fluid mosaics of lipids and proteins

1. The large molecules of all living things fall into just four main classes. Name them.
2. Explain what is meant when we say a molecule is amphipathic.
3. In the 1960s, the *Davson-Danielli model* of membrane structure was widely accepted. Describe this model and then cite two lines of evidence that were inconsistent with it.
4. Who proposed the *fluid mosaic model* of membrane structure? When? Describe this model.
5. What is meant by *membrane fluidity*? Describe the movements seen in the fluid membrane.
6. Describe how each of the following can affect membrane fluidity:
 - a. decreasing temperature
 - b. phospholipids with unsaturated hydrocarbon chains
 - c. cholesterol

7. Membrane proteins are the *mosaic* part of the model. Describe each of the two main categories:

integral proteins

peripheral proteins

8. Use Figure 7.9 to briefly describe major functions of membrane proteins.

Function	Description
Transport	
Enzymatic activity	
Signal transduction	
Cell-cell recognition	
Intercellular joining	
Attachment to cytoskeleton and ECM	

9. Membrane carbohydrates are important in cell-cell recognition. What are two examples of this?
10. Distinguish between *glycolipids* and *glycoproteins*.

11. Label the following structures:

glycolipid

glycoprotein

integral protein

peripheral protein

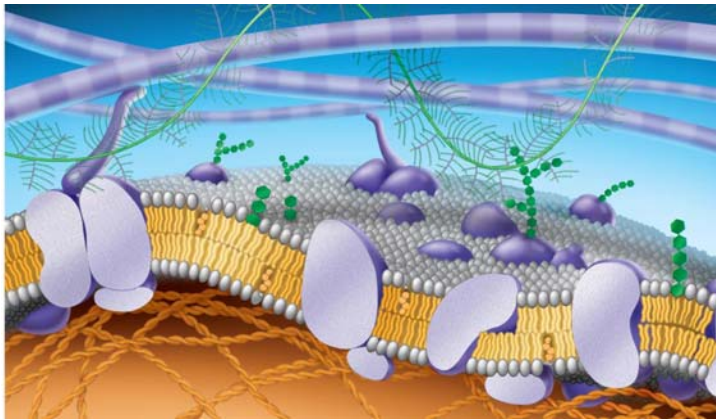
cholesterol

phospholipid

ECM fibers

cytoskeleton microfilaments

integrins (go back to Chapter 6)



Concept 7.2 Membrane structure results in selective permeability

12. Distinguish between *channel proteins* and *carrier proteins*.

13. Are transport proteins specific? Cite an example that supports your response.

14. Peter Agre received the Nobel Prize in 2003 for the discovery of *aquaporins*. What are they?

15. Consider the following materials that must cross the membrane. For each, tell how it is accomplished.

Material	Method
CO ₂	
glucose	
H ⁺	
O ₂	
H ₂ O	

Concept 7.3 Passive transport is diffusion of a substance across a membrane with no energy investment

16. Define the following terms:

diffusion

concentration gradient

passive transport

osmosis

isotonic

hypertonic

hypotonic

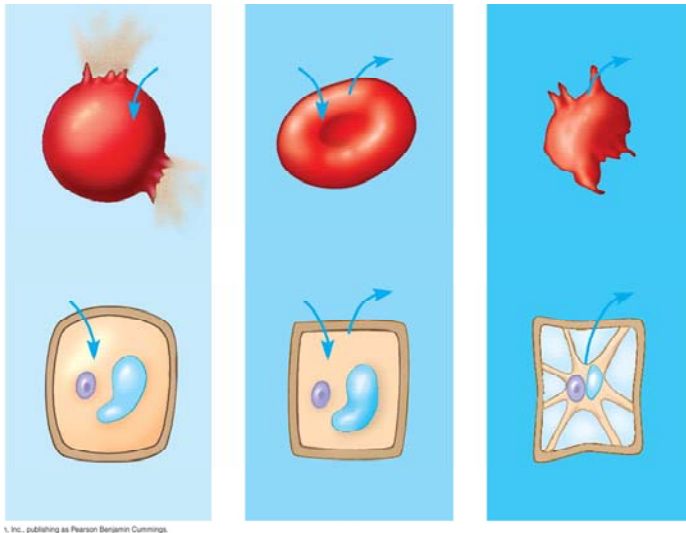
turgid

flaccid

plasmolysis

17. Use as many words from the list above to describe why a carrot left on the counter overnight would become limp. Underline each word you use.

18. What is *facilitated diffusion*? Is it active or passive? Cite two examples.
19. Label the *hypotonic solution*, *isotonic solution*, and *hypertonic solution*. What is indicated by the *blue arrows*? Label them. Which cell is *lysed*? *Turgid*? *Flaccid*? *Plasmolyzed*? Apply all these labels.

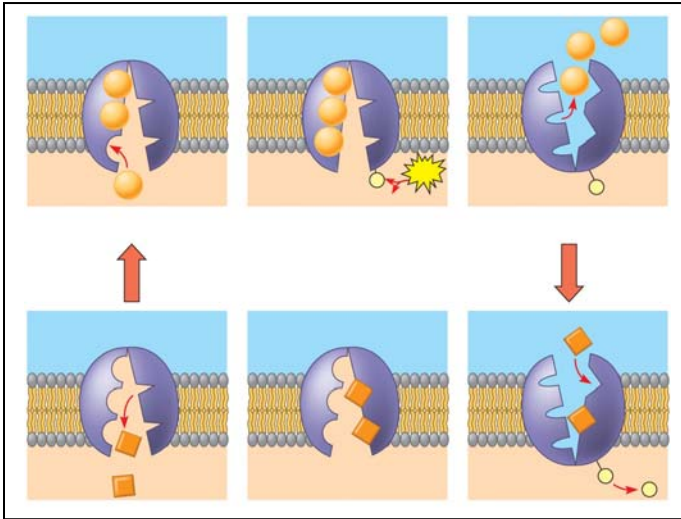


20. Why doesn't the plant cell burst?

Concept 7.4 Active transport uses energy to move solutes against their gradients

21. Describe *active transport*. What type of transport proteins are involved, and what is the role of ATP in the process?

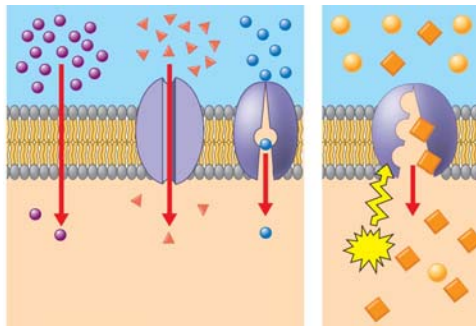
22. The *sodium-potassium pump* is an important system for you to know. Use the following diagram to understand how it works. Use the following terms to label these figures, and briefly summarize what is occurring in each figure: *extracellular fluid*, *cytoplasm*, Na^+ , K^+ , *ATP*, *ADP*, *P*, *transport protein*.



Summary

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

23. On the diagram below, add these labels: *facilitated diffusion with a carrier protein*, *facilitated diffusion with a channel protein*, *active transport with a carrier protein*, *simple diffusion*. For each type of transport, give an example of a material that is moved in this manner.



24. What is *membrane potential*? Which side of the membrane is positive?

25. What are the two forces that drive the diffusion of ions across the membrane? What is the combination of these forces called?
26. What is *cotransport*? Explain how understanding it is used in our treatment of diarrhea.

Concept 7.5 Bulk transport across the plasma membrane occurs by exocytosis and endocytosis

27. Define each of the following, and give a specific cellular example.

endocytosis

phagocytosis

pinocytosis

exocytosis

receptor-mediated endocytosis

28. What is a *ligand*? What do ligands have to do with receptor-mediated endocytosis?
29. Are the processes you described in question 23 active or passive transport? Explain your response.

Testing Your Knowledge: Self-Quiz Answers

Now you should be ready to test your knowledge. Place your answers here:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

Reproduce the diagram for question 6, and draw arrows as instructed.

6b. _____ 6c. _____ 6d. _____ 6e. _____