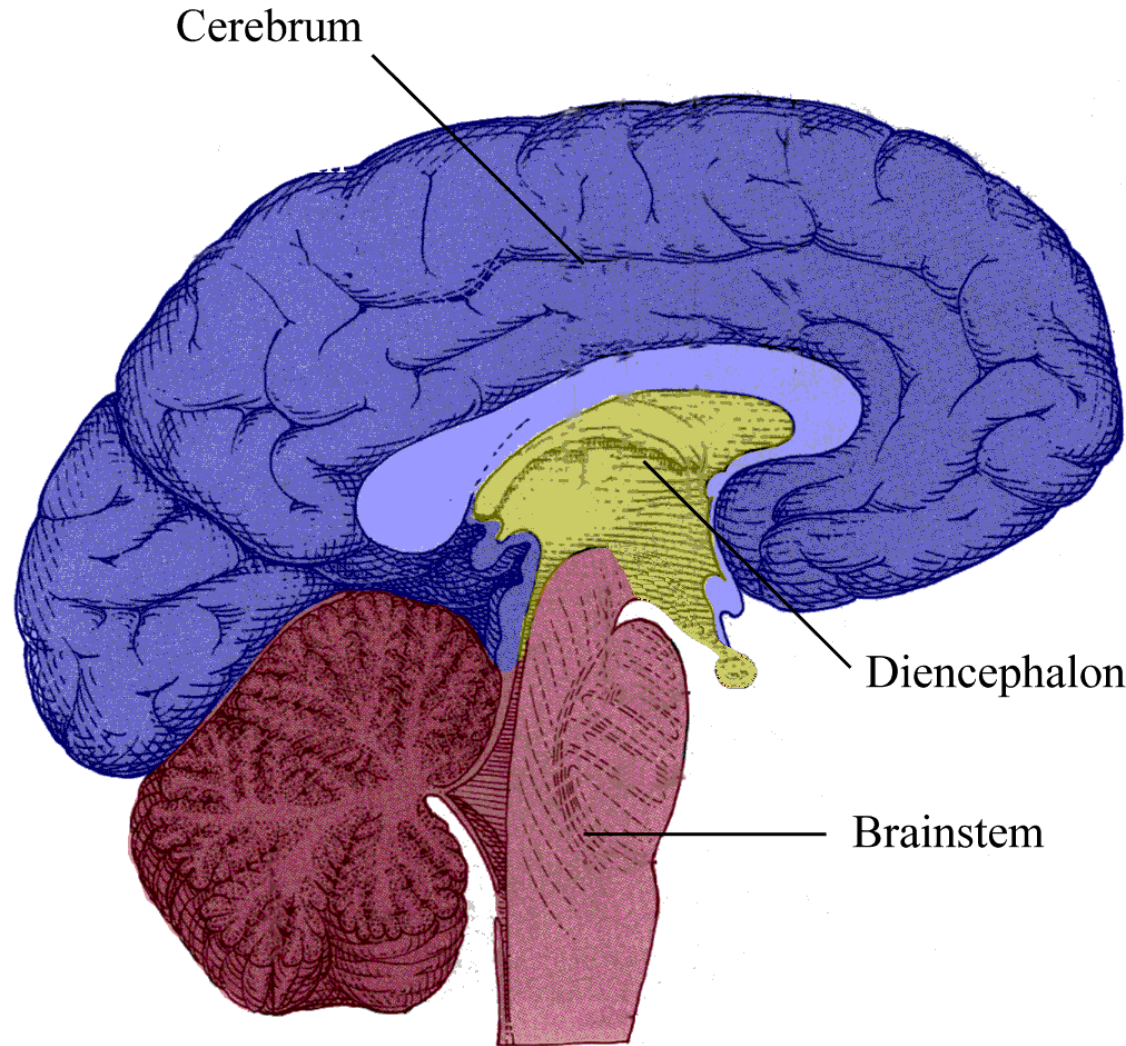


# Brain Regions

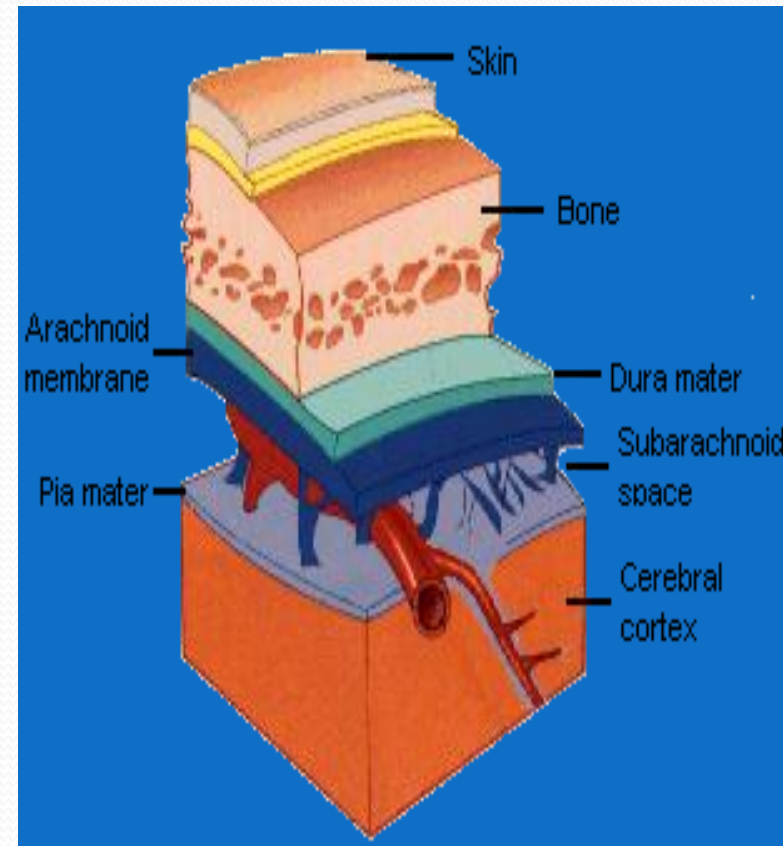
1. Cerebrum  
2. Diencephalon

1. Cerebrum
2. Diencephalon
3. Brainstem
4. Cerebellum



## **MENINGES**

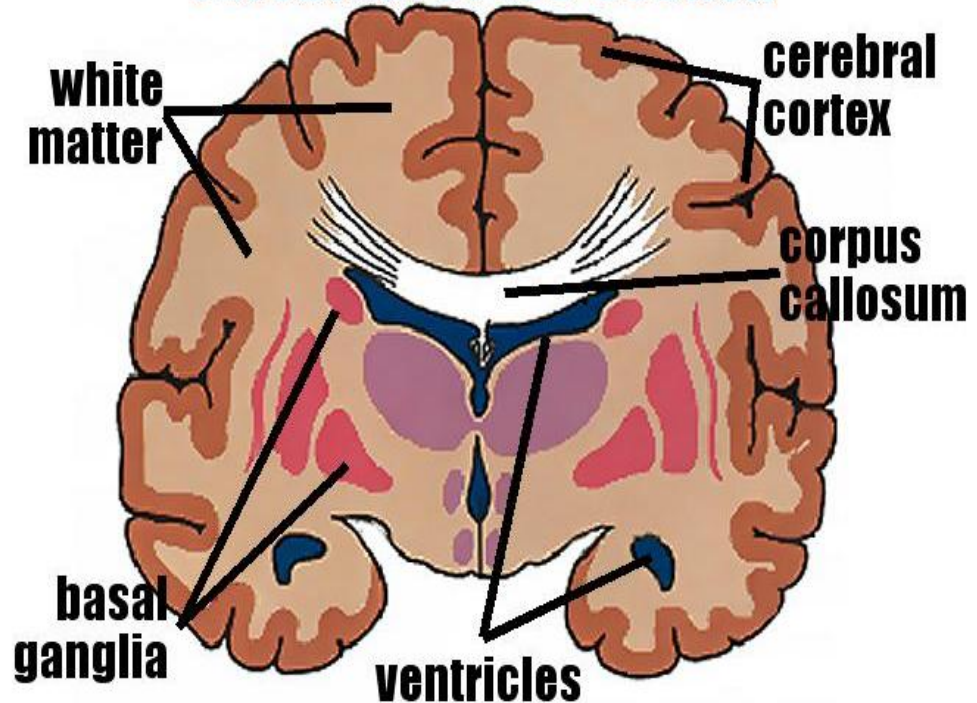
- 1. DURA MATER – Outer covering**
- 2. ARACHNOID MATER – Middle covering**
- 3. PIA MATER – Inner most covering**



- The largest, portion of the brain.
- 2 hemispheres connected by the **corpus callosum**.
- outer cortex of gray matter
- an interior white matter, except for a few small portions.
- **basal nuclei** – islands of gray matter found within the white matter
- The surface is marked by ridges called **gyri** separated by grooves called **sulci**.

# Cerebrum (cerebral cortex)

## Cerebrum Cross-Section



# Cerebrum lobes

1-frontal lobe

2- Parietal lobe

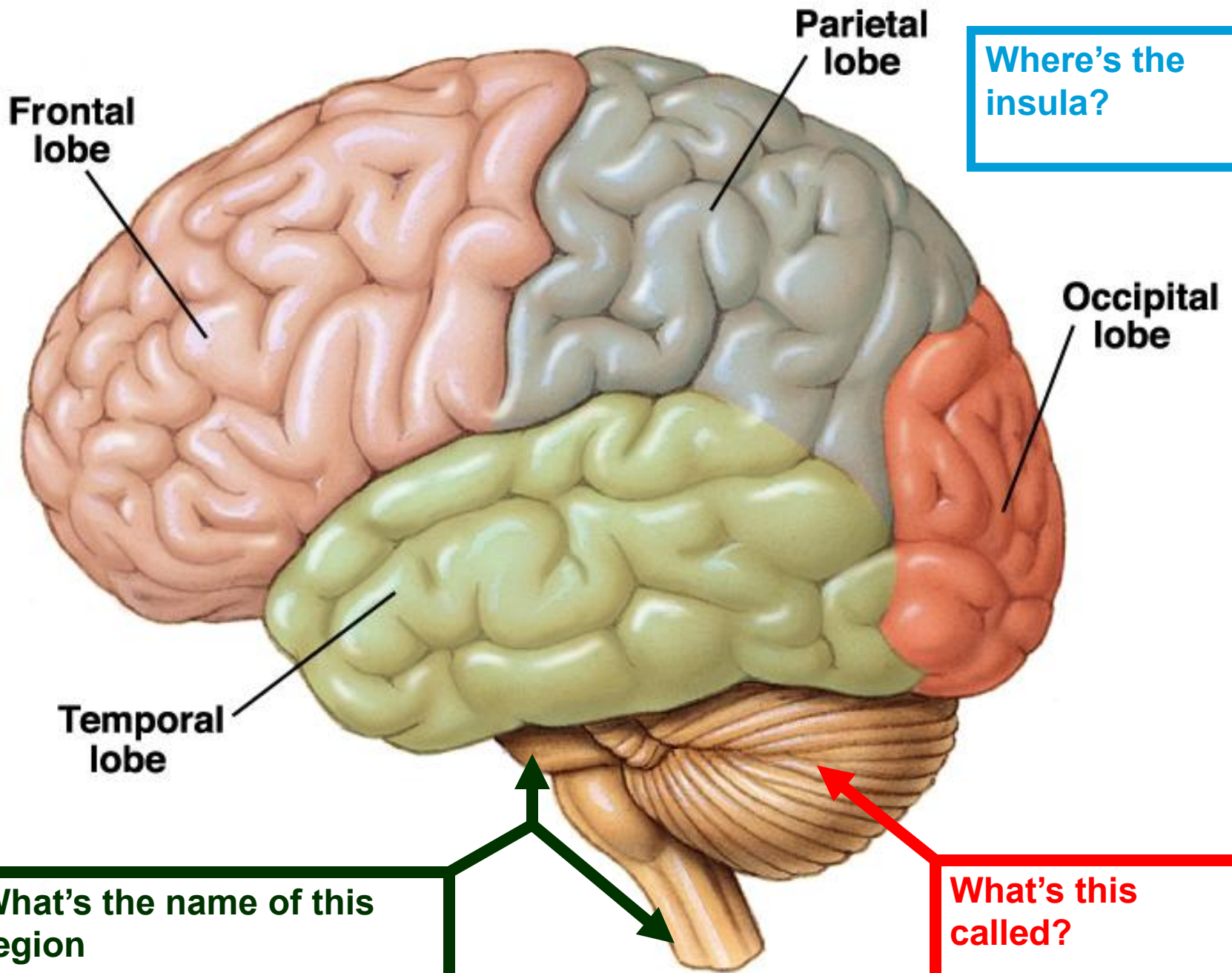
3- Temporal lobe

4- Occipital lobe

•

-





Frontal lobe

Parietal lobe

Where's the insula?

Occipital lobe

Temporal lobe

What's the name of this region

What's this called?

## Brain lobes

### 1-frontal lobe.

-High intellectual functions/centers of thinking-  
problem solving-intelligence-decision making-  
verbal communication

- Speaking ability.
- Elaboration of thoughts.
- ***primary motor cortex***
- premotor cortex**
- **Supplementary area**

## 2-parietal lobe

### 1- somatosensory area

-parietal lobe also has areas of speech for formulation of words and understanding of speech

### 3- The temporal lobe:

- \* Contains auditory centers that receive informations from the cochlea of each ear.

- \* Involved in interpretation of auditory stimuli

- storage of auditory & visual experiences

### The insula: deep inside temporal lobe

- \* memory encoding.

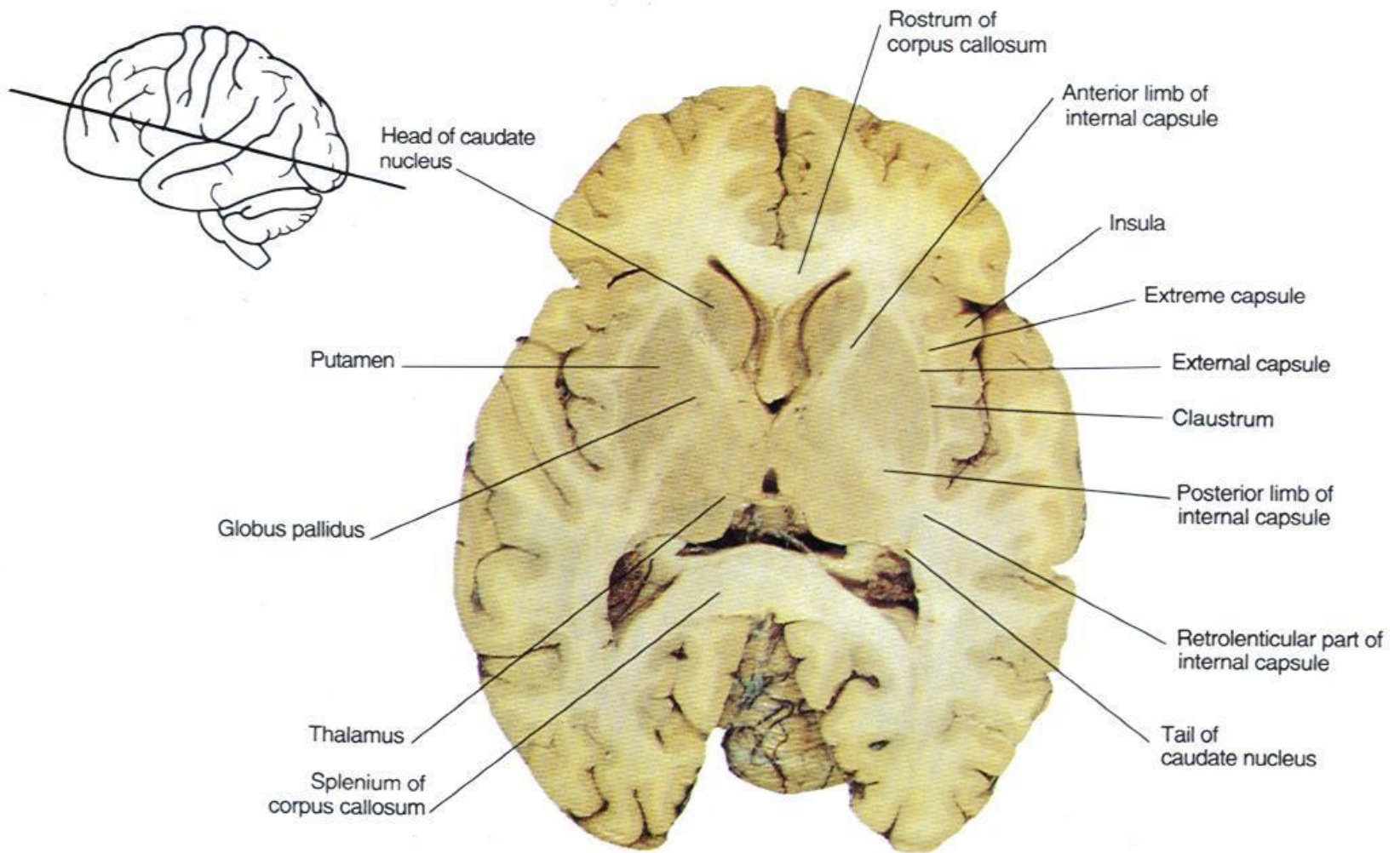
- \* Integration of sensory information (pain) with visceral responses.

- insula involved in coordinating the cardiovascular responses to stress.



## **4-The occipital lobe:**

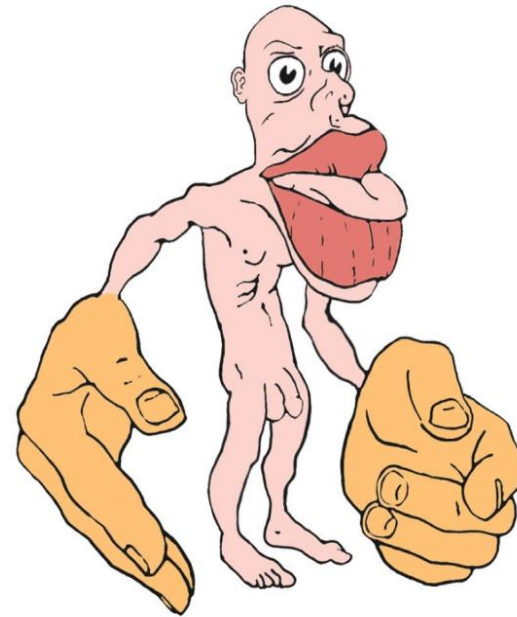
Is the primary area responsible for conscious perception of vision and for coordination of eye movements.



# MOTOR AREAS OF CEREBRAL CORTEX

1. Primary Motor Cortex
2. Premotor Cortex
3. Supplementary motor area
4. Broca's Area

(c) Motor homunculus



# 1- Primary Motor Cortex -Motor area4(MI-I)

## (Brodmann's area 4)-

- Site (precentral gyrus)

- Body presentation:-

1-upside down( inverted)

2-face represented **bilaterally** , but rest of body **unilateral**

3- crossed ( each control opposite side=contralateral)

4-area of presentation is proportionate to skill with which this part is used in fine voluntary movement  
(**lips ,tongue,thumb,hands have large area**)

5- axial & proximal parts of limbs at anterior edge of precentral gyrus **& distal parts at posterior edge**

-this area+ supplementary motor area has increased blood supply during movements

--cells arranged in columns receive sensory input directly from peripheral areas in which they produce movements & from somatic sensory area I in postcentral gyrus.

## **Functions:-**

- 1- execution of fine discrete skilled movements**
  - 2- controls the direction, force and velocity of movements.**
  - 3- facilitates muscle tone**
- 30% origin of corticospinal tracts or pyramidal tracts to AHC s of SC**
  - Contains large neurons (pyramidal cells called betz cells)**

-

## **Lesions:-**

-

- contralateral weakness in distal muscle (fingers) (paresis)**
- loss of ability to control fine movements**
- hypotonia as it is facilitatory to muscle tone.**

## 2- Supplementary motor area

- **(In frontal lobe medial and lateral side & extends to premotor cortex on lateral surface**
  - **-blood flow increase in it during planning even before movement performance**
  - **Function:**  
It works together with premotor cortex.
    - 1-programming & planning of motor sequences of movements
    - 2-bimanual (bilateral) coordinated movements for movements that requires both hands
    - 3-mental rehearsal of movements before performing a complex motor functions.
    - 4- With premotor cortex it translates a motor task into a series of motor command (MENTAL LEARNING).
    - 5-together with premotor area 6 give 30% origin to corticospinal & corticobulbar tracts
- Lesions:**  
Produces weakness in performing complex activity like bimanual coordinated activity



### 3-Premotor cortex (area 6)(motor association area)

- on lateral surface of frontal lobe in front of area 4

#### Functions:

1-set posture at start of planned movements

2- getting ready to perform movements

3- Premotor & supplementary motor cortex are involved in coordinating & planning complex sequences of movement (motor learning)

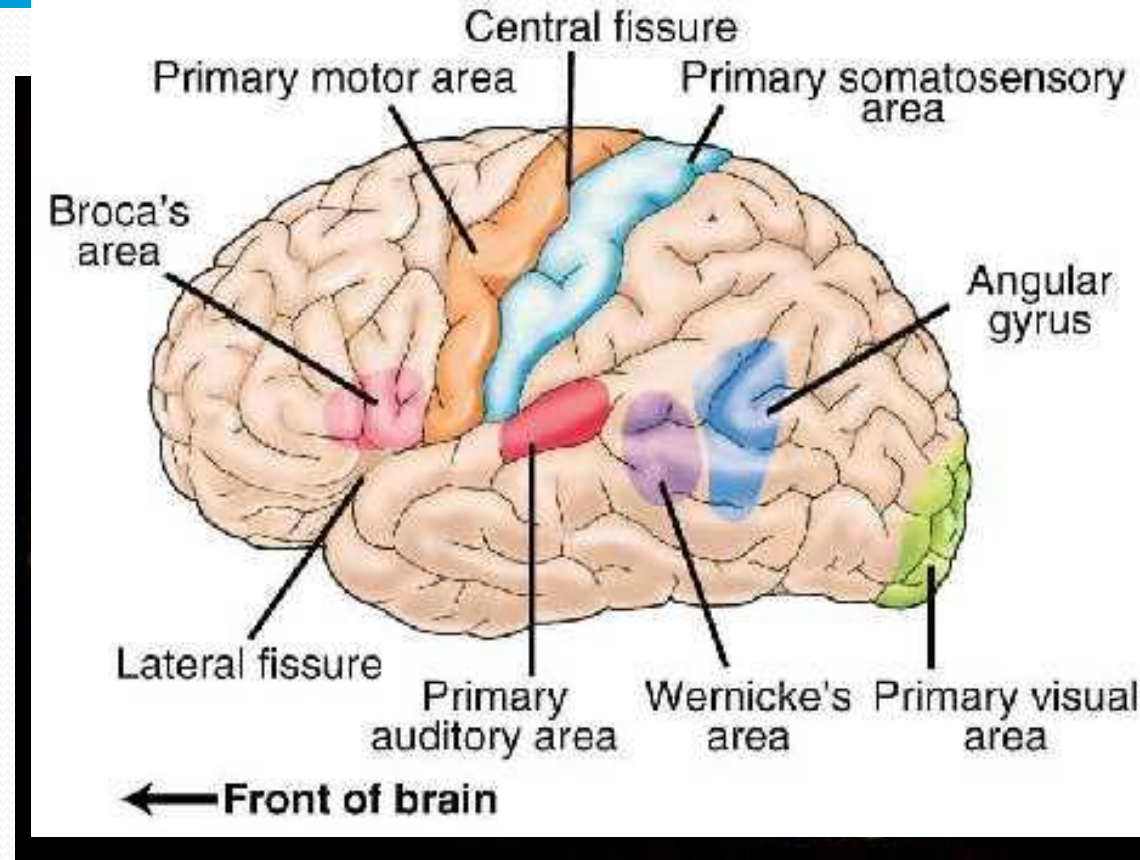
4-together with supplementary motor area give 30% origin to corticospinal & corticobulbar tracts

**5- control gross subconscious movements**

Lesion:-- When damaged with supplementary cortex it may result in **APRAXIA** ( no paralysis but only **slowing** of the **complex** limb movement & loss of short-term working memory)

# Broca's Area

- Found in only one hemisphere (often the left), anterior to the inferior portion of the premotor cortex.
- Directs muscles of tongue, lips, and throat that are used in speech production.



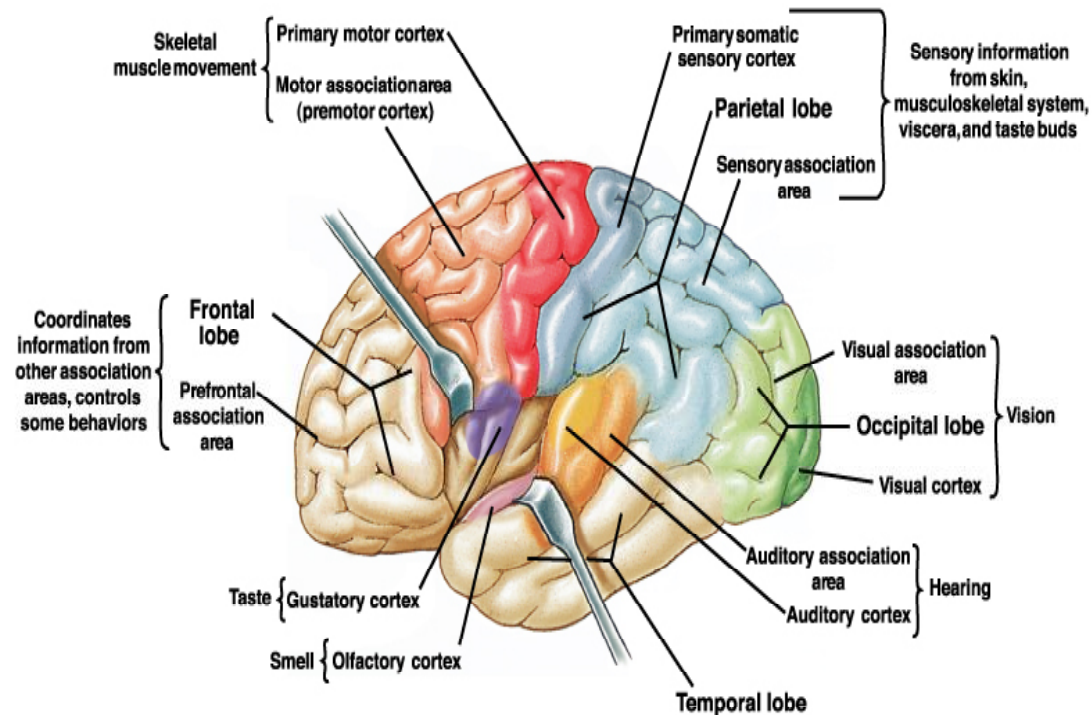


# Sensory Areas

- Found in the parietal, occipital, and temporal lobes.
  1. Primary somatosensory cortex
  2. Somatosensory association cortex
  3. Visual areas
  4. Auditory areas
  5. Olfactory cortex
  6. Gustatory cortex

# Primary Somatosensory Cortex (AREA I-Primary)

- Found in the postcentral gyrus in the **parietal lobe**
- Receives sensory information from Contralateral side of body except face is bilaterally represented in both sides



## Representation of the body in it:

- The body is represented in an ***upside down*** (**inverted**)
- The area of representation depend*** on the number (density) of ***receptors*** and on the complexity of the sensation (lips, face & hands specially thumbs have wide area of representations , trunk & legs have small area)
- ***crossed representation (contralateral)***

## FUNCTIONS:-

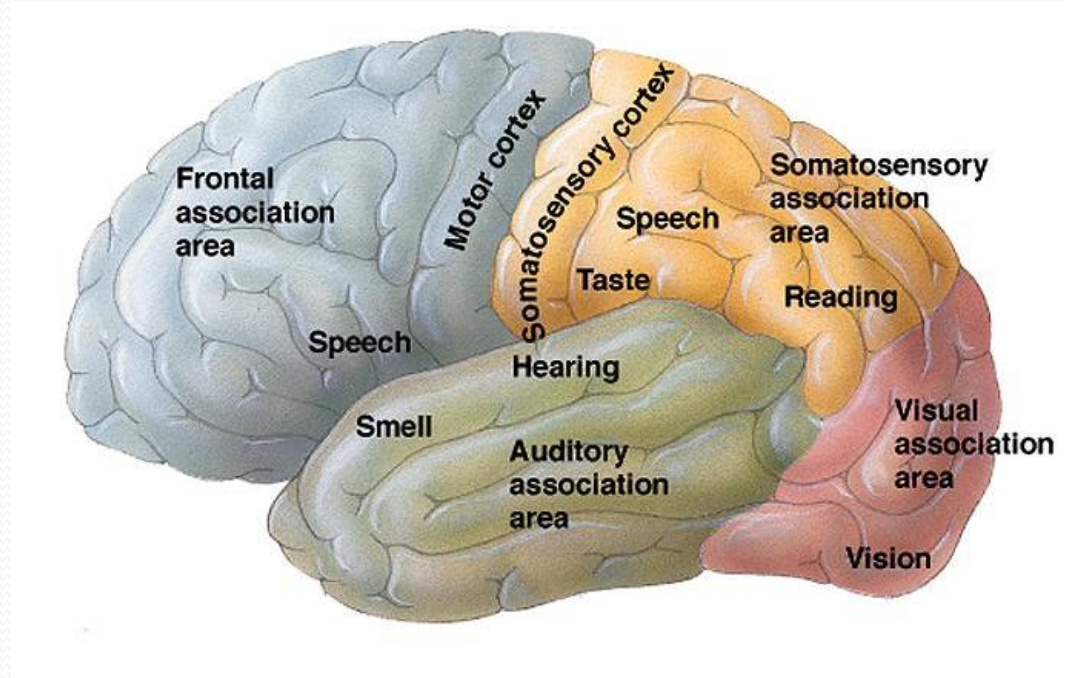
- Receiving cutaneous and muscular sensations, receiving sensory input such as touch, pressure, heat, cold, and pain from the surface of the body
- Interpreting texture and shapes
- 
- also perceives awareness of the body position, a process called proprioception.
- also perceives awareness of the body position, a process called proprioception
- discrimination of weights,
- , stereognosis
- localization of site of stimulation & 2 points discrimination



# Somatosensory Cortex

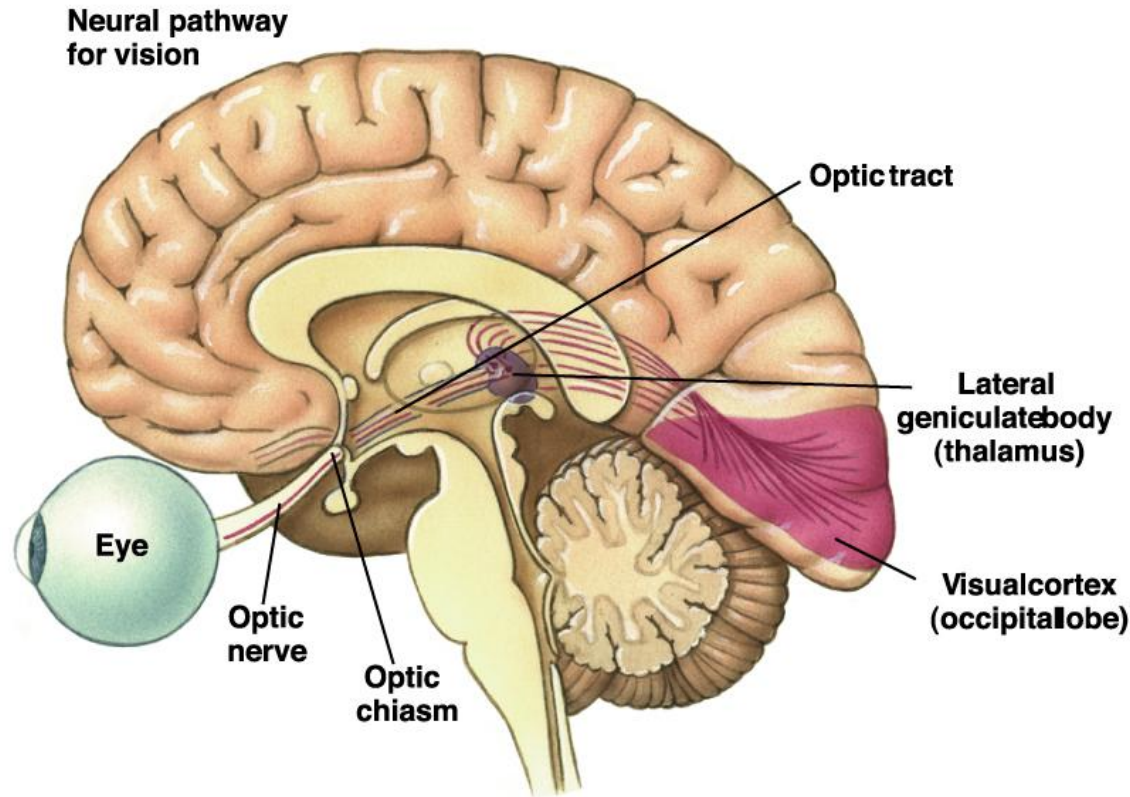
( somatosensory association area )

- Found posterior & inferior to the primary somatosensory cortex
- create a complete comprehension of the object being felt & interpretation of meaning of sensation
- -Face represented anteriorly & arms centrally & legs posteriorly



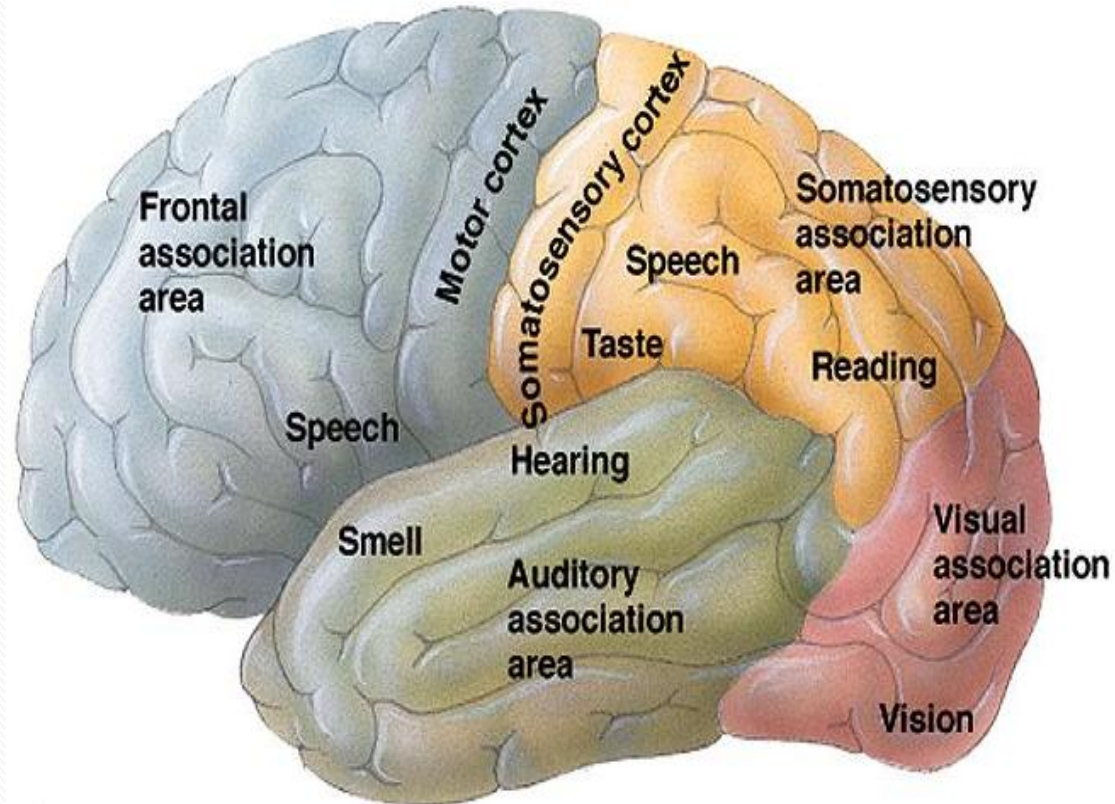
# Primary Visual Cortex

- Found in the occipital lobe.
- Vision without meaning
- Visual association area
- Surrounds the primary visual cortex.
- . (meaning)



# Auditory Cortex

- in the superior margin of the temporal lobe, next to the lateral sulcus.
- **auditory association area** lets us interpret and remember sounds.



# Olfactory Cortex

- Found in the **frontal lobe**
- **-smelling**
  
- Gustatory cortex for taste - in the **parietal lobe** deep to the temporal lobe.