3.02 Understand the functions and disorders of the nervous system
3.02 Essential Questions

- What are the functions of the nervous system?
- What are some disorders of the nervous system?
- How are nervous system disorders treated?
- How does the nervous system relate to the body’s communication systems?
Functions of the nervous system: Neurons

- **Sensory** - Emerge from the skin or sense organs to carry messages toward the spinal cord and brain
- **Motor** - Carry messages from the brain and spinal cord to the muscles and glands
- **Associative** - Carry impulses from the sensory neuron to the motor neuron
Functions of the central nervous system: **Brain**

**THINK ABOUT IT...**

**HOW DO YOU USE YOUR BRAIN?**
Functions of the central nervous system: **Brain**

**HOW DO YOU USE YOUR CEREBRUM?**

- **Frontal lobe** - Controls voluntary muscle movement. Also contains the area that makes speech possible.
- **Parietal lobe** - Interprets nerve impulses from the sensory receptors for pain, touch, heat, cold and balance.
- **Occipital lobe** - Controls eyesight.
- **Temporal lobe** - Smell and hearing. Speech understanding and comprehension.
Functions of the central nervous system: **Brain**

**HOW DO YOU USE YOUR LIMBIC SYSTEM?**

- What are the functions of the limbic system? It influences unconscious and instinctive behaviors that relate to survival.
- Can you control it? Behavior is modified by the action of the cerebral cortex.
Functions of the central nervous system:

**Brain**

**Your Limbic System at Work!**

What’s happening in these pictures? Can you control it?

3.02 Understand the functions and disorders of the nervous system
Functions of the central nervous system:

**Brain**

**How do you use your cerebellum?**

- Maintenance of balance
- Maintenance of muscle tone
- Coordination of muscle movements
Functions of the central nervous system: BRAIN

- **Diencephalon**
  - Located between the cerebrum and the midbrain
  - **Structures**
    - Thalamus
    - Hypothalamus
    - Pineal body
    - Pituitary gland
Functions of the central nervous system: BRAIN

- **Diencephalon**
  - **Thalamus** — Receives direct or indirect nerve impulses from the various sense organs of the body. Also receives nerve impulses from the cerebral cortex, cerebellum and other areas of the brain. Damage to this may result in increased sensitivity to pain or total loss of consciousness.
  - **Hypothalamus** — Stimulates the pituitary to release its hormones.
3.02 Understand the functions and disorders of the nervous system

**Functions of the central nervous system:**

**Brain**

**How do you use your brainstem?**

- The brain stem is made up of 3 parts:
  - **Midbrain**: Contains the nuclei for reflex centers involved with vision and hearing.
  - **Pons**: Serves as a two way conductive pathway for nerve impulses between the cerebrum, cerebellum and other areas of the nervous system.
  - **Medulla oblongata**: Serves as a passageway for nerve impulses between the brain and spinal cord.
3.02 Understand the functions and disorders of the nervous system

Functions of the central nervous system:

**Brain**

**DISCUSS THE RELEVANCE OF THE BRAIN STEM FOR THESE FUNCTIONS?**
Functions of the central nervous system: Spinal Cord

- The major function of the spinal cord is to carry messages from the sensory neurons to the brain for interpretation.
- The response is then carried back from the brain through motor neurons to the muscles and glands.
- It also serves as the reflex center for the body.
Functions of the Peripheral nervous system

PNS can be divided into 2 subcategories:

- Afferent peripheral system: consists of afferent or sensory neurons that convey information from receptors in the body to the brain and spinal cord.
- Efferent peripheral system: consists of efferent or motor neurons that convey information from the brain and spinal cord to the muscles and glands.

- Cranial nerves: part of the PNS. Consists of 12 pairs which begin in areas of the brain.
- Spinal Nerves: Originate in the spinal cord. Conduct impulses from the periphery (like the skin to the spinal cord.
12 cranial nerves

- I- Olfactory- Smell
- II- Optic- vision
- III- Oculomotor- Eyelid and eyeball movement
- IV- Trochlear-Turns eye downward and laterally
- V- Trigeminal- Face and mouth touch, chewing
- VI- Abducens- turns eyes laterally
- VII- Facial-Controls most facial expressions, tears, saliva and taste
- VIII- Vestibulocochlear (auditory)- Hearing, equilibrium, sensation
- IX- Glossopharyngeal- Taste, senses carotid pressure
- X- Vagus- Senses aortic blood pressure, slows heart rate, stimulates digestion, taste
- XI- Spinal accessory- Controls trapezius, sternocleidomastoid muscles, controls swallowing
- XII- Hypoglossal- movement of tongue muscles

3.02 Understand the functions and disorders of the nervous system
Autonomic nervous system

2 Divisions

- **Sympathetic system:** Contains nerves that extend to all vital internal organs. This is the “fight or flight” system.
  - When the body perceives danger or stress, it prepares to run away or stand and fight.
  - The heart starts beating faster, your mouth goes dry.

- **Parasympathetic system:** Contains two important active nerves; vagus and pelvic nerves.
  - The parasympathetic system helps restore balance to the body after the danger has passed.

- Both sympathetic and parasympathetic nerves are strongly influenced by emotion.
- They operate as a pair to strike the perfect balance.
Functions of the nervous system

- Discuss the relevance of the nervous system to the body’s communication systems.
Disorders of the nervous system and their treatments

- Alzheimer’s disease
  - Cause: Unknown
  - 3 stages:
    - 1: lasts from 2-4 years. Symptoms are confusion, short-term memory loss, anxiety, and poor judgment.
    - 2: lasts from 2-10 years. Increase in memory loss, motor problems, logic problems, loss of social skills
    - 3: Lasts from 1-3 years. Inability to recognize self, weight loss, mood swings, loss of speech (aphasia).
  
Treatment: No cure, some medications can help minimize or stabilize symptoms
Disorders of the nervous system and their treatments

- **Cerebral palsy**

What is cerebral palsy? A permanent motor deficit diagnosed in infants and young children, thought to be from damage to the motor cortex

   - Risk factors: Low birth weight, infection during pregnancy, premature birth, multiple births, brain hemorrhage, lack of oxygen
   - Symptoms: increased muscle tone, lack of coordination, foot drag, drooling, speech difficulties, tremor, uncontrollable movements

How is it treated? Physical and occupational therapy, assistive devices, drugs to control symptoms
Disorders of the nervous system and their treatments

- **Epilepsy**

What is epilepsy? Seizure disorder of the brain from recurring and excessive discharge from neurons
What are the symptoms? Seizures, loss of consciousness,
How is it treated? Anticonvulsants such as phenobarbital, dilantin, and tegretol.
Disorders of the nervous system and their treatments

- **Hydrocephalus**

Hydro- cephal -us

Define the terms. Do the meanings of the parts represent the whole? Who is most likely to develop hydrocephalus?

How is it treated? A shunt is placed to divert the cerebrospinal fluid around the blocked area.
Disorders of the nervous system and their treatments

- **Meningitis**

What causes of meningitis?
What are the symptoms?
How is it treated?
Disorders of the nervous system and their treatments

- **Multiple sclerosis**

  What are the symptoms? Weakness of extremities, numbness, double vision, speech problems, loss of coordination, possible paralysis

  Who is most likely to develop it? Women between the ages of 20-40

  How is it treated? Adequate rest, exercise, minimal stress, and some medications can slow the progression.
Disorders of the nervous system and their treatments

- Neuritis

neur- -itis

Discuss the terms.

Symptoms: Severe pain, hypersensitivity, loss of sensation, weakness

Causes: Infection, chemical exposure, or due to other conditions such as chronic alcoholism.
Disorders of the nervous system and their treatments

- **Paralysis**

  “disabling of a nerve”

How does this quote relate to paralysis? 
What are the symptoms? 
What is the prognosis?
Disorders of the nervous system and their treatments

- Parkinson’s disease
  - What are the symptoms of Parkinson’s disease? Shuffling gait, pill rolling, and muscular rigidity
  - How is it treated? With the drug L-dopa and other drugs that help control the symptoms of this disease
Disorders of the nervous system and their treatments

- Poliomyelitis
  - What is the impact of this disorder? Paralysis
  - How can it be prevented? Vaccine
  - How is it treated? No treatment
  - What is the prognosis? If the patient lives during the acute phase, he or she will face an extensive rehabilitation
Disorders of the nervous system and their treatments

- **Spinal cord injury**

  What are the symptoms? Loss of movement and feeling

  What determines a patient’s symptoms? The level of injury determines the symptoms

  How is it treated? Do not move the victim if a spinal injury is suspected. Realignment, stabilization, and release of pressure of the spinal cord. Surgery may be necessary along with certain medications.

  What are the risk factors for teens?
Disorders of the nervous system and their treatments

- **West Nile Virus**

  Where is the greatest incidence of West Nile virus?  
  What are the risk factors? Unprotected skin  
  How is it prevented? Wear protective clothing, insect repellent, screens on windows, get rid of standing water  
  How is it treated? Treat symptoms. It may cause encephalitis or meningitis.
Disorders of the nervous system and their treatments

- What are some common symptoms of neurological disorders?

- What are some common prognoses?

- Why do these commonalities exist?
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The end