Name _____

Lab Time/Date _____

EXERCISE 13

REVIEW SHEET

Neuron Anatomy and Physiology

1. The cellular unit of the nervous system is the neuron. What is the major function of this cell type?

TO GENERATE NEURONAL IMPULSES TO HELP CONTROL ORGANS + ORGAN SYSTEMS

2. The supporting cells, or neuroglia, have numerous functions. Name three.

ACT AS PHAGOCYTES, PROTECT NEURONS, ACT AS SELECTIVE BARRIER BETWEEN BLOOD SUPPLY + NEURONS

3. Match each statement with a response chosen from the key.

Key:

afferent neuron	interneuron	nuclei
central nervous system	neurotransmitters	peripheral nervous system
efferent neuron	nerve	synaptic cleft
ganglion	neuroglia	tract

CENTRAL NERVOUS SYSTEM 1. the brain and spinal cord collectively

SYNAPTIC CLEFT 2. a tiny gap that separates two neurons

GANGLION 3. a collection of nerve cell bodies found outside the central nervous system

INTERNEURON 4. neuron connecting sensory and motor neurons

TRACT 5. neuron processes running through the CNS

NUCLEI 6. collections of nerve cell bodies inside the CNS

EFFERENT NEURON 7. neuron that conducts impulses away from the CNS to muscles and glands

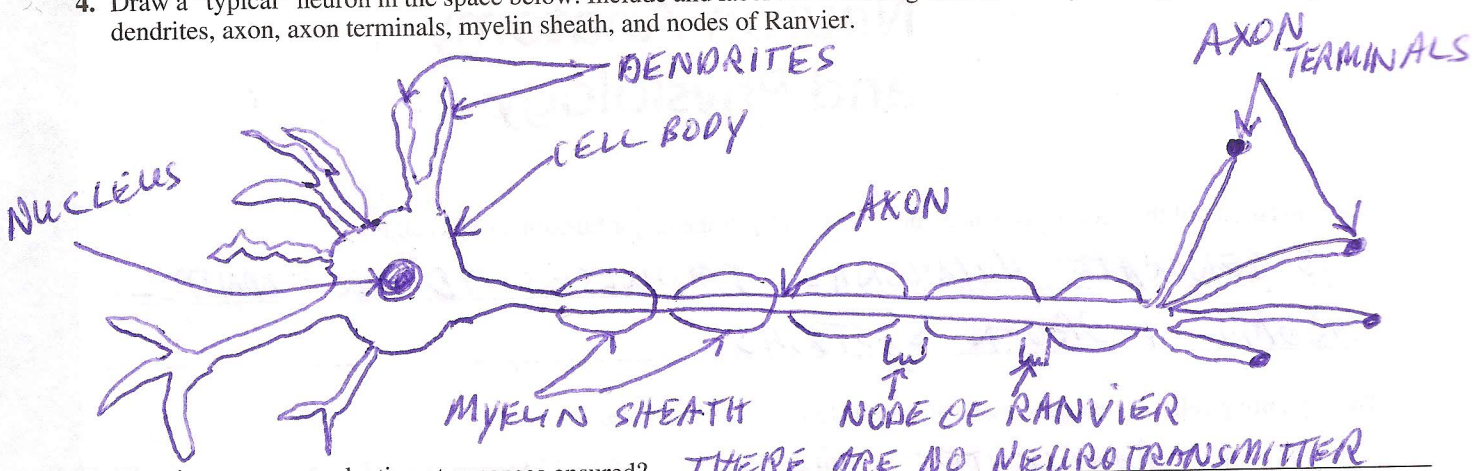
AFFERENT NEURON 8. neuron that conducts impulses toward the CNS from the body periphery

NEUROTRANSMITTERS 9. chemicals released by axon terminals

NEUROGLIA 10. specialized supporting cells in the CNS

Neuron Anatomy

4. Draw a "typical" neuron in the space below. Include and label the following structures on your diagram: cell body, nucleus, dendrites, axon, axon terminals, myelin sheath, and nodes of Ranvier.

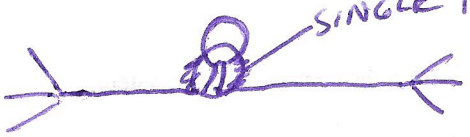


5. How is one-way conduction at synapses ensured? THERE ARE NO NEUROTRANSMITTER RECEPTORS ON THE CELL MEMBRANES OF THE AXON TERMINALS

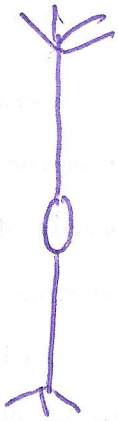
6. What anatomical characteristic determines whether a particular neuron is classified as unipolar, bipolar, or multipolar?

NUMBER OF PROCESSES EXTENDING FROM THE CELL BODY

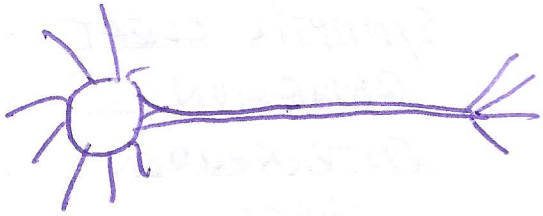
Make a simple line drawing of each type here.



Unipolar neuron



Bipolar neuron



Multipolar neuron

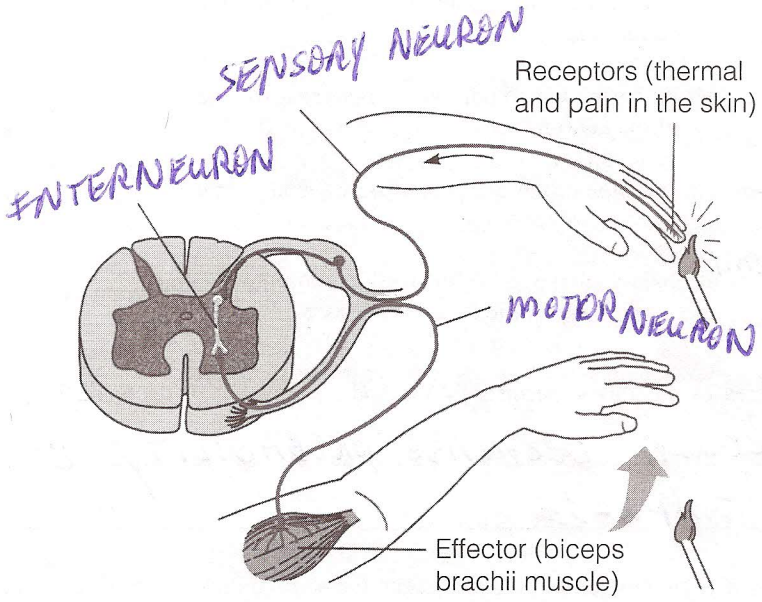
7. Describe how the Schwann cells form the myelin sheath and the neurilemma encasing an axon. (You may want to diagram the process.)

SCHWANN CELLS WRAP THEMSELVES AROUND THE AXON OF A NEURON IN JELLY-ROLL FASHION. THE TIGHTLY PACKED PLASMA MEMBRANE OF THE WRAPPED SCHWANN CELL FORM THE MYELIN SHEATH. THE NEURILEMMA REPRESENTS THE REMAINING SURFACE MEMBRANE + NUCLEUS OF THE SCHWANN CELL

8. Correctly identify the sensory (afferent) neuron, interneuron, and motor (efferent) neuron in the figure below.

Which of these neuron types is/are unipolar? SENSORY NEURON

Which is/are most likely multipolar? MOTOR NEURON



Structure of a Nerve

9. What is a nerve? A COLLECTION OF INDIVIDUAL AXONS FROM VARIOUS NEURONS

10. State the location of each of the following connective tissue coverings:

endoneurium SURROUNDS INDIVIDUAL AXONS

perineurium SURROUNDS BUNDLES OF AXONS TO FORM FASCICLES (JUST LIKE MUSCLE CELLS!!)

epineurium SURROUNDS BUNDLES OF FASCICLES

11. What is the value of the connective tissue wrappings found in a nerve? PROVIDES INSULATION FOR THE AXONS FOR CLEANER CONDUCTION OF SIGNAL

12. Define *mixed nerve:* BUNDLE OF AXONS FROM BOTH SENSORY + MOTOR NEURONS, CARRYING IMPULSES BOTH TOWARD + AWAY FROM THE CENTRAL NERVOUS SYSTEM.

The Nerve Impulse

13. Match each of the terms in column B to the appropriate definition in column A.

	Column A	Column B
DEPOLARIZATION	1. reversal of the resting potential owing to an influx of sodium ions	action potential
REPOLARIZATION	2. period during which potassium ions are diffusing out of the neuron	depolarization
ACTION POTENTIAL	3. transmission of the depolarization wave along the neuronal membrane	repolarization
SODIUM-POTASSIUM-PUMP	4. mechanism that restores the resting membrane voltage and intracellular ionic concentrations	sodium-potassium pump

14. Would a substance that decreases membrane permeability to sodium increase *or* decrease the probability of generating a nerve impulse? IT WOULD DECREASE PROBABILITY OF GENERATING A NERONAL IMPULSE

15. Why don't the terms *depolarization* and *action potential* mean the same thing? (*Hint:* Under what conditions will a local depolarization *not* lead to the action potential?) DEPOLARIZATION HAS TO HIT THESHOLD BEFORE AN ACTION POTENTIAL IS GENERATED. IF ONLY A SMALL NUMBER OF Na^+ CHANNELS ARE OPENED THEN THE MEMBRANE WILL ONLY DEPOLARIZATION TO A SMALL DEGREE. TO GET AN ACTION POTENTIAL, YOU NEED TO DEPOLARIZE ENOUGH TO GET TO A THESHOLD VOLTAGE. AT THAS VOLTAGE, VOLTAGE-GATED Na^+ CHANNELS WILL OPEN, CAUSING THE ALL-OR-NONE RESPONSE OF AN ACTION POTENTIAL