SUBJECT: The nervous system

final EXAMS

It's divided into 2 major divisions:

1. Central nervous system CNS

found within the bones and consist of:

* the Brain: within the skull
* the spinal cord: within the vertebral canal

2. peripheral nervous system PNS

Consist of:

[a] Autonomic nervous system ANS

Supplies involuntary structures, e.g: Cardiac muscle and Smooth muscles

which is divided into:

* Sympathetic nervous system
* Parasympathetic nervous system

[b] Somatic nerves SNS

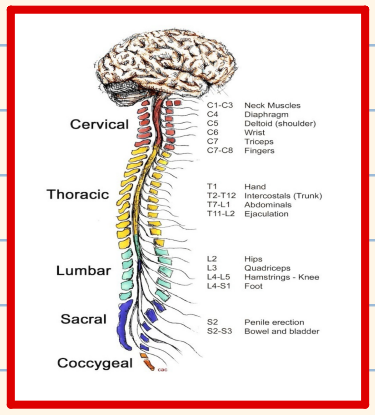
Supplies voluntary structures Body Wall and Limbs

* Cranial nerves (12 pairs) → Connected to the Brain
* Spinal nerves (31 pairs) → Connected to the Spinal Cord

The central nervous system

Consist of:

* the Brain: Within the skull
* the Spinal Cord: Within the vertebral canal

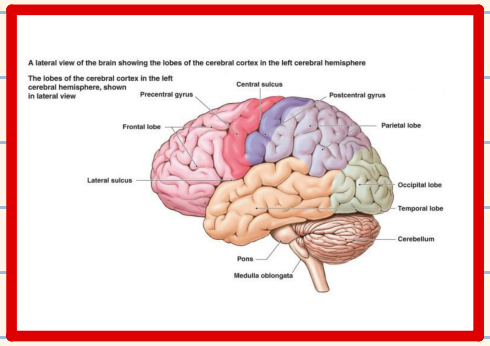


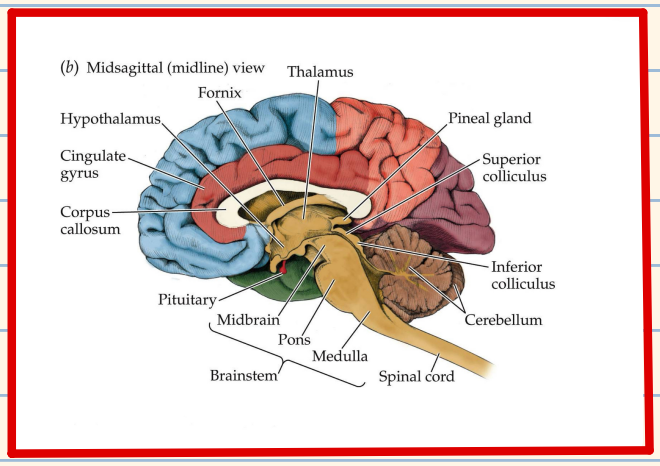
SUBJECT: DATE:

The Brain

It consist of:

1. Cerebrum
   - two cerebral hemispheres separated from each other by median fissures
   - Diencephalon
2. Brain stem
   - midbrain
   - Pons
   - medulla
3. Cerebellum

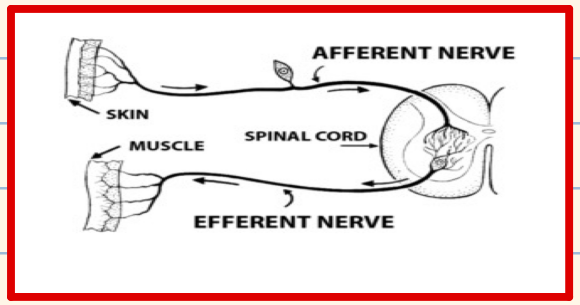




Functional Classification of neurons:

1. **Afferent (Sensory) neurons**

Convey information from tissues and organs into the Central (CNS) nervous system



2. **Efferent (motor) neurons**

transmit signals from the CNS to the effector organs (muscles & glands)

SUBJECT: Cranial Nerves DATE:

Third Letter:

A: Afferent : Sensory fibers

E: Efferent : motor fibers to skeletal and Smooth muscle ;

also secretmotor fibers to glands

Afferent nerves Arrive at the Brain

Efferent nerves Exit from the Brain

Cranial nerve fibers

- Afferent Sensory
  - Somatic
    - Special SSA — Vision / hearing equilibrium
    - General GSA — Cutaneous Sensation (pain, temperature, etc)
  - Visceral
    - GVA general — Visceral information such as digestion of organs & viscera
    - Special SVA — Smell / Taste
- Efferent motor
  - Somatic
    - SSE Special — X
    - general GSE — motor to skeletal muscles
  - Visceral
    - GVE general — autonomic fibers to smooth muscles, cardiac muscles & glands
    - Special SVE — to skeletal muscles derived from brachial arches

SUBJECT: DATE:

12 Cranial nerves:

Out Of Our Troubled Times Arose Fear Very Great Violence And Hatred

Olfactory sensory
Optic sensory
Oculomoter motor
Trochlear motor
Trigeminal Both
Abducens motor
Facial Both
Vestibulocochlear sensory
Glossopharyngeal Both
Vagus Both
Accessory motor
Hypoglossal motor

Some Say Money Matters,
But My Brother Says Big
Brains Matter More

Olfactory Smell
Optic Vision
Oculomoter movement of the eye
Trochlear movement of the eye
Trigeminal divided into:
- V1: Opthalamic
- V2: Maxillary
- V3: Mandibular

Sensory to face / motor to muscles of mastication

Abducens movement of the eye
Facial motor to muscle of the face / Lacrimation
Vestibulocochlear (Auditory)
Hearing & sensation of position & movement of Head
Glossopharyngeal sensory to tonsil, palate, pharynx
taste sensation of past 1/3 of tongue
Vagus sensory / motor to larynx visceral sensation to heart, lungs, stomach, small & large intestines till right 2/3 of transverse colon
Accessory motor to sternomastoid / trapezius
Hypoglossal motor to muscles / tongue

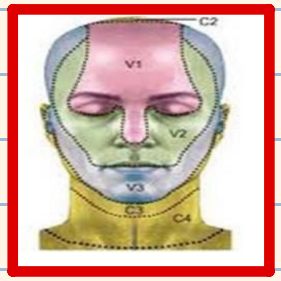
SUBJECT: DATE:

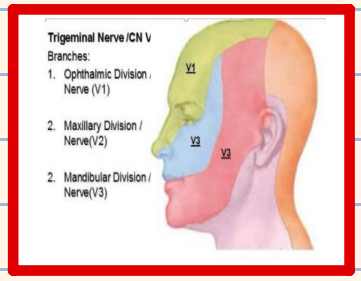
Sensory : Trigeminal , divided into :

V1 : opthalamic

V2 : maxillary

V3 : mandibular





Orgin of the Cranial nerve		Attachement to the brain
Cerebrum	Olfactory, Optic	cerebrum → 1, 2
midbrain	Oculomoter, Trochlear	midbrain → 3, 4
Pons	Trigeminal, Abducens, Facial, Vestibulocochlear	Pons → 5 – 8
medulla	Glossopharyngeal, Vagus, Accessory, Hypoglossal	medulla → 9 – 12

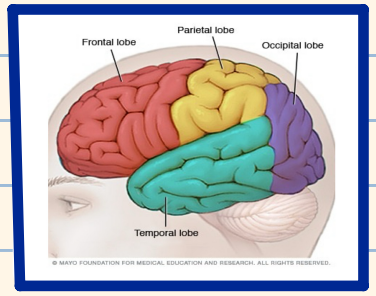
SUBJECT: The cerebral hemispheres DATE:

Is divided into 4 lobes by:

- the Central Sulcus
- Lateral Fissures

Each hemispheres is divided into 4 lobes:

- Frontal lobe
- Temperal lobe
- Occipital lobe
- Parietal lobe



Frontal lobe

Contains motor area which controls muscles of the opposite half of the body

Temperal lobe

contains hearing Center

Occipital lobe

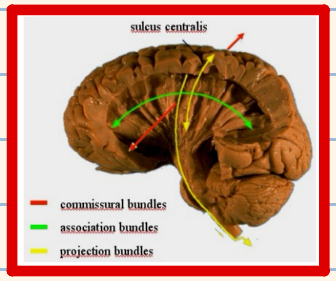
Contains center of vision

Parietal lobe

contains the sensory area for the opposite half of the body

SUBJECT: DATE:

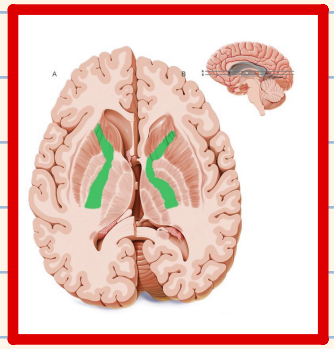
The main functional areas of the different lobes of the brain:



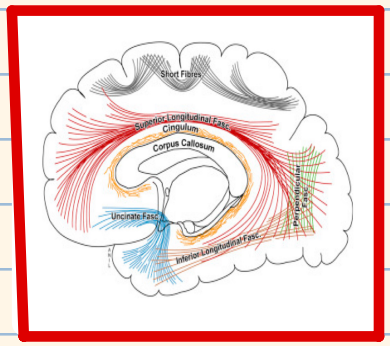
The white matter of the brain Consist of:

1. Association Fibers: connect different areas in the same hemispheres
2. Commissural Fibers: connect similar areas in the 2 hemispheres as corpus callosum
3. Projection Fibers: Fibers from and to the cerebral cortex as internal capsule

Corpus Callosum



Internal Capsule

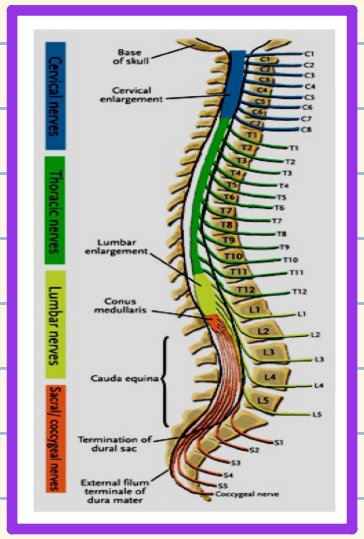


Association Fibers

SUBJECT: Spinal Cord DATE:

* **Gross Features**:

- It's Cylindrical in shape, about 45 cm in length
- It begins at the upper border of atlas vertebra "C1"
- It ends at the intervertebral disc between the 1st & 2nd Lumbar Vertebrae
- It's lower end is conical in shape & is known as "Conus Medullaris"



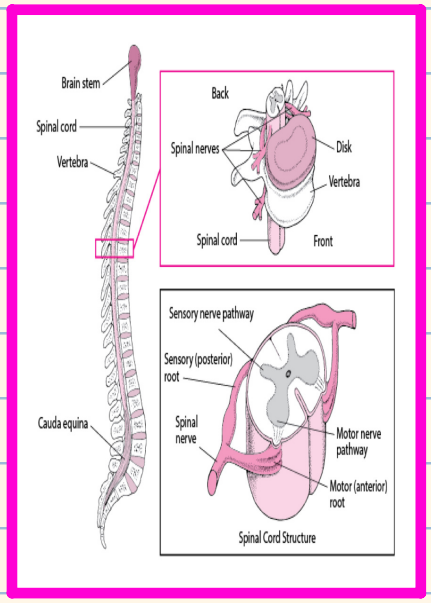
- It organized into 31 spinal segments
  - Cervical 8
  - Thoracic 12
  - Lumbar 5
  - Sacral 5
  - Coccygeal 1

Each segment gives 2 spinal nerves, that leave through Intervertebral foramen of the same level of its spinal segment.

The roots of Lumbosacral nerves gathered inferiorly as group of fibers called **Cauda equina** (horse tail)

The spinal cord has 2 enlargements:

- Cervical C5 – T1
- Lumbar L1 – S3

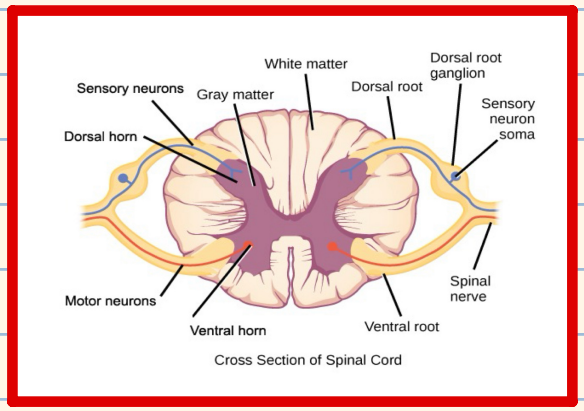


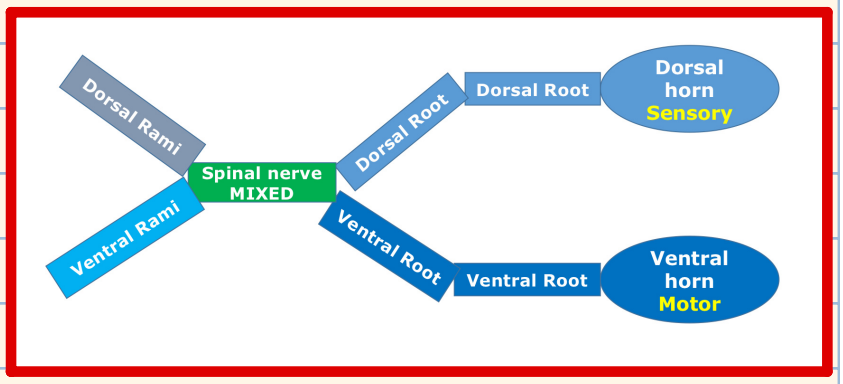
SUBJECT: Internal structures of the spinal cord: DATE:

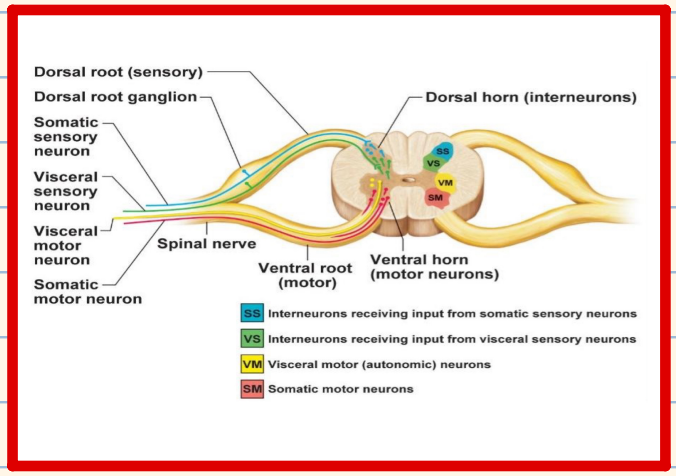
- **Central Canal** : Contains CSF
- **Grey matter** is H-shape & it has:
  - 2 ventral horns contain motor nuclei
  - 2 dorsal horns contain sensory nuclei
  - 2 lateral horns from T1-L2 that contain sympathetic nuclei
- **White matter**

Surrounds the grey matter & is formed of ascending and descending tracts

It's divided into 3 funiculi ; anterior (ventral)
& posterior (dorsal)



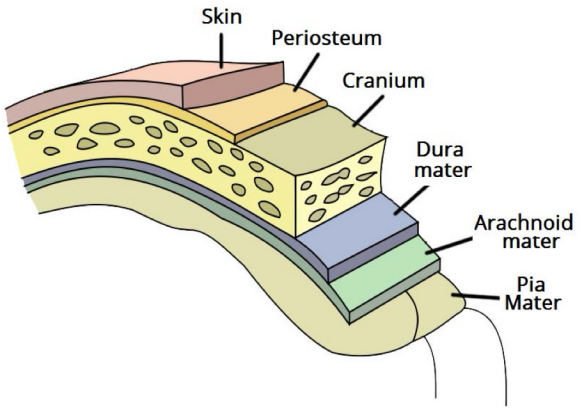


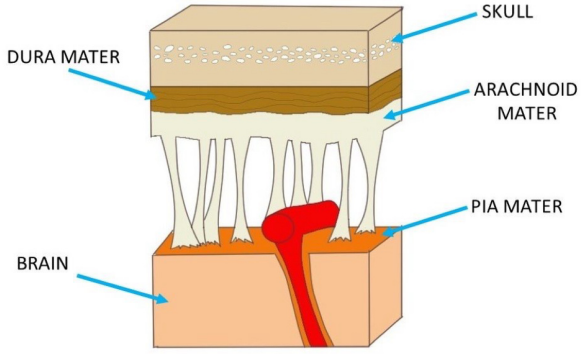


SUBJECT: The menings DATE:

The brain is covered with 3 layers (meninges)

- Dura → Outer Layer → Dense layer of fibrous tissue
- Arachnoid → Middle Layer → Delicate CT membrane
- Pia → Inner Layer → Transparent fibrous membrane that stick on the spinal cord.



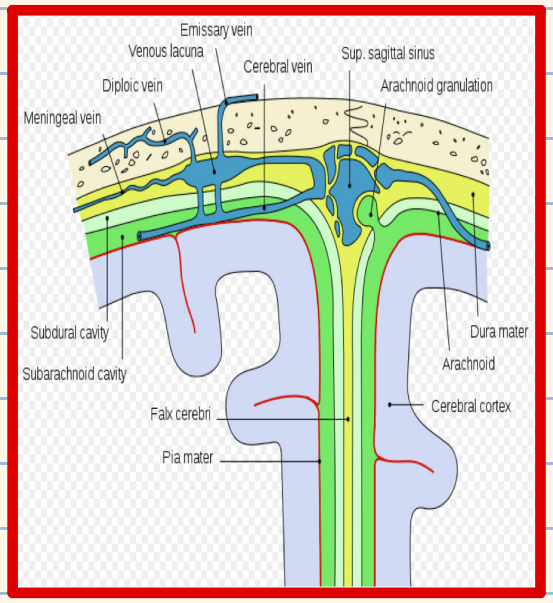


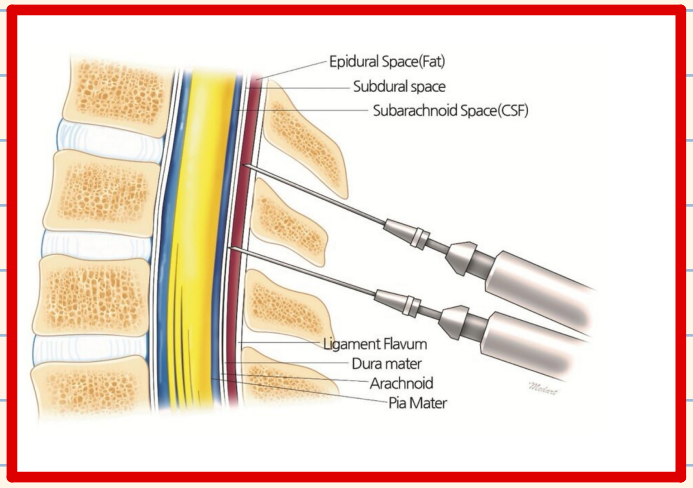
SUBJECT: meningeal spaces DATE:

located between the 3 meninges and the vertebral canal

Include 3 spaces:

- Extradural space
  - filled with fat, connective tissue & blood vessels
- Subdural space
  - contains serous fluid
- Subarachnoid space
  - a wide space that contains cerebrospinal fluid "CSF"





The cerebrospinal fluid "CSF"

It's the fluid filling the ventricles and central canals of the CNS

Production of CSF: It's secreted by the choroid plexuses

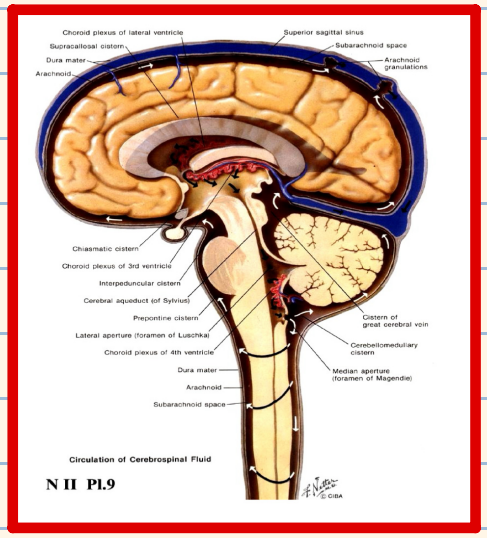
Circulation of CSF: It circulates in the ventricles & central canals of the CNS

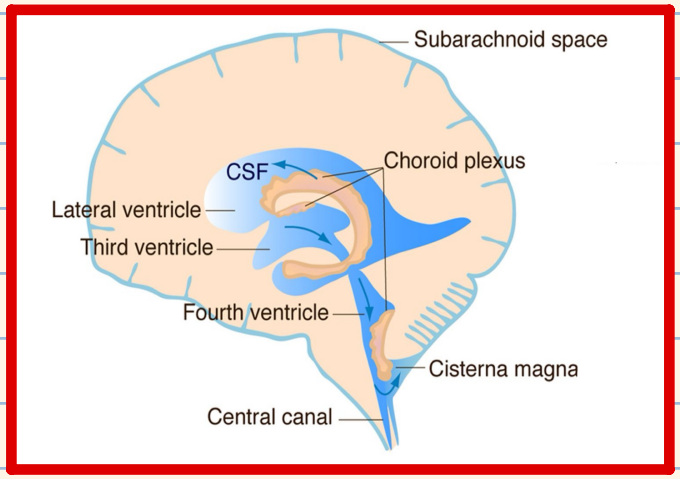
Absorption of CSF: It's absorbed by arachnoid villi & granulations to be excreted into the dural venous sinuses

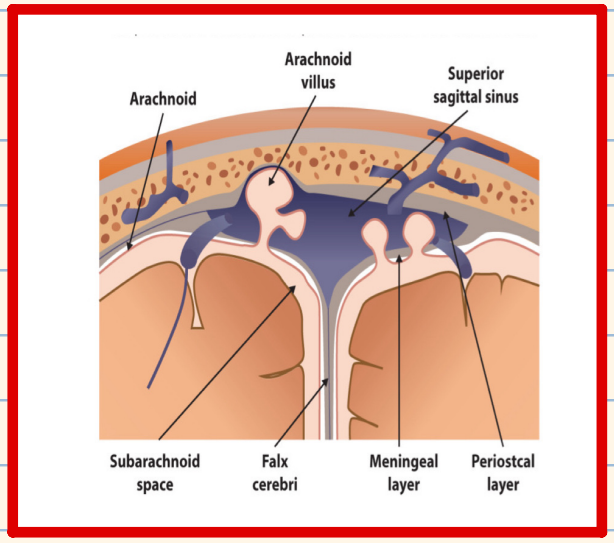
Function: It forms a water cushion to protect the brain & spinal cord.

SUBJECT:

DATE:







DONE!