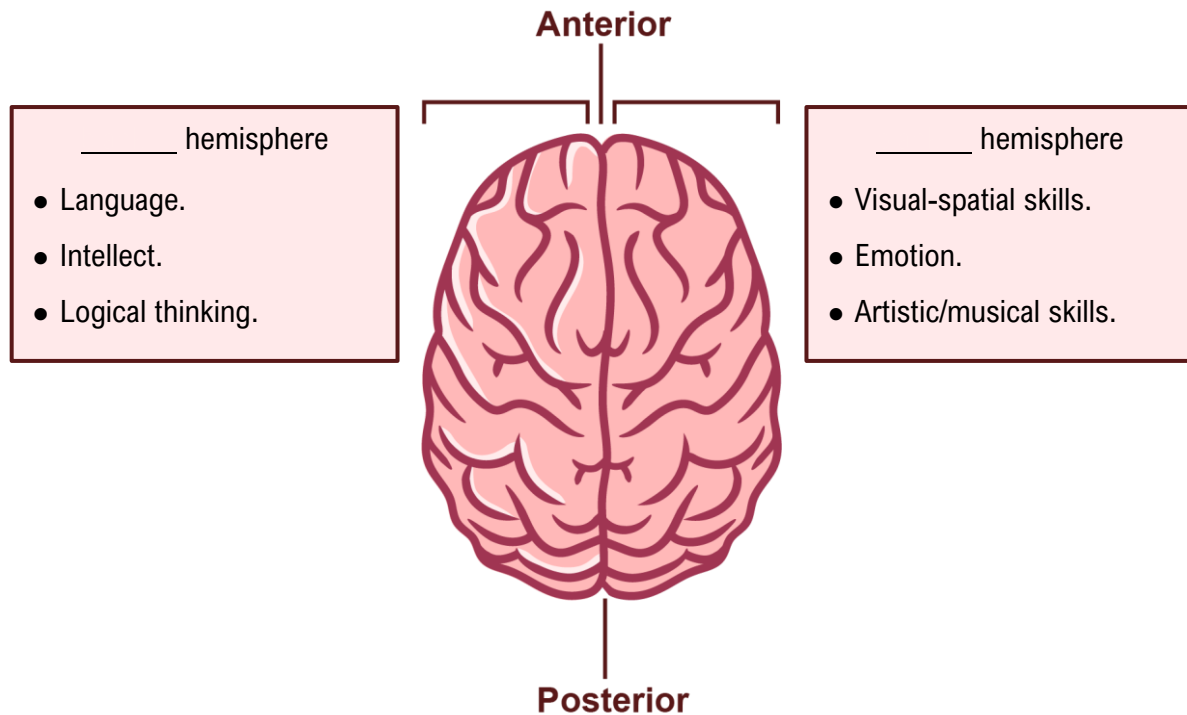


TOPIC: THE CEREBRUM

- Consists of 2 cerebral _____ spheres, making up the superior portion of the brain.
 - Responsible for many complex functions.
- **Lateralization:** Phenomenon of each hemisphere being specialized for certain functions.
- **Cerebral Dominance:** Designates hemisphere dominant for _____.
- **Contralateral Control:** Each hemisphere controls the _____ side of the body.



EXAMPLE: Aphasia is a condition that often prevents people from being able to talk. For most people, this means there is an issue with the _____ hemisphere of their brain. Sometimes people with aphasia can communicate by singing, as this primarily uses the _____ hemisphere of their brain.

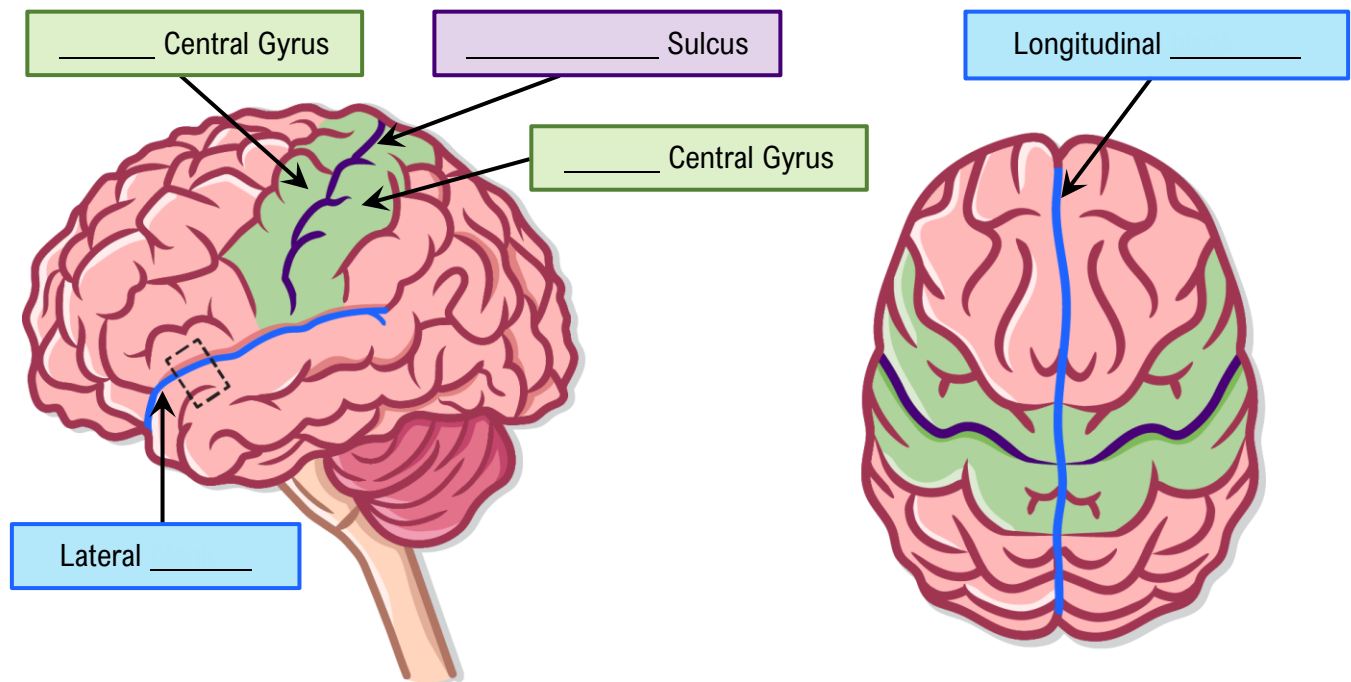
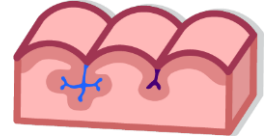
- a) Left, right.
- b) Right, left.

TOPIC: THE CEREBRUM

Important Features of the Cerebrum

- The surface of the cerebrum features prominent grooves and ridges, giving the brain its distinct “wrinkled” look.

- **Gyrus** (plural: gyri): Elevated _____ of tissue on the surface of the brain.
- **Sulcus** (plural: sulci): Shallow _____ of tissue that separates gyri.
- **Fissure:** _____ groove of tissue that separates larger regions of the brain.



EXAMPLE: Which type of matter is present in gyri and sulci on the surface of the cerebrum?

- a) Gray matter only.
- b) White matter only.
- c) A combination of gray and white matter.

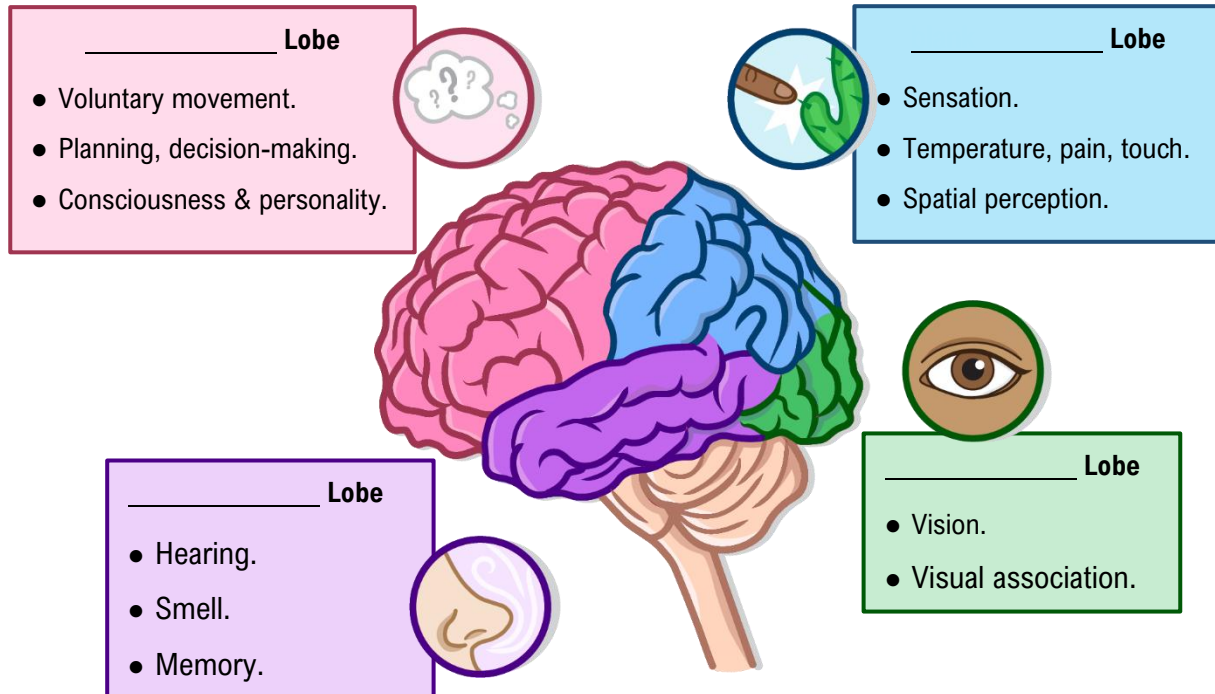
PRACTICE: The brain is divided into two cerebral hemispheres by the _____.

- a) Central sulcus.
- b) Lateral fissure.
- c) Longitudinal fissure.
- d) Precentral gyrus.

TOPIC: THE CEREBRUM

Lobes of the Cerebrum

- The cerebrum consists of _____ lobes, which are named after the respective cranial bones that overlie them:



EXAMPLE: Use the words in the word-bank to fill in the blanks and complete the sentences:

Word-Bank: Temporal Occipital Frontal Parietal

Your _____ lobe allows you to sense pain after you accidentally cut yourself, then your _____ lobe makes the decision to put on a bandage and initiates the movement to do so. The _____ lobe allows you to see where the cut is and your _____ lobe helps you remember the incident so that you can avoid cutting yourself again.

PRACTICE: The occipital lobe is found at the _____ of the brain, while the parietal lobe is found at the _____.

- a) Back, front.
- b) Bottom, top.
- c) Back, top.
- d) Top, front.

TOPIC: THE CEREBRUM

Functional Areas of the Cerebral Cortex

- Recall: The cortex is the area around the _____ edge of the brain.
- There are ____ types of functional areas in the cortex:

_____ Areas	_____ Areas	Association Areas
		
		
Voluntary _____.	Process _____ signals.	_____ processing.

- Motor & sensory areas are chiefly concerned with functions on the _____ side of the body.

EXAMPLE: Terence has suffered a brain injury and now struggles to recognize familiar faces and objects. Which type of functional area is injured, and how do you know?

- A sensory area because there is a problem with his vision.
- An association area because he's struggling to associate visual stimuli with memories.
- A sensory area because this area is responsible for processing incoming signals.
- An association area because this injury has reduced his intellectual capacity.

TOPIC: THE CEREBRUM

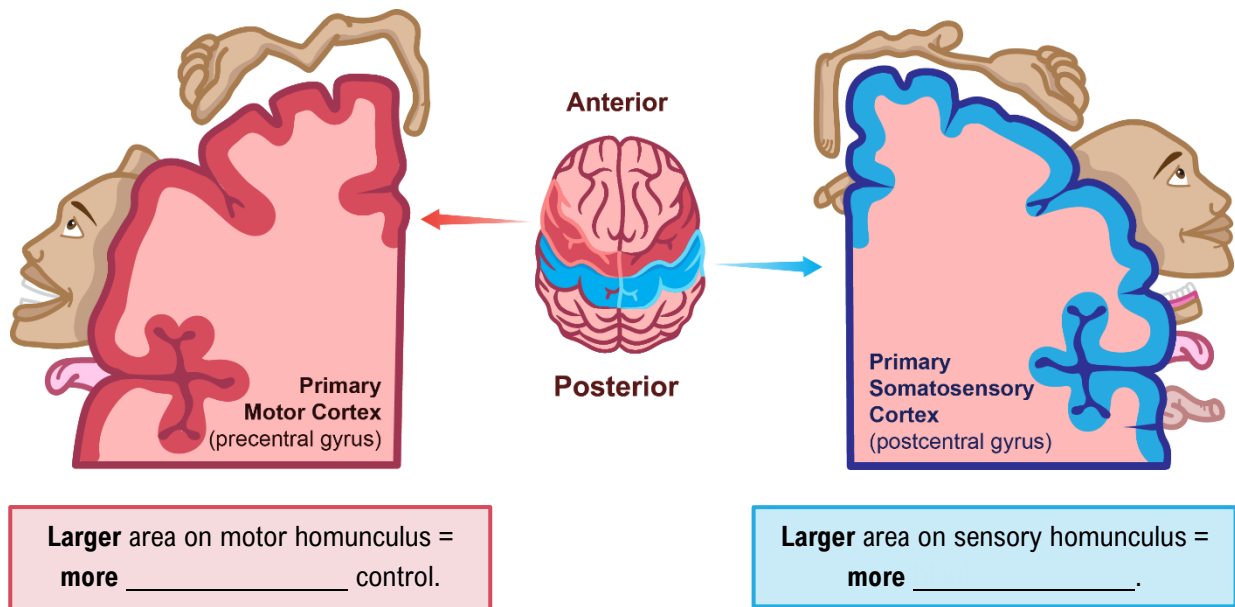
PRACTICE: A spinal reflex is a rapid, involuntary response to a stimulus. Tala has an issue with motor areas of her brain. Will her spinal reflexes still function?

- a) No, because the motor areas control all movement.
- b) No, because an issue with the motor areas is likely to prohibit the sensory areas from working.
- c) Yes, because the sensory and association areas can initiate movement when motor areas are injured.
- d) Yes, because spinal reflexes are involuntary, and the motor areas are responsible for voluntary movement.

TOPIC: THE CEREBRUM

Primary Motor Cortex & Primary Somatosensory Cortex

- **Primary motor cortex:** in the _____ gyrus
 - Responsible for initiating voluntary _____.
- **Primary somatosensory cortex:** in the _____ gyrus
 - Receives incoming signals from sensory receptors in skin, skeletal muscles, and joints.
- **Homunculus:** size of body parts is _____ to number of neural connections



EXAMPLE: The area of the primary somatosensory cortex concerned with the foot is larger than the area of the primary motor cortex concerned with the foot. What does this mean functionally?

- The foot is not particularly sensitive, and we do not have precise motor control over it.
- The foot is very sensitive, and we have very precise motor control over it.
- We have more motor connections with the foot than sensory connections.
- We have more sensory connections with the foot than motor connections.

PRACTICE: Which of the following body parts would you expect to have the greatest size difference between its area on the motor homunculus and its area on the sensory homunculus?

- Hand.
- Tongue.
- Stomach.
- Shoulder.

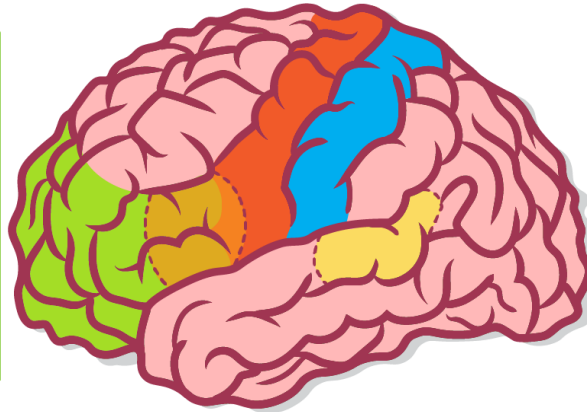
TOPIC: THE CEREBRUM

Important Areas of the Cerebral Cortex

- There are many specialized areas of the cerebral cortex; here are some that will be useful for you to know:

Prefrontal Cortex

- Most _____ part of cerebrum.
- Intellect, cognition, personality, reasoning, planning.



Wernicke's Area

- Associated with language _____.
- Found in the _____ lobe.

Broca's Area

- Associated with speech _____.
- Found in the _____ lobe.

EXAMPLE: When someone asks you “what time is it?”, the soundwaves enter your ear and information is sent to the auditory cortex in the temporal lobe. _____ area allows you to understand what the person is saying to you. Then, you use your _____ cortex to make the decision to check your watch. Finally, _____ area controls your mouth and tongue as you answer the question.

- | | |
|-------------------------------------|--|
| a) Broca's, prefrontal, Wernicke's. | c) Prefrontal, primary motor, Broca's. |
| b) Wernicke's, prefrontal, Broca's. | d) Wernicke's, primary motor, Broca's. |

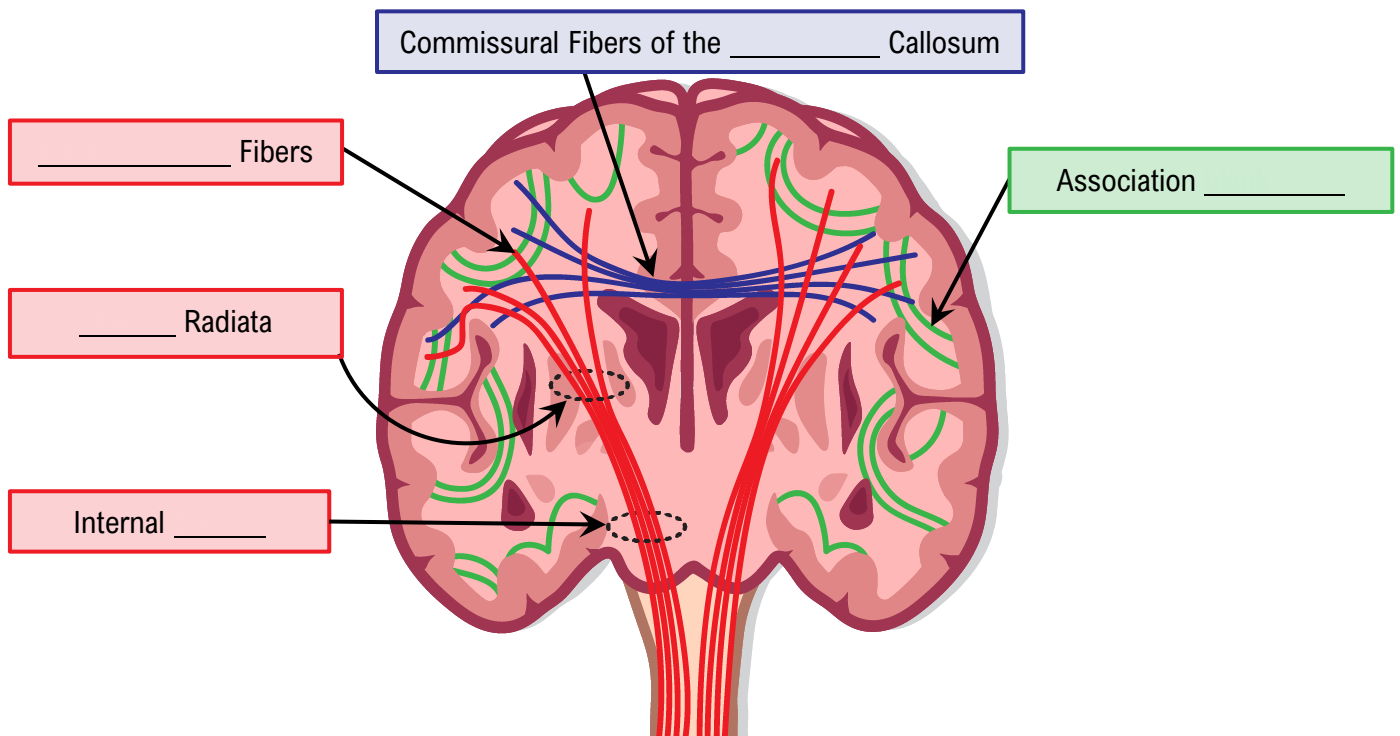
PRACTICE: The prefrontal cortex & Wernicke's area can both be classified as association areas, while Broca's area is classified as a motor area.

- | | |
|----------|-----------|
| a) True. | b) False. |
|----------|-----------|

TOPIC: THE CEREBRUM

Cerebral White Matter

- Responsible for _____ between cerebral areas and lower CNS centers.
- Classified into _____ groups based on direction they run:
 - **Association Fibers:** restricted to one hemisphere – connect cortical _____.
 - **Commissural Fibers:** connect left and right hemispheres.
 - Largest is the *corpus callosum*.
 - **Projection Fibers:** Connect _____ within one hemisphere, and parts of brain to spinal cord. Form the:
 - Corona radiata and internal capsules



EXAMPLE: Which of the following is accurate regarding association fibers?

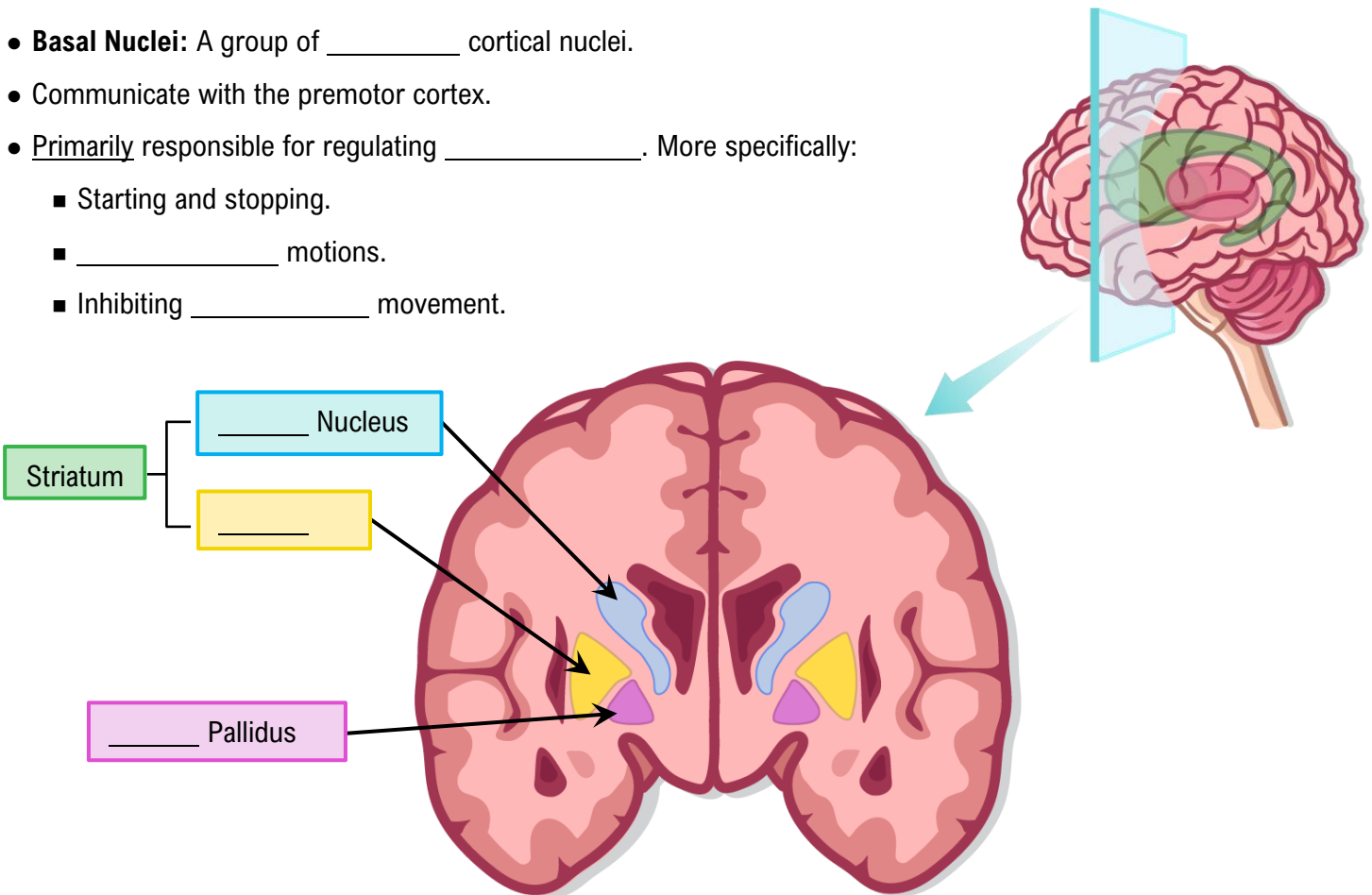
- a) They form ascending tracts that allow the cortex to communicate with the spinal cord.
- b) They are mainly used for long distance communication in the CNS.
- c) They connect different areas of the brain across hemispheres (e.g., the left and right parietal lobe).
- d) They connect different areas of the brain within the same hemisphere (e.g., left temporal lobe to left prefrontal cortex).

TOPIC: THE CEREBRUM

Basal Nuclei

- *Recall:* Nuclei are clusters of neuron cell bodies.
- **Basal Nuclei:** A group of _____ cortical nuclei.
- Communicate with the premotor cortex.
- Primarily responsible for regulating _____. More specifically:
 - Starting and stopping.
 - _____ motions.
 - Inhibiting _____ movement.

Note: Basal nuclei are commonly called ***basal ganglia***.



EXAMPLE: Which of the following statements is false?

- a) Basal nuclei are found exclusively in the cerebrum.
- b) Basal nuclei are part of the cortex.
- c) Basal nuclei coordinate with the cortex to produce smooth movement.
- d) Basal nuclei are also known as basal ganglia.

PRACTICE: Which of the following diseases would you expect might result from a dysfunction of the basal nuclei?

- a) Multiple sclerosis (MS).
- b) Guillain-Barré Syndrome.
- c) Parkinson's Disease.
- d) Alzheimer's Disease.