Name_____

AP Biology
TEXT: *Biology*, **Campbell and Reece**
7th Edition

Chapter 11 – Cell Communication
Guided Reading

This chapter is often considered difficult as you have not covered it in an introductory biology course. Plan on reading this chapter at least twice and go slowly. I would suggest that you read the key concepts in bold first and then for each concept, look at the headings, then the figures and then read.

1. What is a signal transduction pathway?

2. How do yeast cells communicate while mating?

3. How do intercellular connections function in cell to cell communication?

4. Explain the two types of local signaling:
    a. Paracrine signaling

    b. Synaptic signaling

5. How are long distance signals sent?

6. Explain Sutherland's investigations with epinephrine and the inferences that were derived from this work.

7. Define the three stages of cell communication:
   a. Reception

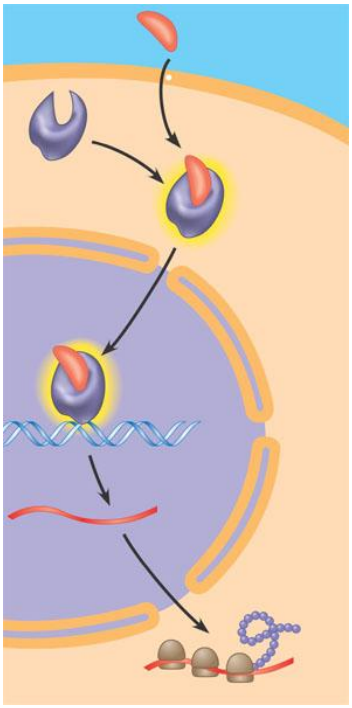
   b. Transduction

   c. Response

8. What is a ligand?

9. What is special about intracellular receptors – hint think of the structure of the cell membrane and how this relates?

10. Label the diagram below of a steroid interacting with an intracellular receptor.



11. Where would you expect most water soluble messengers to bind and why?

12. What is a G-protein-linked receptor?

13. The G-protein-linked receptor is located _____. When GDP is attached to the G protein the messenger is considered _____. GTP replaces GDP and now the messenger is considered _____. The G protein carrying the GTP leaves the receptor and _____ and the enzyme causes a cellular response. All of this is brought on by a _____ _____ attaching to the G-protein-linked receptor and will shut down quickly when the _____ _____ is no longer there.

14. What is a kinase?

15. A tyrosine kinase receptor is different from a G-protein linked receptor in that it can trigger _____ _____ _____ pathway at the same time. When both _____ _____ are in their receptor sites, the molecules form a dimer – two molecules joined together. ATP is converted to ADP and the _____ gets attached to the tyrosine molecules. The addition of the _____ causes a cascade of cellular responses.

16. Ligand gated means controlled by the _____ or signal molecule. If the door is closed, certain ____ are blocked from entering the cell. When the _____ or signal molecule is attached, the door is open for certain _____ to enter the cell. These types of receptors are important in the _____ _____.

17. What does conformation mean?

18. What is a signal transduction pathway?

19. Phosphorylation cascades are similar to a row of dominoes falling down, instead of one domino knocking down the next, a phosphate being added activates the message. In this way, a series of different _____ are each _____ one after another. Inactive protein kinase 1 gets a _____ added and now it is _____ protein kinase 1. Active protein kinase 1 transfers a _____ and now inactive protein kinase 2 is now _____. This continues until the desired _____ is activated to cause a cellular response.

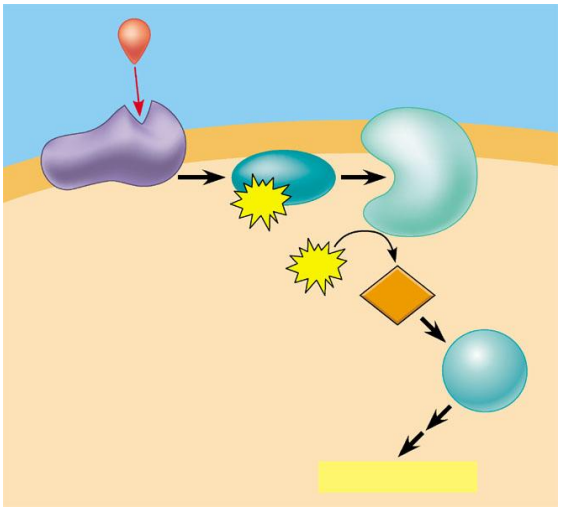
20. What are protein phosphatases and why are they so important?

21. What are second messengers and what are two characteristics of a second messenger?

22. What did Sutherland find in his experiments with regard to cyclic AMP and why is this important?

23. What is adenylyl cyclase?

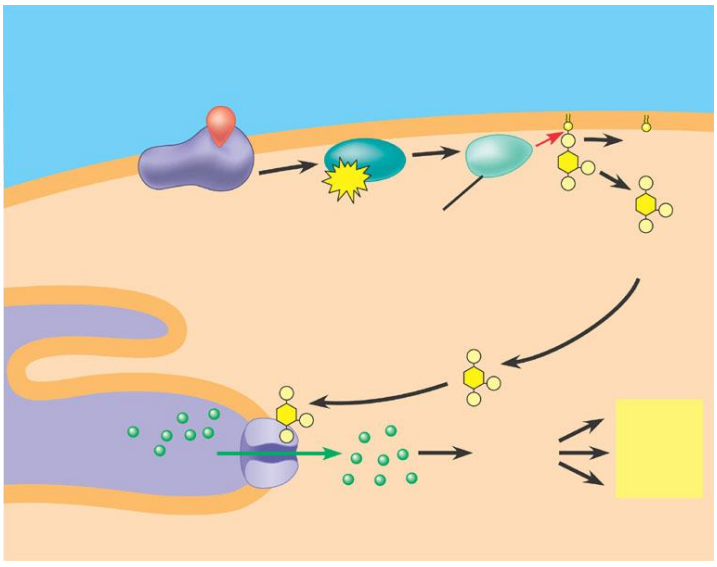
24. Complete the diagram below of cAMP as second messenger:



25. How does cholera connect with the concepts of cell to cell communication?

26. How and why are the calcium concentrations kept different and separate comparing the endoplasmic reticulum, mitochondria and cytoplasm?

27. Label the diagram below showing calcium and IP_3 in a cell.



28. How is signal amplification accomplished in the cell?

29. How is specificity accomplished in cell signaling?

30. What is a scaffolding protein and why is it important?

31. How is termination of a signal accomplished and why is it so important that termination be accomplished?