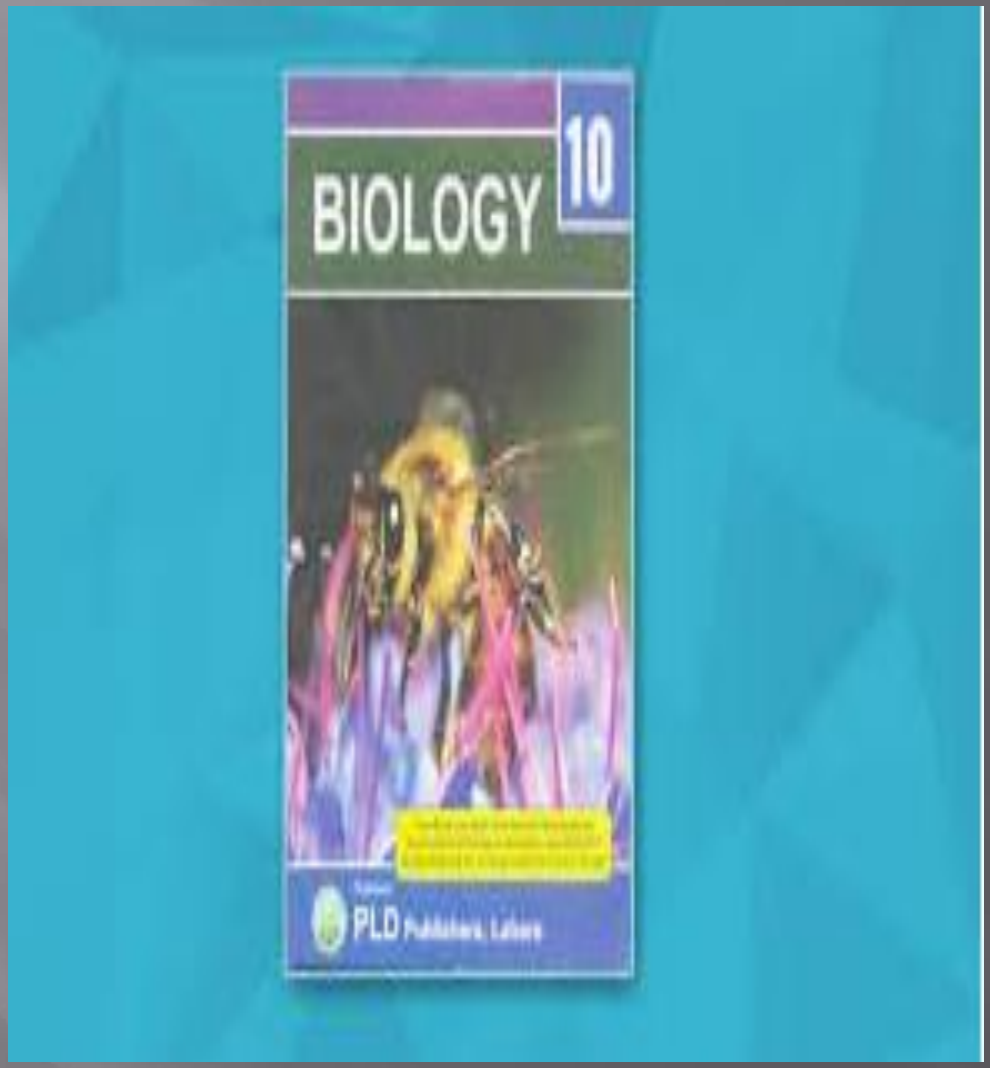
Pakistan School
Kingdom of Bahrain

BIOLOGY LESSON 10TH


BIOLOGY
10
PLD Publishers, Lahore

Ch.3. COORDINATION & CONTROL

- **Topic.** **HUMAN NERVOUS SYSTEM**

PAGES (34 to 38)

OBJECTIVES OF THE LESSON

- At the end of this lesson students will be able to

- Define neuron, its structure & function

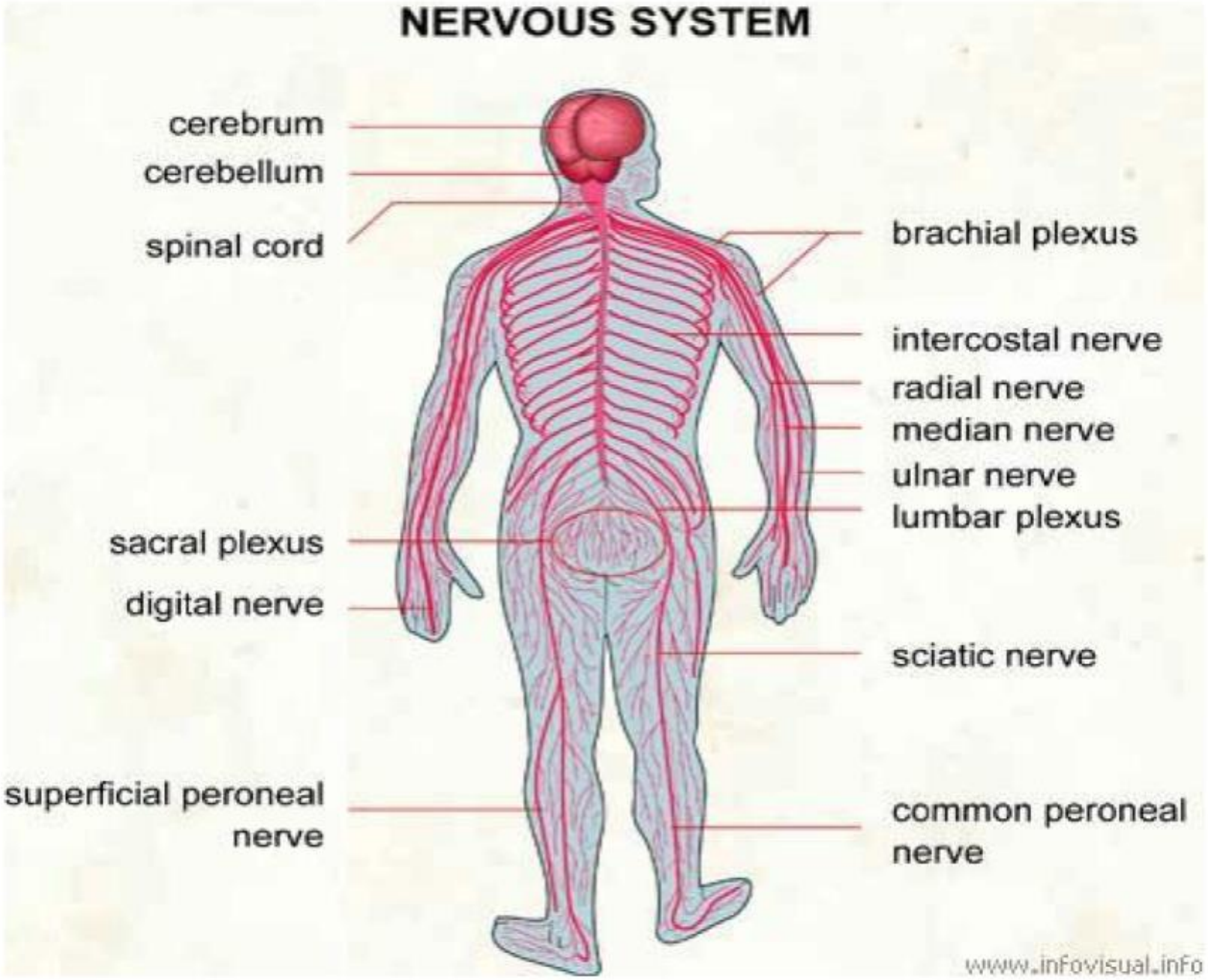
&

- Describe the CNS and study its various parts.

What is Nervous system?

The Nervous system is a network of organs and nerves that sends signals throughout the body, and controls everything we do, from breathing to tasting.

HUMAN NERVOUS SYSTEM



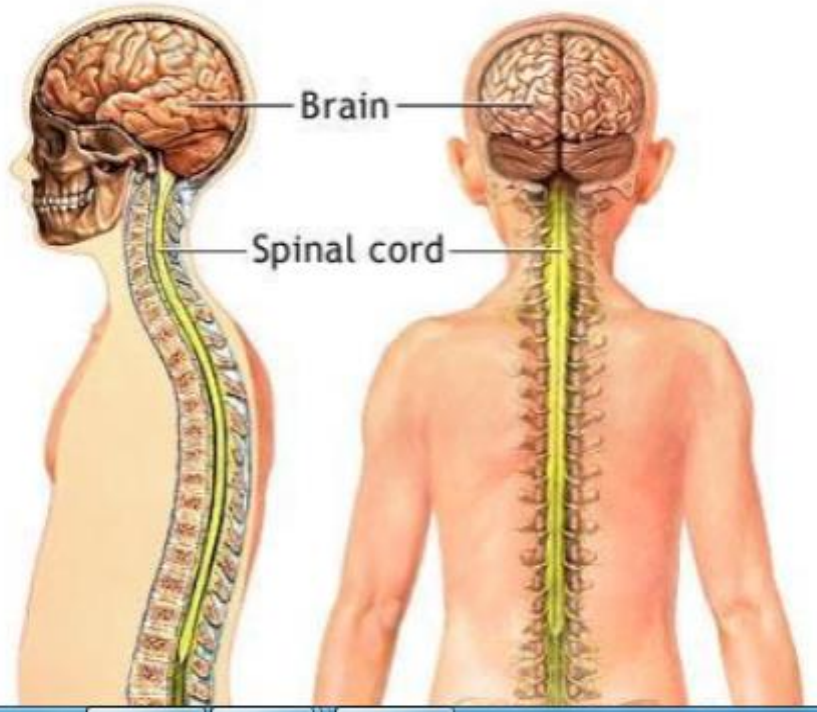
3) Human nervous system :-

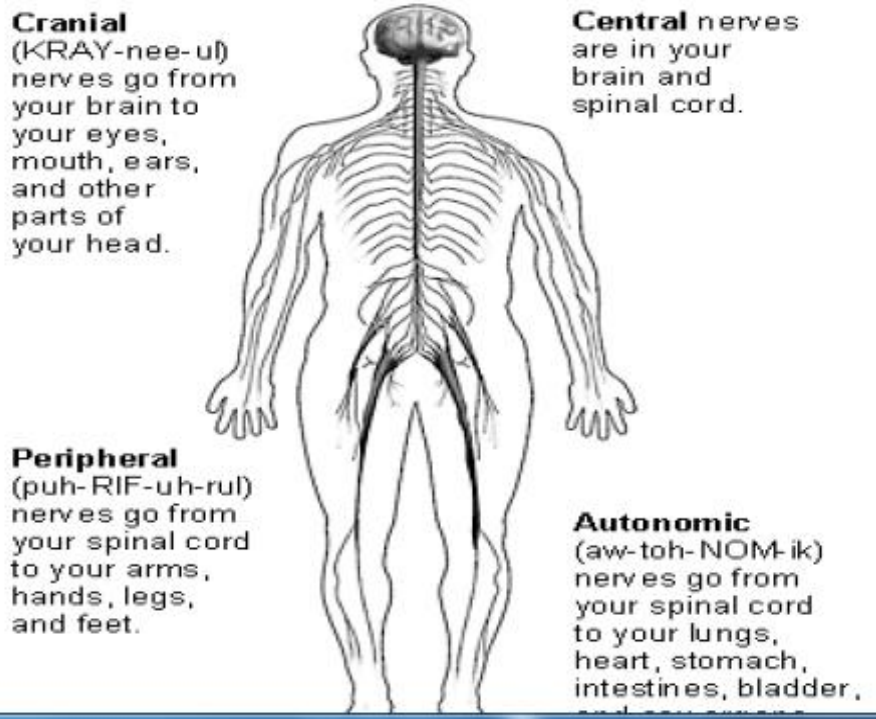
a) Parts of the nervous system :-

The human nervous system consists of the Central Nervous System and Peripheral Nervous System.

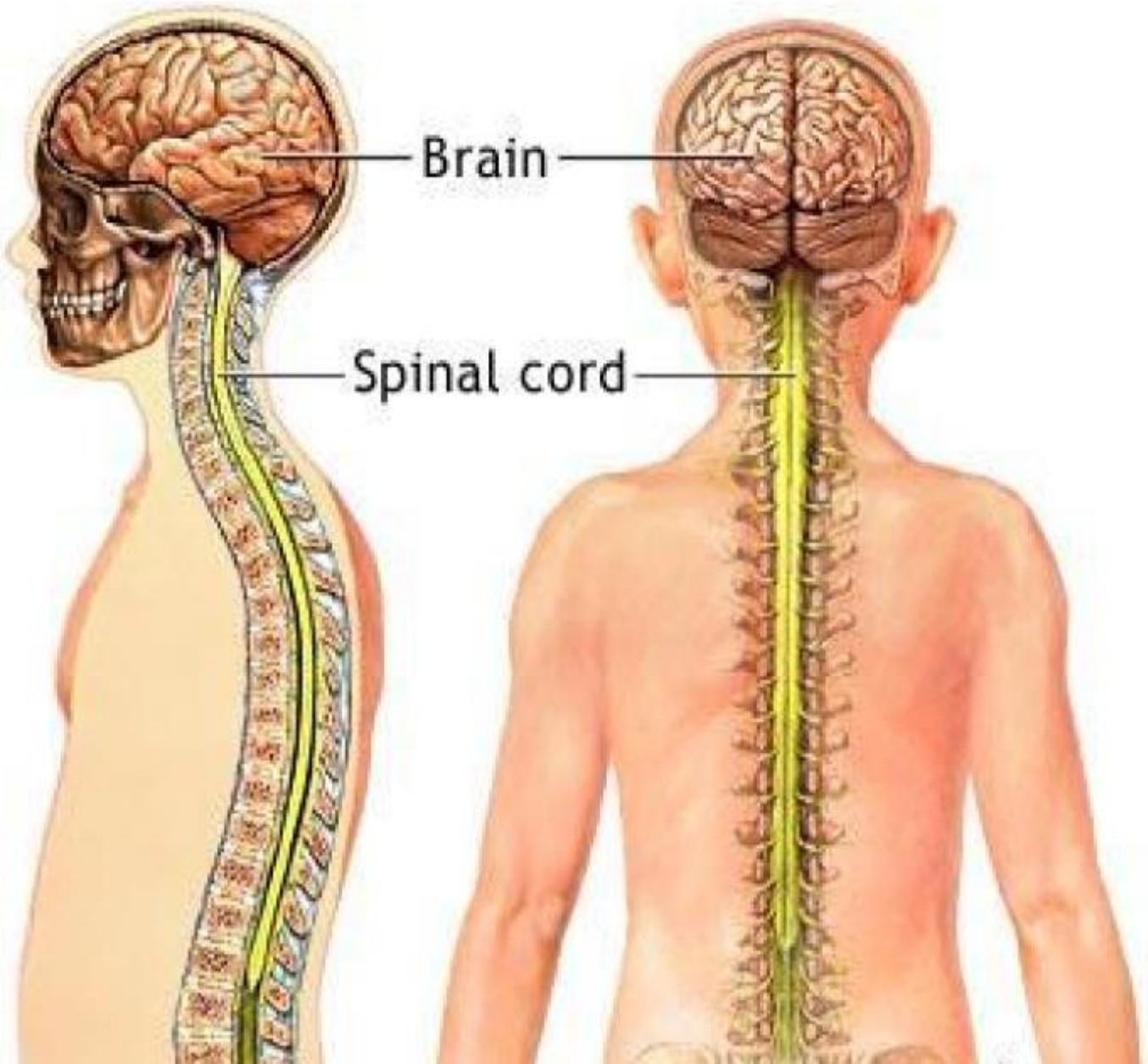
i) The central nervous system :- consists of the brain, and spinal cord.

ii) The peripheral nervous system:- consists of cranial nerves arising from the brain and spinal nerves arising from the spinal cord.



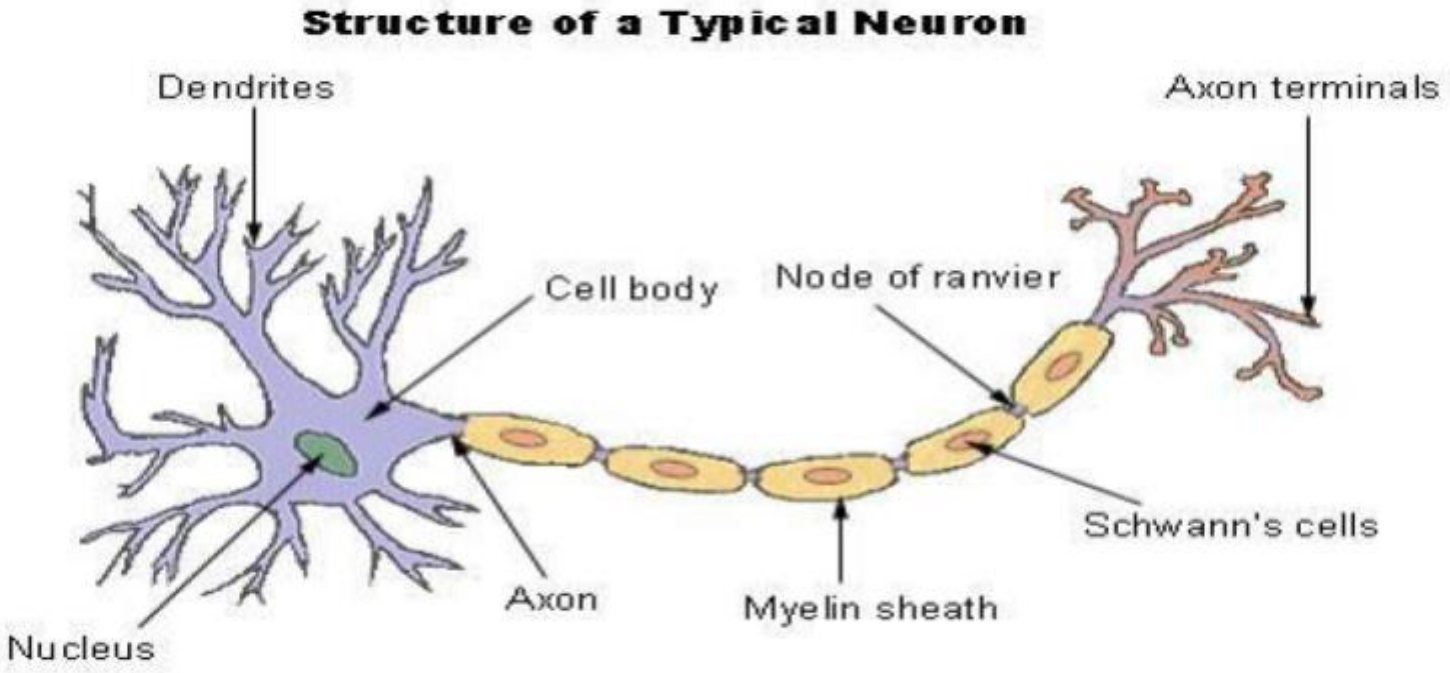


CENTRAL NERVOUS SYSTEM

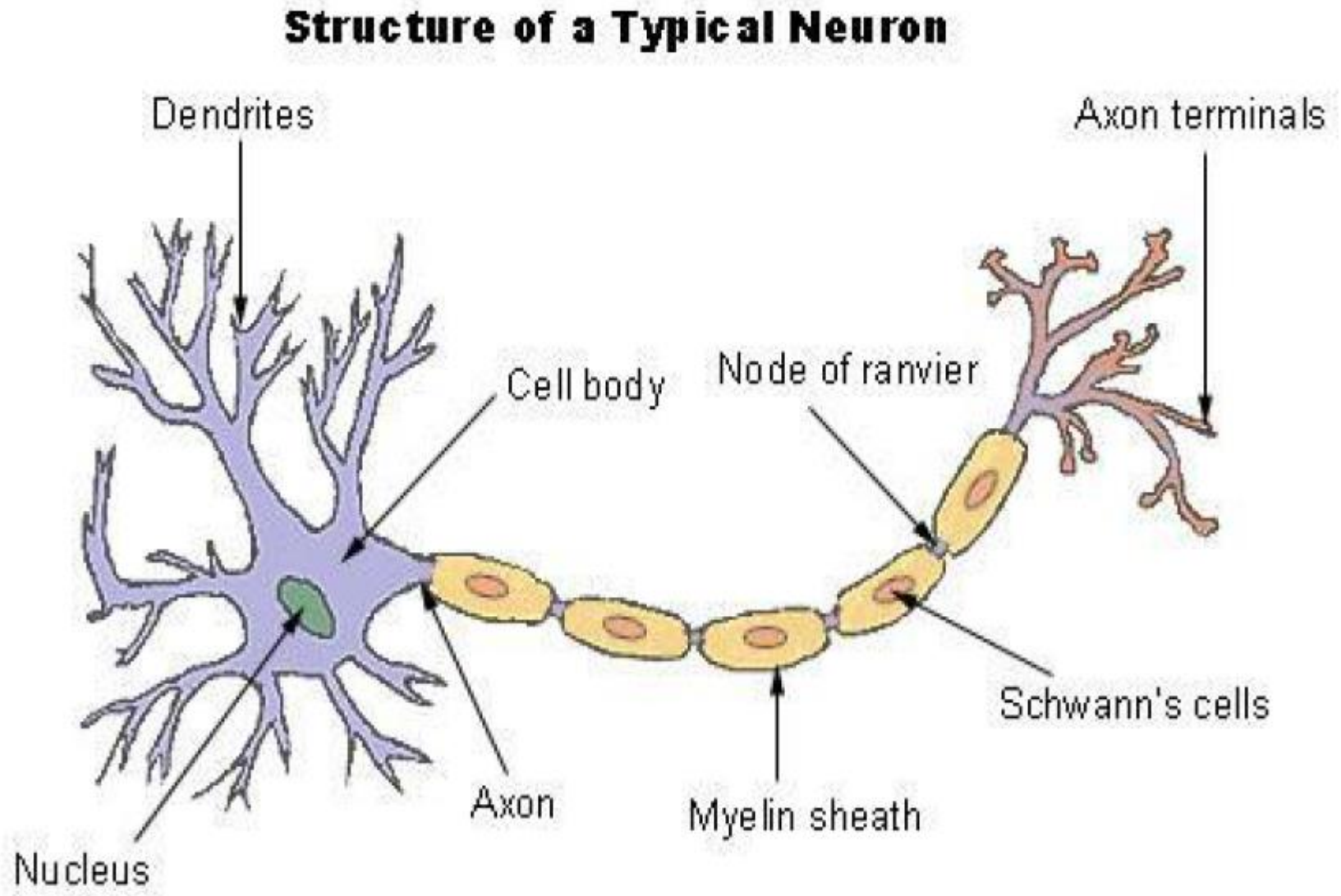


b) Nerve cell (Neuron) :-

Neuron is the structural and functional unit of the nervous system. It has a cell body called cyton containing a nucleus and cytoplasm. It has several branched structures called dendrites. It has a long nerve fibre called axon which is covered by a protective covering called Myelin sheath. The junction between two neurons is called synapse. Messages pass through the nerve cell in the form of chemical and electrical signals called nerve impulse. The dendrites receive the information and starts a chemical reaction which produce electrical impulse which passes through the axon.



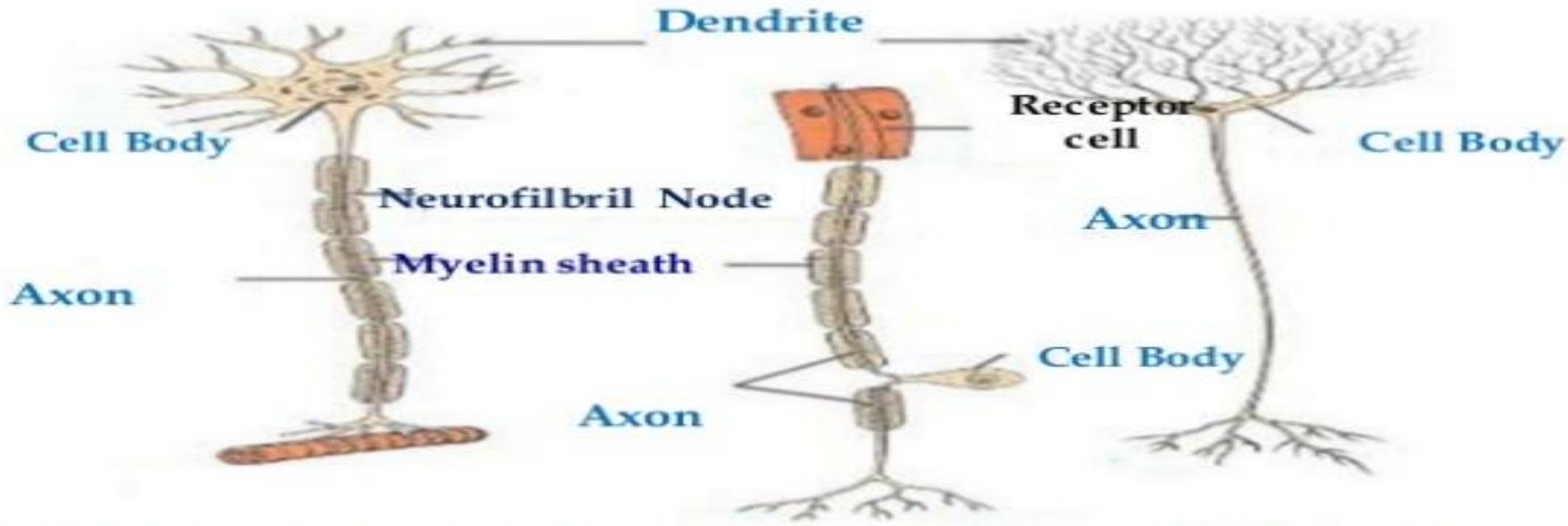
Structure of neuron (Nerve cell)



Three Types of Neurons

- Efferent (motor)
  - Conveys information from the CNS to muscles and glands.
- Afferent (sensory)
  - Carry information from sensory receptors to the CNS.
- Interneuron
  - Carry and process sensory information.

Types of Neurons



(i) Efferent (motor) neuron

(ii) Afferent (sensory) neuron

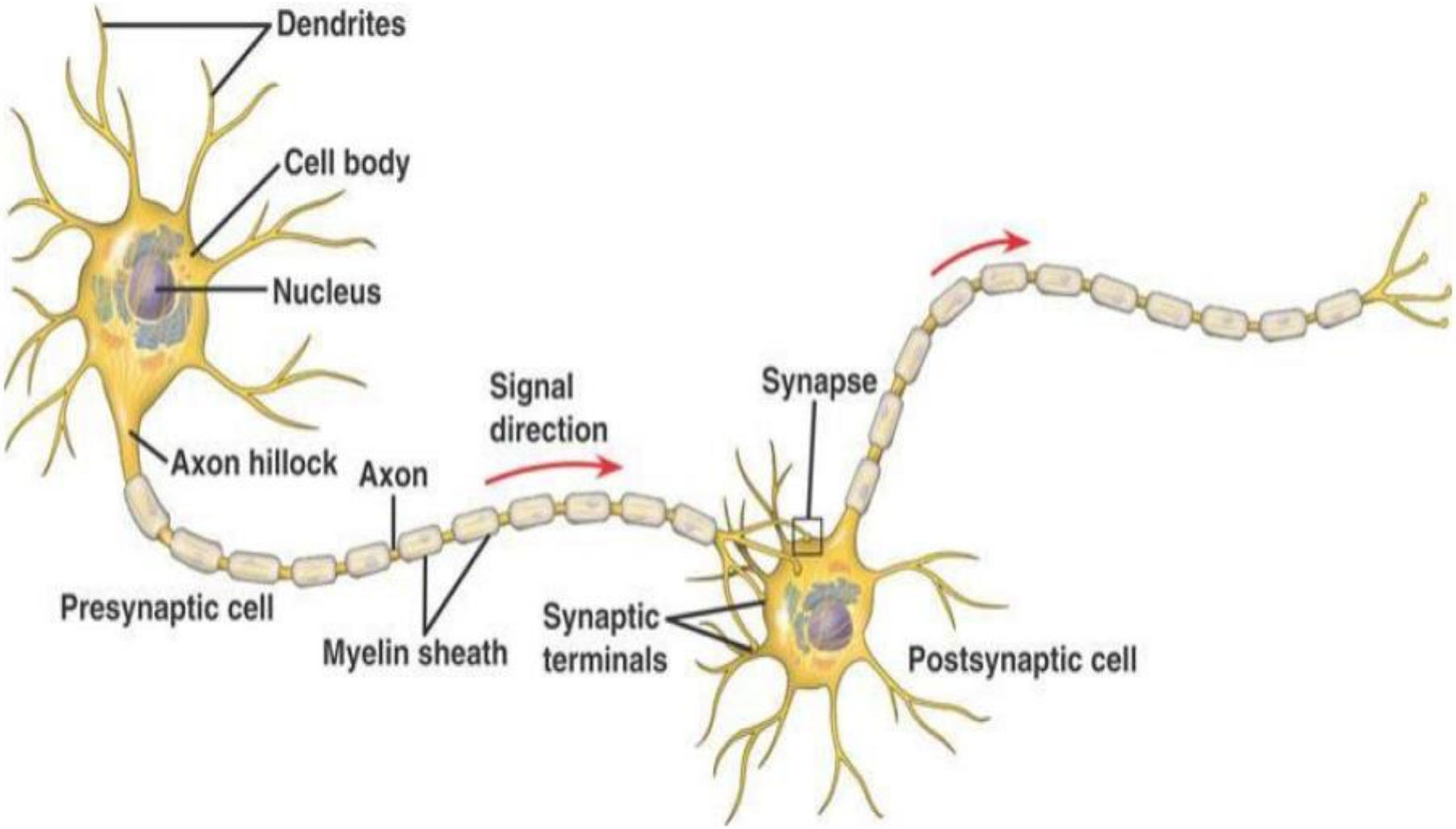
(iii) Interneuron

NERVE & ITS TYPES

- A nerve means the union of several axons. Based on the property of axons, the nerves are classified into **three** types.

1. **SENSORY NERVES**. Contain the axons of sensory neurons only.
2. **MOTOR NERVES**. Contain the axons of motor neurons only.
3. **MIXED NERVES**. Contain the axons of both i.e. sensory and motor neurons.

Transmission of messages through neurons



HUMAN BRAIN

The brain is the main coordinating centre in the human body. It is protected by the cranium. It is covered by three membranes called meninges filled with a fluid called cerebrospinal fluid which protects the brain from shocks.
The brain has three main parts. They are fore brain, mid brain and hind brain.

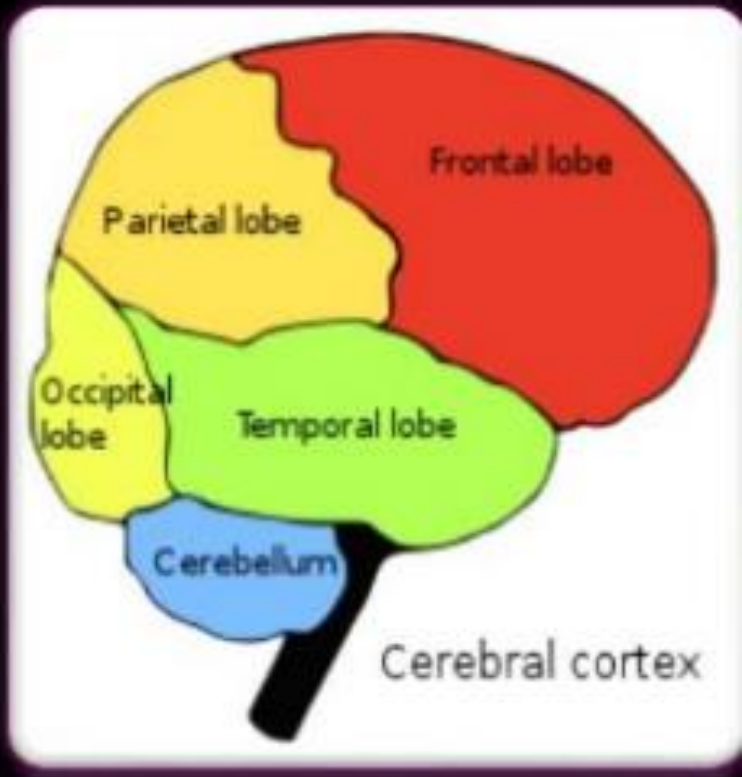
i) Fore brain :- consists of the cerebrum and olfactory lobes. It is the thinking part of the brain and controls voluntary actions. It controls touch, smell, hearing, taste, sight, mental activities like thinking, learning, memory, emotions etc.

ii) Mid brain :- controls involuntary actions and reflex movements of head, neck, eyes etc.

iii) Hind brain :- consists of cerebellum, pons and medulla.
Cerebellum :- controls body movements, balance and posture.
Pons :- controls respiration.

The Anatomy of the Brain

The brain can be divided into four sections , which are known's as lobes. The frontal lobe, pariental lobe, occipital lobe and temporal lobe have been associated with different functions ranging from reasoning to auditory perception.



The four Lobes of the Brain

•The Frontal lobe

– is located at the front of the brain and is associated with reasoning, motor skills , higher level cognition , and expressive language. At the back of the frontal lobe, near the central sulcus lies the motor cortex. This area of the brain receives information from various lobes of the brain and utilizes this information to carry out body movements.

•The Parietal lobe

– is located in the middle section of the brain and is associated with processing tactile sensory information such as pressure, touch, and pain. A portion of the brain known as the somatosensory cortex is located in the lobe and is essential to the processing of the body's sense.

Legends:

Occipital lobe
Parietal lobe
Frontal lobe
Temporal lobe

Cerebellum
Medulla

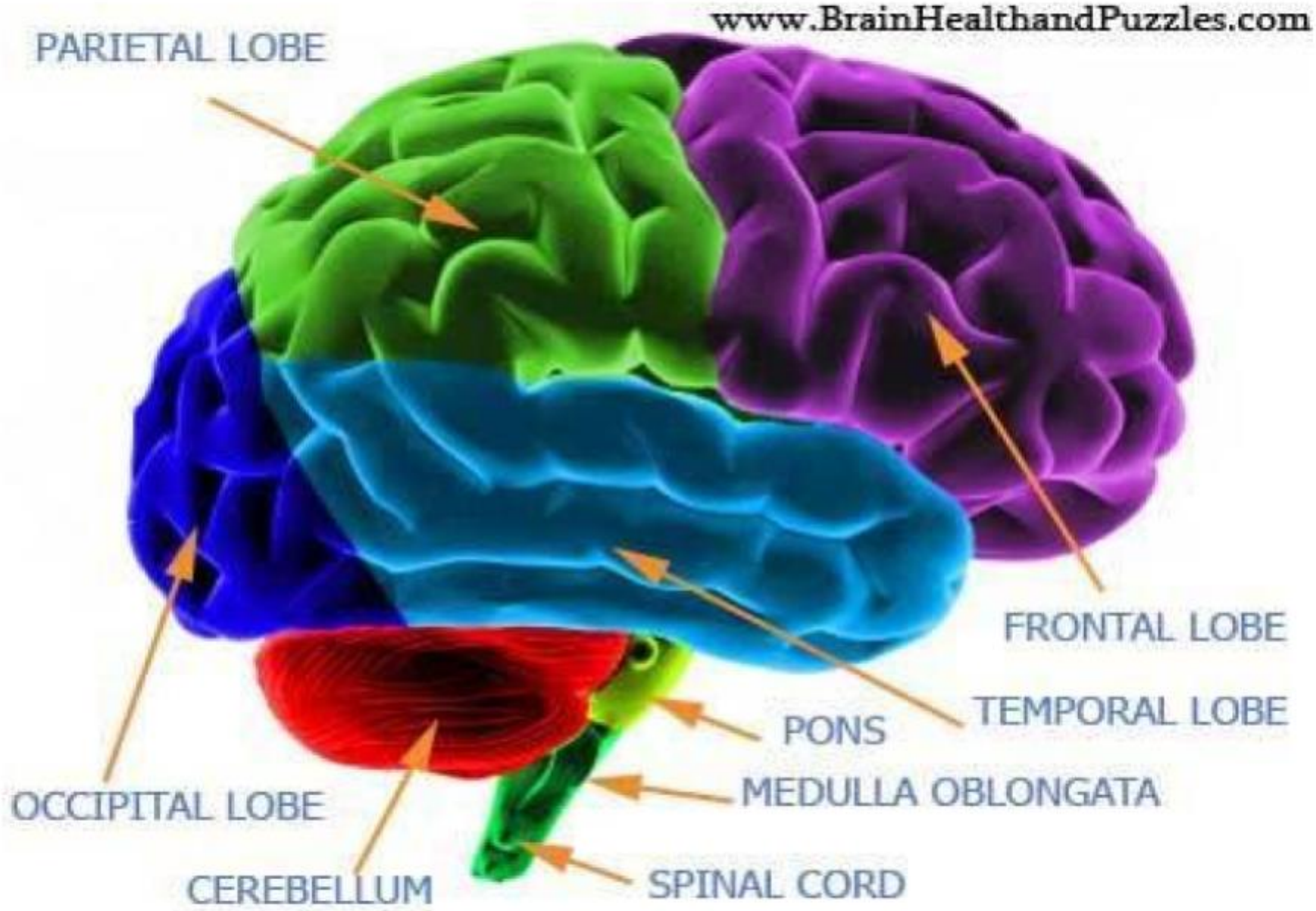
•The Temporal lobe

– is located on the bottom section of the brain. This lobe is also the location of the primary auditory cortex, which is important for interpreting sounds and the language we hear. The hippocampus is also located in the temporal lobe, which is why this portion of the brain is also heavily associated with the formation of memories.

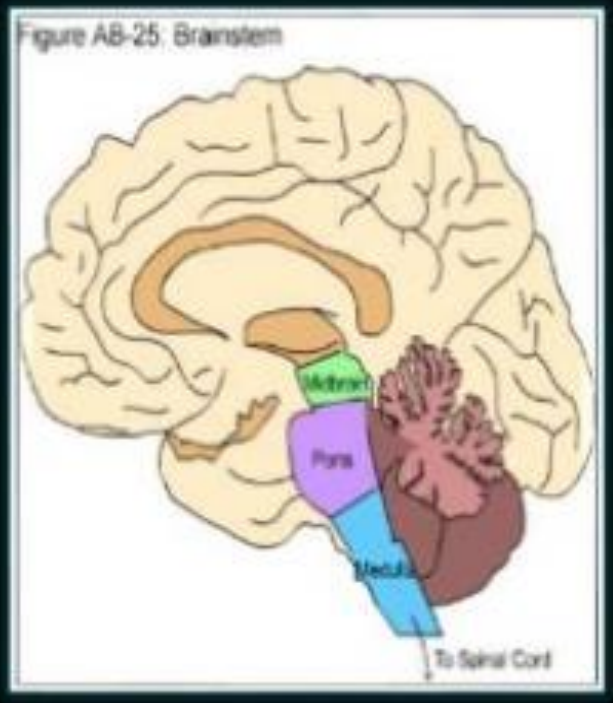
•The Occipital lobe

– is located at the back portion of the brain and is associated with interpreting visual stimuli and information. The primary visual cortex, which receives and interprets information from the retinas of the eyes, is located in the occipital lobe.

HUMAN BRAIN


www.BrainHealthandPuzzles.com
PARIETAL LOBE
FRONTAL LOBE
TEMPORAL LOBE
PONS
MEDULLA OBLONGATA
OCCIPITAL LOBE
CEREBELLUM
SPINAL CORD

PARTS OF THE BRAIN



The brain stem is comprised of the hindbrain and midbrain. The hindbrain contains structures including medulla, the pons and the reticular formation.

The Hindbrain

The hindbrain is the structure that connects the spinal cord to the brain.

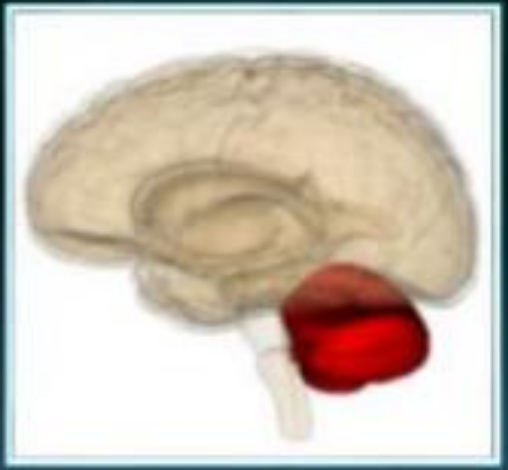
- **The medulla is located directly above the spinal cord and controls many vital autonomic functions such as heart rate, breathing and blood pressure.**
- **The pons connects the medulla to the cerebellum and helps coordinate movement on each side of the body.**
- **The reticular formation is a neural network located in the medulla that helps control functions such as sleep and attention.**

The Midbrain

controls many important functions such as the visual and auditory systems as well as eye movement. Portions of the midbrain called the **red nucleus** and the **substantia nigra** are involved in the control of body movement.

The Cerebellum

Sometimes referred to as the **"little brain,"** the cerebellum lies on top of the pons, behind the brain stem. The cerebellum is comprised of small lobes and receives information from the balance system of the inner ear, sensory nerves, and the auditory and visual systems. It is involved in the coordination of motor movements as well as basic facets of memory and learning.



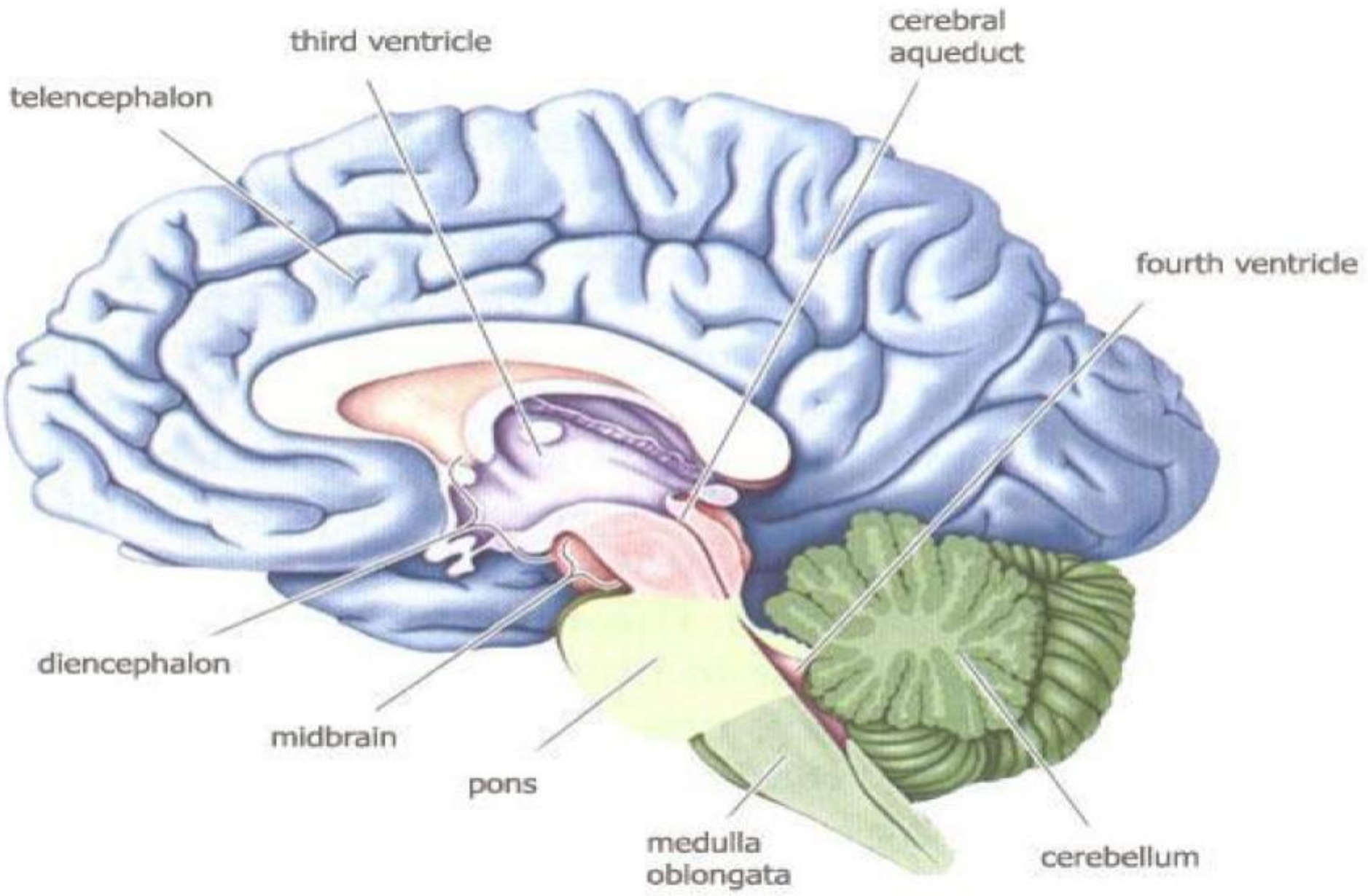
The Thalamus

Located above the brainstem, the thalamus processes and relays movement and sensory information. It is essentially a relay station, taking in sensory information and then passing it on to the cerebral cortex. The cerebral cortex also sends information to the thalamus, which then sends this information to other systems.

The Hypothalamus

The hypothalamus is a grouping of nuclei that lie along the base of the brain near the pituitary gland. The hypothalamus connects with many other regions of the brain and is responsible for controlling hunger, thirst, emotions, body temperature regulation, and circadian rhythms. The hypothalamus also controls the pituitary gland by secretinghormones, which gives the hypothalamus a great deal of control over many body functions.

HUMAN BRAIN


third ventricle
cerebral aqueduct
telencephalon
fourth ventricle
diencephalon
midbrain
pons
medulla oblongata
cerebellum

ACTIVITY.1.

- Give short answers of the following.

i. What is a neuron?
ii. Define sensory neuron.
iii. How many parts of human brain are there?
iv. What is the function of a motor neuron?
v. Explain the function of thalamus and cerebrum.

ACTIVITY.2.

- FILL IN THE BLANKS.

i. There are ----------main parts of a human brain.

ii. The hind brain consists of ---------major parts

iii. ----------lies between hind brain and forebrain.

CLOSURE

BRAIN STEM

SPINAL CORD

NERVES

Carry information from the brain to the body

Sensory Nerves

Information from the organs to the brain and spinal cord

Motor Nerves

Information from the brain and spinal cord to organs

HOME WORK

- Draw a labeled diagram of human brain and show its various parts.

- Define a neuron and state its structure and function.

THE END!!!

- Thank you for your cooperation and attention!!
- Hope you learned some new, exciting things.