

SI A&P - Full Discipline Demo - Biodigital

The Central Nervous System - BioDigital

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI A&P - Full Discipline Demo - Biodigital
Course	SI A&P - Full Discipline Demo - Biodigital
Instructor	Sales SI Demo

Test Your Knowledge

Match each term with the best description.

⚡ Cerebellum	Nervous tissue containing the myelinated axons of nerve cells	1
⚡ Grey matter	Nervous tissue containing spherical-shaped nerve cell bodies	2
⚡ Temporal lobe	Structure within the limbic system that creates a pathway for sensory tracts from the eyes, ears, and spinal cord	3
⚡ Thalamus	Second largest structure of brain that functions as the integration center for movement coordination	4
⚡ White matter	Area of cerebral cortex involved in sound recognition and facial recognition	5

Correct answers:

- 1 White matter 2 Grey matter 3 Thalamus 4 Cerebellum
5 Temporal lobe

Categorize each statement as true or false.

⚡ The central nervous system consists of the brain and spinal cord.	
⚡ Meninges surround the brain but not the spinal cord.	
⚡ The brain stem functions to relay information between the brain and spinal cord.	
⚡ The cerebral cortex is the part of the brain that controls emotions, memory, olfaction, and behavior.	
True	False
1	2

Correct answers:

- 1 The central nervous system consists of the brain and spinal cord.
The brain stem functions to relay information between the brain and spinal cord.
- 2 Meninges surround the brain but not the spinal cord.
The cerebral cortex is the part of the brain that controls emotions, memory, olfaction, and behavior.

Exploration

The ____ is the primary organ of the nervous system and the most complex organ in the human body.

- ☒ brain
 - ☐ meninges
 - ☐ spinal cord
 - ☐ skull

✓

Grey matter is found in the outer layer of the spinal cord.

- ☐ True
- ☒ False

✓

The _____ lobe of the cerebral cortex is mainly involved in visual processing and interpretation.

- ☐ frontal
- ☐ parietal
- ☒ occipital
- ☐ temporal

✓

The ____ is primarily associated with emotional responses, particularly fear and aggression.

- ☒ amygdala
- ☐ hippocampus
- ☐ thalamus
- ☐ basal ganglia

✓

The ____ is a collection of highly branched neurons scattered throughout the brainstem.

- ☐ medulla oblongata
- ☐ pons
- ☐ cerebellum
- ☒ reticular formation

✓

Exercise 1

What are the functions of the spinal cord white and grey matter that was examined in this exercise?

The white matter of the spinal cord contains myelinated axons which transmit electrical impulses from cells in the body through the spinal cord. The grey matter of the spinal cord contains neural cell bodies which process nerve impulses transmitted from axons.

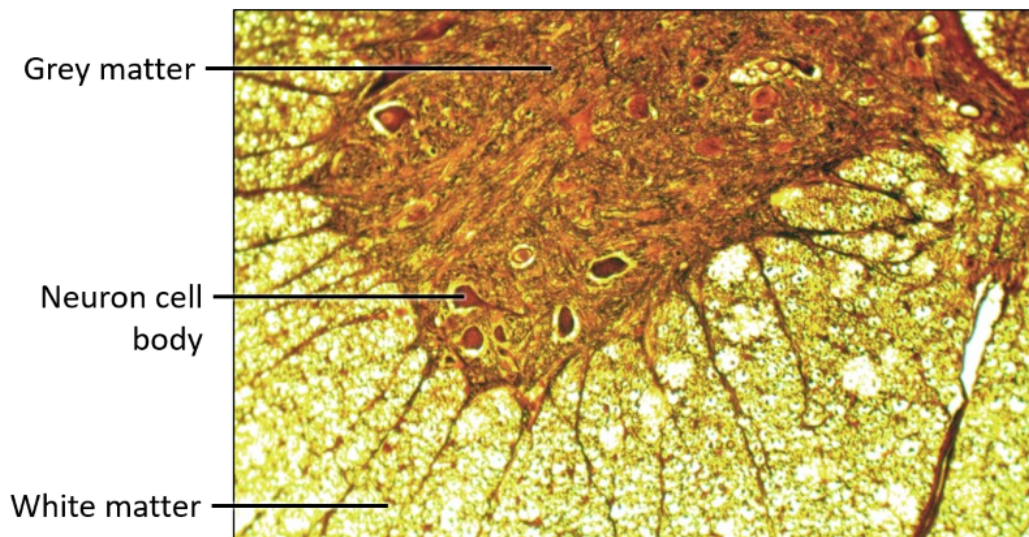
How does the location of white and grey matter in the spinal cord differ from the location of these tissues in the brain?

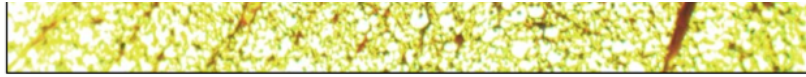
White matter occurs in the outer layer of the spinal cord but in the deep interior of the cerebrum and cerebellum of the brain. Grey matter is found in the H-shaped central area of the spinal cord but the outer cortex areas of the cerebrum and cerebellum. Grey matter is also found in the brainstem.

Data Table 1: Microscopic Examination of Spinal Tissue
(SAMPLE ANSWER BELOW)

Slide;	Magnification	Comments
Spinal Cord, CS	100x (V-scope = 150x)	Students should only comment if they cannot identify white matter, gray matter, or a neuron cell body.

Photo 1: Spinal Cord, Cross Section
(SAMPLE ANSWER BELOW)





Exercise 2

What are the functions of the limbic system? Which of the modeled structures in Part 2 of this exercise are part of the limbic system?

The limbic system is the part of the brain that controls emotions, memory, olfaction, and behavior. The thalamus and hypothalamus modeled in Part 2 of this exercise are part of the limbic system.

What is the function of the corpus callosum? Where would it be located on your model if you created it?

The corpus callosum connects the left side of the cerebrum to the right side of the cerebrum and allows the hemispheres to communicate. The corpus callosum would have been located in the longitudinal fissure between the hemispheres of the cerebrum on the model created for this exercise.

Photo 2: Virtual Model Brain
(SAMPLE ANSWER BELOW)

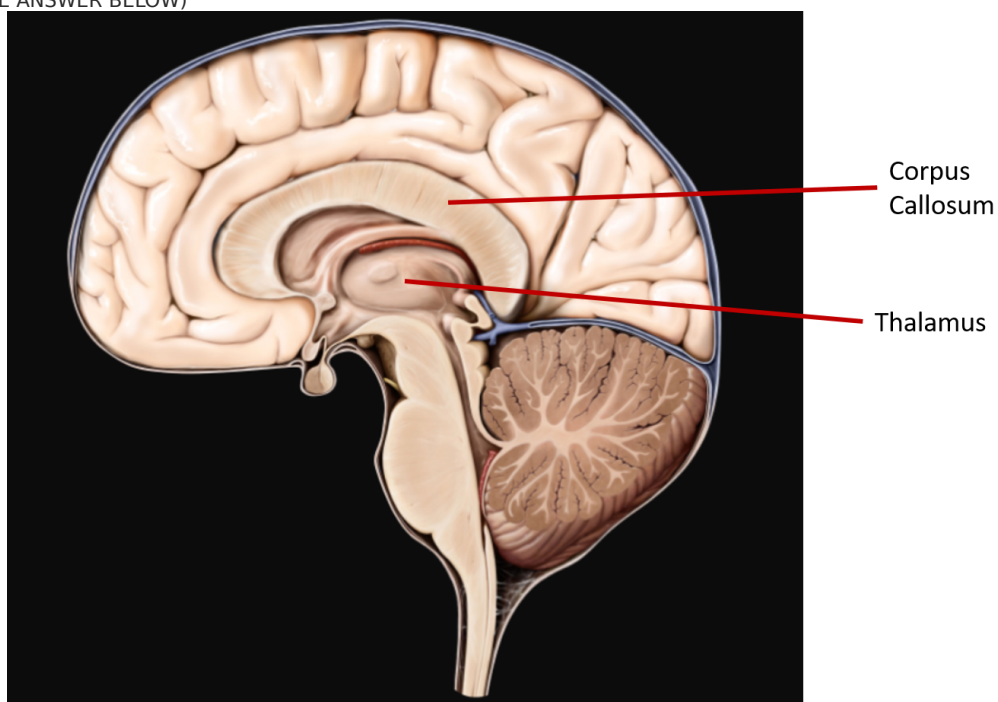


Photo 3: Cerebrum Model - Lateral View Model
(SAMPLE ANSWER BELOW)

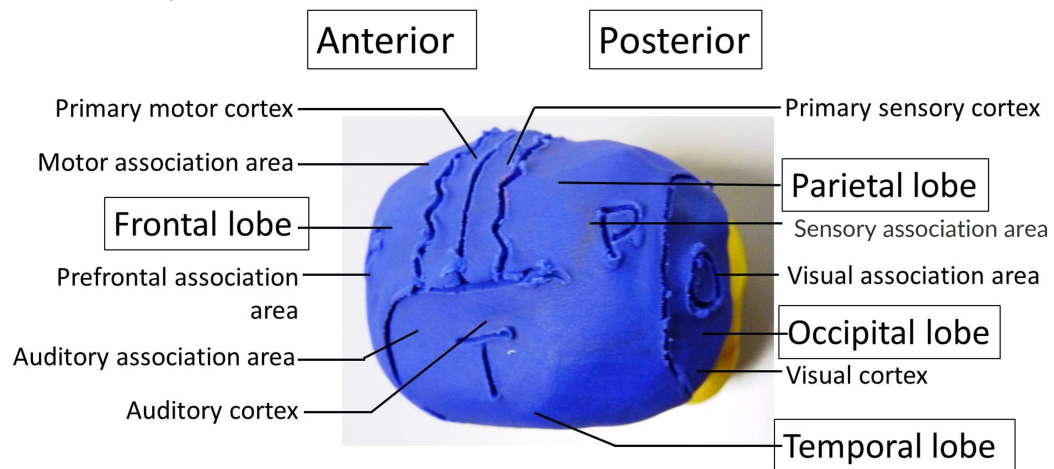


Photo 4: Cerebrum Model - Superior View Model
(SAMPLE ANSWER BELOW)

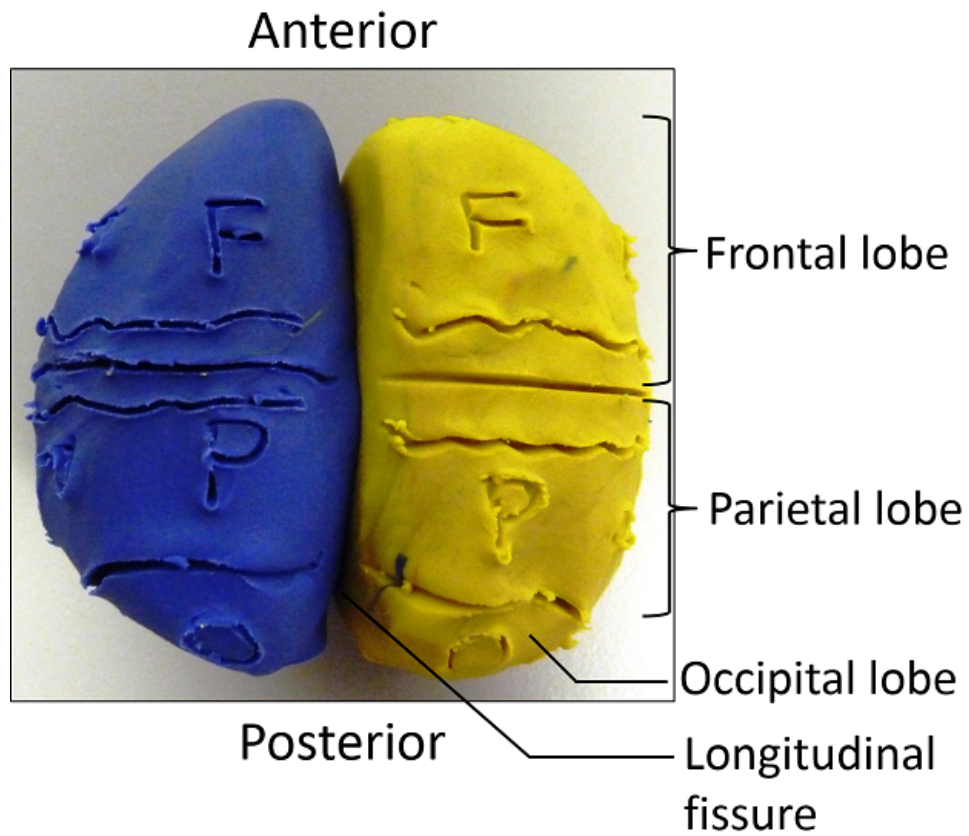


Photo 5: Diencephalon and Cerebellum Model
(SAMPLE ANSWER BELOW)

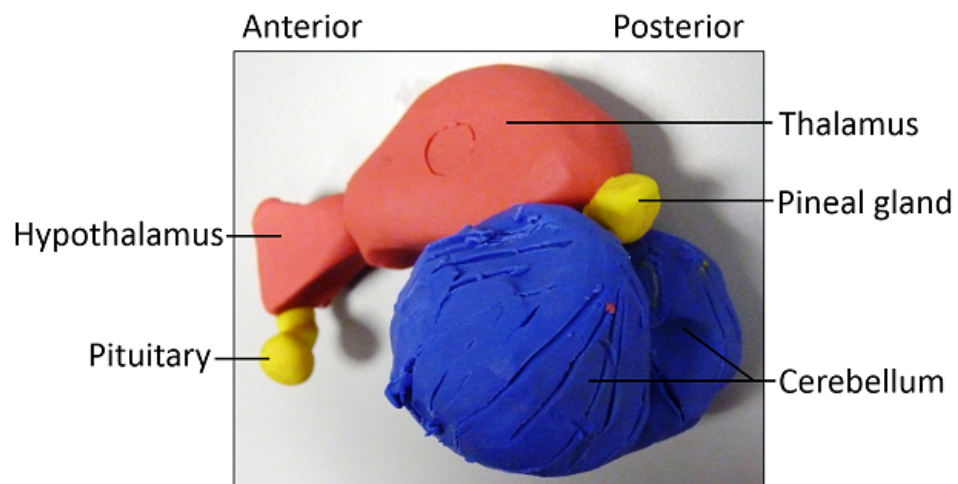
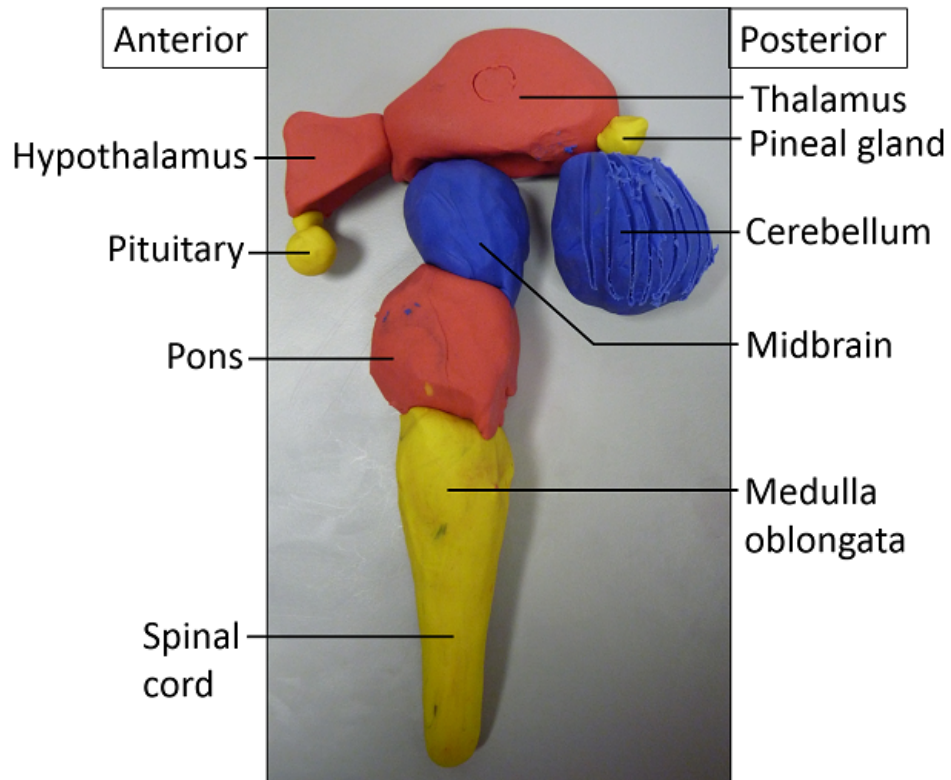


Photo 6: Brain Stem Model
(SAMPLE ANSWER BELOW)



Exercise 3

Where are the choroid plexuses found, and what is their function?

The choroid plexuses are found lining the ventricles. Their function is to secrete cerebrospinal fluid, which is a fluid that physically and chemically protects the central nervous system.

Describe the folding of the cerebrum in the human brain. Why are the folds important?

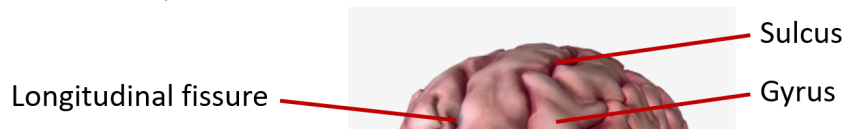
There is a great amount of folding on the cerebrum of the human brain. The folding is important because it allows for a larger surface area of the cerebrum, which otherwise would not be able to develop as much as it currently does and still fit inside the skull.

What is the name for the part of the brain not displayed on this model that is located between the cerebrum and the brain stem? What is its function?

The diencephalon. It is responsible for the integration of sensory and motor information, behavioral drives, and hormone secretion.

The left putamen is one of the structures that comprises what component of the brain?

Photo 7: Brain Surface Structures
(SAMPLE ANSWER BELOW)



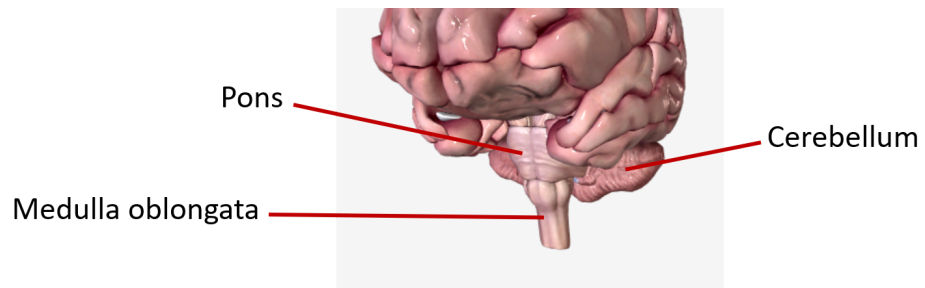
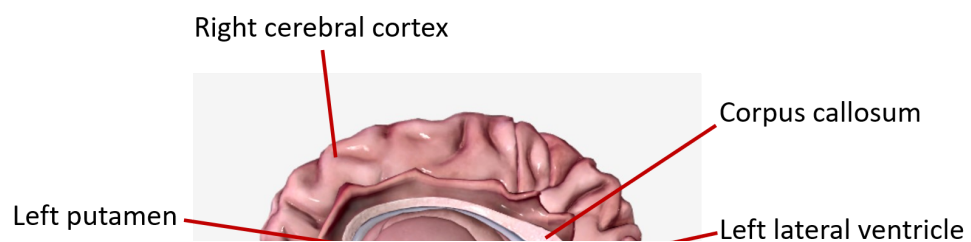


Photo 8: Brain Internal Structures Part 1
(SAMPLE ANSWER BELOW)



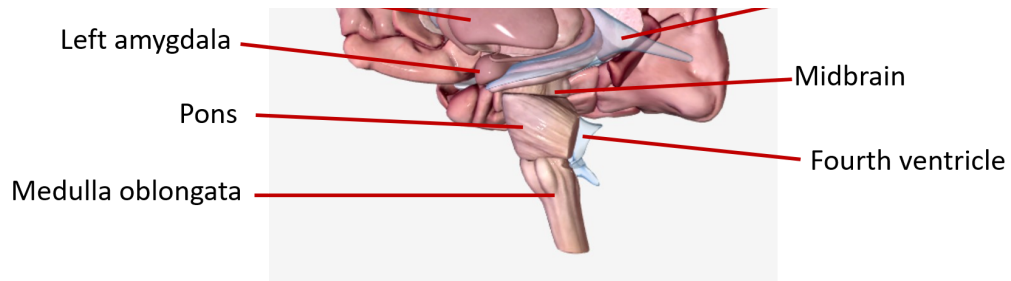
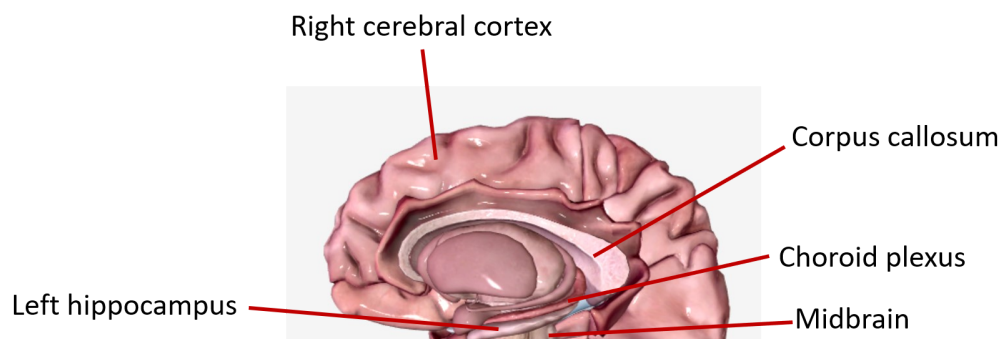
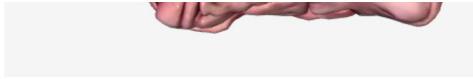


Photo 9: Brain Internal Structures Part 2
(SAMPLE ANSWER BELOW)





Competency Review

The spinal cord conducts signals to and from the brain and controls reflexes.

- ☒ True
- ☐ False



The brain and spinal cord are surrounded by a series of protective membranes called ____.

- ☐ grey matter
- ☐ basal ganglia
- ☒ meninges ✓
- ☐ medulla

White matter is found deep within the cerebrum and the cerebellum of the brain as well as the outer layer of the spinal cord.

- ☒ True ✓
- ☐ False

White matter contains the myelinated ____ of nerve cells which function for signal transmission.

- ☒ axons ✓
- ☐ dendrites
- ☐ soma
- ☐ organelles

The ____ of the cerebral cortex is mainly involved in speech and language, emotions, and decision making.

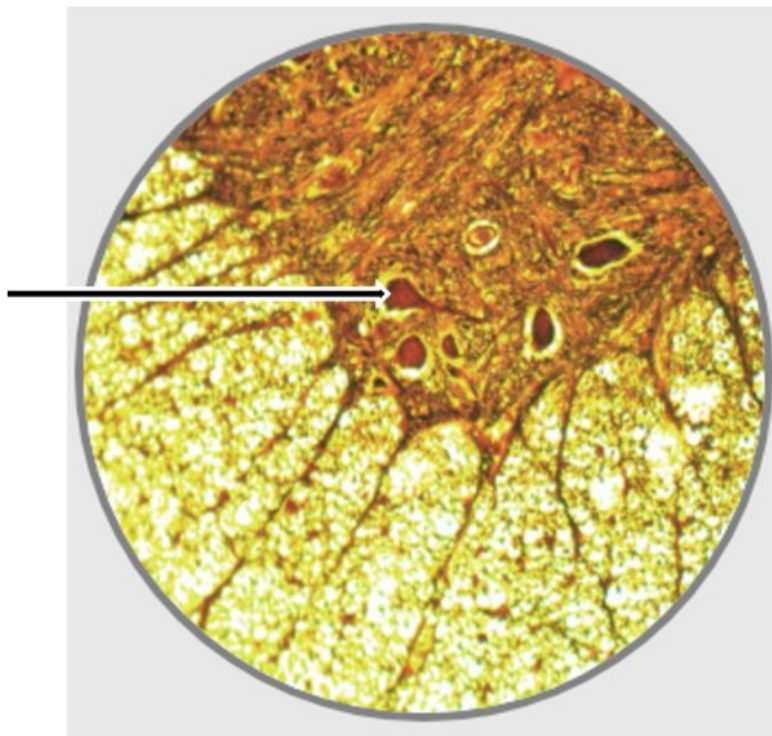
- ☐ occipital lobe
- ☐ medulla oblongata
- ☐ thalamus
- ☒ frontal lobe ✓

The ____ creates a pathway for sensory tracts from eyes, ears, and spinal cord that move toward the cerebrum.

- ☐ hypothalamus
- ☒ thalamus
- ☐ cerebellum
- ☐ pons

✓

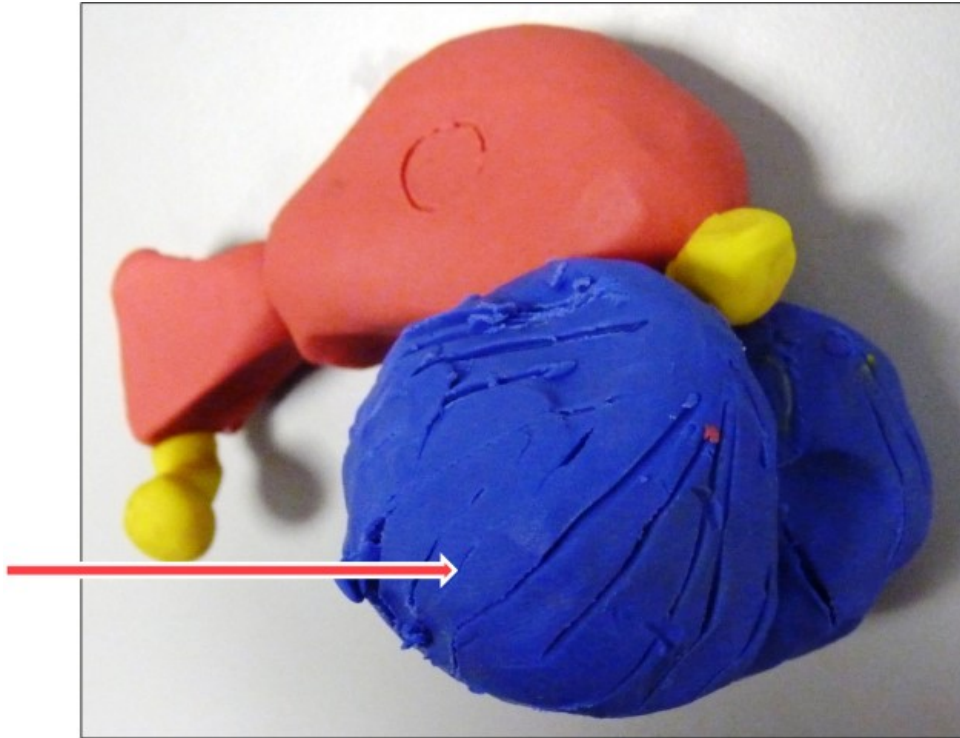
The arrow in the image of a spinal cord cross section micrograph below indicates ____.



- ☐ white matter
- ☐ an axon
- ☒ a neuron cell body
- ☐ a meninges

✓

The arrow in the image of a modeled diencephalon and cerebellum below indicates the ____.



- ☒ cerebellum
- ☐ thalamus
- ☐ temporal lobe
- ☐ pituitary gland



Extension Questions

A contusion is a brain injury resulting from bruised nervous tissue due to an impact to the skull. Two accident victims are admitted to the ER suffering from brain contusions. Patient A has a marble-sized bruise to the frontal lobe of the cerebrum, while Patient B has a similarly sized bruise to the cerebellum. Which patient will most likely require support while sitting or standing? Explain your answer by referencing the functions of the damaged portions of each patient's brain. (SAMPLE ANSWER BELOW)

Patient B would most likely require support when sitting or standing because the cerebellum functions as the integrating center for movement coordination. By contrast, the frontal lobe of the cerebrum functions for speech and language, decision making, and an individual's personality.