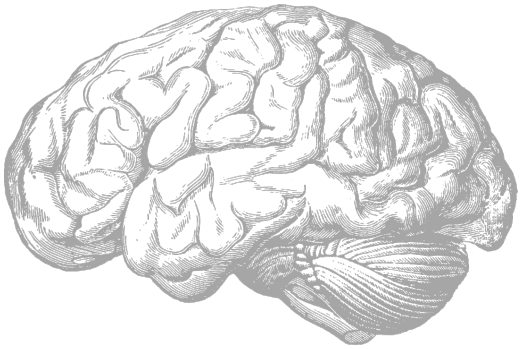
Anatomy of the Cerebral Hemispheres

CNS Block



Color Index

- Main Text
- Female Slides
- Male Slides
- Drs' Notes
- Important
- Extra info

The Editing File

Objectives

- List the parts of the cerebral hemisphere (cortex, medulla, basal nuclei, lateral ventricle).
- Describe the subdivision of cerebral hemisphere (Lobes).
- List the important sulci and gyri of each lobe.
- Describe different types of fibers in cerebral medulla (association, projection and commissural) and give example of each type.

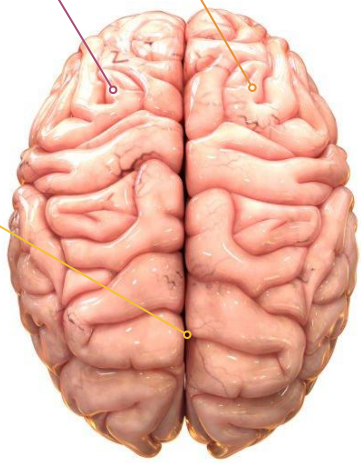
You can find Atlas by Clicking HERE!

Cerebrum

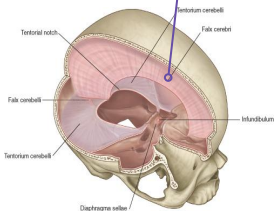
Cerebrum

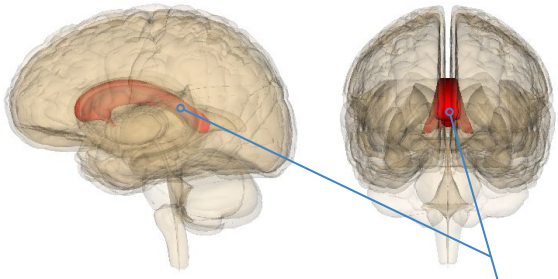
The cerebrum is the **largest part** of the forebrain, which is divided into two halves:

Left and Right Cerebral Hemispheres



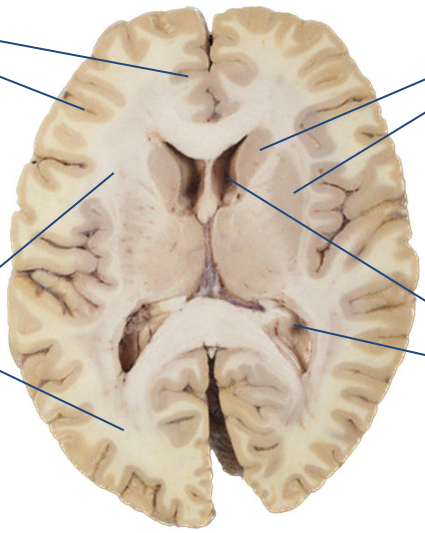
Both cerebral hemispheres are separated by a deep median longitudinal fissure which lodges the falx cerebri (layer of Dura).





In the depth of the median longitudinal fissure, the hemispheres are connected by a bundle of fibers called the corpus callosum.

Structures of the Cerebrum



Cerebral Cortex

Superficial layer of grey matter.

Basal Ganglia

Number of nuclear masses buried within the white matter.

Medulla (White matter)

Deeper to the cortex, contains axons to and from the cells of the cortex.

Lateral Ventricle

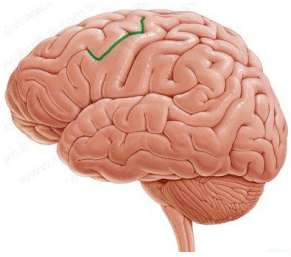
The **cavity** of the hemisphere.

*3rd + 4th ventricles are below and not in the Cerebrum

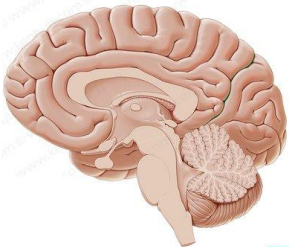
Cerebrum

Surfaces of the Cerebrum

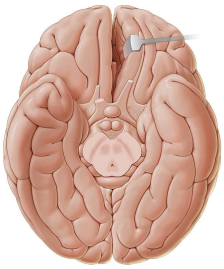
1. Superolateral



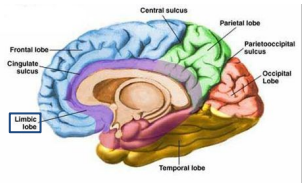
2. Medial

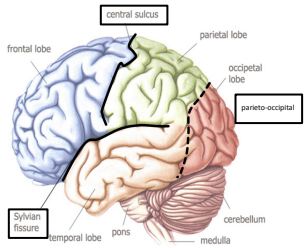


3. Inferior (tentorial) — Separates Cerebrum & Cerebellum



Lobes of the Cerebrum





The superficial layer of **grey matter** is **highly convoluted** to form a complex pattern of **ridges** (gyri) and **grooves** (sulci); This arrangement **maximize the surface area of the cerebral cortex** (about 70% is hidden within the depths of sulci).

Three sulci, consistent in position, named as: **central, lateral (sylvian)** & **parieto-occipital** (is barely seen).

These sulci divide each hemisphere into FOUR lobes: Frontal, Parietal, Temporal & Occipital (named after overlying bones).

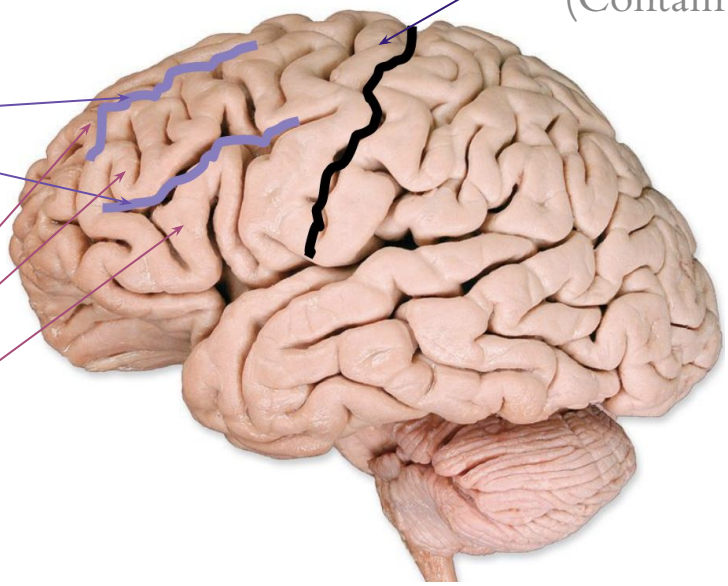
Functionally **each hemisphere contains a** limbic lobe on the medial surface.

Main Gyri on Superolateral Surface

Frontal Lobe

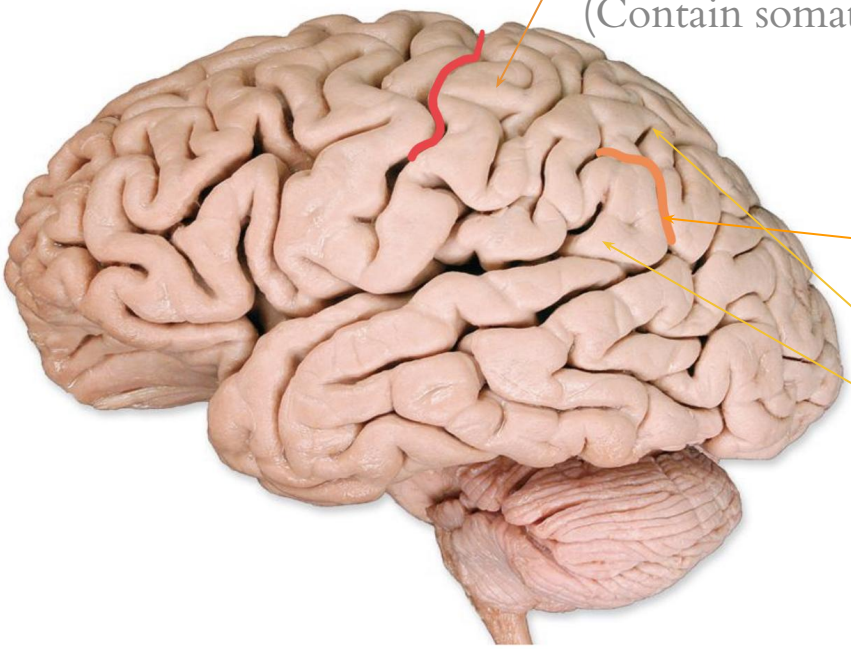
Gyrus:
Precentral Gyrus.
(Contain motor cortex).

Sulcus:
Superior Frontal Sulcus
Inferior Frontal Sulcus
divide the lobe into
Superior Frontal Gyrus
Middle Frontal Gyrus
Inferior Frontal Gyrus



Parietal Lobe

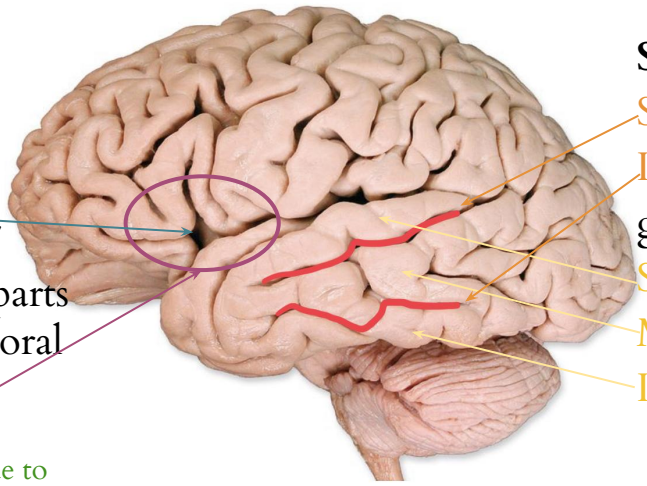
Gyrus:
Postcentral Gyrus.
(Contain somatosensory cortex).



Sulcus:
Intraparietal Sulcus
divide the lobe into
Superior Parietal Lobule
Inferior Parietal Lobule

Main Gyri on Superolateral Surface

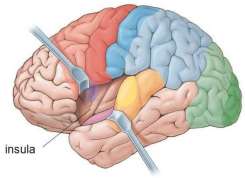
Temporal Lobe



Sulcus:
Superior temporal sulcus
Inferior temporal sulcus
giving rise to
Superior temporal gyrus
Middle temporal gyrus
Inferior temporal gyrus

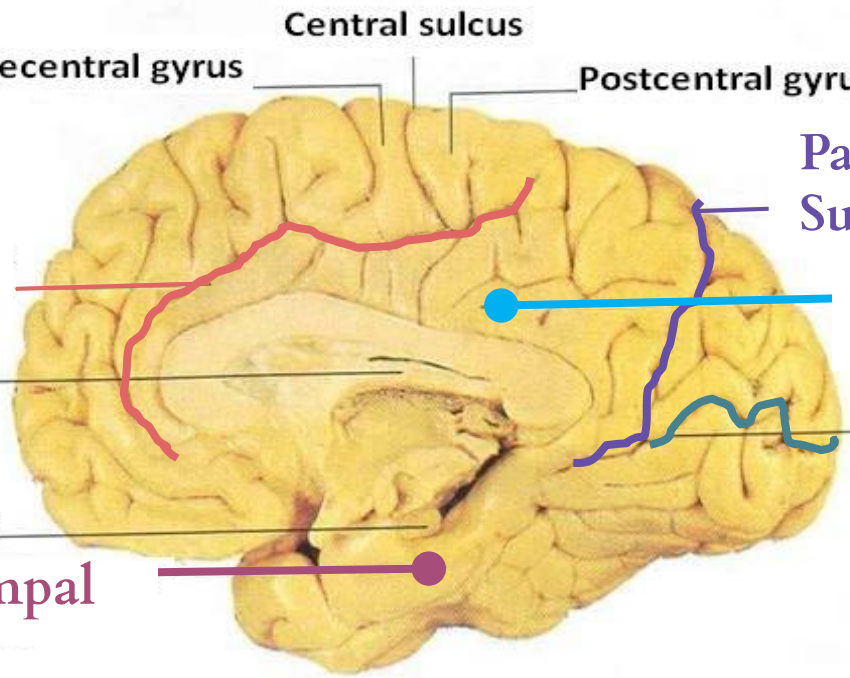
Insula:
The gyrus in the depth of lateral sulcus, covered by parts of frontal, parietal & temporal lobes called the opercula

(opercula is marked from the outside to determine the Insula's location in the inside).



Medial Surface

Sulci: Parieto-occipital, Calcarine, Cingulate.
Gyri: Cingulate, Parahippocampal.



Functions of Lobes of Cerebrum

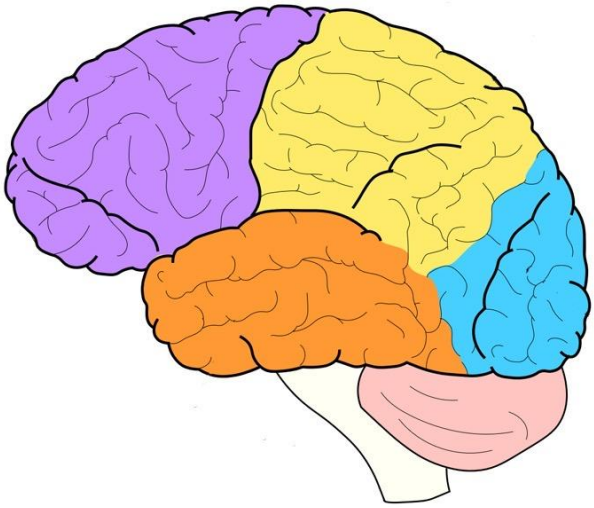
Male Slides

Frontal Lobe

1-Motor function.
2-Motivation.
3-Aggression.
4-Smell.
5-Mood.

Parietal Lobe

Reception and evaluation of sensory information.



Temporal Lobe

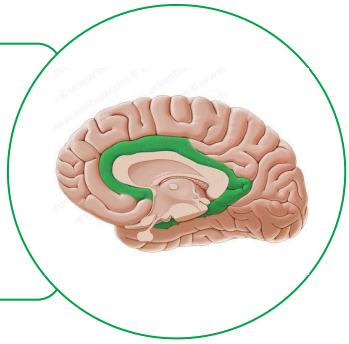
1-Smell.
2-Hearing.
3-Memory.
4-Abstract thought.

Occipital Lobe

Visual processing.

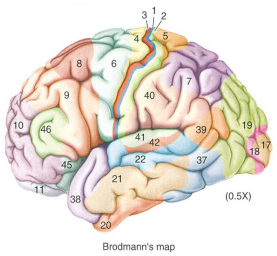
Limbic Lobe

1- Emotions
2- Memory storage.
3- Linking conscious intellectual functions with the unconscious autonomic functions.



Brodmann's Map of Cerebrum

1. Brodmann produced a **numbered, cytological map** of cerebral cortex **based upon** its regional **histological characteristics**.



2. Subdivisions with **similar cellular and laminar structure** are called **'areas'**.

3. Brodmann's numbering of these cortical locations has become one of the standard ways to identify brain areas.

Functional Areas of the Cerebral Cortex

Frontal Lobe

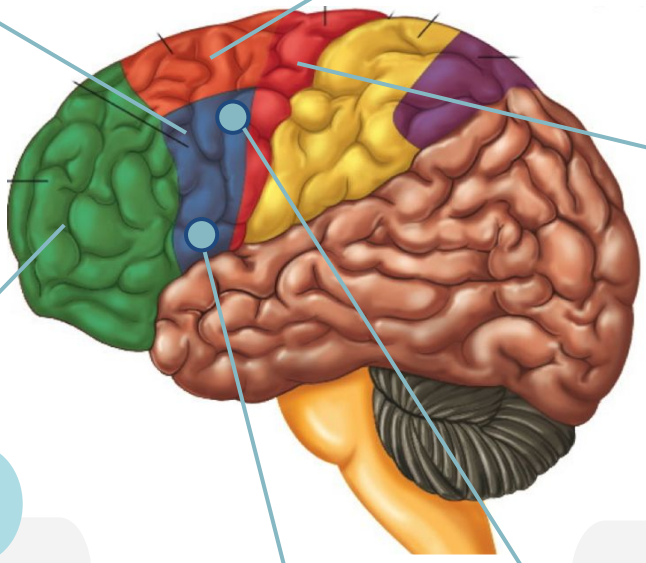
Premotor Cortex

Located in the region immediately anterior to the precentral gyrus **(Brodmann's area 6).**

Supplementary Motor Cortex

Primary Motor Cortex

Located in precentral gyrus **(Brodmann area 4).**



Prefrontal Cortex

Extensive region of the frontal lobe anterior to premotor area.

Frontal Eye Field

Located in the middle frontal gyrus immediately in front of motor cortex **(Brodmann's area 8).**

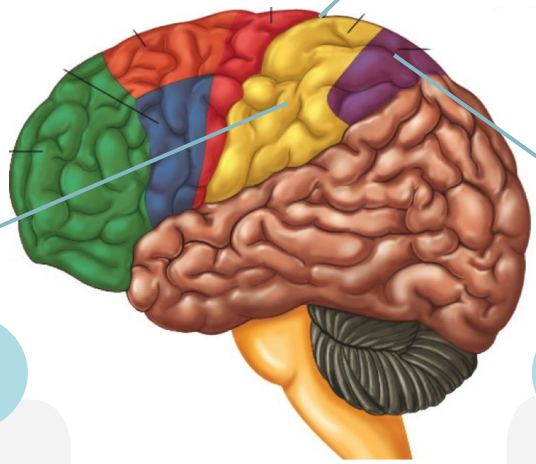
Broca's (Motor Speech)

Located in the inferior frontal gyrus of the dominant hemisphere, usually left **(Brodmann's area 44 & 45).**

A 44 year old man who lives a normal life except that he's missing 90% of his brain!
Click here to read the story

Functional Areas of the Cerebral Cortex

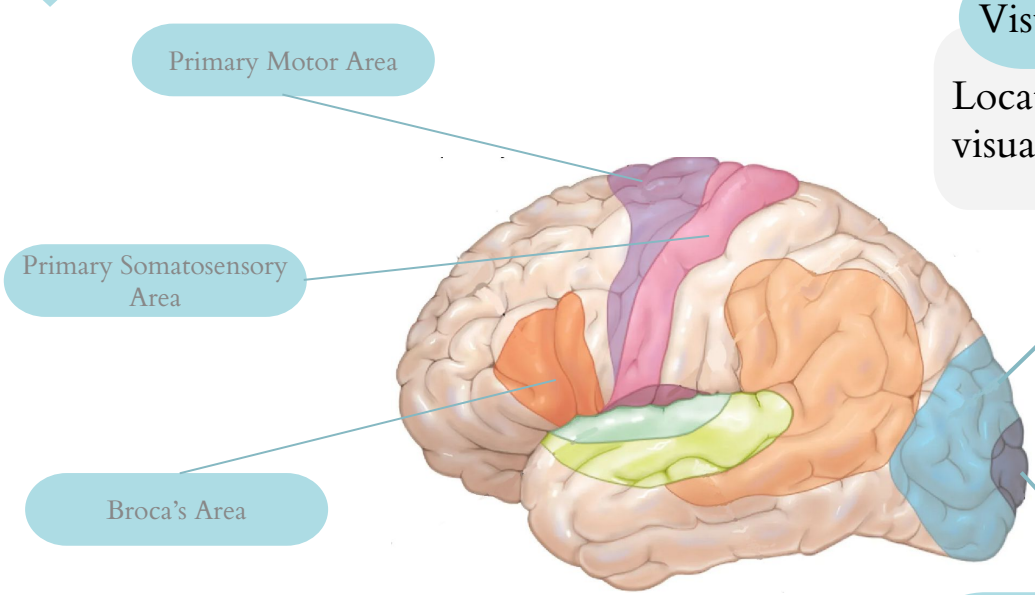
Parietal Lobe



Located in postcentral gyrus **(Brodmann's area 1, 2, 3).**

Located posterior to primary somatosensory cortex.

Occipital Lobe

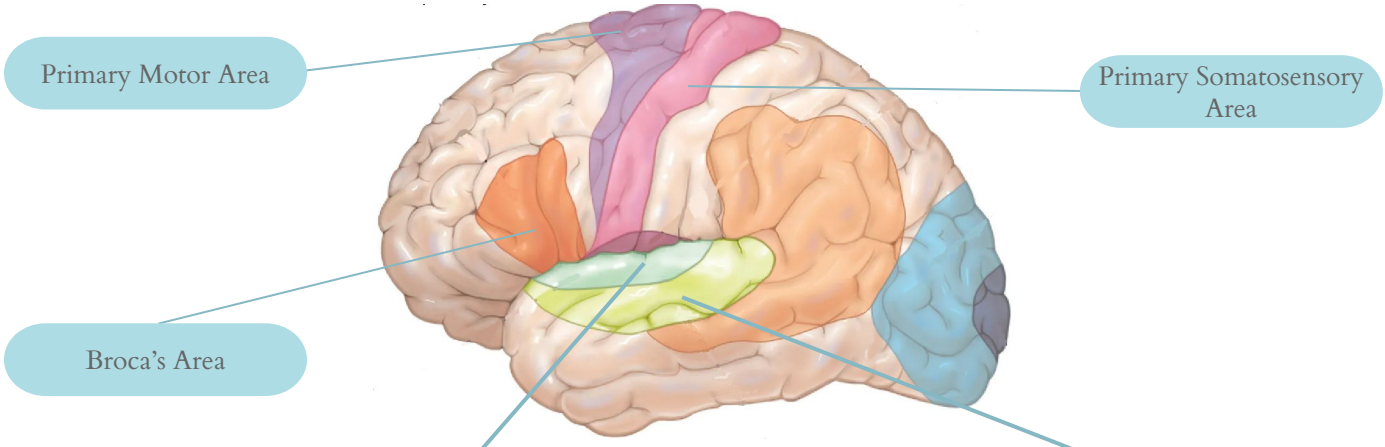


Located around the primary visual cortex **(Area 19).**

Located on the medial surface of the hemisphere, in the gyri surrounding the calcarine sulcus **(Brodmann's area 17).**

Functional Areas of the Cerebral Cortex

Temporal Lobe



Primary Auditory Cortex

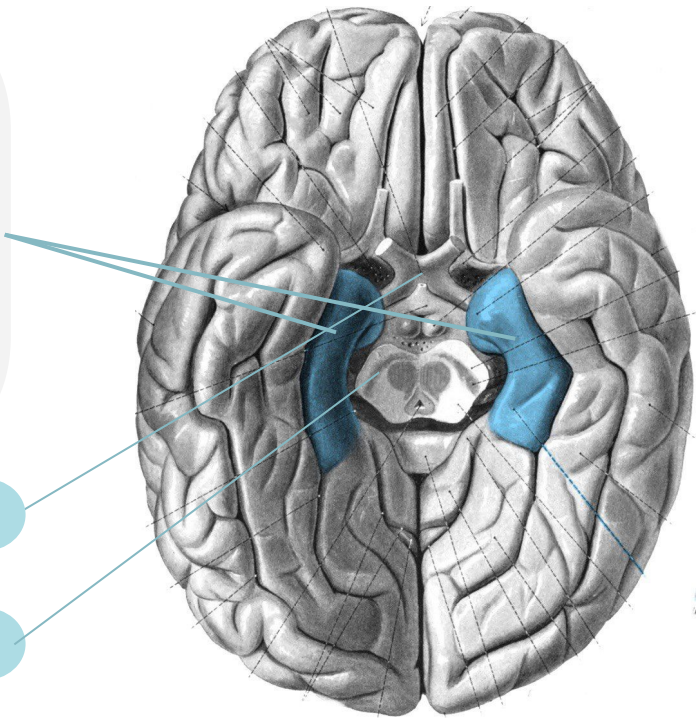
Located in the superior surface of the superior temporal gyrus **(Brodmann's area 41, 42).**

Auditory Association Cortex

Located immediately around the primary auditory cortex (also includes **Wernicke's area).**

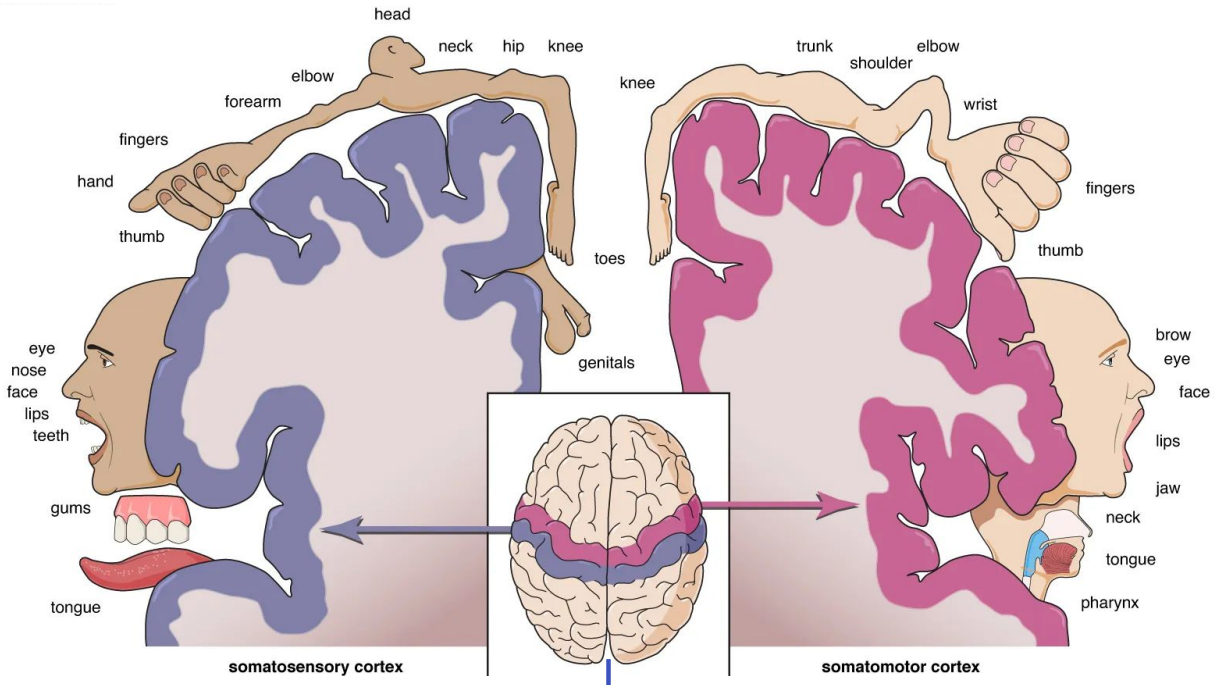
Parahippocampal Gyrus

Located in the inferomedial part of **temporal lobe.**
Deep to this gyrus lies the **hippocampus** and the **amygdala**, which are parts of **limbic system.**



Functional Areas of the Cerebral Cortex

Homunculus



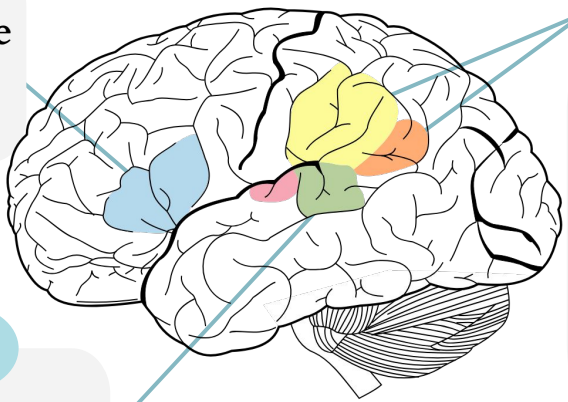
The word "homunculus" means little man in Latin. But in neuroanatomy, the cortical homunculus represents either the motor or the sensory distribution along the cerebral cortex of the brain.

Language Areas

- Organized around the lateral Sulcus

Broca's Area

Concerned with **expressive** aspects of language.



Angular Gyrus & Supramarginal Gyrus

(Nearby regions of temporal lobe and parietal lobe of the inferior parietal lobule)
Are important in **naming, reading, writing,** and **calculation.**

Wernicke's Area

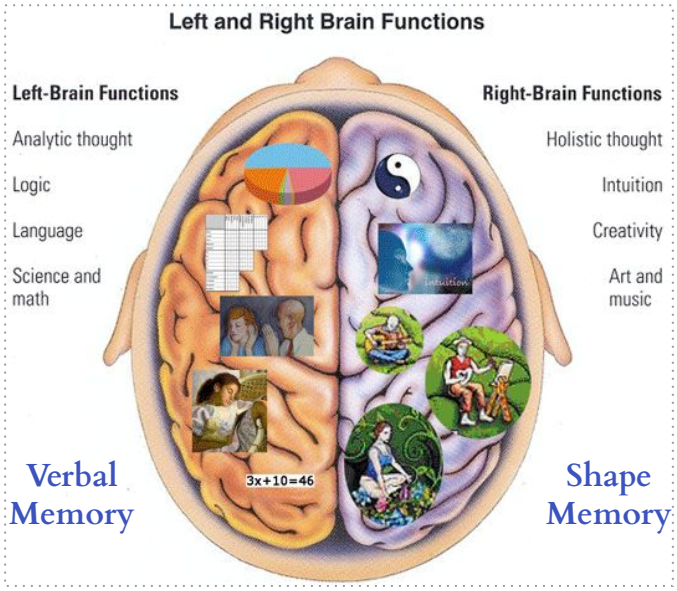
Responsible for **comprehension** of the spoken words.

Dominance and White Matter

Hemispheric Dominance

The localization of **Speech centers & Mathematical ability** is the criterion for defining the dominant cerebral hemisphere.

In 96% of normal **right-handed** individuals and 70% of normal **left-handed** individuals, the Left hemisphere contains the language centers. These are **Left Hemisphere Dominant.**



In 96% of normal right-handed Cerebral dominance becomes established during the first few years after birth. Hemispheres communicate via the corpus callosum.

White Matter of the Cerebrum

Underlies the cortex, contains **nerve fibers, neuroglia** cells and **blood vessels.**

The nerve fibers **originate**, **terminate or** sometimes **both**, **within the cortex.**

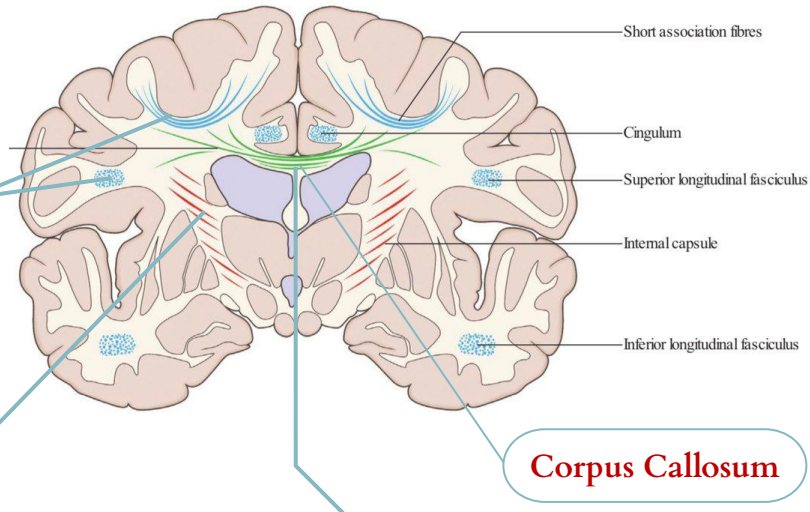
Depending on their origin & termination, these nerve fibers are classified into three types: **Association, Projection & Commissural.**

Association fibers

Unite different parts of the **same hemisphere,** and they are of two types: **long** & **short.**

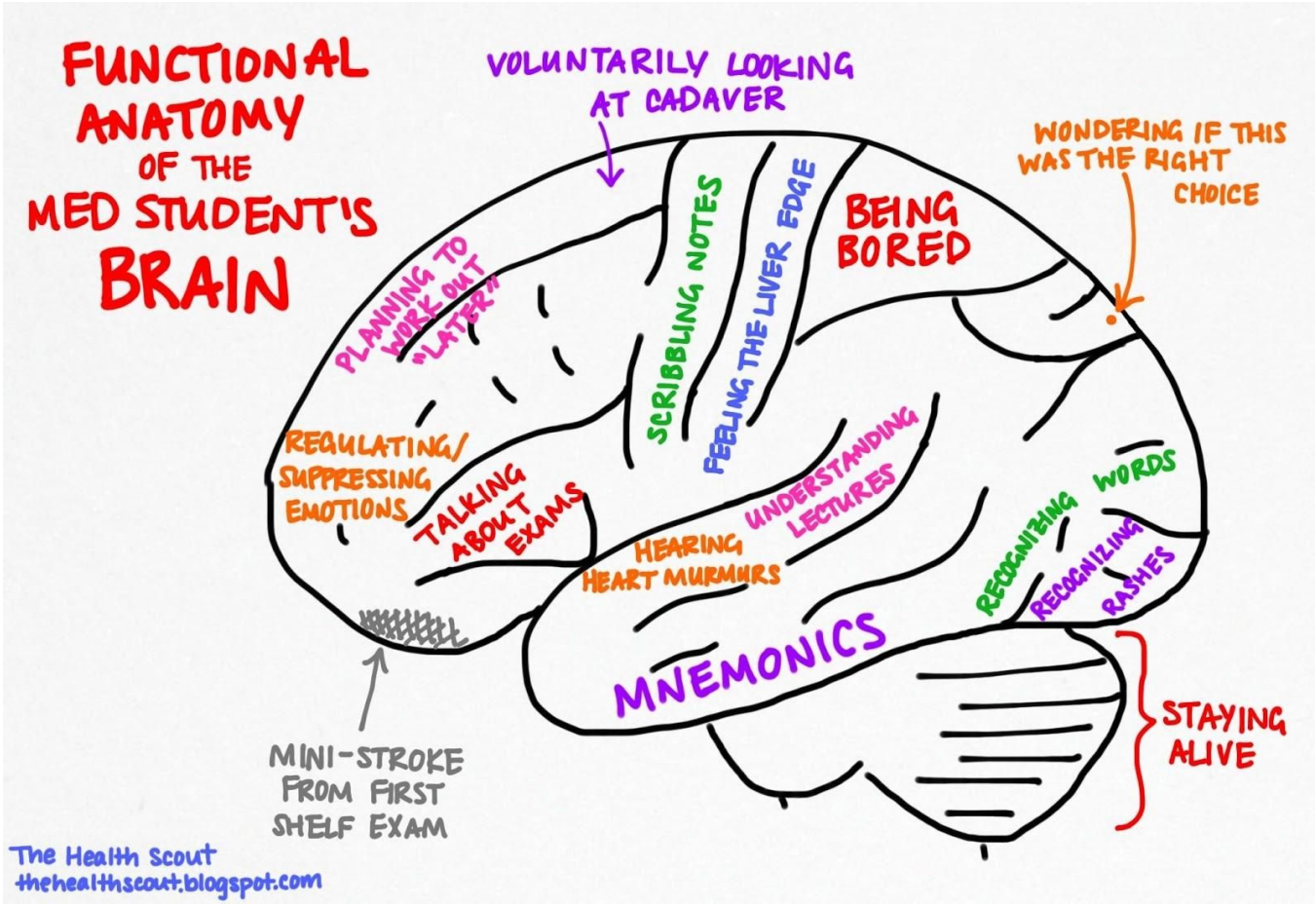
Projection fibers

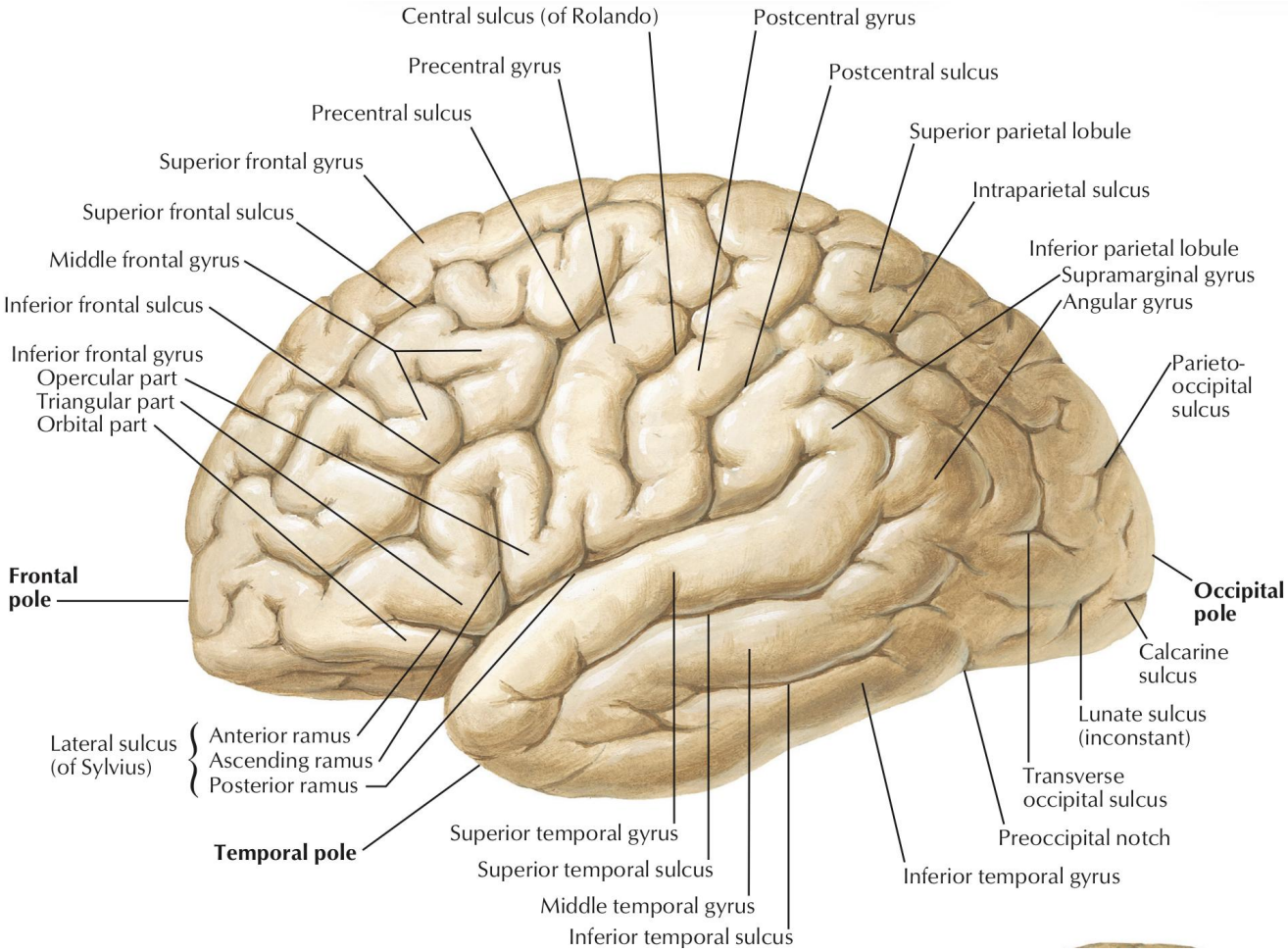
Consist of afferent and efferent fibers of the cerebral cortex. Best example for Projection fibers is the **Internal Capsule.**



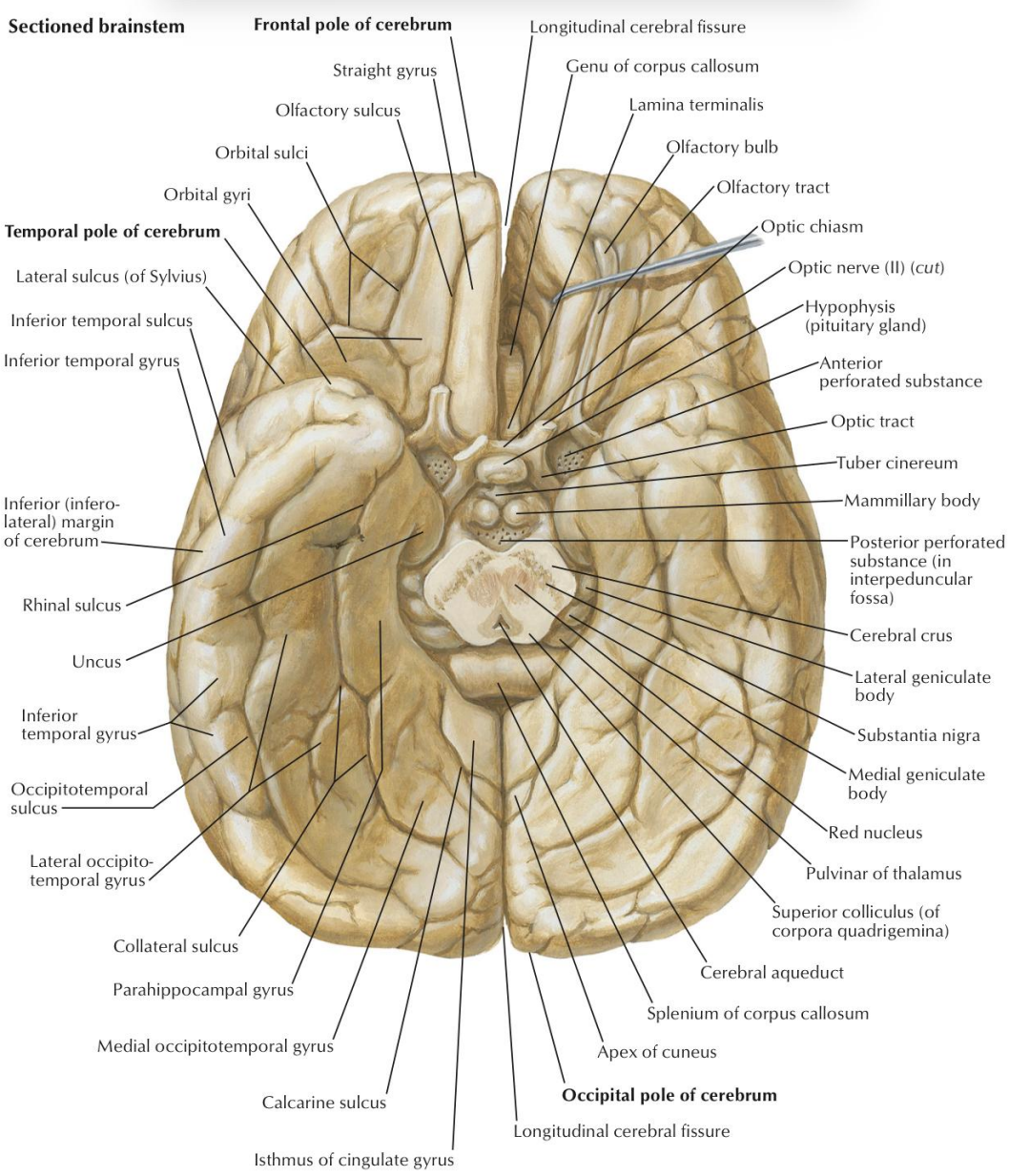
Commissural fibers

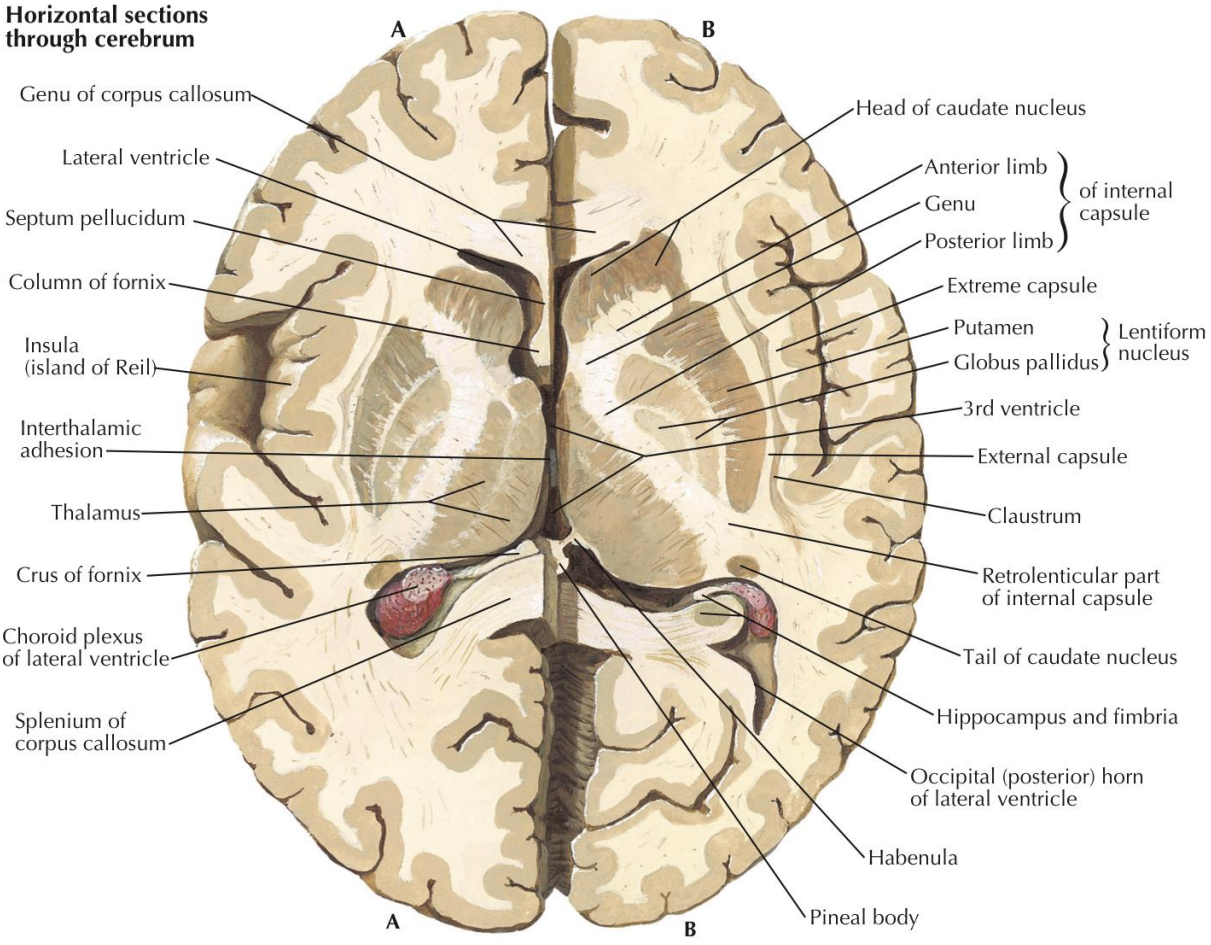
Connect the **corresponding regions** of the two hemispheres.


FUNCTIONAL ANATOMY OF THE MED STUDENT'S BRAIN
VOLUNTARILY LOOKING AT CADAVER
WONDERING IF THIS WAS THE RIGHT CHOICE
PLANNING TO WORK OUT "LATER"
SCRIBBLING NOTES
FEELING THE LIVER EDGE
BEING BORED
REGULATING/ SUPPRESSING EMOTIONS
TALKING ABOUT EXAMS
HEARING HEART MURMURS
UNDERSTANDING LECTURES
RECOGNIZING WORDS
RECOGNIZING RASHES
MNEMONICS
STAYING ALIVE
MINI-STROKE FROM FIRST SHELF EXAM
The Health Scout
thehealthscout.blogspot.com


Central sulcus (of Rolando)
Postcentral gyrus
Precentral gyrus
Postcentral sulcus
Precentral sulcus
Superior parietal lobule
Superior frontal gyrus
Intraparietal sulcus
Superior frontal sulcus
Inferior parietal lobule
Middle frontal gyrus
Supramarginal gyrus
Inferior frontal sulcus
Angular gyrus
Inferior frontal gyrus
Opercular part
Triangular part
Orbital part
Parieto-occipital sulcus
Frontal pole
Occipital pole
Calcarine sulcus
Lateral sulcus (of Sylvius)
Anterior ramus
Ascending ramus
Posterior ramus
Lunate sulcus (inconstant)
Transverse occipital sulcus
Temporal pole
Superior temporal gyrus
Preoccipital notch
Superior temporal sulcus
Inferior temporal gyrus
Middle temporal gyrus
Inferior temporal sulcus

EXTRA


Sectioned brainstem
Frontal pole of cerebrum
Longitudinal cerebral fissure
Straight gyrus
Genu of corpus callosum
Olfactory sulcus
Lamina terminalis
Orbital sulci
Olfactory bulb
Orbital gyri
Olfactory tract
Temporal pole of cerebrum
Optic chiasm
Lateral sulcus (of Sylvius)
Optic nerve (II) (cut)
Inferior temporal sulcus
Hypophysis (pituitary gland)
Inferior temporal gyrus
Anterior perforated substance
Optic tract
Tuber cinereum
Inferior (infero-lateral) margin of cerebrum
Mammillary body
Posterior perforated substance (in interpeduncular fossa)
Rhinal sulcus
Cerebral crus
Uncus
Lateral geniculate body
Inferior temporal gyrus
Substantia nigra
Medial geniculate body
Occipitotemporal sulcus
Red nucleus
Pulvinar of thalamus
Lateral occipito-temporal gyrus
Superior colliculus (of corpora quadrigemina)
Collateral sulcus
Cerebral aqueduct
Parahippocampal gyrus
Splenium of corpus callosum
Medial occipitotemporal gyrus
Apex of cuneus
Occipital pole of cerebrum
Calcarine sulcus
Longitudinal cerebral fissure
Isthmus of cingulate gyrus


Horizontal sections through cerebrum
A
B
Genu of corpus callosum
Head of caudate nucleus
Lateral ventricle
Anterior limb
Genu
Posterior limb
of internal capsule
Septum pellucidum
Column of fornix
Extreme capsule
Putamen
Globus pallidus
Lentiform nucleus
Insula (island of Reil)
3rd ventricle
Interthalamic adhesion
External capsule
Thalamus
Claustrum
Crus of fornix
Retrolenticular part of internal capsule
Choroid plexus of lateral ventricle
Tail of caudate nucleus
Splenium of corpus callosum
Hippocampus and fimbria
Occipital (posterior) horn of lateral ventricle
Habenula
Pineal body
A
B

MCQs

Q1. Which type of nerve fiber connect corresponding regions of different hemisphere?			
A. Association	**B.** Commissural	**C.** Projection	**D.** Corpus callosum
Q2. Which of the following is not one of the surfaces of the cerebrum ?			
A. Superolateral	**B.** Medial	**C.** Posterior	**D.** Inferior
Q3. Brodmann's area 44, 45 is related to?			
A. Primary auditory cortex	**B.** Primary somatosensory cortex	**C.** Broca's area	**D.** Primary visual cortex
Q4. Primary somatosensory cortex is located in?			
A. Occipital lobe	**B.** Temporal lobe	**C.** Parietal lobe	**D.** Frontal lobe
Q5. The cerebrum functions in all of the following EXCEPT:			
A. Involuntary movement of arms	**B.** Voluntary movement of eyes	**C.** Contributes to making you who you are	**D.** Ability to feel sensations
Q6. Which lobe of cerebral cortex links conscious intellectual functions with unconscious autonomic functions.			
A. Temporal lobe	**B.** Limbic lobe	**C.** Parietal lobe	**D.** Frontal lobe

A1. B A2. C A3. C A4. C A5. A A6. B

FOR ANKI FLASHCARDS

OR CLICK HERE

Team Leaders

Remaz Almahmoud

Areej Alquraini

Sarah Alshahrani

Moath Alhudaif

Faris Alzahrani

Team Members

Aleen Alkulyah

Khawla Alfaqih

Haya Alajmi

Sarah Alajaji

Almas Almutairi

Bayan Alenazi

Sadeem Alyahya

Zahra Alhazmi

Salma Alsaadoun

Norah Almohaimeed

Waad Alanazi

Aseel Alshehri

Lama Alsuliman

Aljoharah Alkhalifah

Aishah Boureggah

Maryam Alghannam

Lama Alotaibi

Wafa Alakeel

Ghaida Aldossary

Retal Alshohail

Norah Almania

Deena Almahawas

Omar Almogren

Nazmi M Alqutub

Abdulaziz Alqarni

Mansour Alotaibi

Khalid Alsobei

Khalid Alanezi

Almuthana Alageel

Aban Basfar

Zeyad Alotaibi

Mohammed Alqutub

Abdalmalik Alshammakhi

Hamad Alyahya

Mohammed Alsalamah

Mohammed Alarfaj

Ziyad Alsalamah

Faisal Alshowier

Faisal Alhejji

Abdullah Aldhuwaihy

Special Thanks to Aleen Alkulyah for the Wonderful Design!

Anatomy.med443@gmail.com