

Chapter 4 – Nervous System

Subject - Science

Class V

Nervous system

The nervous system is a system in the body which sends signals around the body. It lets people and animals respond to what is around them. ... The structure of the system includes the brain and spinal cord, which together are called the central nervous system.

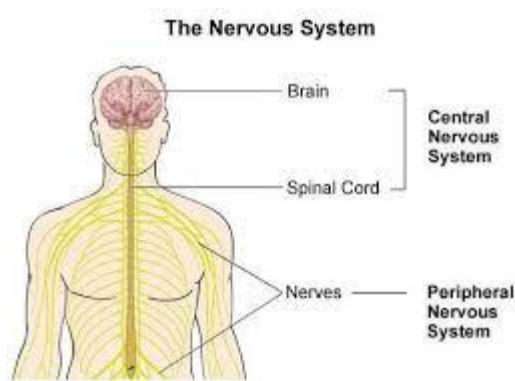
The nervous system is a highly complex part of an animal that coordinates its actions and sensory information by transmitting signals to and from different parts of its body. The nervous system detects environmental changes that impact the body.

The vertebrate nervous system is divided into a number of parts.

The central nervous system includes the brain and spinal cord.

The peripheral nervous system consists of all body nerves.

Motor neuron pathways are of two types: somatic (skeletal) and autonomic (smooth muscle, cardiac muscle, and glands).



The nervous system has three main functions:

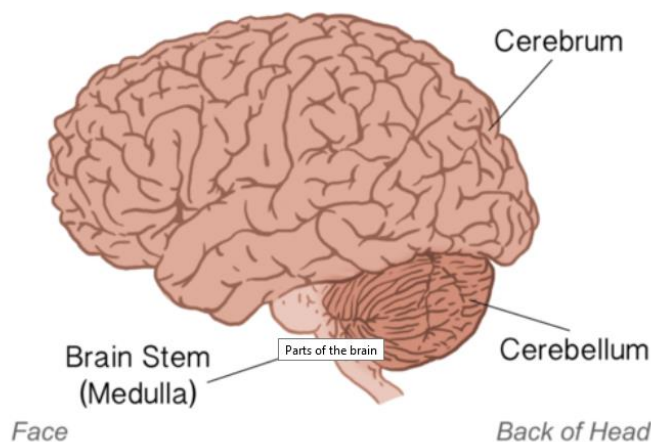
1. To collect sensory input from the body and external environment.
2. To process and interpret the sensory input.
3. To respond appropriately to the sensory input.

Brain

A brain is an organ that serves as the center of the nervous system in all vertebrate and most invertebrate animals. It is located in the head, usually close to the sensory organs for senses such as vision. It is the most complex organ in a vertebrate's body.

The brain works like a big computer. It processes information that it receives from the senses and body, and sends messages back to the body. ... Brain tissue is made up of about 100 billion nerve cells (neurons) and one trillion supporting cells which stabilize the tissue.

Parts of the Brain



The brain has three main parts:

Cerebrum: is the largest part of the brain and is composed of right and left hemispheres. It performs higher functions like interpreting touch, vision and hearing, as well as speech, reasoning, emotions, learning, and fine control of movement.

The cerebrum is the largest part of the brain. Located in the front and middle part of the brain, it accounts for 85% of the brain's weight. Of the three main parts of the brain, the cerebrum is considered the most recent to develop in human evolution. The cerebrum is responsible for all voluntary actions (e.g.: motor skills), communication, emotions, creativity, intelligence and personality.

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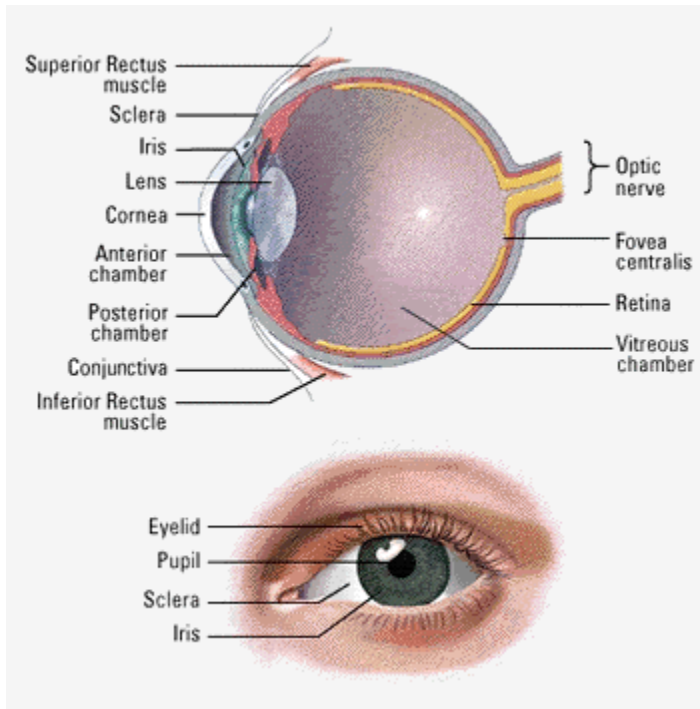
Brainstem: The final section of the brain is a mass of tissue and nerves called the brain stem. Located underneath the cerebrum and cerebellum, the brain stem connects the brain to the spinal cord. All information that goes from the brain to the body (or vice versa), must pass through the brain stem to reach its destination. The brain stem accounts for the remaining 5% of the brain's mass, and is (along with the cerebellum), the oldest part of the brain. **The brain stem is responsible for regulating the heart and lungs, communications between the brain and the peripheral nervous system (the nerves of the body), our sleep cycle, and coordinating reflexes.**

Medulla oblongata helps regulate breathing, heart and blood vessel function, digestion, sneezing, and swallowing. This part of the **brain** is a center for respiration and circulation. Sensory and motor neurons (nerve cells) from the forebrain and midbrain travel through the **medulla**.

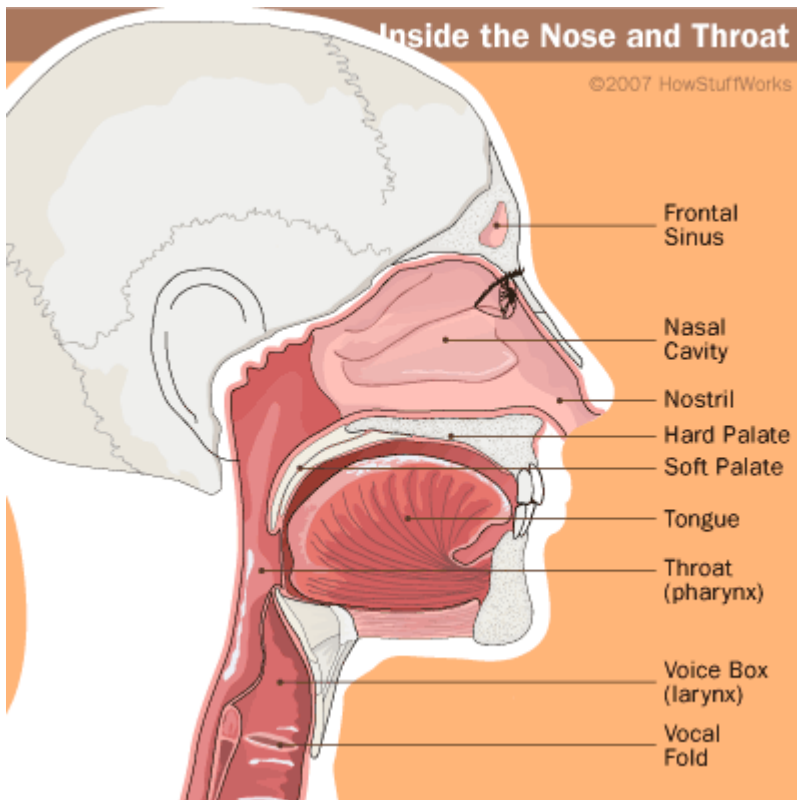
Sense Organs

We have all heard about the five senses i.e see, hear, smell, taste and touch. To see we use our eyes, to hear we use our ears, to smell we use our nose, to taste we use our tongue, and we touch with the help of tongue. So basically, human beings have five sense organs i.e. eyes, ear, nose, tongue, and skin.

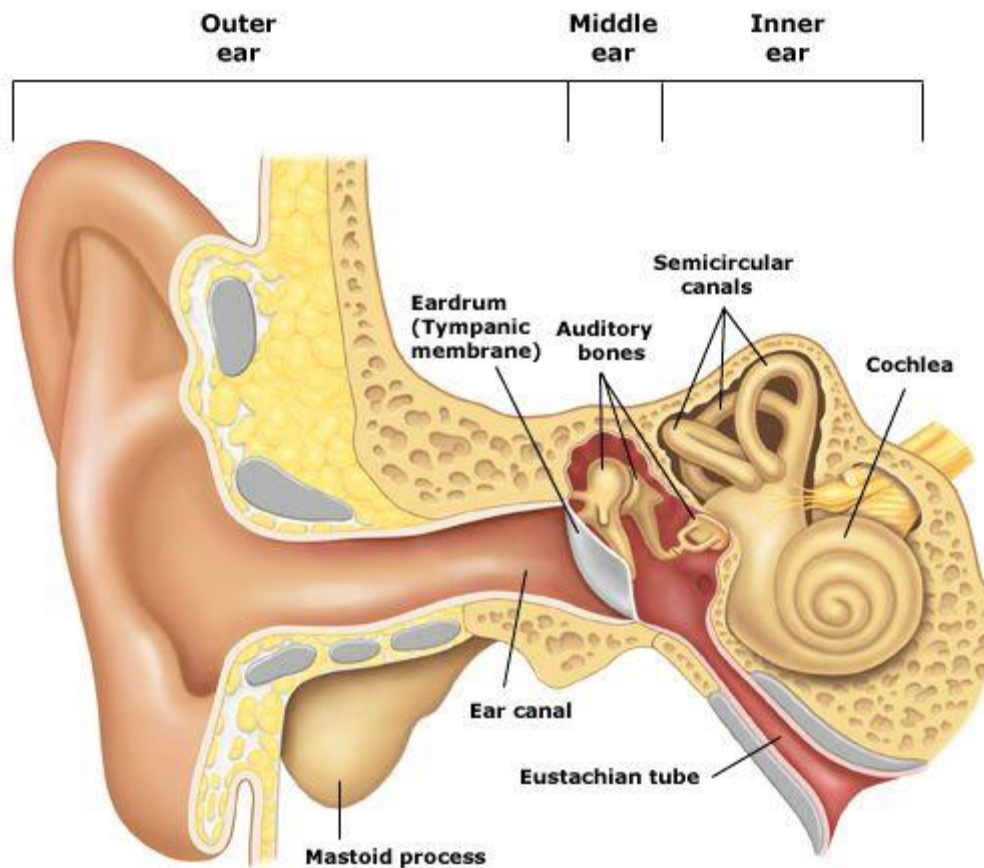
Eyes: **Eyes** are **organs** of the visual system. They provide animals with vision, the ability to receive and process visual detail, as well as enabling several photo response functions that are independent of vision. **Eyes** detect light and convert it into electro-chemical impulses in neurons.



Nose: The organ for the sense of smell is the nose. Nose has nostrils, we breathe in through nostrils. The olfactory system is responsible for our sense of smell and the nose is also known as an olfactory organ. Usually, animals have a stronger sense of smell than human beings. However, human beings can also smell thousands of various odors and fragrances. The nose is also an organ which helps us in the sense of taste. For example, we can smell a gas leak. Read about Respiratory Organs here.

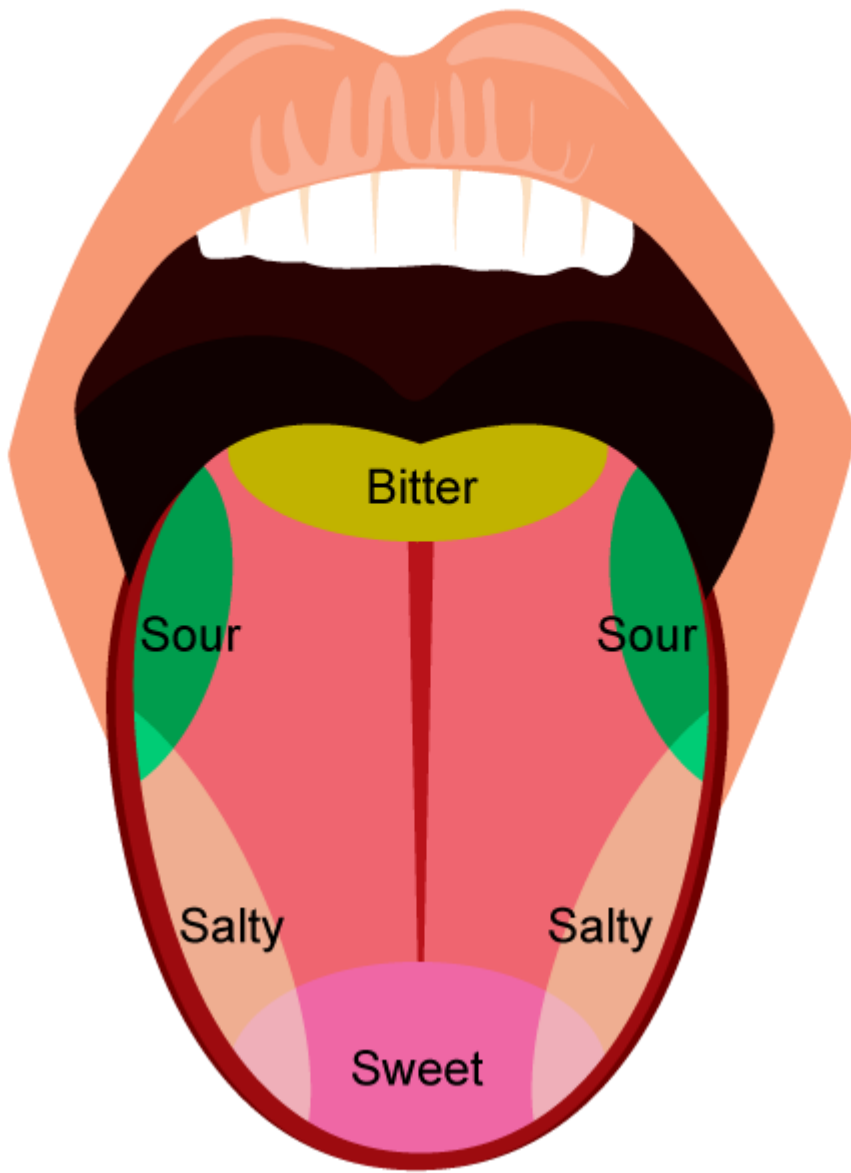


Ears: The organ for the sense of hearing is ears. Hearing or auditory perception is the ability to perceive sound by detecting vibrations, changes in the pressure of the surrounding medium through time, through an organ such as the ear. For example, we hear music through earphones which are inserted into our ears. Total or partial ability to hear is known as hearing loss.

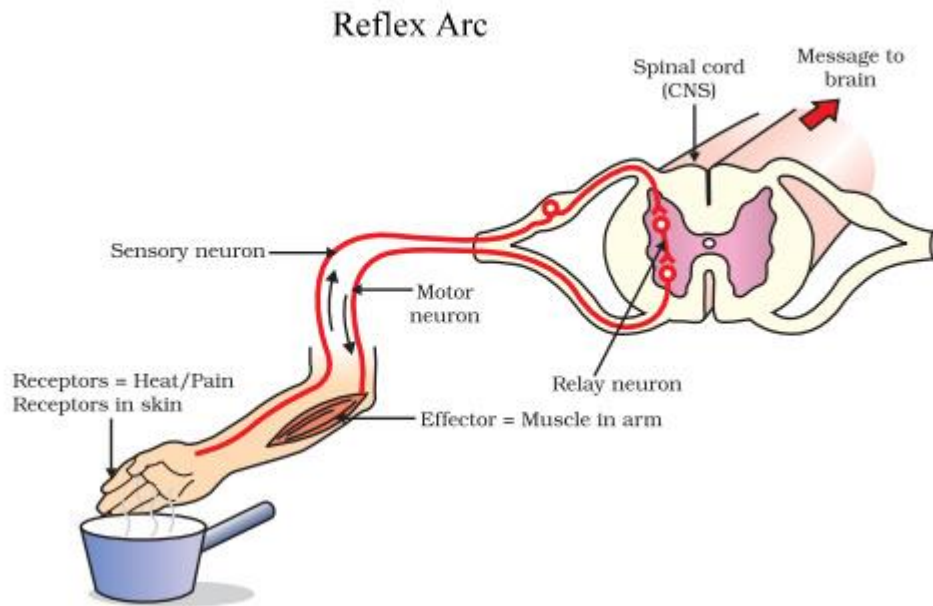


Skin: The organ for the sense of touch is skin. Skin is the largest organ as it is located throughout the human body. Various receptors are used for different situations like pain, temperature, pressure, etc. For example, when we touch something hot like a hot cup of tea or coffee, we instantly move our hands away from it.

Tongue: The organ for the sense of taste is the tongue. The tongue has various receptors (taste buds) which can detect whether the item consumed is salty, sweet, bitter or sour. The behind part of the tongue detects bitter taste, the front most part detects salty taste, the side part detects sour taste and the middle and front part detects sweet taste.



Reflex Action



A reflex, or reflex action, is an involuntary and nearly instantaneous movement in response to a stimulus. A reflex is made possible by neural pathways called reflex arcs which can act on an impulse before that impulse reaches the brain. It is a way for the body to automatically and rapidly respond to a stimulus to minimise any further damage to the body. It follows this general sequence and does not involve the brain: stimulus → receptor → sensory neuron → relay neuron → motor neuron → effectors → response.

In simple words, Reflex action is a sudden and involuntary response of effectors (muscles and organs) to a stimulus.

Withdrawal of hands when touched by hot things, watering of mouth on seeing favourite food, coughing, sneezing and blinking of eyes are examples of reflex actions.

Nerves

Your nervous system is composed of a network of **nerves** and **nerve** cells that carry messages to and from the brain and spinal cord and the rest of **the body**. A **nerve** is a bundle of fibers that receives and sends messages between the **body** and the brain.

Sensory Nerves: Sensory **nerves** also known as afferent **nerves**, carry impulses from sensory receptors towards the brain. The sensory function of the **nervous system** involves collecting information from sensory receptors that monitor the body's internal and external conditions.

Motor Nerves: Motor **nerves** also known as efferent **nerves**, carry impulses away from the brain to muscles and glands. A **motor nerve** is a nerve located in the central nervous system (CNS), usually the spinal cord, which sends motor signals from the CNS to the muscles of the body.

Motor nerves act as nerves which carry information out from the CNS, as opposed to sensory nerves, which send signals from sensory receptors in the periphery to the CNS.

Mixed Nerves: There are also nerves that serve as both sensory and motor nerves called mixed nerves. **Mixed nerves** are the **nerves** that perform both the action of sensory **nerves** as well as a motor **nerve**. They transform electrical impulses from the central nervous system to the muscles of the body.

Questions and Answers

Q1. What are the parts of brain? Which part is known as centre of intelligence?

A1. The brain has three main parts: Cerebellum, Cerebrum and Medulla. Prefrontal cortex is known as the centre of intelligence.

Q2. How is the brain protected?

A2. Brain is protected by the bony box-cranium, also called as skull.

Q3. How do ears help us to listen?

A3. The inner ear is shaped like a snail and is also called the cochlea. Inside the cochlea, there are thousands of tiny hair cells. Hair cells change the vibrations into electrical signals that are sent to the brain through the hearing nerve. The brain tells you that you are hearing a sound and what that sound is.

Q4. How does nose act as filter for the air we breathe in?

A4. A mucous membrane lines your nasal cavity and it helps keep your nose moist. Little hairs inside your nasal cavity help filter the air you breathe in, and

block dirt and dust from getting into your lungs. When you breathe in through your mouth, or oral cavity, the air is moistened, but not filtered.

Q5. Mention three ways to take care of our eyes?

A5. Eyes are very delicate. We must take proper care of our eyes:

1. Wash your eyes by splashing water.
2. Maintain proper distance between your eyes and the book.
3. Make sure you are in the right posture while reading and writing.