

Short essay questions (7.5 points each) - there will be four of these.

1. (7.5 points) Unlike sodium and potassium which serve primarily to regulate membrane potential in the nervous system, calcium is important in a large number of neural functions. Name and briefly explain four of the functions that calcium serves in neural and synaptic function.

2. (7.5 points) How is it possible for a receptor that depolarizes the membrane to be inhibitory?

3. (7.5 points) How is sound transduced into action potentials in the cochlea?

4. (7.5 points) What role do the neural properties of dynamic range and spike frequency adaptation play in the encoding of color in the visual system?

Long essay questions (15 points each)

5. (15 points) Describe, compare, and contrast the cellular and molecular mechanisms of **SHORT-** term memory for nonassociative sensitization in *Aplysia*'s gill-withdrawal reflex and the **SHORT** term memory encoded by **EARLY** long-term potentiation in the hippocampus.

6. (15 points) Describe and explain two ways that the nervous system determines the location of a sound in the environment.