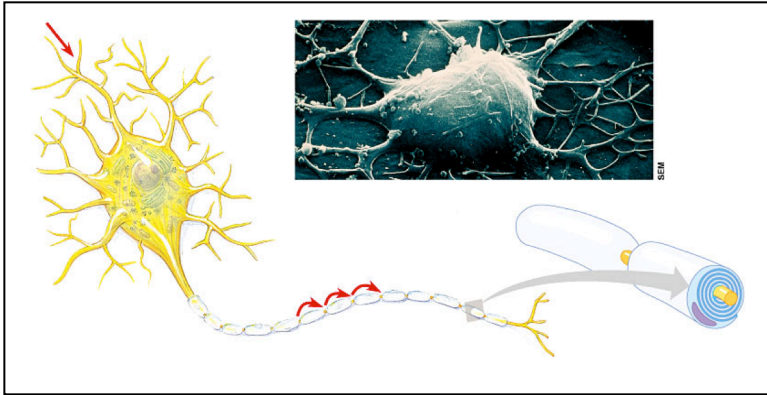


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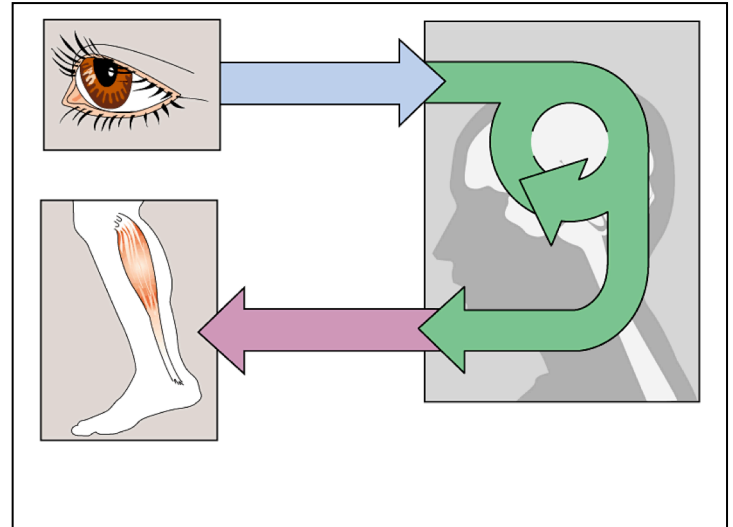
# BIOLOGY 30

## neuron, reflex arc, action potential, synapse

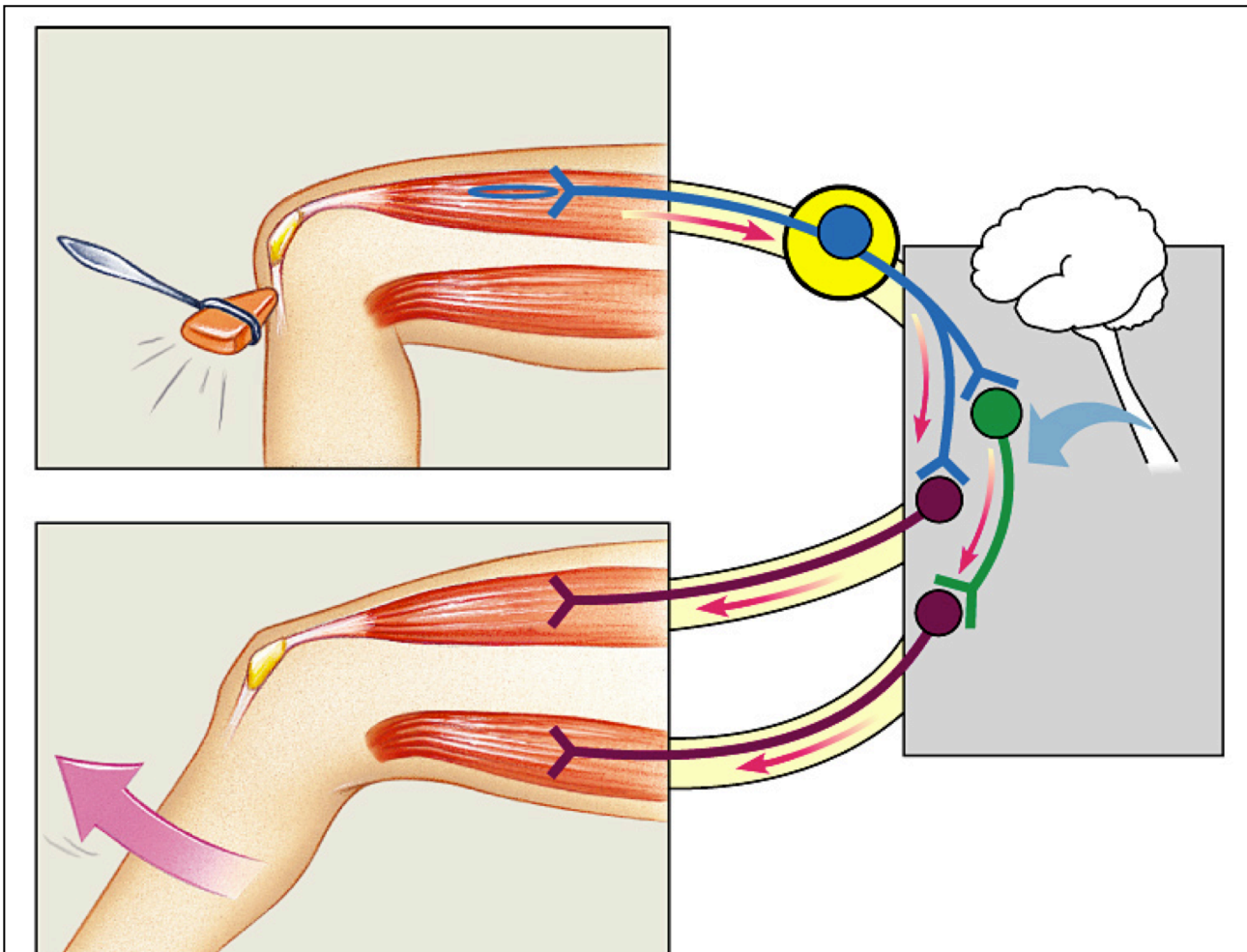
**DIAGRAM 1: Neuron Anatomy-** Identify the following parts: Dendrite, axon, axon terminal, neurilemma, schwann cell, myelin sheath, node of ranvier



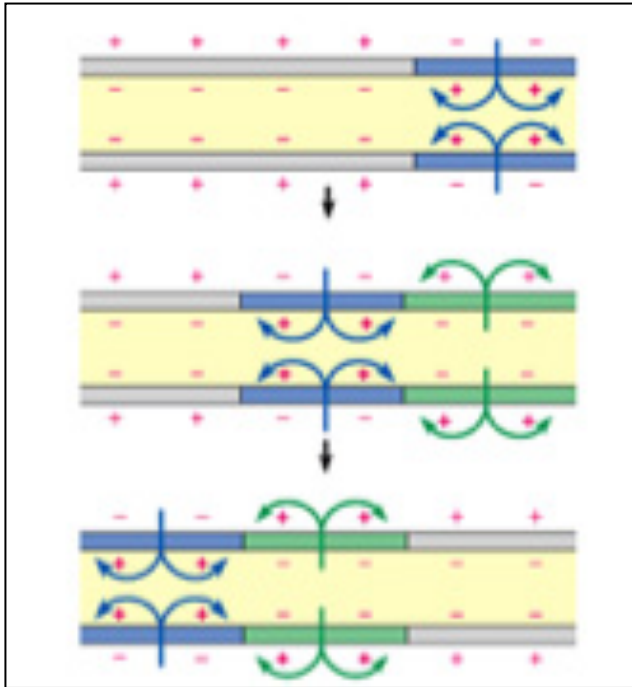
**DIAGRAM 2: Identify 3 parts of this general nervous system**



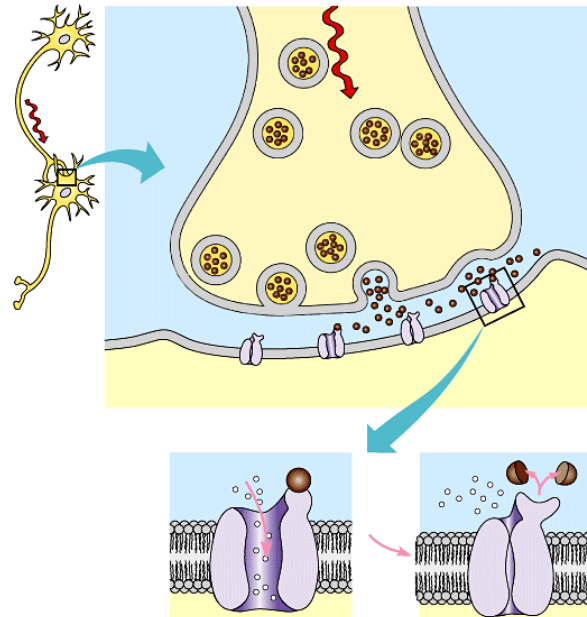
**DIAGRAM 3 – Identify the 5 parts of the reflex arc**



**Diagram 4: Identify which direction this "Wave of Depolarization" is going using an arrow**

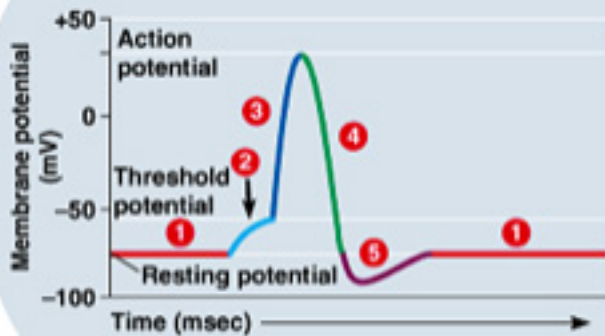


**DIAGRAM 5: Identify the following in this Synapse...neuraltransmitter, vesicle, post-synaptic neuron, pre-synaptic neuron, receptor site, sodium ions**  
**ADD: cholinesterase, calcium ions**



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**DIAGRAM 6: Identify whether the  $K^+$  and  $Na^+$  gates are opened or closed at the following points...**



1. Describe a structural difference between a motor and sensory neuron.

Motor sends signal to effector, sensory takes signal from effector to CNS (interneuron)

2. Name the part of a neuron described by each statement.

- a. neurilemma Outer portion of surrounding sheath that promotes regeneration of a neuron
- b. dendrite Conveys electrical signals towards the cell body
- c. glial Cells that support neurons
- d. myelin sheath Speeds up neural transmission

3. There are three types of neurons based on function. Identify the type of neuron described by each statement.

a.)	A neuron that carries impulses from the CNS to muscles and glands.	motor neuron
b.)	A neuron that connects motor and sensory neurons in neuron pathways; shuttles signals within CNS.	interneuron
c.)	A neuron that has dendrite endings which are specialized receptors for specific changes occurring nearby; carries impulses to the CNS	Sensory neuron

4. A resting neuron is said to be \_\_\_\_\_. This means it has a resting membrane potential that is not zero. Actually, the resting potential of most human neurons is - 70 mV. The minus symbol means that the potential difference (difference between 2 points) of the neuron is relatively negative.

5. The establishment of a resting membrane potential requires which mechanism that uses ATP as an energy source?

Sodium / potassium pump

6. Provide two reasons why a resting neuron membrane is polarized.

Na/K pump -- K in high concentration on inside (along with neg proteins) and Na in high concentrations on outside

7. Which gates in a neuron's membrane are opened by an excitatory stimulus?

sodium

8. Explain why sodium rushes into a neuron when sodium gates open?

Low concentration on inside...are trying to equalize on both sides (diffusion)

9. Fill in the blanks to describe the process of local **DEPOLARIZATION** of the input region of a neuron.

a.) A stimulus results in sodium gates opening.

b.) sodium ions rush into the neuron / axon because the concentration of these ions in the axon is low [choose high or low].

c.) This movement of ions results in the neuron cytoplasm becoming relatively more negative [choose negative or positive]

10. The sequence of events in the formation of an action potential can be summarized as follows:

a.) Above threshold, stimulation causes gates to open briefly so that Na ions can enter the neuron cytoplasm. This flow occurs because: the cytoplasm concentration of these ions is low [choose high or low]. The membrane potential is now + 40 mV.

b.) The gates just mentioned close, and now gates open, so that K ions can leave the neuron cytoplasm. This flow occurs because: the cytoplasm concentration of these ions is high (high / low) [choose one]; This process is called repolarization, and the membrane potential returning toward - 70 mV.

c.) The Na / K pump then restores resting ion concentration by pumping K ions into the cytoplasm and Na ions out.

11. The time it takes to restore resting ion conditions is called the refractory period.
12. An area that has just generated an action potential cannot generate another one until the refractory period has been completed.
13. The fact that any above threshold stimulus will cause an impulse and that a subthreshold stimulus will not is called:  
All or none response
14. A stronger (e.g., more painful, hotter, etc.) stimulus is felt not because a neuron can send stronger impulses, because this is not possible. All action potentials are alike. Describe two ways that the nervous system relays the message of a stronger stimulus to the brain.

-More neurons stimulated

-higher frequency of action potentials per neuron

15. What is the more rapid conduction of impulses by myelinated axons called? saltatory
16. Explain how alcohol or sedatives affect the generation of an action potential in a neuron.  
Lowers resting potential(hyperpolarizes) because excess potassium is put outside of neurons...resulting in more stimulus needed before action potential is created

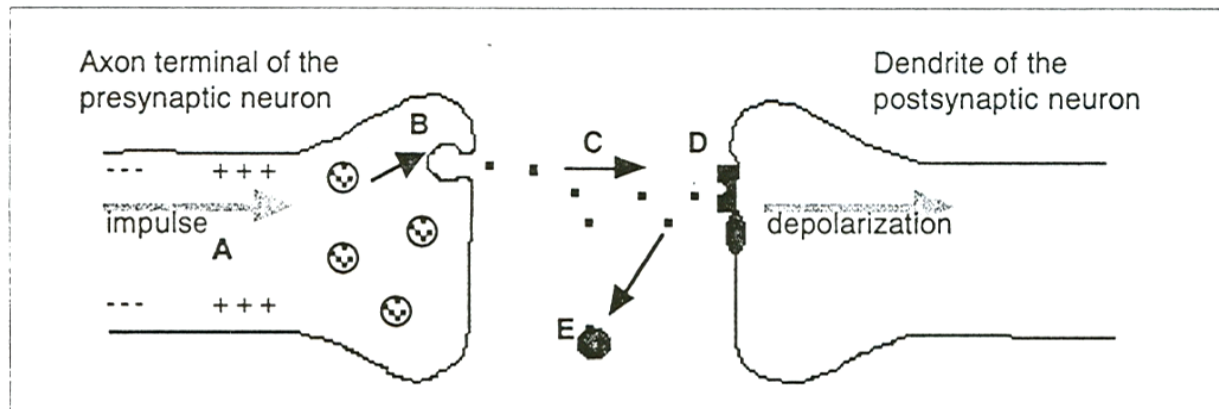
17. Identify each structure.

- a.) The space between the axon terminal of one neuron and the dendrite of the next neuron (or a muscle cell). synapse or synaptic cleft
- b.) The neuron which contributes an axon terminal to the synapse. pre-synaptic neuron
- c.) The neuron which contributes a dendrite to the synapse. post-synaptic neuron
- d.) The name for the synapse when the postsynaptic cell is a muscle cell. neuromuscular junction

18. The axon terminals of neurons are packed with special vacuoles called vessicles that contain thousands of special molecules called neurotransmitters.
19. When an impulse reaches an axon terminal, vessicles migrate to the axon terminal membrane and spill their neurotransmitters into the synaptic gap. These chemicals then diffuse across the gap and lock into receptors that only fit the particular shapes of these diffusing chemicals. These "docking regions" are linked to ion gates that will open when the docking regions receive their "cargo".
20. Neurotransmitters that in most cases cause depolarizations are said to be: excitatory
21. Neurotransmitters that in most causes cause hyperpolarizations are said to be: inhibitory

22. Name the enzyme that breaks down acetylcholine. **Cholinesterase**

23. Explain the events in the diagram as they occur from A to E.



- A. action potential arrives
- B. calcium enters causing vessicles to move toward membrane and empty contents (neurotransmitters)
- C. neurotransmitters diffuse across synaptic cleft
- D. neurotransmitters attach to recptors and causes them to open gates which lets Na into post-synaptic neuron
- E. neurotransmitters broken down by cholinesterase