

# Nervous System

## FUNCTIONS OF THE NERVOUS SYSTEM

### Sensory Input-Gathering Information

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Integration-To \_\_\_\_\_ and \_\_\_\_\_ sensory input and decide if action is needed.

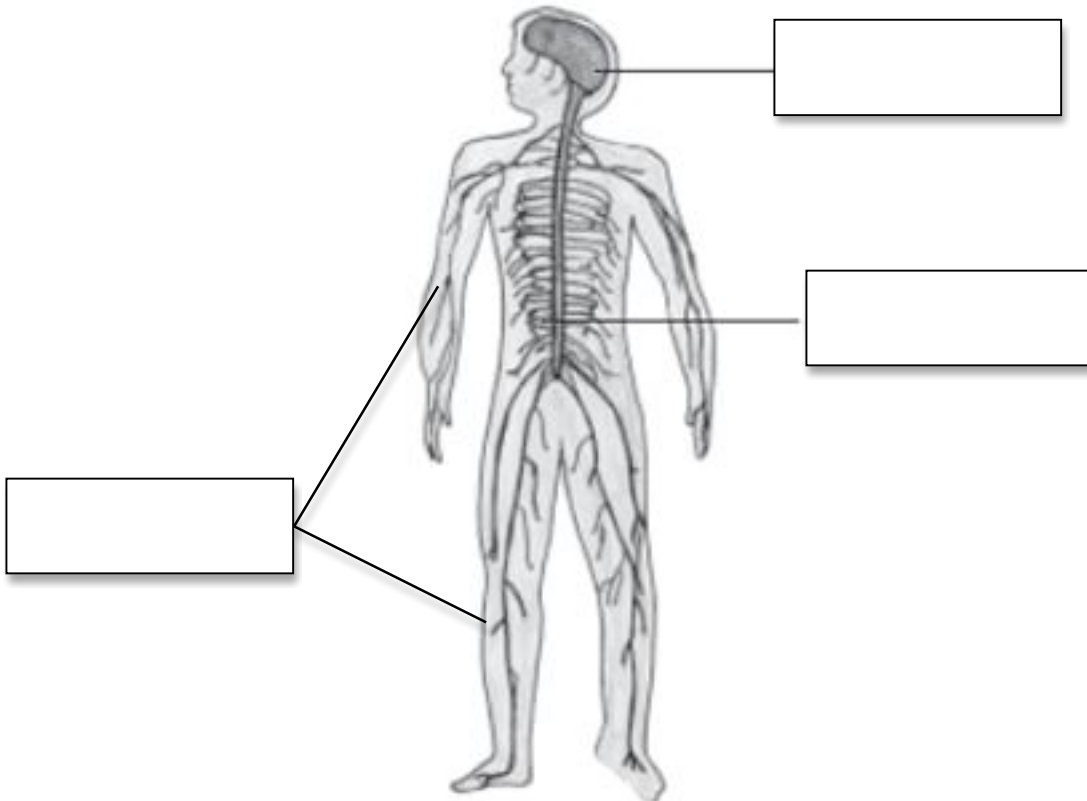
### Motor Output

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## STRUCTURE OF THE NERVOUS SYSTEM

The central nervous system (CNS) consists of the \_\_\_\_\_ and \_\_\_\_\_.

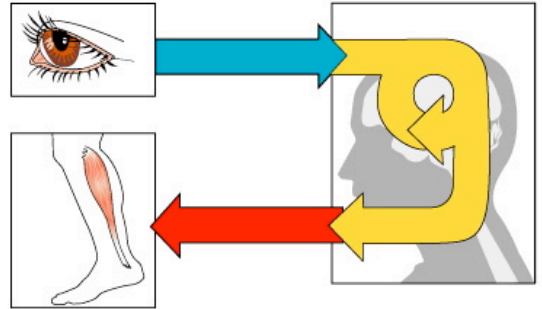
The peripheral nervous system (PNS) consists of all of the nerves outside of the \_\_\_\_\_ and \_\_\_\_\_.



## FUNCTIONS OF THE PNS

Sensory (\_\_\_\_\_)

Division- sends information to the  
CNS.



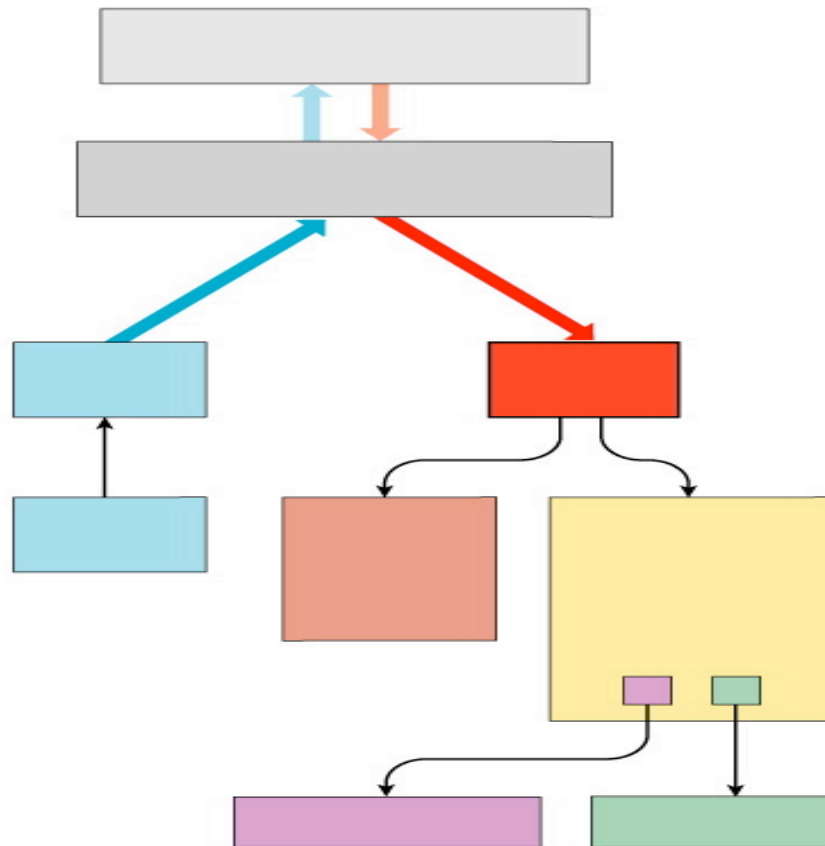
Motor (\_\_\_\_\_)

Division- \_\_\_\_\_ fibers

carry the impulse away from the CNS.

The motor division is subdivided into two sections.

- Somatic Nervous System - \_\_\_\_\_
- Autonomic Nervous System- \_\_\_\_\_



## THE NEURON (\_\_\_\_\_)

- Specialized to transmit \_\_\_\_\_
- Cell Body-
- Processes-

The cell body contains the \_\_\_\_\_  
and \_\_\_\_\_

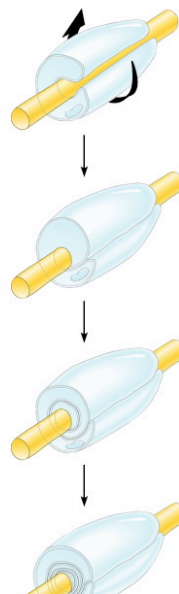
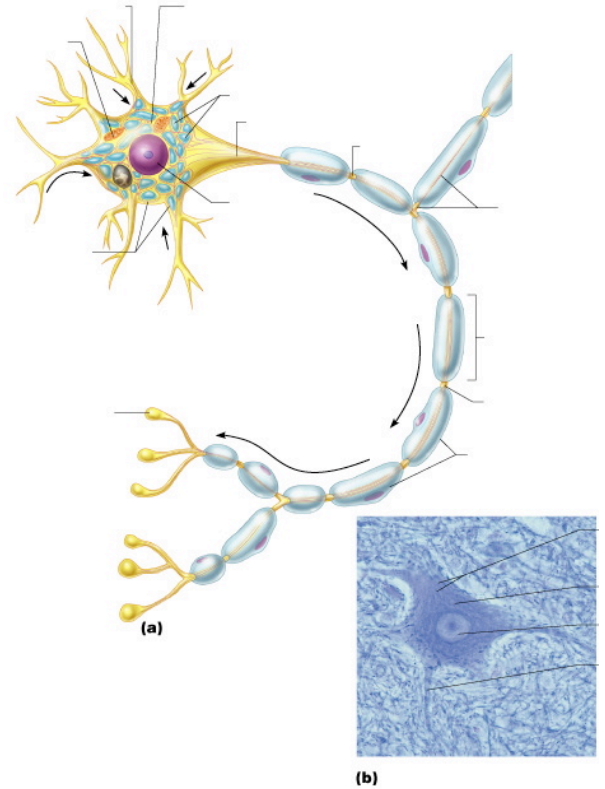
The extensions out of the cell body:

- Dendrites-
- Axon-

The axons end in \_\_\_\_\_ which  
contain vesicles with \_\_\_\_\_

They are separated from another nerve cell by  
a small space called a \_\_\_\_\_ or  
a \_\_\_\_\_.

The nerve fibers are covered with cells called \_\_\_\_\_  
which produce \_\_\_\_\_ sheaths in a jelly-roll like fashion. The gaps  
in the myelin are called the \_\_\_\_\_.



## THE CELL BODY

Most of the nerve cell bodies are found in the \_\_\_\_\_. This is called \_\_\_\_\_ because the cell bodies lack \_\_\_\_\_.

The \_\_\_\_\_ are clusters of cell bodies within the white matter of the CNS.

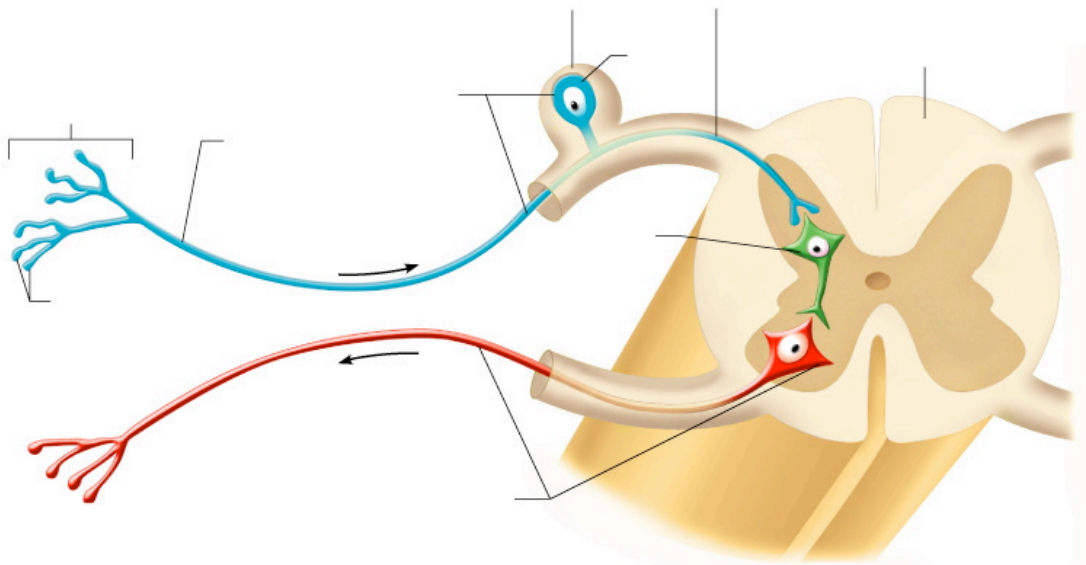
The \_\_\_\_\_ are collection of nerve cell bodies outside of the CNS.

## FUNCTIONS

The sensory (\_\_\_\_\_) neurons carry impulses from the sensory receptors to the CNS.

The motor (\_\_\_\_\_) can the impulse away from the CNS to the effector, usually a muscle.

Interneurons are found in the CNS and connect \_\_\_\_\_ to \_\_\_\_\_ neurons.



A multipolar neuron has many extension from the \_\_\_\_\_

- Irritability-Ability to respond to

\_\_\_\_\_

- Conductivity-Ability to transmit an

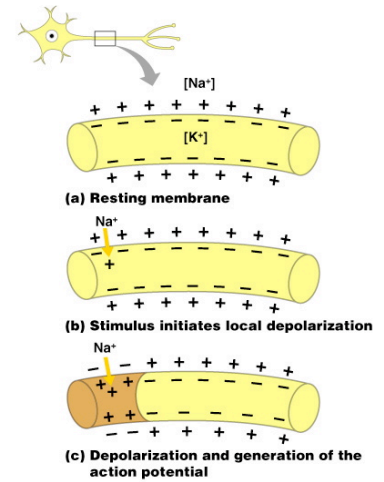
\_\_\_\_\_

- The plasma membrane at rest is

\_\_\_\_\_.

There are fewer positive ions inside than

\_\_\_\_\_.



Depolarization-A stimulus depolarizes

the membrane and allows \_\_\_\_\_

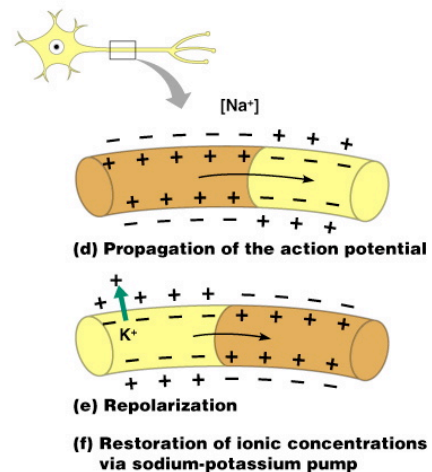
to flow in. The exchange initiates the \_\_\_\_\_.

The action potential ( \_\_\_\_\_ ) starts and propagates the entire \_\_\_\_\_.

The \_\_\_\_\_ ions rush out as the \_\_\_\_\_ rush in. This repolarizes

the membrane. The \_\_\_\_\_ pump restores the original configuration.

This action requires \_\_\_\_\_.



Impulses are able to cross over the \_\_\_\_\_ to another nerve. Neurotransmitter is

released from the nerve's \_\_\_\_\_ terminal. The dendrite of the next neuron has a

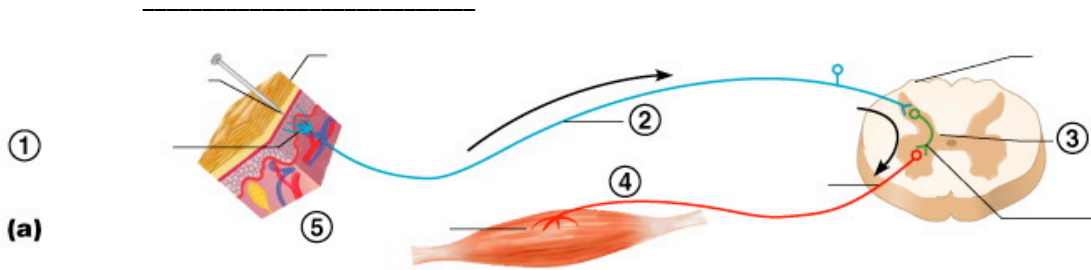
\_\_\_\_\_ that are stimulated by the \_\_\_\_\_.

An \_\_\_\_\_ is started in the \_\_\_\_\_.

## THE REFLEX ARC

Reflex- A rapid \_\_\_\_\_ and involuntary response to a \_\_\_\_\_.

A Reflex Arc-A direct route from a \_\_\_\_\_ neuron to the \_\_\_\_\_ to the



Examples-What happens when you tap your knee?

What happens when you push your finger onto something sharp or hot?

Autonomic Reflexes

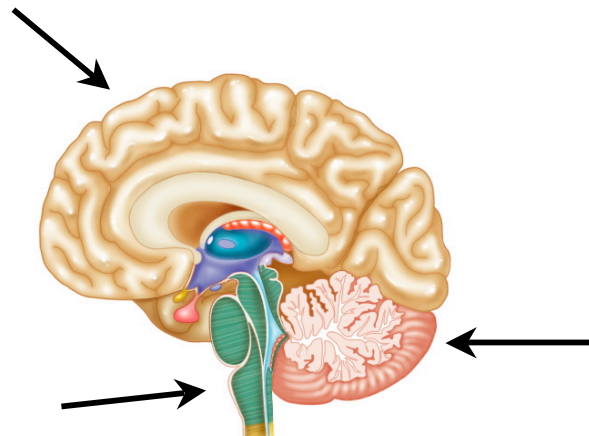
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Somatic Reflexes

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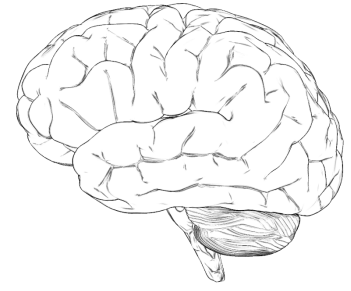
## REGIONS OF THE BRAIN

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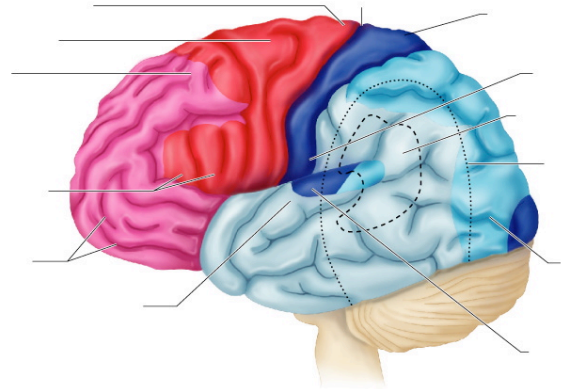


## THE CEREBRAL CORTEX

- Paired (\_\_\_\_\_ and \_\_\_\_\_)  
superior part of the brain. (top)
- Includes more than \_\_\_\_\_ of the brain's mass
- Divided into 4 lobes



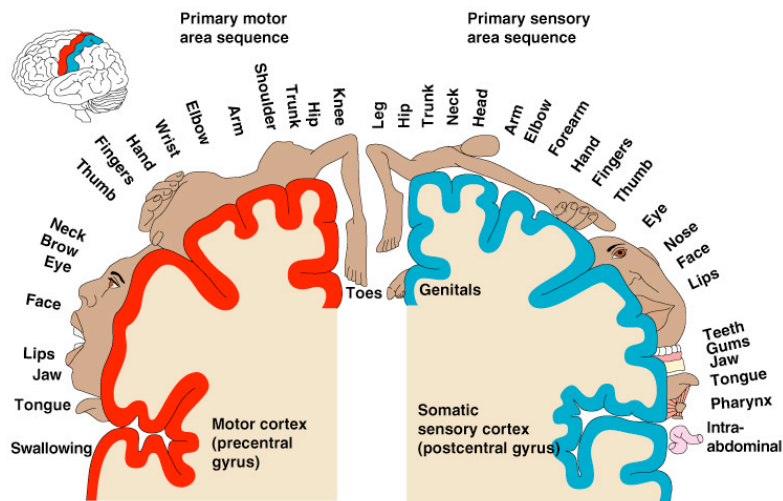
- 1.
- 2.
- 3.
- 4.



(c)

## SPECIALIZED AREAS OF THE CEREBRUM

- Somatic Sensory Area-Somatic sensory area – receives \_\_\_\_\_ from the body's sensory \_\_\_\_\_
- Primary Motor Area – sends impulses to \_\_\_\_\_ muscles
- Broca's area – involved in our ability to \_\_\_\_\_

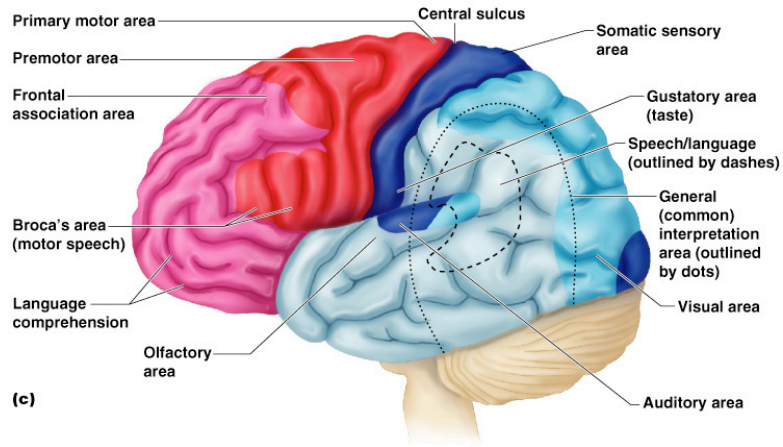


## Cerebral areas involved in special senses

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## Interpretation areas of the cerebrum

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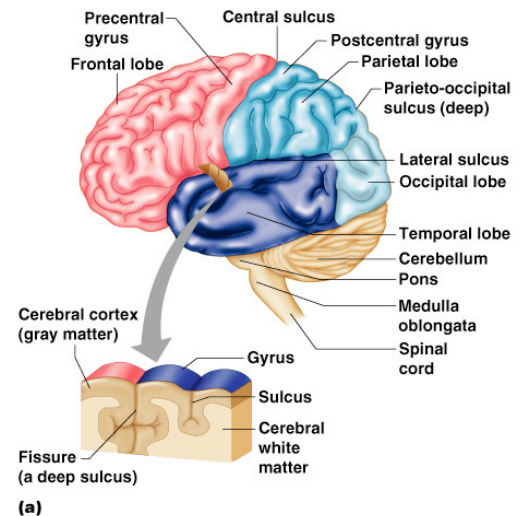
## LAYERS OF THE CEREBRUM

### Grey Matter

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### White Matter

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## DIANCEPHALON

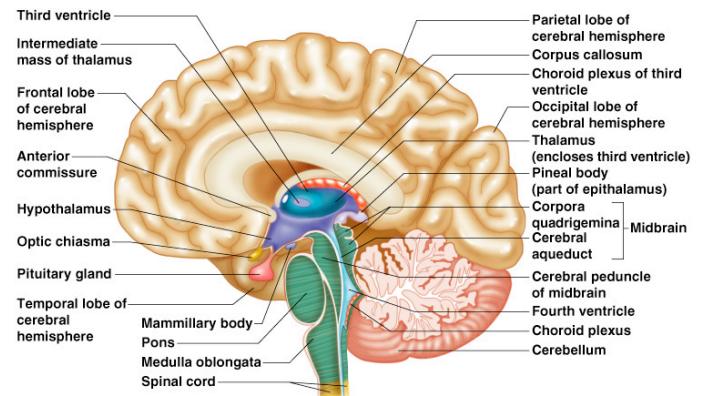
- Sits on top of the brain stem
- Enclosed by the cerebral hemispheres
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

## THALAMUS

- Surrounds the \_\_\_\_\_ ventricle
- The relay station for \_\_\_\_\_ impulses
- Transfers impulses to the correct part of the cortex for localization and interpretation

## HYPOTHALAMUS

- Under the \_\_\_\_\_
- Important autonomic nervous system center
  - Helps regulate body \_\_\_\_\_
  - Controls water \_\_\_\_\_
  - \_\_\_\_\_ metabolism



(a)

## BRAIN STEM

- Attaches to the \_\_\_\_\_
- Parts of the brain stem
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

## THE MIDBRAIN

- Mostly composed of tracts of \_\_\_\_\_ fibers
  - Reflex centers for \_\_\_\_\_ and \_\_\_\_\_

## THE PONS

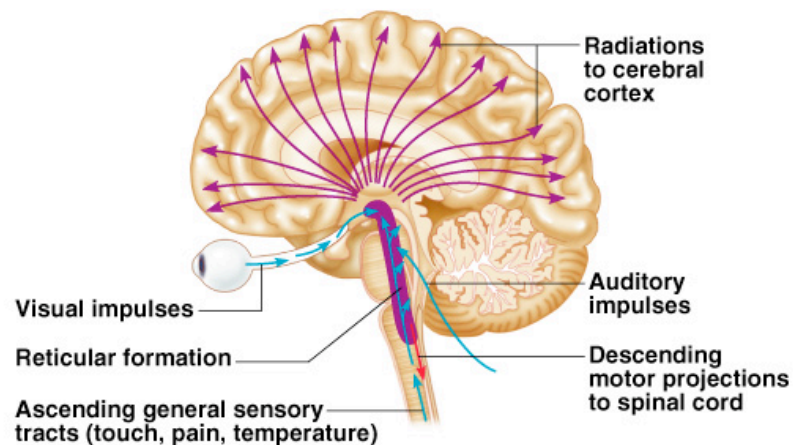
- The bulging center part of the \_\_\_\_\_
- Mostly composed of fiber tracts
- Includes nuclei involved in the control of \_\_\_\_\_

## THE MEDULA OBLONGATA

- The \_\_\_\_\_ part of the brain stem
- Merges into the \_\_\_\_\_
- Includes important fiber tracts
- Contains important control centers
  - \_\_\_\_\_ control
  - \_\_\_\_\_ regulation
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

## RETICULAR FORMATION

- Diffuse mass of gray matter along the brain stem
- Involved in motor control of \_\_\_\_\_ organs (heart, lungs, ect..)
- Reticular activating system plays a role in \_\_\_\_\_ cycles and consciousness



(b)

## CEREBELLUM

What is the cerebellum involved in?

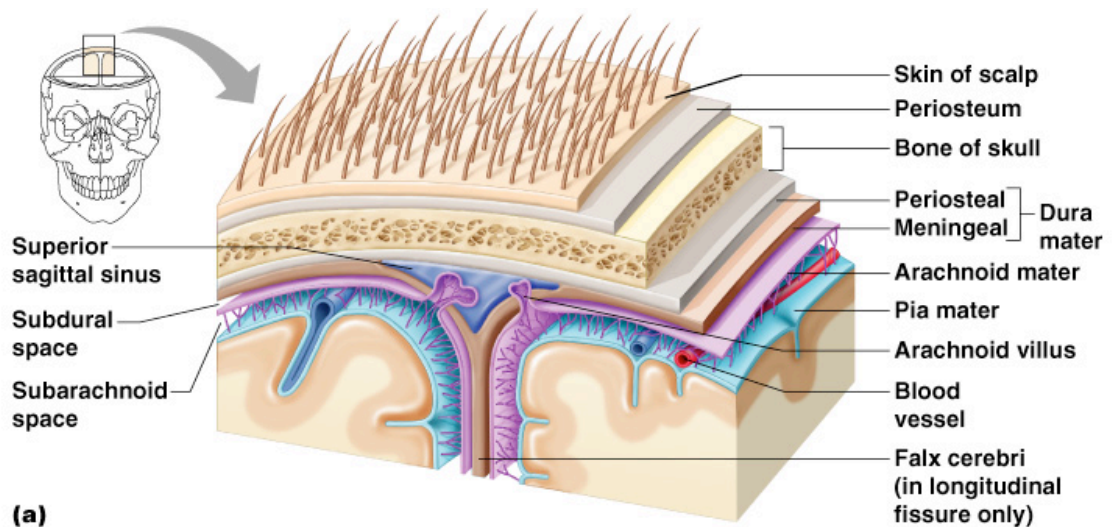
Where is it located?

List at least 4 effects on a person if the cerebellum is damaged.

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## PROTECTION OF THE CNS

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## Meninges

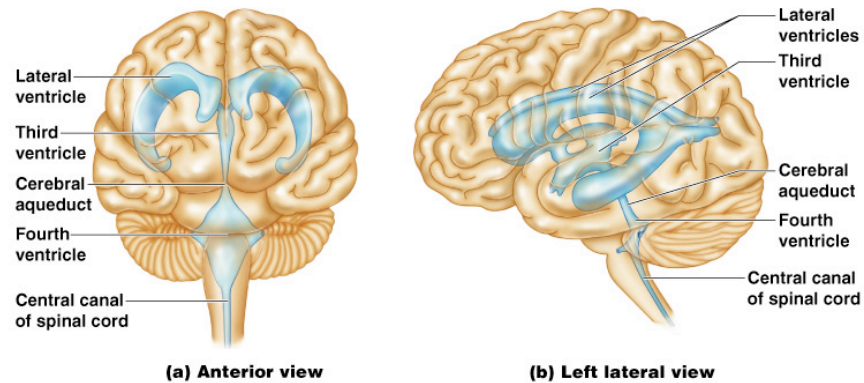
### Dura Mater

- Double-layered external covering
- Periosteum-
- Meningeal Layer-

Folds inward in several areas

## Cerebrospinal Fluid

Similar composition to blood \_\_\_\_\_. Formed by the \_\_\_\_\_ and is a watery cushion to protect the \_\_\_\_\_. Circulates in the \_\_\_\_\_ and the canal of the spinal cord.



## Blood-Brain Barrier

Includes the \_\_\_\_\_ permeable capillaries of the body. These can help exclude many \_\_\_\_\_ substances. It is useless against the following:

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## Traumatic Brain Injury

Concussion-

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Contusion-

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Cerebral edema-

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## Cerebrovascular Accident

Commonly called a \_\_\_\_\_. The result is a \_\_\_\_\_ blood vessel supplying a region of the \_\_\_\_\_.

What happens if the brain is not supplied with oxygen?

What else could happen?

## Alzheimer's Disease

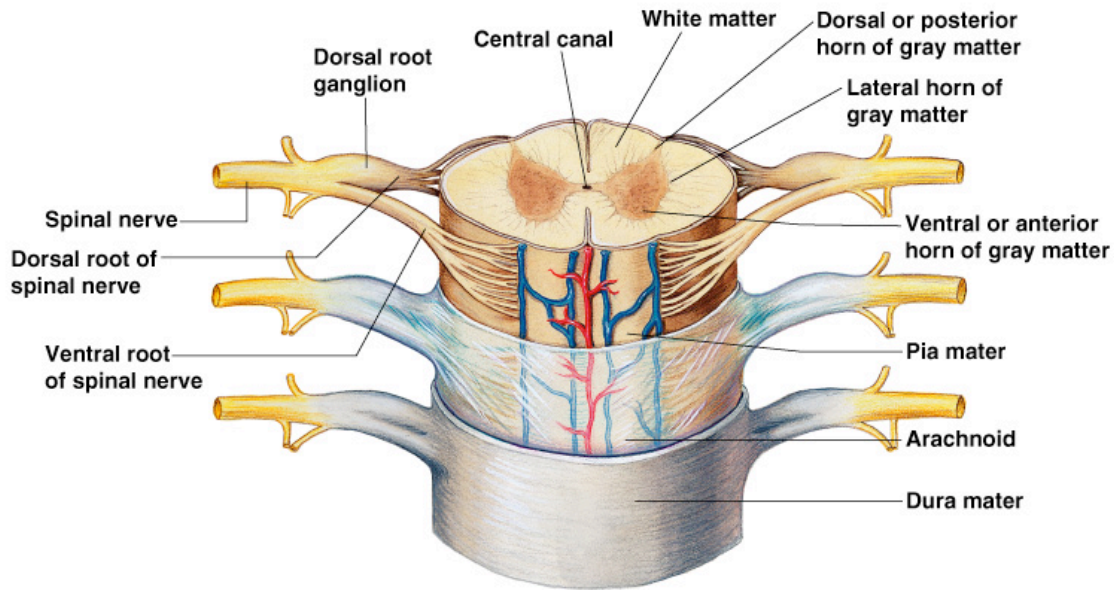
Progressive \_\_\_\_\_ brain disease that is seen mostly in the \_\_\_\_\_ but can be seen in \_\_\_\_\_ age people.

What are some structural changes in the brain?

What do victims experience?

## Spinal Cord

Extends from the \_\_\_\_\_ to the region of \_\_\_\_\_. Enlargements occur in the \_\_\_\_\_ and \_\_\_\_\_ regions. The exterior matter is \_\_\_\_\_ and contains conductive tracts.

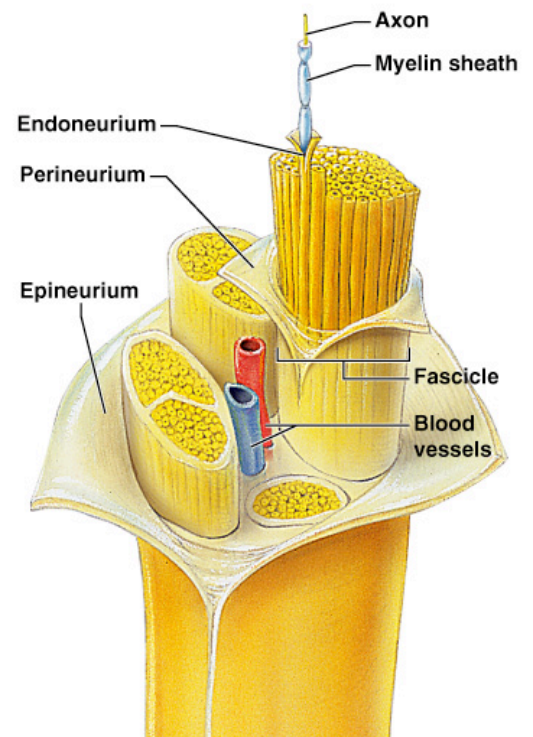


The internal grey matter is mostly \_\_\_\_\_.

The \_\_\_\_\_ cover the spinal cord. The nerves leave at the level of each vertebrae.

## Structure of a Nerve

The \_\_\_\_\_ surrounds each fiber. Groups of fibers are bound into fascicles by \_\_\_\_\_. The fascicles are bound together by \_\_\_\_\_.



Afferent ( \_\_\_\_\_ ) Nerves-Carry impulses \_\_\_\_\_ the CNS

Efferent ( \_\_\_\_\_ ) Nerve-Carry impulses \_\_\_\_\_ from the CNS

Mixed nerves are both \_\_\_\_\_ and \_\_\_\_\_ found in the head.

### Cranial Nerves

\_\_\_\_\_ pairs of nerves that mostly serve the \_\_\_\_\_ and \_\_\_\_\_.

They are in number ordered from \_\_\_\_\_ to \_\_\_\_\_. Most are mixed but \_\_\_\_\_ are sensory only.

I – Olfactory Nerve- Sense of \_\_\_\_\_

II – Optic Nerve-Sense of \_\_\_\_\_

III – Oculomotor Nerve- Motor fibers to \_\_\_\_\_ muscles.

IV – Trochlear – Motor fibers to the eyes.

V – Trigeminal Nerve-Sensory for the \_\_\_\_\_ and motor fibers for \_\_\_\_\_.

VI – Abducens Nerve- Motor fibers to the eye.

VII – Facial Nerve- Sensory for \_\_\_\_\_, and motor fibers for the \_\_\_\_\_

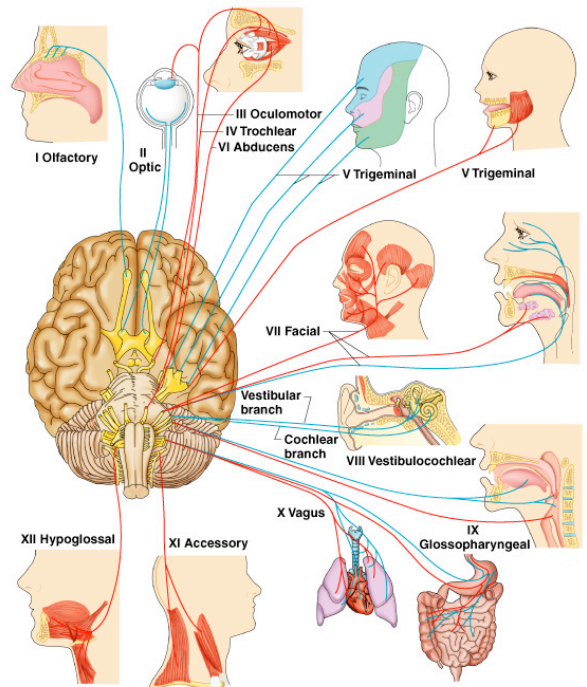
VIII – Vestibulocochlear Nerve- Sensory for \_\_\_\_\_ and \_\_\_\_\_.

IX – Glossopharyngeal Nerve- Sensory for \_\_\_\_\_ and motor fibers to the \_\_\_\_\_

X – Vagus Nerve- Sensory and motor fibers for the \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_

XI – Accessory Nerve- Motor fibers to the \_\_\_\_\_ and \_\_\_\_\_

XII – Hypoglossal Nerve- Motor fibers to the \_\_\_\_\_.



## DEVELOPMENTAL ASPECTS

- The nervous system is formed in the first \_\_\_\_\_ of embryonic development.
- Any maternal \_\_\_\_\_ can have extremely \_\_\_\_\_ effects on the fetus.
- The \_\_\_\_\_ is one of the last areas of the brain to develop.
- After birth \_\_\_\_\_ more neurons are formed. Growth and maturation will continue for \_\_\_\_\_ years.
- The brain reaches its maximum weight as a \_\_\_\_\_.