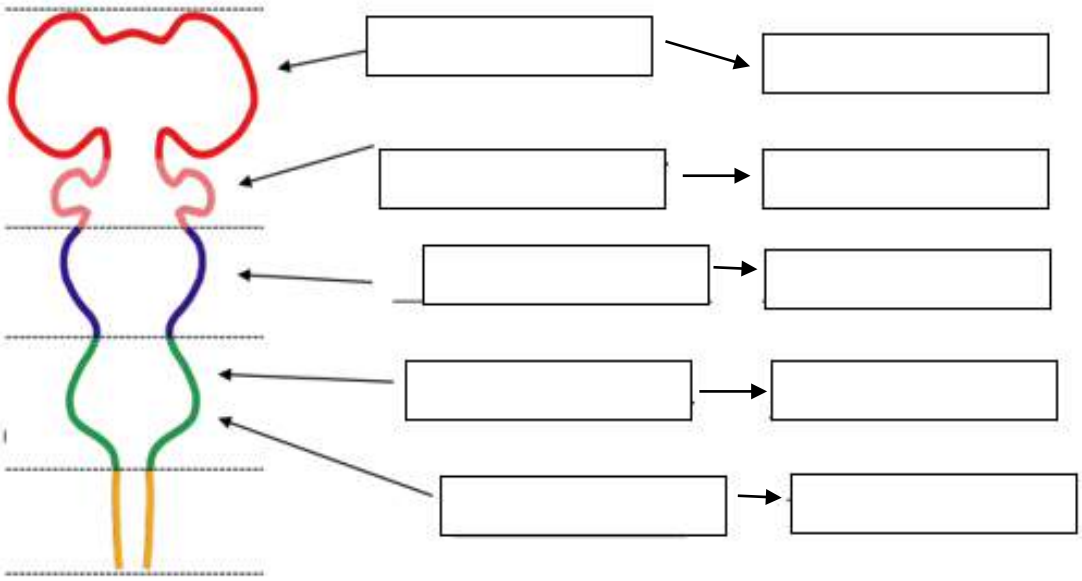
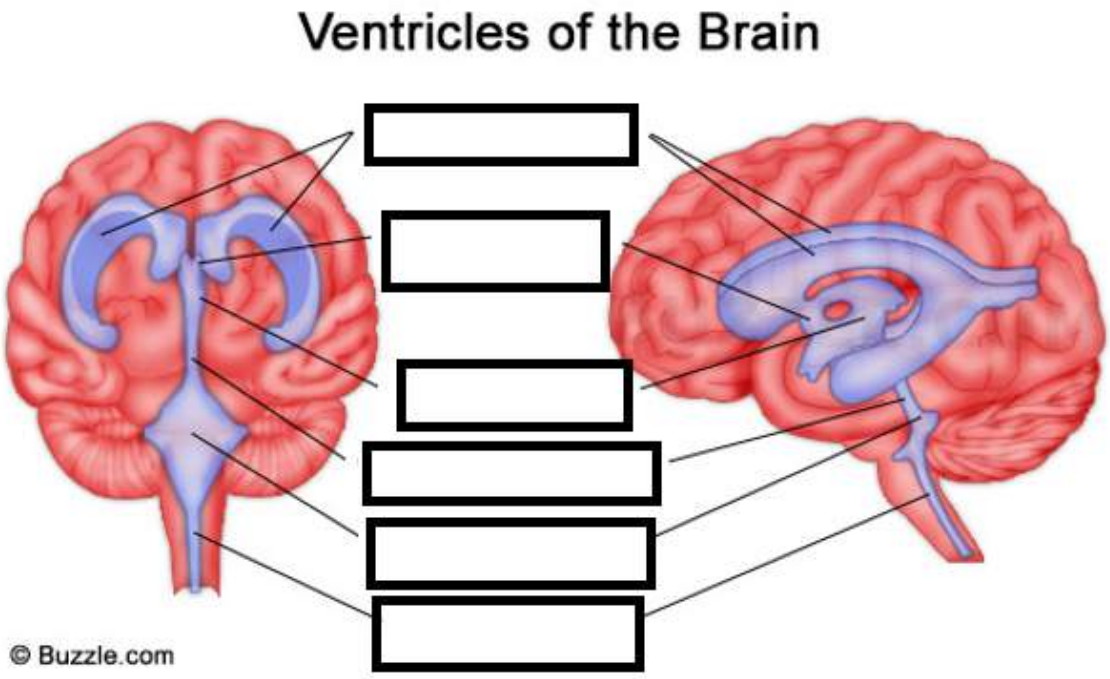
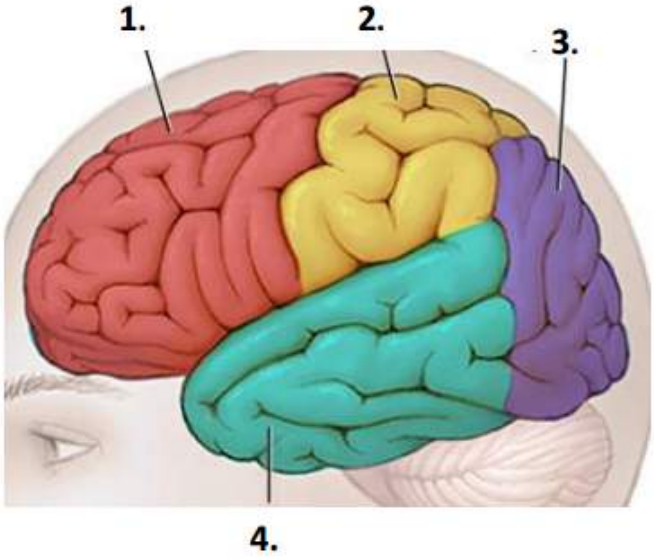
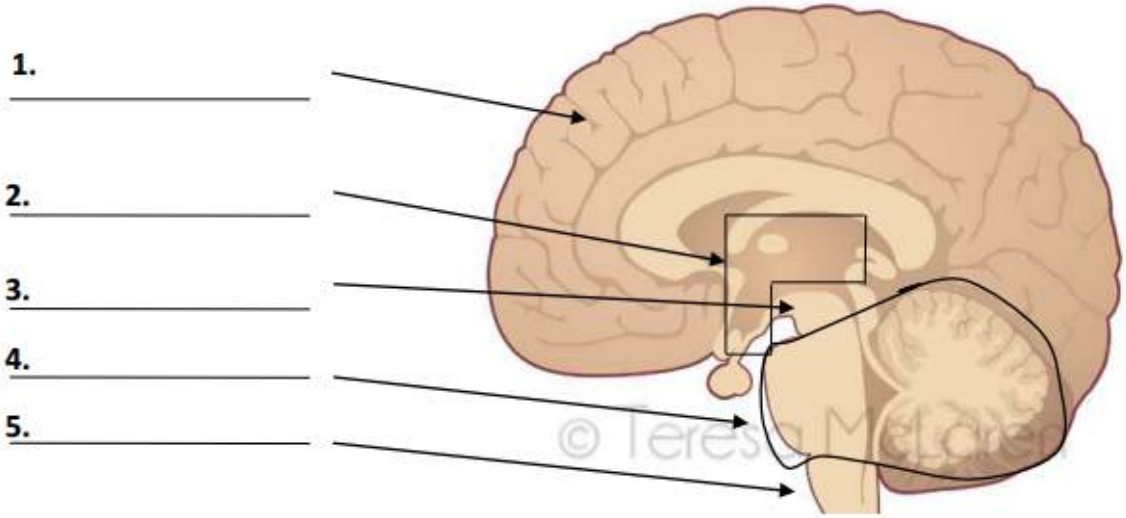
Cortical structure and function







1. _____
   - Voluntary movements, decision making and cognitive processes
2. _____
   - Sensory processing
3. _____
   - Vision
4. _____
   - Emotions and memory, hearing, language



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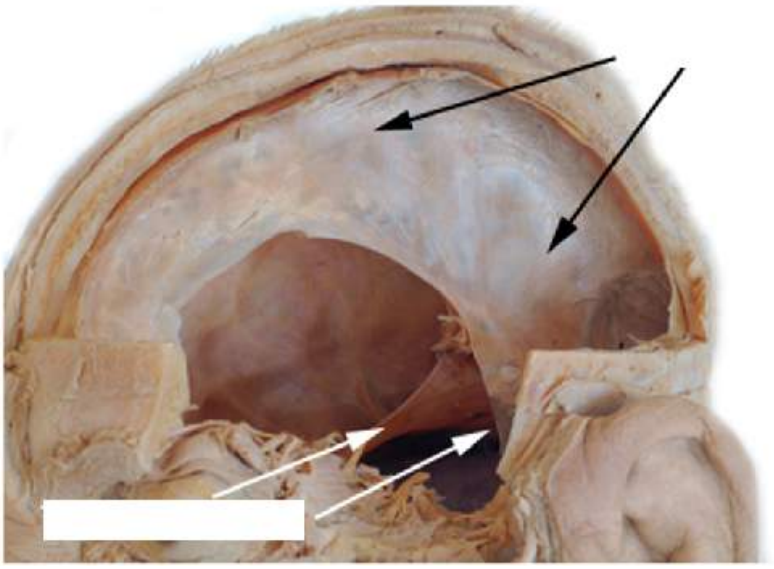


There are 2 types of cortex:

- ……. : 90% of cortical volume
- ……. Cortical layers

- …….: 10% of cortical volume.
- Consists of ….. cortical layers. Can be divided into:
- ……. also known as the olfactory cortex.
- ……., also known as the hippocampal cortex.

Types of cortical cells:

……. cells.

These comprise ……. of the cortex

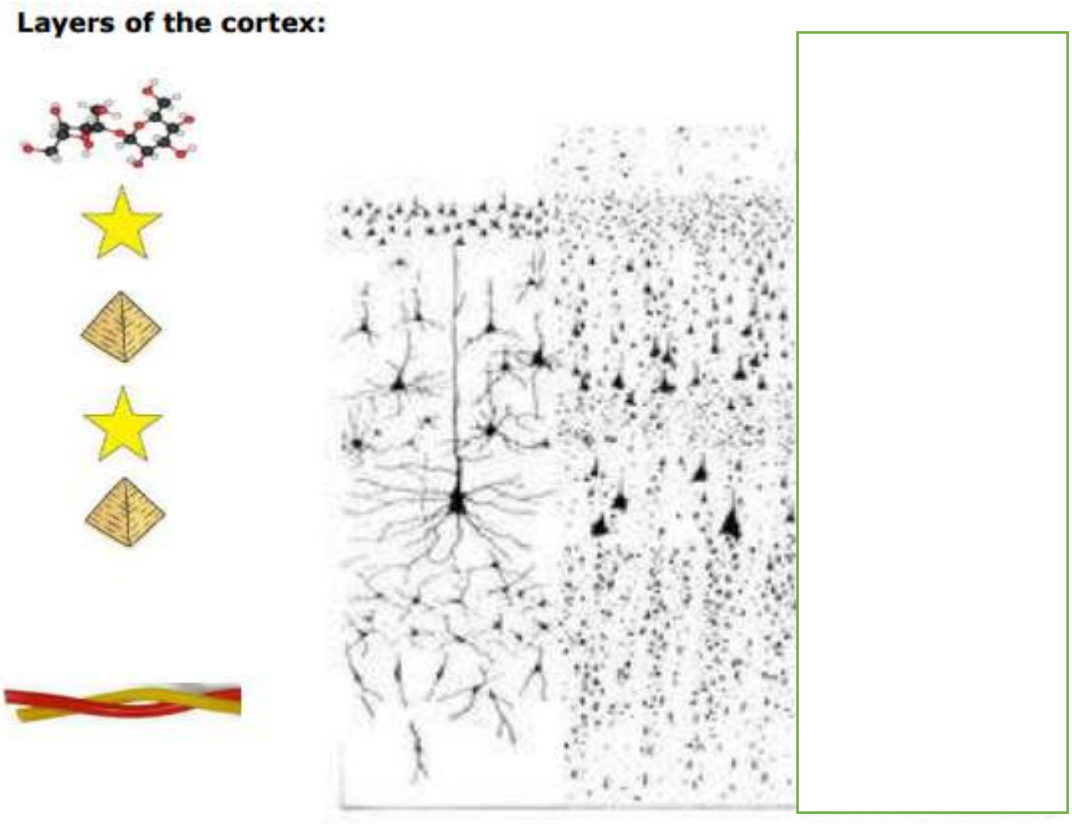
Their main function is ……. (…….)

…….. cells. One function is as …….. interneurons. These are …… . They're described as being …….. …….. . (Like a ★)

There are also …….. stellate neurons which are …….. .These are **only** found in the ……..…….. .

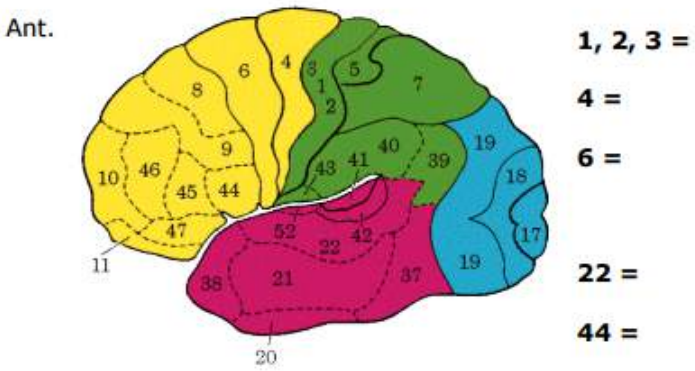
When stained, cortex can have two appearances:

1. Granular: …….. , made up of lots of granular cells.
2. Agranular: …….. – contains many more pyramidal cells.



Taken from Rhys Taylor's FBN session, 2016.

Brodmann's map:



Golgi Stain:

Nissl:

Weigert:

Basic functional units are …… . These can be afferent or efferent fibres.

Afferent **Efferent**

Lateralisation

75-95% have language dominantly in their …… hemisphere.

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MCQ

1) Smooth stellate neurons are ……

2) Cortex consists mostly of which type of cortex?

3) What do we call accumulation of CSF in the brain? Hydropcephalus, Migraine, Aneurysm, Glioma

4) Which areas sends signal to the premotor area? Primary Motor area, Wernicke's Area, Primary Somatosensory Area, Frontal lobe

5) Commissural fibres transmit inputs from the …… hemisphere.

6) Projection fibres are a type of afferent/efferent fibre. They transmit inputs to the cerebellum/basal ganglia/frontal lobe.

7) The supragranular and granular layers mainly form …… inputs.

8) CSF from the 3rd ventricle drains into which structure?

9) Which primary brain vesicle gives rise to the diencephalon? Forebrain/Midbrain/Hindbrain.

10) The myelencephalon gives rise to which brain structure? Cerebellum/Thalamus/Pons/Medulla.

WHITE MATTER TRACTS AND MOTOR SYSTEMS

White matter refers to _____ axons. There are 3 types.

1. Commissural fibres: exchange information _____ hemispheres

There are 5 different types of commissural fibres

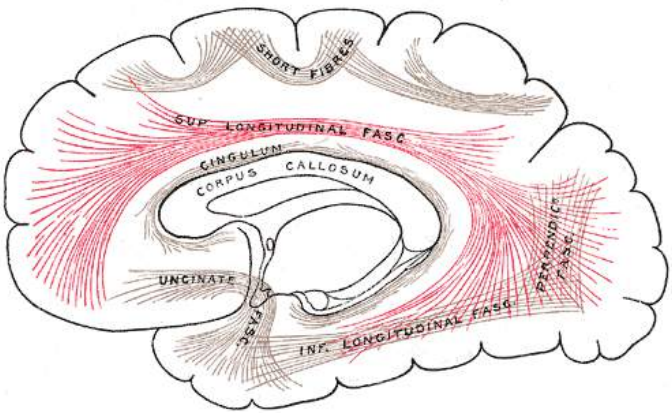
1. Corpus callosum – connecting the two hemispheres.

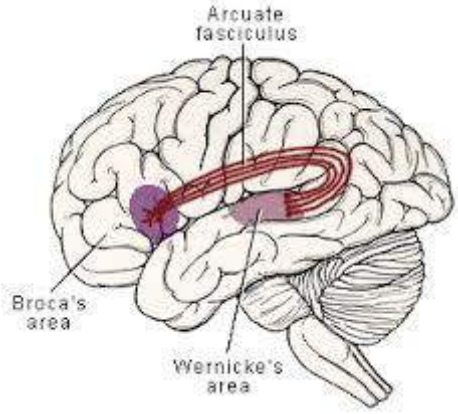
   Anterior portion = _____

   Middle portion = _____

   Posterior portion = _____
2. Anterior commissure – connecting the temporal lobes
3. Posterior commissure – crosses the midline of the brain on the dorsal aspect of the upper end of the cerebral aqueduct
4. Fornix – part of the limbic system, connecting the hippocampus to the mammillary bodies and then to the thalamus
5. Habenular commissure – connect the habenular nuclei on either side of the brain, located anterior to the pineal gland

2. Association fibres: exchange information in the same hemisphere





1. Cingulum
2. Superior longitudinal fasciculus
3. Arcuate fasciculus
4. Inferior longitudinal fasciculus
5. Uncinate fasciculus
6. Occipitofrontal fasciculus

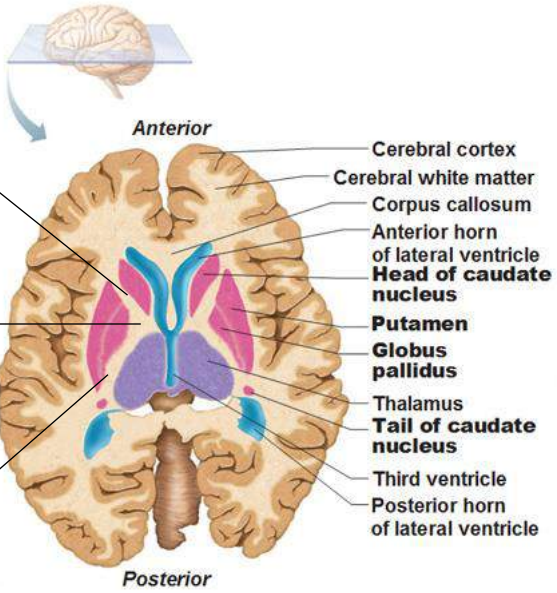
3. Projection fibres: carry information to the basal ganglia, brain stem and spinal cord

Corona radiata → internal capsule

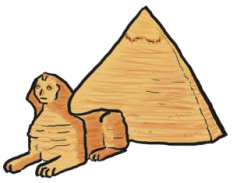
Anterior limb = contains association fibres of the _____ hemisphere. These are _____ and _____ fibres.

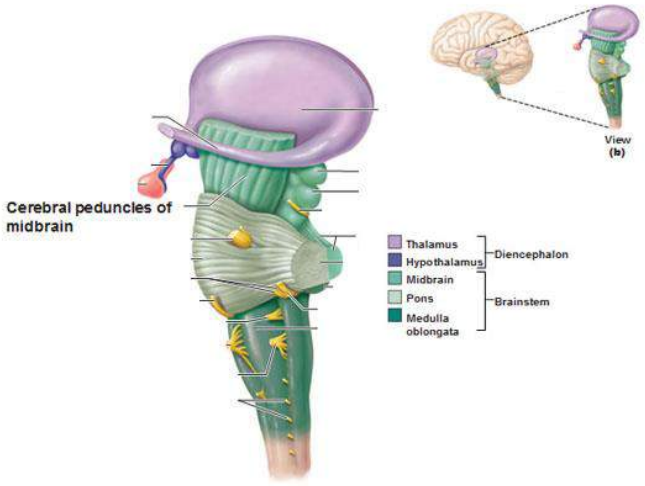
Genu (geniculate fibres) = projection fibres from the cortex (UPPER MOTOR NEURONES). These will go on to on to form the _____ tract, resulting in head and face movement.

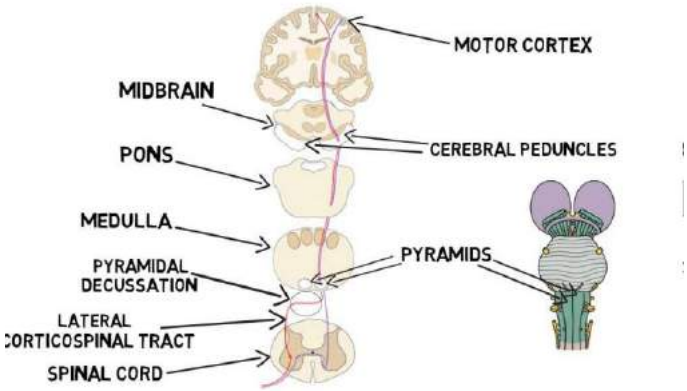
Posterior limb = contains projection fibres from the cortex (UPPER MOTOR NEURONES). These will go on to form the _____ tract, resulting in arm, trunk and leg movement.



Corticobulbar tract + corticospinal tract = PYRAMIDAL TRACT





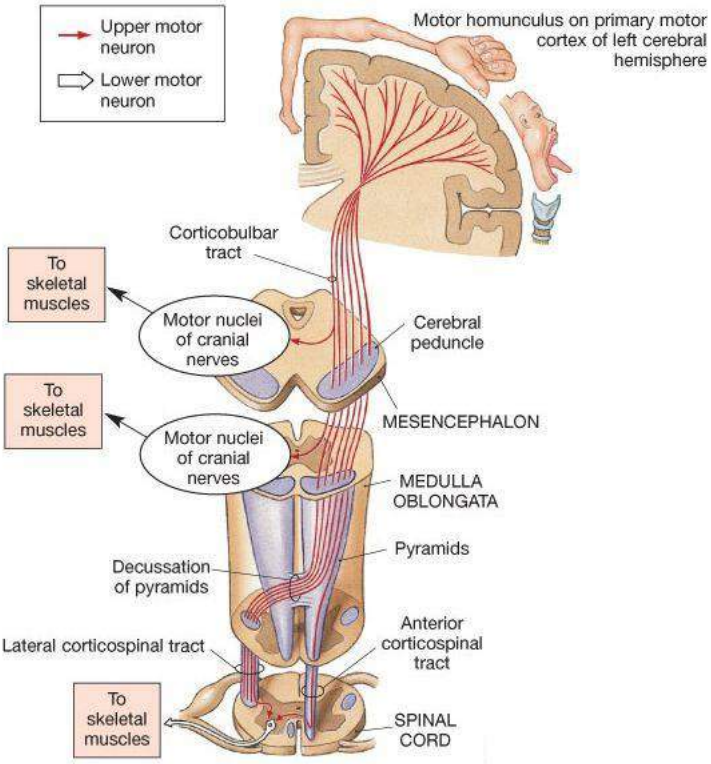


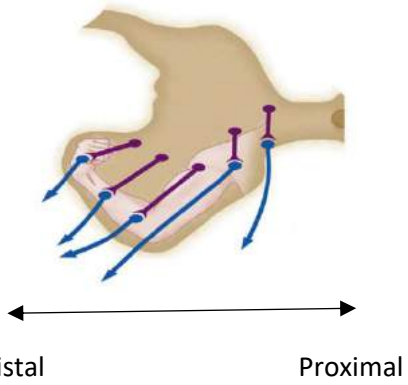
In the brain stem, neurones of the CORTICOBULBAR tract synapse with cranial nerves.

CORTICOSPINAL TRACT

Lateral corticospinal tract	Ventral corticospinal tract
• Decussates in the pyramids • Synapses with interneurons and motor neurones controlling _____ and _____	• Remains on same side • Synapses with interneurons and motor neurones controlling the _____

The corticospinal tract synapses with neurones in the ventral horn of the spinal cord. The motor neurones which innervate muscles are LOWER MOTOR NEURONES. These neurones are arranged TOPOGRAPHICALLY in the ventral horn.





Upper motor neurone syndrome	Lower motor neurone syndrome
• Increased muscle tone • Increased reflexes • Clonus (involuntary muscle contractions)	• Decreased muscle tone • Decreased reflexes

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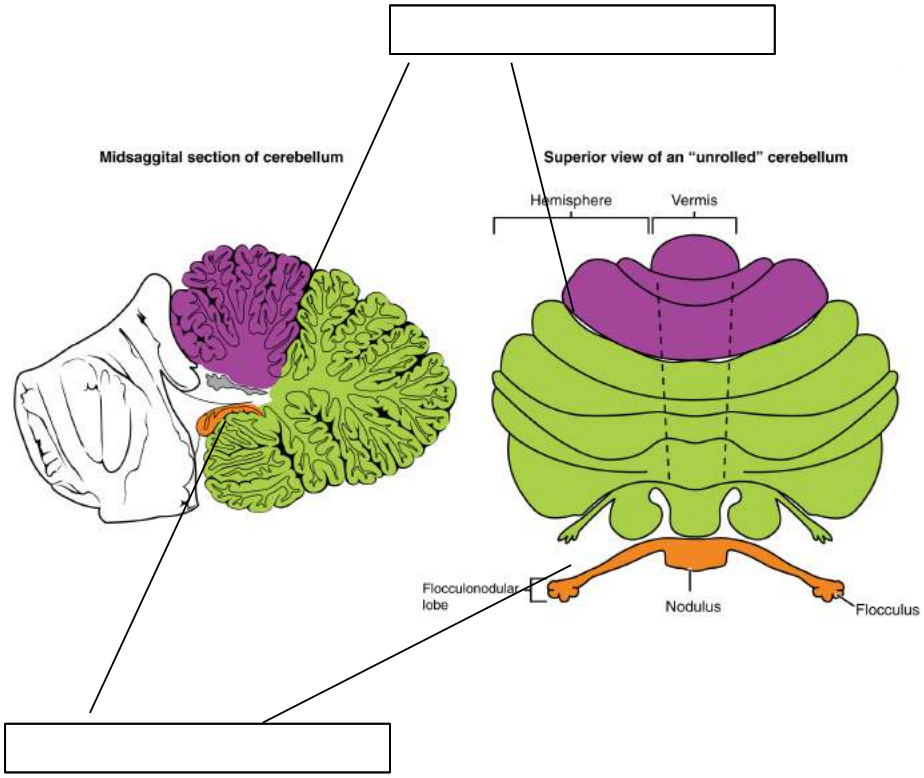
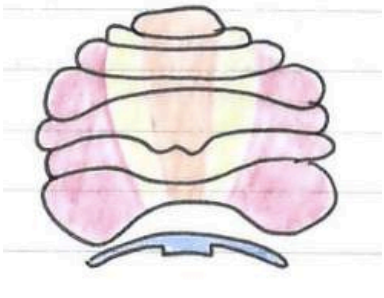
Cerebellum

ANATOMY

- 3 lobes
  1. _____ Lobe
  2. _____ Lobe
  3. _____ Lobe



- 4 zones- key for the cerebellar pathways
  1. _____
  2. _____ Zone
  3. _____ Hemisphere
  4. _____ Lobe

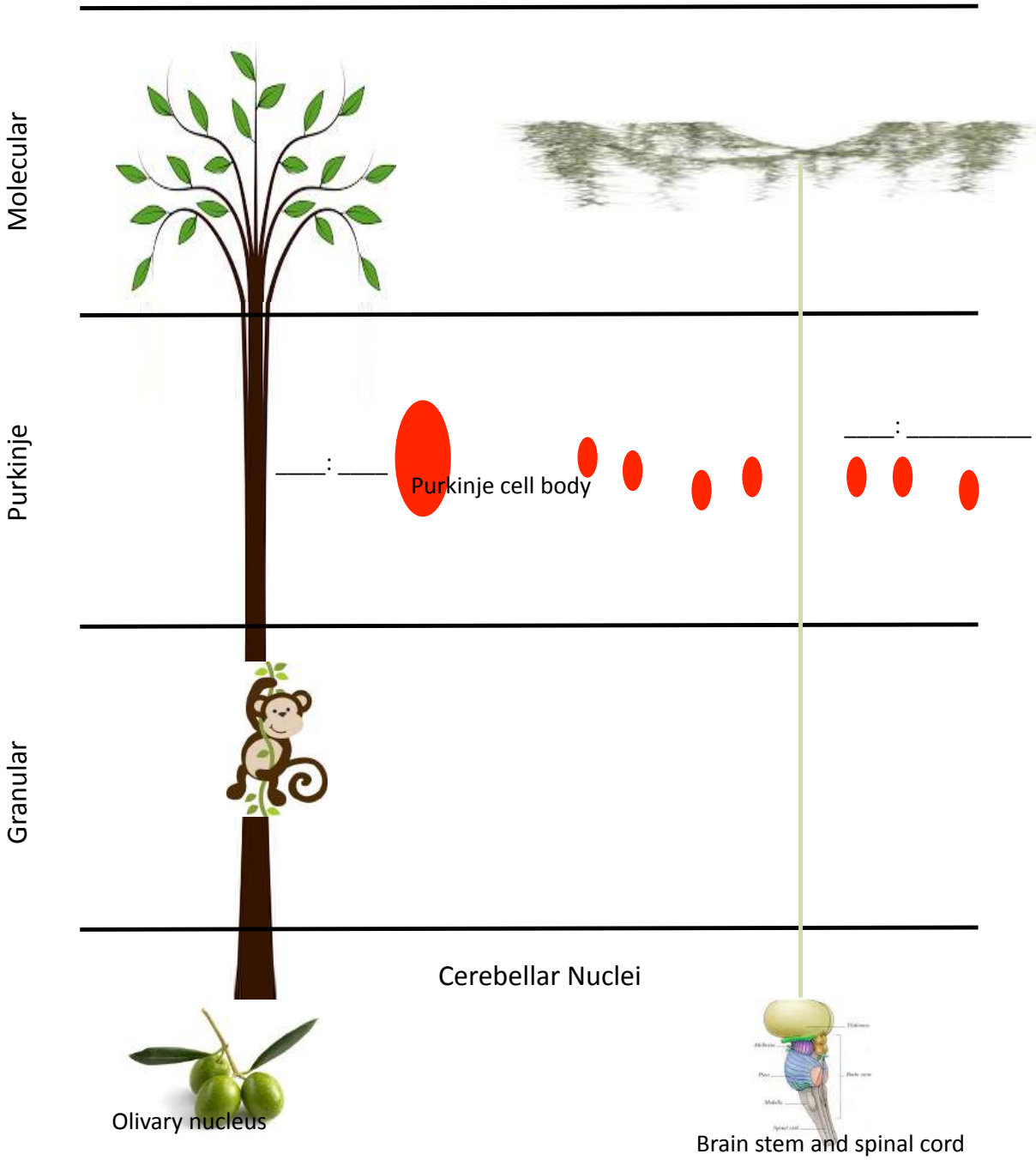


FUNCTION

Modifies and Refines movement

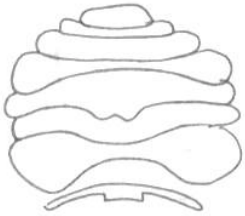
- Posture
- Balance
- Gait
- Rapid muscle movement

LAYERS AND CELLS



PATHWAYS LEAVING THE CEREBELLUM

Vestibulocerebellar
- vestibular reflex
- balance and stability



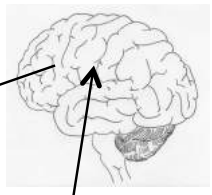
_____ peduncle

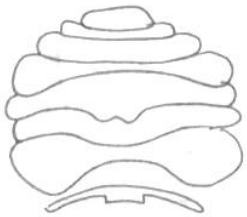
Vestibular _____

_____ Tract

_____

Cerebrocerebellar
- planning and timing movement





_____ Nucleus

peduncle

peduncle

_____ Nucleus

_____ peduncle

_____ Nucleus

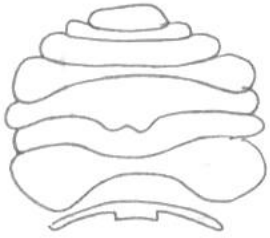
_____

(_____)

(_____)

Spinocerebellar
- integrates sensory input and motor commands

_____ Tract



Vestibular _____

peduncle

_____ peduncle

_____ Nucleus

_____ peduncle

_____ Formation

Tract

peduncle

_____ Nuclei

_____ peduncle

_____ Nucleus

Tract

_____

(_____)

(_____ tracts)