READING NOTES CHAPTERS 10 & 11: NERVOUS SYSTEM

Name _____
Period ____ Due date _____

Nervous system: an introduction (p. 361)

The nervous system is composed of neural tissue, but it also includes blood vessels and connective tissues – which may explain the occurrence of migraines and other neural disorders (see clinical application on page 362). Neural tissues consists of two cell types: nerve cells called _____ and _____ which serve to support and keep nerve cells functioning correctly.

Nerve cells are specialized to react to _____ and _____ changes in their surroundings. Small processes in the cell itself called _____ receive the input. A longer process called an _____ leads out of the cell and carry the information away from the cell in the form of a bioelectric signal or _____.

The organs of the nervous system can be divided into two groups. One group consists of the brain and spinal cord, called the _____ _____ _____ or CNS. The other group connects the CNS to other body parts and is called the _____ _____ _____ or PNS.

General functions of the nervous system (p. 362)

There are 3 general functions of the nervous system: _____ information (sensory), _____ what to do/how to respond (integrative), and _____ on those decisions (motor). Sensory receptors are called **affectors**, for they convert their information into _____, which are then conducted along peripheral nerves to the CNS. There the signals are integrated, which means are made meaning of, and then decisions are made and then acted upon by means of motor functions. These last nerves that conduct impulses from the CNS to responsive structures are called _____. The action can include muscles and/or glands and can be either _____ (voluntary or conscious) or _____ (involuntary or subconscious) in nature.

Divisions of the nervous system: an introduction (p. 390)

As stated above, the CNS consists of brain and the spinal cord. The brain includes about one hundred _____ neurons and countless branches of the axons for communication. It is protected by 3 layers of membranes called _____. The name of each layer from outside to in is the _____ mater, the _____ mater, and the _____ mater. An inflammation of these layers is called _____, which is caused by either bacteria or viral infection.

Spinal cord and reflexes (pages 393 – 401)

The spinal cord is a column of nervous tissues that extends from the brain down through the vertebral canal. There are _____ segments, each of which giving rise to a pair of spinal nerves that are part of the PNS. A cross-section of the cord reveals that it consists of _____ matter surrounding a core of _____ matter. The pattern of the latter resembles a _____ with its wings outspread. The top (or ventral) "wings" are sensory in nature and lead into the CNS; the bottom (or dorsal) "wings" are motor in nature and lead from the CNS into the PNS. If the stimulus is strong enough, a **reflex** can occur, which means that the ventral portion sparks a reaction immediately in the dorsal portion without needing to travel the CNS pathway first. There are 4 types of reflexes that we will study; in the space provided below, provide a brief description of each type as well as a relatable example of the reflex in action:

Patellar (or stretch) reflex:

Withdrawal (or pain) reflex:

Crossed extensor reflex:

Golgi reflex (we will discuss this one in class):

The ventral and dorsal regions of the spinal cord continue up to the brain, creating an **ascending tract** that conducts _____ impulses and a **descending tract** that conducts _____ impulses.

The brain (pages 404 – 417)

The development of the brain can be divided into 3 main categories: forebrain, midbrain, and hindbrain. The forebrain contains the **cerebrum and the diencephalons.** Using the information beginning on page 408, list the primary functions for each of the following **association areas**:

Frontal lobe:

Parietal lobe:

Temporal lobe:

Occipital lobe:

Insula:

Hemisphere dominance is observed in most people, but it is vital to understand that we use our entire brains at all times. List several functions dominated by each hemisphere:

Left hemisphere:

Right hemisphere:

The nerve fibers that connect the two hemispheres together, allowing for full-brain communication and processing, is called the _____ _____.

The **diencephalon** consists of two masses called the _____ and the _____. It also contains the 1) _____ tract with optic chiasma, 2) _____ that attaches the pituitary gland, 3) _____ which is part of the hypothalamus, 4) _____ and 5) _____ gland. Structures in this region control homeostatic responses in the body (heart rate, blood pressure, body temp, day/night cycles, etc) but also are important in controlling _____ responses. These structures form a complex called the _____ system, which can modify a person acts, produces feelings, and also are integral to memory.

The **brainstem** (which the book considers the "midbrain") connects the brain to the spinal cord and consists of 3 parts.

1) The _____ (**mesencephalon**) serves as a reflex center primarily for the eyes and ears but it also connects peripheral nerves to the thalamus and the cerebellum to the cerebrum for "uploading" body movements into long-term muscle memory.

2) The _____ separates the midbrain from the medulla oblongata and essentially serves to distribute impulses to different locations in the cerebrum.

3) The **medulla oblongata** has three primary reflex functions:

a) it serves as the _____ **center**, for it increases or decreases heart rate.

b) it functions as the _____ **center**, which constricts or dilates the diameter of blood vessels

c) it is the _____ **center**, for it increases the rate and depth of breathing.

The _____ **formation** stretches through all of these brainstem structures, serving to increase brain awareness/wakefulness and serves to filter out some unwanted signals from entering the cerebrum for processing.

The _____ is a large mass of tissue found posterior to the occipital lobe and the pons and medulla oblongata. We generally refer to it as the balance and coordination center, for it controls our skeletal muscle activity and smooths out our spatial awareness and body position responses.

For each of the following **brain waves** listed below, use the inset on page 418 to describe mental activity or awareness of the individual under each state:

Alpha

Beta

Theta

Delta

The peripheral nervous system (PNS) (pages 417 – 420)

The PNS consists of nerves that branch out of the CNS to other parts of the body. It includes the cranial nerves that we studied as we dissected the cat brain as well as the spinal nerves that arise from the spinal cord. It was mentioned at the beginning of this packet that the PNS can be divided into consciously-controlled activities called the _____ nervous system and subconscious activities called the _____ nervous system. Like the spinal cord, there are PNS nerves that carry sensory impulses **into** the CNS – called _____ nerves – and there are PNS nerves that carry motor impulses **out of** the CNS – called _____ nerves.