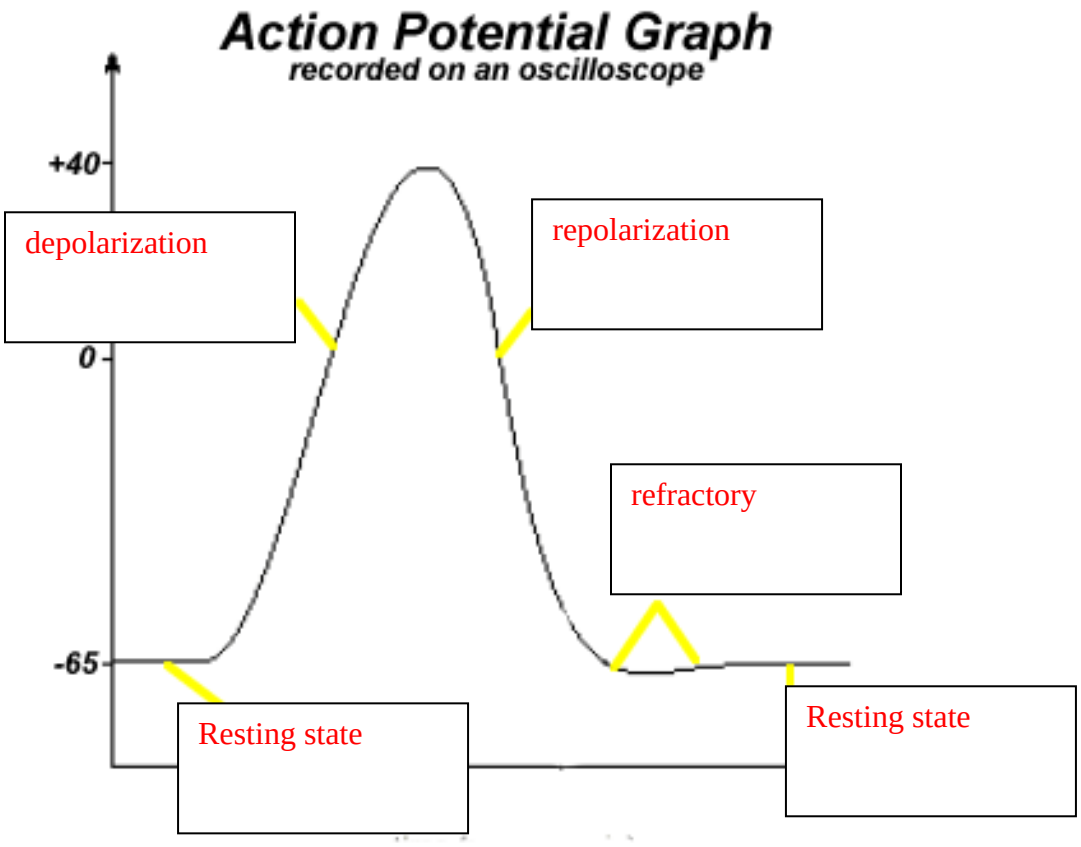
NAME:_____ DATE:_____

Chapter 12 Written Practice Questions

1. Compare and contrast motor and sensory neurons.

Sensory Neuron	Motor Neuron
Carries APs towards CNS	Carries APs away from CNS
Long dendrite and short axons	Short dendrites and long axons
Cell body just outside the CNS	Cell body just inside CNS
Dendrites myelinated and partially myelinated axon	Unmyelinated dendrites and myelinated axon

2. Label the following Action Potential graph with the following terms: Membrane potential in millivolts, Time in milliseconds, resting potential (use twice), repolarization, refractory period, and depolarization.



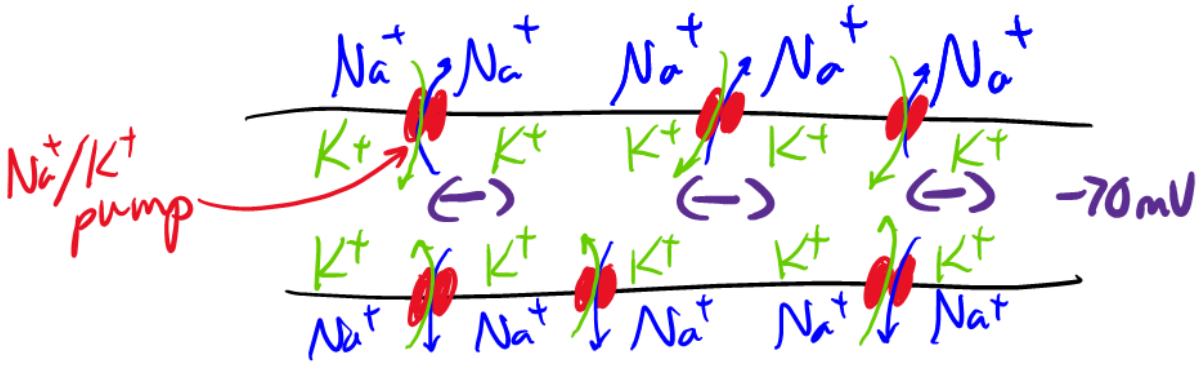
3. Describe the transmission of an impulse along a neuron (action potential).

In the neuron at rest, the sodium potassium pump actively pumps sodium ions out of the neuron and potassium ions into the neuron to maintain resting potential at -70mV.

Depolarization: When stimulation results in the sodium gates opening and sodium flowing into the neuron (diffusion high to low concentration). If the threshold of -45mV is passed the full depolarization goes to +30mV.

Repolarization: At +30mV the sodium gates close and the potassium gates open. K+ diffuses out of the neuron and with an overshoot, the potential goes down to -90mV.

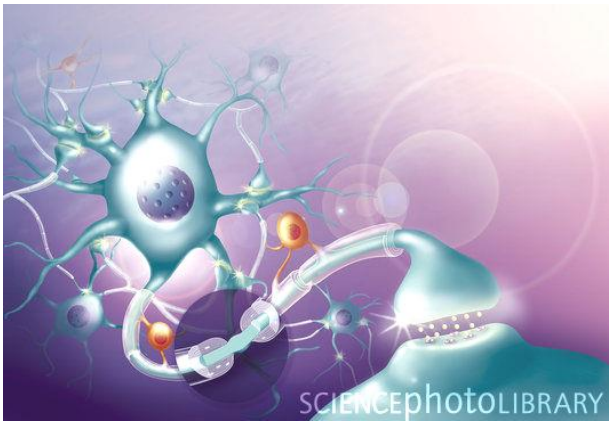
Refractory: The sodium-potassium pump actively pumps the sodium ions back out and the potassium ions back into the neuron and returns the neuron to resting potential so a new depolarization can be generated.



4. Explain how an action potential travels on a myelinated neuron compared to an unmyelinated neuron.

APs travel faster on the myelinated as it only goes from the node of Ranvier to node of Ranvier (node to node – which is also known as saltatory conduction).

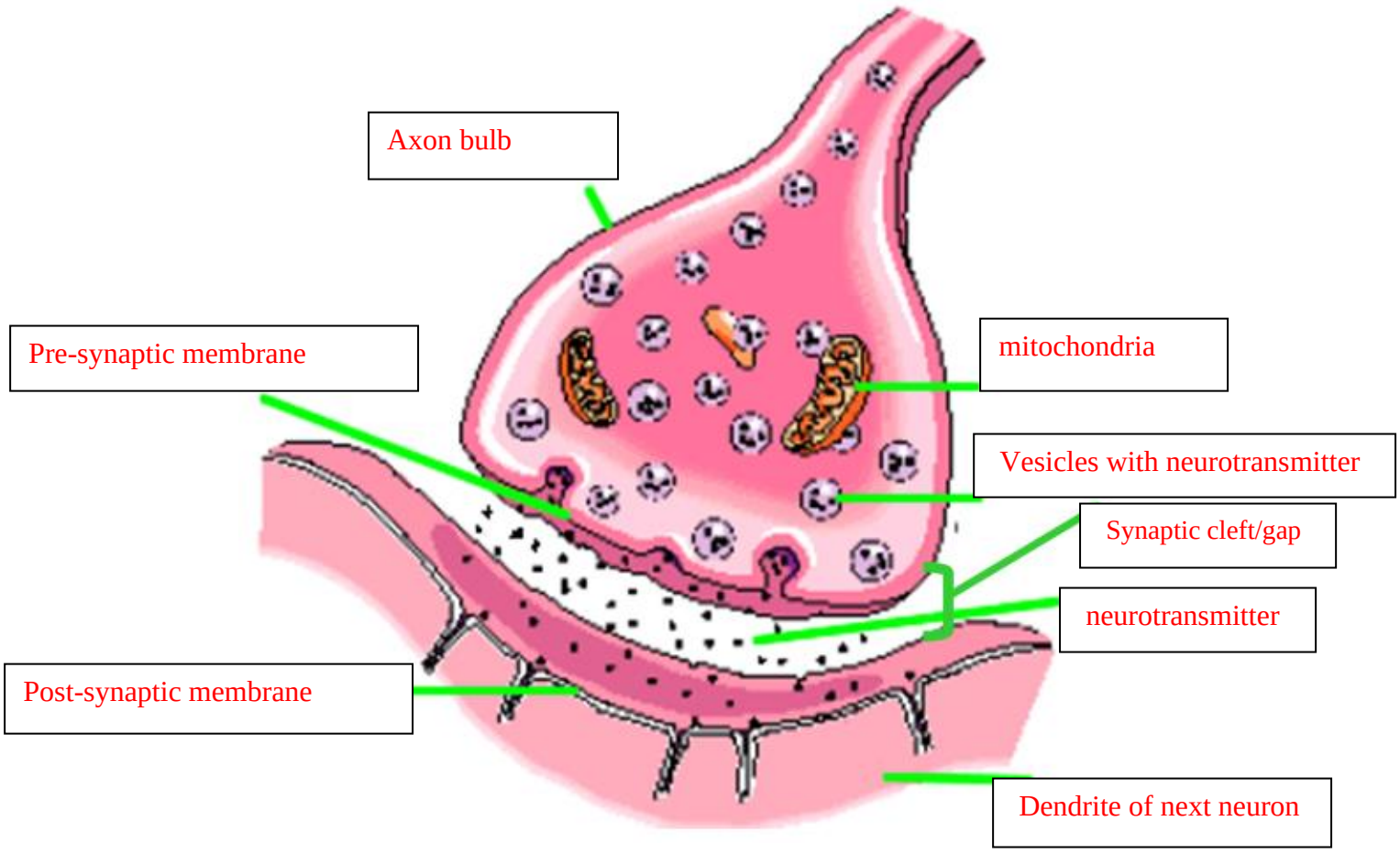
5. Define "synapse" and describe the process of transmitting a nerve impulse between neurons as shown in the picture above and below.



The synapse is where the NT is released to cause depolarization on the next neuron.

1. depolarization reaches the axon bulb and causes Calcium ion (Ca^{2+}) gates to open allowing Calcium ion to enter the bulb.
2. vesicles carrying the NT move to the pre-synaptic membrane and exocytosis of the NT occurs to release NT into the synaptic cleft.
3. NT attaches to receptors on the post-synaptic membrane and cause sodium gates to open and begin depolarization of the next neuron.

6. Label the following image of a synapse:



7. Describe a reflex. Include the order of all structures and provide two examples of reflexes for the human body. (2 marks)

A reflex is a quick response to stimuli that does not involve the higher, thinking parts of the brain.

1. sensory receptor
2. sensory neuron
3. interneuron
4. motor neuron
5. effector

Example 1: when the knee is hit to test reflexes, the sensory receptors detect the pain and pressure and send an AP along the sensory neuron in the leg to the spinal cord. The interneuron in the spinal cord relays the AP directly to motor neuron which carry the AP in the leg to the skeletal muscle effector to generate the appropriate response.

Example 2: when dust comes near or on your eye, the sensory receptors detect the stimulus and initiates an AP along the sensory receptors in the brain to the interneuron which directly relays the impulse to the motor neuron and to the effector which are the muscles that cause blinking.

8. Describe the two main divisions of the Autonomic Nervous System and use at least 4 examples to explain how they effect different areas of the body.

Autonomic = involuntary controls (smooth muscle, cardiac muscle, glands)

Somatic = voluntary controls (skeletal muscle)

The two divisions of the autonomic system are:

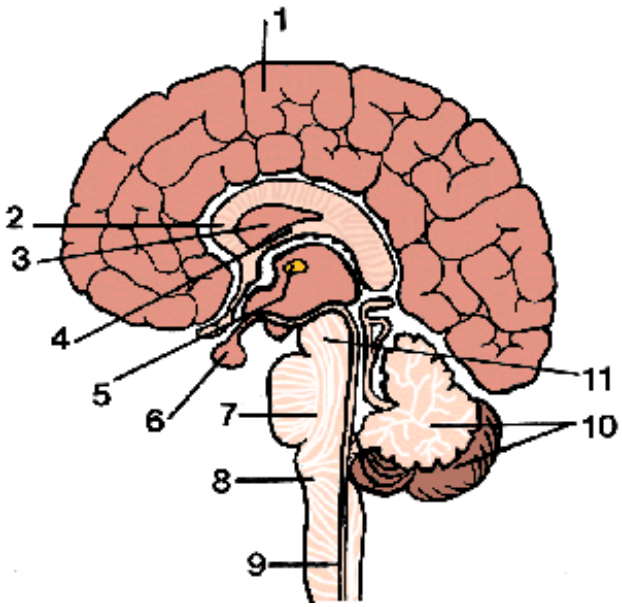
Sympathetic = fight or flight; NT = norepinephrine (epinephrine/adrenalin)

Parasympathetic = relaxed or digestive state; NT = acetylcholine

Sympathetic = increased heart rate, increased breathing, decreased intestinal activity, pupil dilation, bronchiole dilation, decreased urination, decreased salivation.

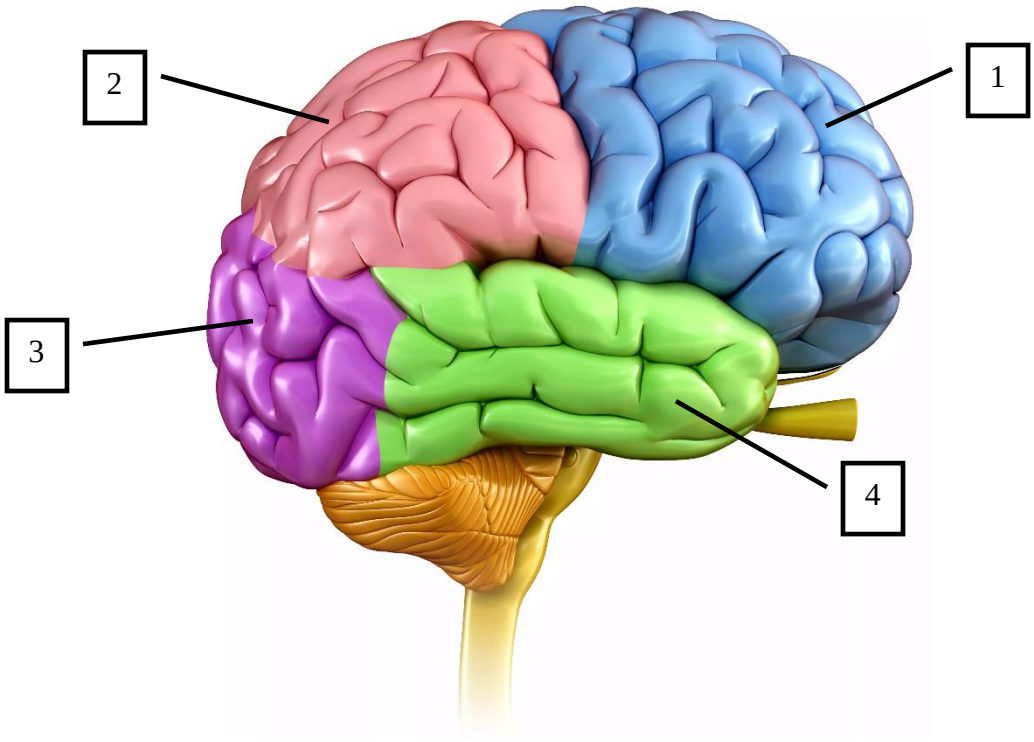
Parasympathetic = decreased heart rate, decreased breathing, increased intestinal activity, pupil constriction, bronchiole constriction, increased urination, increased salivation.

9. Label the brain below and include the functions of each structure in the table provided.



Structure	Function
1. Cerebrum	Consciousness, thinking, decision making, problem-solving, interpreting sensory input.
2. Corpus callosum	Connects the right and left hemispheres where the neuron tracts cross over which results in the left hemisphere controlling the right side of the body and the right hemisphere controlling the left side of the body.
3. Ventricle	Produces and stores cerebrospinal fluid (CSF) – which circulates nutrients around the brain.
4. Fornix	Connected to the hippocampus and has a role in storing memories.
5. Thalamus	Sorts incoming sensory stimuli and determines which parts of the cerebrum the stimulus goes.
6. Pituitary gland	Receives stimulus from the hypothalamus which helps maintain homeostasis in the body (thirst, hunger, sleep, water/salt balance, BP, sex hormones and reproduction). It secretes hormones.
7. Pons	Helps the medulla oblongata with heart rate and breathing functions. Also responds to head reflexes.
8. Medulla Oblongata	Helps control autonomic nervous system; controls heart rate, breathing rate, smooth muscle contraction.
9. Spinal cord	Transmits messages to and from the brain to the rest of the body below the head.
10. Cerebellum	Maintains muscle tone, coordinated movements, balance, posture, and stores learned motor skills.
11. Midbrain	Relay station for sending messages to different parts o the brain (between cerebrum and cerebellum, cerebellum and spinal cord, spinal cord and cerebrum, etc.)

10. Label the brain below and include the functions of each structure in the table provided.



Structure	Function
1. Frontal	Interprets sensory that allow for decision-making, problem solving, speech production, and personality.
2. Parietal	Interprets sense of taste and touch, orientation.
3. Occipital	Interprets sense of vison
4. Temporal	Interprets sense of hearing, language comprehension and stores memories and involved in emotions.