

Chapter 5 Essential Knowledge V 2.0

Write a detailed response to each of the following pieces of information. If numbers are given in parentheses, they refer to the pages of your text book.

Main Concept: Cell membranes are selectively permeable due to their structure. **AND** Growth and dynamic homeostasis are maintained by the constant movement of molecules across membranes. **AND** Cells communicate by generating, transmitting and receiving chemical signals.

1. Draw and label the cell membrane.
 - a. How does the structure of the membrane allow it to be semi-permeable?
 - b. Describe how a phospholipid can interact with:
 - i. Hydrophobic material
 - ii. Hydrophilic material
 - iii. Embedded proteins (polarity of side groups)
 - c. How do the following pass through the cell membrane? Why?
 - i. Small unchanged polar molecules & small nonpolar molecules such as N_2
 - ii. Large polar molecules (hydrophobic)
 - iii. Water
2. What is the function of a cell wall?
 - a. Compare and contrast plant cell walls and cell walls of fungi & prokaryotes. You will probably need to use a resource other than your text.
3. Compare and Contrast passive and active transport.
 - a. Why does passive transport play a primary role in the import of resources and the export of wastes?
 - b. Discuss how membrane proteins transport glucose.
4. Draw a cell in each of the environments. Explain why the environment is labeled the way that it is.
 - a. Hypotonic
 - b. Hypertonic
 - c. Isotonic
5. What is active transport and how does it involve free energy?
6. What is the role of membrane proteins with regard to active transport? What is the most common source of cellular energy for active transport?
7. Draw and label the processes of exocytosis and endocytosis.
8. Cell communication with single celled organisms influences how the cell responds to the environment. Explain an example of this with chemical messengers by microbes (quorum sensing). **Please watch Bozeman Video: Evolutionary Significance of Cell communication – link provided**

9. Explain how individual cells responding to a signal transduction pathway can allow the functioning of an organism as a whole. Use the example of the epinephrine stimulation of glycogen in mammals.
10. Explain how cells are able to communicate with each other when they are in direct cell to cell contact with each other:
 - a. Immune cells with antigen-presenting cells
 - b. Plasmodesmata in plant cells
11. Explain how cells communicate with each other over short distances.
 - a. Neurotransmitters
12. Explain briefly how signals released by one cell type can travel long distances to target cells of another cell type:
 - a. Endocrine signals
13. Explain how signal transduction pathways link signal reception with a cellular response via:
 - a. Reception: What types of chemical messengers exist and what change initiates transduction of the signal?
 - b. Signal transduction: Explain the concept of a cascade amplifying the signal as well as the use of second messengers as an essential component to the functioning of the cascade.
 - c. Phosphorylation: what proteins are responsible for this activity and exactly what action takes place?
14. What happens when there are changes in the signal transduction pathway? **Use the examples given in Bozeman video: Changes in the signal transduction pathway** (a link is provided on website)