READING NOTES CHAPTERS 10 & 11: NERVOUS SYSTEM

**Name \_\_\_\_\_\_\_\_\_\_\_\_**

**Period \_\_\_\_\_\_\_\_\_\_\_**

**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.