

Name: \_\_\_\_\_

Period: \_\_\_\_\_

## Unit 6 Nervous System Test Review

### Test Review

1. List the major functions of the nervous system.
  
2. Describe the general organization of the nervous system:
  - a. central nervous system
  
  - b. peripheral nervous system
    - 1) autonomic
      - sympathetic
      - parasympathetic
    - 2) somatic
  
3. Explain the difference between the sensory afferent pathway and the motor efferent pathway.
  
  
  
  
  
  
  
  
  
  
4. List the functions and structures of neurons and neuroglial cells.
  - a. neurons
  
  
  
  
  
  
  
  
  
  
  - b. astrocytes
  
  
  
  
  
  
  
  
  
  
  - c. microglia
  
  
  
  
  
  
  
  
  
  
  - d. oligodendrocytes
  
  
  
  
  
  
  
  
  
  
  - e. ependymal cells
  
  
  
  
  
  
  
  
  
  
  - f. Schwann cells

5. Describe what occurs during nerve impulse transmission.
  - a. resting membrane potential
  - b. all or none
  - c. depolarization
  - d. repolarization
  - e. refractory period
6. Differentiate between white and gray matter
7. Describe the meninges:
  - a. dura mater
  - b. arachnoid mater
  - c. pia mater
8. Identify the role of each component of a reflex arc:
  - a. receptor
  - b. sensory neuron
  - c. interneuron
  - d. motor neuron
  - e. effector
9. Identify and briefly describe the four principle parts of the brain.
  - a. cerebrum
  - b. cerebellum
  - c. brain stem
  - d. diencephalon

10. Describe CSF and identify the areas where it is typically found.
  - a. CSF is
  - b. Where is CSF located?
11. Identify the three divisions of the brain stem and list the general functions.
  - a. Medulla oblongata
  - b. pons
  - c. midbrain
12. Identify the two divisions of the diencephalon and list their general functions.
  - a. thalamus
  - b. hypothalamus
13. Identify the four lobes of the cerebrum and list their general functions.
  - a. frontal
  - b. parietal
  - c. temporal
  - d. occipital
14. List the major functions of the cerebellum
15. Describe the diseases, disorders, and procedures of the nervous system.
  - a. ALS
  - b. Alzheimer's
  - c. Bacterial Meningitis
  - d. Cerebral Palsy
  - e. Epilepsy
  - f. Multiple Sclerosis
  - g. Parkinson's

16. Identify the principle anatomical structures of the eye and their functions

- a. Accessory Structures:
  - 1. Eyelid:
  - 2. Conjunctiva:
  - 3. Lacrimal Apparatus:
  - 4. Extrinsic Muscles of the eye:
- b. Fibrous Tunic:
  - 1. Sclera:
  - 2. Cornea:
- c. Vascular Tunic:
  - 1. Choroid coat:
  - 2. Ciliary Body:
  - 3. Iris:
  - 4. Lens:
- d. Nervous Tunic:
  - 1. Retina:
    - a. Rods:
    - b. Cones:

17. Identify the principle anatomical structures of the ear and their functions.

- a. Outer Ear:
  - 1. Auricle:
  - 2. Auditory Canal:
- b. Middle Ear:
  - 1. Tympanic Membrane:
  - 2. Auditory (Eustachian) Tube:
  - 3. Auditory Ossicles:
- c. Inner Ear:
  - 1. Semicircular Canals:
  - 2. Organ of Corti:
  - 3. Cochlea:

18. Describe the diseases or disorders of the special senses:

- a. Presbyopia:
- b. Myopia:
- c. Hyperopia:
- d. Conductive Deafness:
- e. Sensorineural Deafness:
- f. Glaucoma:
- g. Macular Degeneration:
- h. Middle Ear Infection:
- i. Strabismus:
- j. Tinnitus:
- k. Vertigo:

## Unit 6 Nervous System Test Review

### Test Review - KEY

1. List the major functions of the nervous system.
  - A. Sensory  
Perceives or senses changes that occur in the body.
  - B. Integration  
Interprets the incoming sensory information to formulate a response.
  - C. Motor  
The ability to initiate a response such body movement or the secretion from a gland.
  
2. Describe the general organization of the nervous system:
  - a. central nervous system: consists of the brain and spinal cord which function to integrate the body's response.
  - b. peripheral nervous system: contains the nerves which extend from the brain and spinal cord.
  
3. List the functions and structures of neurons and neuroglial cells.
  - a. neurons: basic units of the nervous system. They are responsible for transmitting nerve impulses which communicate with other nerves, muscles, and glands. There are three basic parts of a neuron -- the dendrites, the cell body, and the axon.
  
  - b. astrocytes: They are star-shaped cells which have numerous projections between blood capillaries and neurons. They secrete chemicals which help to maintain the blood-brain barrier which isolates the brain from the general circulation. They help neurons receive nutrition from nearby capillaries. They also help to form scar tissue in the brain.
  
  - c. microglia: spider-like phagocytic cells found in the CNS. They perform phagocytosis to dispose of dead brain cells and infection.
  
  - d. oligodendrocytes: cells with few projections. They are found in the CNS and are responsible for producing the myelin which insulates the axons. Myelin helps to increase the speed of the action potential along the axon.
  
  - e. ependymal cells: Ependymal cells are ciliated cells which line the central canal of the spinal cord and the ventricles of the brain. They are responsible for producing cerebrospinal fluids (CSF) and the cilia helps to circulate it within the spaces and canals.
  
  - f. schwann cells: found in the peripheral nervous system. The Schwann cells produce myelin that surrounds the axons. Myelin helps to insulate the axons and increases the speed of the action potential along the axon.

4. Describe what occurs during nerve impulse transmission.
  - a. resting membrane potential: The nerve membrane of a resting neuron is polarized which means there are fewer positively charged ions on the inside of the nerve membrane than on the outside of the nerve membrane. The extracellular fluid contains high amounts of sodium ions (Na<sup>+</sup>) and chloride (Cl<sup>-</sup>) ions, where the intracellular fluid contains high concentrations of potassium (K<sup>+</sup>) and many negatively charged proteins. This creates a net positive charge on the outside of the axon membrane and a net negative charge on the inside of the axon membrane. The axon is polarized.
  - b. all or none: depolarization must be reached or nothing happens regarding nerve transmission
  - c. depolarization: When the neuron is stimulated, (by another neuron, light in the eye or a touch on the skin), a phase known as depolarization occurs. The sodium channels (gates) in the cell membrane open. This allows sodium to diffuse quickly into the axon. The inward rush of sodium ions changes the charge of the membrane. The inside now become positive while the outside become negative. This allows the neuron to transmit the action potential which continues down the length of the axon.
  - d. repolarization: The next phase is known as repolarization. Almost immediately after sodium has rushed inward, the potassium channels (gates) open which allows potassium ions to diffuse rapidly out of the axon. The outflow of positive ions restores the electrical condition to the polarized state or a net positive charge on the outside and a net negative charge on the inside.
  - e. refractory period: Although the charges have been restored, the original location and concentration of the ions has not been. This next phase is known as the refractory period. The sodium-potassium pump located in the axon membrane is activated and pumps excess sodium ions out of the axon while bringing potassium ions back inside the axon. It is during this time no nerve impulses can be sent. The nerve is set back to its polarized state and awaits new stimulation.
  
5. Differentiate between white and gray matter
  - A. Regions of the CNS which contain myelinated axons are referred to as white matter.
  - B. Regions of the CNS which contain mostly nerve cell bodies and unmyelinated axons are referred to as gray matter.
  
6. Describe the meninges:
  - a. dura mater: The outer layer is the dura mater. The dura mater or "tough mother" is a double layered membrane. One layer is attached to the inner surface of the skull while the other layer forms the outer meningeal layer.
  - b. arachnoid mater: The middle layer is the arachnoid mater. The arachnoid mater or "spider mother," has threadlike extensions to span the subarachnoid space and attach it to the innermost membrane. (The subarachnoid space is filled with cerebrospinal fluid).
  - c. pia mater: The most inner layer is the pia mater. The pia mater or "soft mother" clings tightly to the surface of the brain and spinal cord.

7. Identify the role of each component of a reflex arc:
  - a. receptor: detects the incoming stimulus
  - b. sensory neuron: transmits the action potential to the spinal cord or brain
  - c. interneuron: in the spinal cord or brain which processes the information
  - d. motor neuron: takes the action potential away from the spinal cord or brain
  - e. effector: the response by the muscle, gland, or organ
  
8. Identify and briefly describe the four principle parts of the brain.
  - a. cerebrum: the largest part of the brain and is divided into paired halves known as the cerebral hemispheres. They are connected by a band known as the corpus callosum. The cerebrum is divided into four lobes: frontal, parietal, temporal and occipital. Conscious thought processes, memory storage and retrieval, sensations, and complex motor patterns originate here.
  - b. cerebellum: a large, cauliflower-like structure found inferior the occipital lobe of the cerebrum. It has two hemispheres and contains both white and gray matter. The cerebellum provides the precise timing for coordinating skeletal muscle activity and controls balance and equilibrium. It also stores memories of previous movements.
  - c. brain stem: about the size of a thumb in diameter and approximately three inches long. It is the most inferior brain structure. Its sections include the medulla oblongata, the pons, and the midbrain
  - d. diencephalons: superior to the brainstem and surrounded by the cerebral hemispheres. The major structures of the diecephalon include the thalamus and the hypothalamus. The thalamus functions as a relay station for sensory impulses, except for smell. As the impulses pass, we have a basic recognition of whether the sensation will be pleasant or unpleasant. The hypothalamus regulates body temperature, water balance and metabolism. It is also important in regulating thirst, hunger, blood pressure, pleasure, and the sex drive.
  
9. Describe CSF and identify the areas where it is typically found.
  - a. CSF is a clear, watery fluid similar to blood plasma. It is continuously formed from the blood by the choroid plexus
  - b. Where is CSF located? CSF is found circulating in the ventricles of the brain and in the subarachnoid space surrounding the brain and spinal cord.
  
10. Identify the three divisions of the brain stem and list the general functions.
  - a. Medulla oblongata: the most inferior section of the brain stem extending from the spinal cord. It serves as a relay station for both sensory and motor nerve impulses. It regulates the heart rate, blood pressure, breathing, swallowing, coughing, sneezing, and vomiting.



- b. pons: the rounded bulge superior to the medulla oblongata. It serves as relay station for both sensory and motor nerve impulses as well as regulating the rate and depth of breathing.
- c. midbrain: is a small section of the brain stem superior to the pons. It serves as a relay station for both sensory and motor nerve impulses and contains reflex centers for hearing, vision, and posture.

11. Identify the two divisions of the diencephalon and list their general functions.

- a. thalamus: It serves as a relay station for sensory impulses, except for the sense of smell. As the impulses pass, we have a basic recognition of whether the sensation will be pleasant or unpleasant.
- b. hypothalamus: . It regulates body temperature, water balance and metabolism. It is also important in regulating thirst, hunger, blood pressure, pleasure, sex drive, and the sleep/wake cycle. It functions as a part of the limbic system or the emotional part of the brain. It produces hormones that regulate the pituitary gland, childbirth, and water balance

12. Identify the four lobes of the cerebrum and list their general functions.

- a. frontal: forms the anterior portion of each cerebral hemisphere. It is associated with the control of skeletal muscles, concentration, planning, problem solving, writing, and speech.
- b. parietal: posterior to the frontal lobes and is separated from the frontal lobe by a groove called the central sulcus. The parietal lobe is responsible for the sensations of temperature, touch, pressure, and pain from the skin. It is also responsible for understanding speech and helping us to use words to express thoughts and feelings.
- c. temporal: inferior to the frontal lobe and is separated from it by a groove called the lateral sulcus. The temporal lobe is responsible for hearing and balance as well as the interpretation of sensory experiences and in the memory of visual scenes and music.
- d. occipital: forms the posterior portion of each hemisphere. There is no distinct boundary between the occipital lobe and the parietal or between the occipital lobe and temporal lobes. The occipital lobe is responsible for vision combining visual images with other sensory experiences.

13. List the major functions of the cerebellum

It helps to integrate and analyze information from the spinal cord and the cerebrum and is able to send impulses to further stimulate or inhibit skeletal muscles at appropriate times to cause movement of body parts into desired positions. The activity of the cerebellum makes rapid and complex muscular movements possible. The cerebellum functions as a center for the control and coordination of skeletal muscles. The cerebellum also receives information from the inner ears to help us maintain our balance.

14. Describe the diseases, disorders, and procedures of the nervous system.

- a. ALS: Amyotrophic Lateral Sclerosis, or Lou Gehrig's Disease is the most common motor neuron disease of muscular atrophy. The symptoms of ALS include muscle weakness, muscle atrophy, dysphasia, dysphagia, and dyspnea. The person usually becomes physically incapacitated.
- b. Alzheimer's: Alzheimer's Disease include progressive changes in the neurons of the brain due to a lack of neurotransmitters in the brain, trauma, and genetics. The neurons will degenerate until they can no longer carry an impulse.
- c. Bacterial Meningitis: In bacterial meningitis, the covering(s) of the brain and spinal cord (usually the pia mater) become inflamed, usually the result of bacterial infection
- d. Cerebral Palsy: Cerebral Palsy is the most common cause of crippling in children results from prenatal, preinatal, or postnatal CNS damage due to fetal anoxia.
- e. Epilepsy: Epilepsy is a condition of the brain marked by susceptibility to recurrent seizures that are associated with abnormal electrical discharges in the neurons of the brain.
- f. Multiple Sclerosis: Multiple Sclerosis (MS) is characterized by a loss of myelin from the axons of the peripheral nerves. Hard, plaque-like structures replace the destroyed myelin and the affected areas are invaded by inflammatory cells.
- g. Parkinson's: Parkinson's Disease is sometimes referred to as the shaking palsy as involuntary tremors are one of the cardinal signs. There is a dopamine (neurotransmitter) deficiency, which prevents brain cells from performing their normal inhibition or stopping nerve impulses within the CNS.

15. Identify the principle anatomical structures of the eye and their functions

- a. Accessory Structures:
  1. Eyelid: Composed of thin skin with eyelashes on the edges. There are also small glands which help to lubricate the eyelashes.  
The eyelid closes to protect the anterior surface of the eye. It is involved in the blink reflex. It also helps to wash tears over the surface of the eyeball.
  2. Conjunctiva: Thin, transparent membrane lining the eyelids and the outer surface of the cornea. It secretes mucous to moisten and lubricate the eyeball.
  3. Lacrimal Apparatus: The lacrimal apparatus is consists of the lacrimal gland, the lacrimal sac, and the nasolacrimal ducts. The lacrimal gland produces tears, a dilute salt solution which also contains the enzyme lysozyme. The tears are flushed across the eye aided by blinking.
  4. Extrinsic Muscles of the eye: Six skeletal muscles located on the outside of the eye responsible for the eye's movements. The extrinsic muscles are connected to the three of the cranial nerves.
- b. Fibrous Tunic: thick, outer layer of the eye
  1. Sclera: It is composed of fibrous connective tissue and is often called the "whites of the eye." It provides protection to the inner eye while giving the

- eye its shape. It has many blood vessels which may be seen when the eye is irritated. The sclera is pierced posteriorly by the optic nerve.
2. Cornea: Nicknames the "window of the eye," this is the anterior, clear portion. It bulges slightly outward and allows light to enter the eye. Forms 1/6 of the fibrous tunic.
- c. Vascular Tunic: middle layer of the eye
1. Choroid coat: Is a thin membrane containing brown pigment (melanin) to absorb light coming in from the sides of the eye. The blood vessels also nourish the retina.
  2. Ciliary Body: Is the thickest part of the vascular tunic. It consists of smooth muscle fibers which are attached to the lens by the suspensory ligaments. These muscles contract and relax to control the thickness of the lens to aid in accommodation or the changing of the lens to help with distance and near vision.
  3. Iris: Colored portion of the eye. Contains muscle fibers to control the size of the opening (pupil) to regulate the amount of light that enters the eye.
  4. Lens: Crystalline epithelial structure located behind the iris and the pupil. Helps to focus light waves on the retina.
- d. Nervous Tunic: The most inner nervous layer
1. Retina: The retina is a thin, fragile layer of neurons which forms the inner lining of the back wall of the eye. The retina receives light waves, converts the information to a nerve impulse which is then transmitted to the optic nerve.
    - a. Rods: Elongated, cylindrical dendrites which are sensitive to low levels of light. They assist us with vision in dim light, shapes of objects, and black and white vision
    - b. Cones: Cells which have dendrites tapered like cones. These cells require bright light and are sensitive to color. They focus objects for us and provide detailed vision.
16. Identify the principle anatomical structures of the ear and their functions.
- a. Outer Ear: Is responsible for directing sound waves to the middle ear and the tympanic membrane.
    1. Auricle: Also known as the pinna, this is an elastic cartilage structure covered with skin. It directs sound waves into the auditory canal.
    2. Auditory Canal: Also known as the external auditory canal, this tube extends into the temporal. It is lined with hair and wax-producing ceruminous glands which help protect the middle ear. It directs sound waves to the tympanic membrane.

- b. Middle Ear: The middle ear is an air filled space within the temporal bone. It contains a membrane and three small bones.
  - 1. Tympanic Membrane: This is a thin membrane connected to the three auditory ossicles. It vibrates in response to sound waves received from the auditory canal. The vibrations are then transmitted to the three bones.
  - 2. Auditory (Eustachian) Tube: A small tube extending from the tympanic cavity into the pharynx. Helps to equalize pressure between the middle ear and atmosphere on both sides of the tympanic membrane.
  - 3. Auditory Ossicles: They include the malleus (hammer), incus (anvil), and the stapes (stirrup). The three bones form a bridge through the tympanic cavity.
- c. Inner Ear: A series of fluid-filled passageways.
  - 1. Semicircular Canals: The semicircular canals are three fluid-filled loops. Helps the body maintain dynamic equilibrium.
  - 2. Organ of Corti: actual organ of hearing
  - 3. Cochlea: The cochlea resembles a small shell. Its canals are coiled. It consists of several fluid-filled chambers. When oval window begins to vibrate, those vibrations are carried into these fluid-filled chambers which causes both the fluid and membranes to vibrate.

17. Describe the diseases or disorders of the special senses:

- a. Presbyopia: Presbyopia is the normal loss of accommodation power of the eye which occurs as a consequence of aging.
- b. Myopia: Myopia is the ability to see close objects but not distant ones and results from a defect in which the eye's focusing systems, the cornea and the lens, are optically too powerful or the eyeball is too long.
- c. Hyperopia: Hyperopia is the ability to see distant objects but not near ones and results from a defect in which the eye's focusing systems, the cornea and the lens, are optically too weak or the eyeball is too short.
- d. Conductive Deafness: Conductive deafness is a loss of hearing related to the impairment of the conduction of sound waves through the external and middle ear.
- e. Sensorineural Deafness: Sensorineural deafness or nerve impairment deafness results from damage to the nerves or to the Organ of Corti
- f. Glaucoma: Glaucoma is the build-up of excessive aqueous humor in the anterior cavity of the eye. The fluid causes excess pressure against the retina which reduces the amount of blood reaching the retina. The reduced blood flow causes the degeneration of the retina resulting in vision loss.
- g. Macular Degeneration: Macular degeneration is the progressive degeneration of the central part of the retina or the macula which is necessary for good vision.

- h. Middle Ear Infection: Middle ear infection or otitis media is an infection of the middle ear usually the result of a bacterial infection spread from the mucous membrane of the pharynx through the auditory tube to the mucous lining of the middle ear.
- i. Strabismus: Strabismus or cross-eyed occurs when the eye cannot be coordinated. Strabismus is caused by paralysis, weakness, or other abnormality affecting the external muscles of the eye.
- j. Tinnitus: Tinnitus is the ringing or clicking in the ears.
- k. Vertigo: Vertigo is dizziness or the sensation of spinning.