NAME _____ LAB TIME/DATE _____

REVIEW SHEET exercise 13

Neuron Anatomy and Physiology

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

_____

_____

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

_____

_____

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

Key:

afferent neuron	ganglion	peripheral nervous system
association neuron	neurotransmitters	synapse
central nervous system	nerve	tract
efferent neuron	nuclei	

_____ 1. the brain and spinal cord collectively

_____ 2. junction or point of close contact between neurons

_____ 3. a bundle of nerve processes outside the central nervous system

_____ 4. neuron connecting sensory and motor neurons

_____ 5. spinal and cranial nerves and ganglia

_____ 6. collections of nerve cell bodies inside the CNS

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

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

_____ 9. chemicals released by axonal terminals

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, myelin sheath, and nodes of Ranvier.

5. How is one-way conduction at synapses ensured? _____

_____

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

_____

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 the nerve processes. (You may want to diagram the process.)

_____

_____

_____

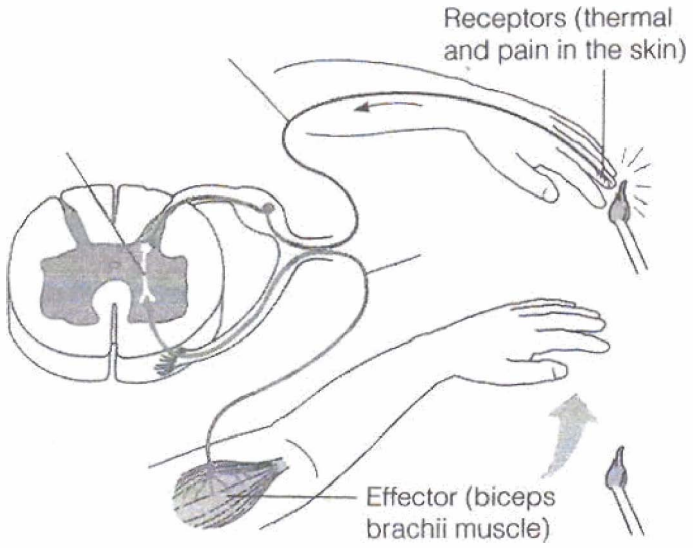
_____

_____

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

Which of these neuron types is/are unipolar? _____

Which is/are most likely multipolar? _____



The Nerve Impulse

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

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

10. Would a substance that decreases membrane permeability to sodium increase *or* decrease the probability of generating a nerve impulse? _____

_____

11. 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?

Structure of a Nerve

12. What is a nerve?

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

endoneurium

perineurium

epineurium

14. What is the value of the connective tissue wrappings found in a nerve?

15. Define *mixed nerve:*

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Neuron Anatomy and Physiology

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

The major function of the neuron is to transmit messages (nerve impulses) from one part of the body to another.

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

The supporting cells act as phagocytes, protect and myelinate, and act as a selective barrier between the capillary blood supply and the neurons.

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

Key:
- afferent neuron
- association neuron
- central nervous system
- efferent neuron
- ganglion
- neurotransmitters
- nerve
- nuclei
- peripheral nervous system
- synapse
- tract

central nervous system 1. the brain and spinal cord collectively

synapse 2. junction or point of close contact between neurons

ganglion 3. a bundle of nerve processes outside the central nervous system

association neuron 4. neuron connecting sensory and motor neurons

tract 5. spinal and cranial nerves and ganglia

nuclei 6. collections of nerve cell bodies inside the CNS

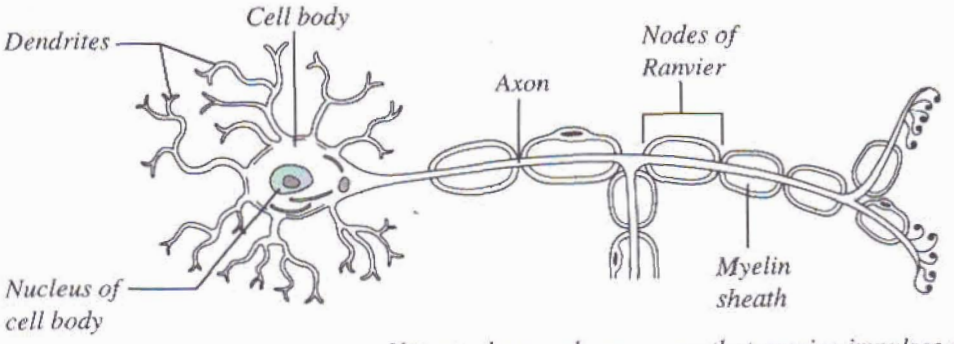
efferent neuron 7. neuron that conducts impulses away from the CNS to muscles and glands

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

neurotransmitters 9. chemicals released by axonal terminals

Neuron Anatomy

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



5. How is one-way conduction at synapses ensured? *Neurons have only one axon that carries impulses away from the nerve cell body toward the synapse.*

6. What anatomical characteristic determines whether a particular neuron is classified as unipolar, bipolar, or multipolar? *The number of processes attached to the cell body determines the structural class of a neuron.*

Make a simple line drawing of each type here.

Unipolar neuron

Bipolar neuron

Multipolar neuron

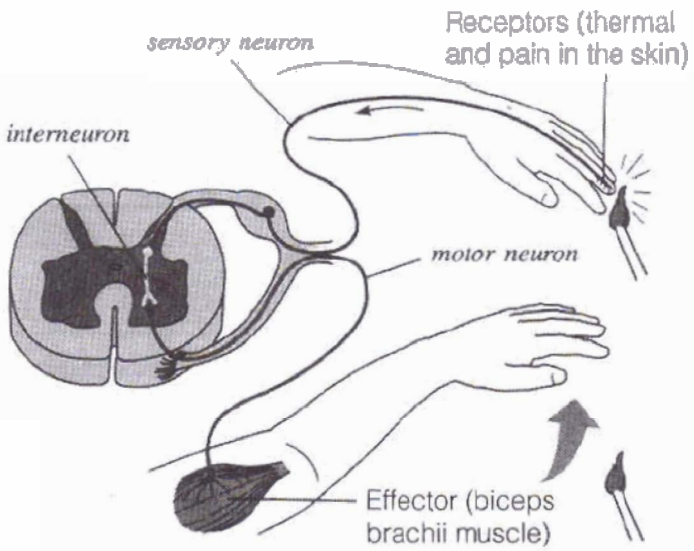
7. Describe how the Schwann cells form the myelin sheath and the neurilemma encasing the nerve processes. (You may want to diagram the process.)

Axons in the peripheral nervous system are myelinated by special supporting cells called Schwann cells, which wrap themselves tightly around the axon in jelly-roll fashion so that when the process is completed, a tight core of plasma membrane material called the myelin sheath encompasses the axon. The Schwann cell nucleus and the bulk of its cytoplasm end up just beneath the outermost portion of its plasma membrane. This part of the Schwann cell, external to the myelin sheath, is referred to as the neurilemma.

5. Correctly identify the sensory (afferent) neuron, association 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? *Interneuron and motor neuron*



The Nerve Impulse

4. 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

Would a substance that decreases membrane permeability to sodium increase *or* decrease the probability of generating a nerve impulse? *It would decrease the probability.*

11. 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? *If the stimulus is of less than threshold intensity, depolarization is limited to a small area of the membrane, and no action potential is generated.*

Structure of a Nerve

12. What is a nerve? *A bundle of neuron fibers or processes that extends to and/or from the CNS and visceral organs or structures of the body periphery such as skeletal muscles, glands, and skin.*

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

endoneurium *Surrounds each nerve fiber*

perineurium *Surrounds a group of nerve fibers*

epineurium *Surrounds the bundles of fibers called fascicles*

14. What is the value of the connective tissue wrappings found in a nerve? *The connective tissue wrappings help insulate the nerve.*

15. Define *mixed nerve:* *Nerves carrying both sensory (afferent) and motor (efferent) fibers*