



Grade 8 Sample Lesson Plan: Body Systems – Brain Surgery

SOLs

- 8.1 A
- 8.3 A

Objectives/Goals

- Students will identify and describe the major structures and functions of the brain.
- Students will identify and describe the major structures and function of the nervous system.
- Students will demonstrate their understanding of how different health behaviors impact these structures and functions (for better or for worse).
- Students will understand unique aspects to the teenage brain and its development.

Materials

- 1 – Play-doh (different colors), pins (thumb tacks), paper to cut into small strips for labeling, plastic straws (to create myelin sheaths), scissors to cut straws, iPad or chromebook to document work with a photograph.
- 2 – Handout: Structures and Functions (option: cut into pieces so students can match)
- 3 – Handout/Assessment: Brain Surgery
- 4 – Article - [Decoding The Teenage Brain \(3 Charts\)](#)

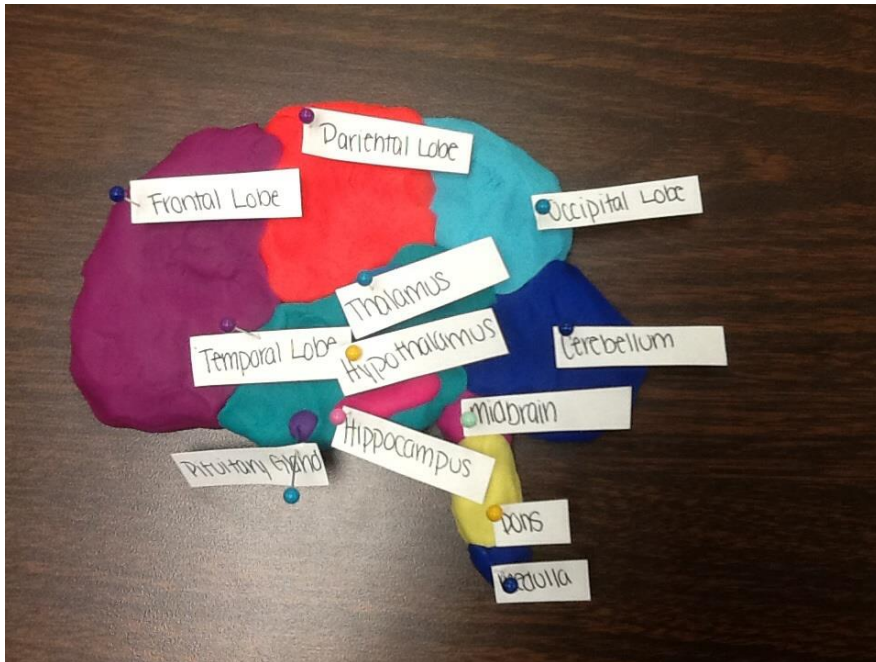
Procedure

Step 1

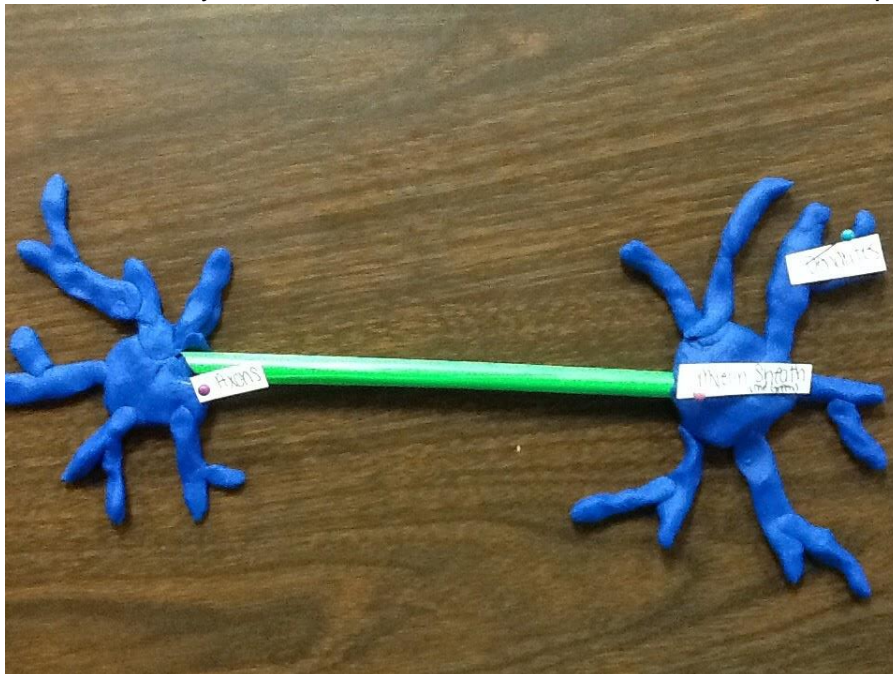
- A – Explain to students: *You will be learning about the brain and nervous system today. Working in small groups of 3-4, your task will be to figure out what each structure does and research where it is located in the brain.*
- B – As the teacher, decide if you have time for students to research each structure and function using the Internet (accessing information skill) or provide them with the handout entitled “Structures and Functions.” You could cut these up and have students try to match the structure to the function. They might have to perform some research on the ones they do not know.

Step 2

- A – Once students have an understanding of each structure and function, they will attempt to create a “brain model” using Play-doh. Task 1 is to create a model of an unchanged brain and neuron and take a photo of their model. (see image below)



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- B – From here you could have students create neurons and take a photo. (see image)



Step 3

- A – Once students have a Play-doh model of a healthy brain and healthy neuron (photos taken) have them pick TWO or assign them TWO questions about *What happens to the teenage brain when...*
 - *A person does heroin?*
 - *A person does marijuana?*
 - *A person on sugar?*
 - *A person suffers from depression?*

- *A person is stressed out?*
 - *A person drinks alcohol?*
 - *A person falls in love?*
 - *A person exercises?*
 - *A person has a concussion?*
 - *A person meditates?*
- B – Have students manipulate their “healthy brain and photograph each manipulation and explain what happened to the brain. You could have students use Explain Everything, Notability, Google docs, Google slides, or an app of your choice to record their work. Have them finish the “Brain Surgery” handout and insert their pictures within the document.

Step 4

- A – An extension to the activity might be to have them read the article “Decoding the Teenage Brain” and have them write a reflection about what they have learned. Questions might include:
 - *Why do teenagers take more risks when they are with friends than when they are alone?*
 - *What does it mean when the article mentioned “the teenage years are the last, great neuroplastic era in our lifetimes.”?*
 - *How does understanding your brain and how it works now as teenagers impact your health around ideas like peer pressure and self-regulation?*

Assessment Idea

- Using Explain Everything, Notability, Google docs, Google slides, or an app of your choice to record their work. Have them finish the “Brain Surgery” handout and insert their pictures within the document.
- Students can share to the class their findings to the two questions about *What happens to the teenage brain when...*
- Students can complete a self-reflection and answering questions to the article Decoding the Teenage Brain.

References

- [Mayfield Clinic – The Brain](#)
- [Decoding The Teenage Brain \(3 Charts\)](#)
- Credit Mary Wentland, High School Health Teacher, for some of these ideas

Handout

The next page includes a handout for the lesson. The handout is designed for print use only.

Brain Surgery

Your task is to identify each structure of the brain and nervous

system by matching the term with its function (see cut out strips of paper). You might have to research terms you are not sure about.

Next, make the brain out of Play-doh and label it with pins. Most of the terms below you should be able to make using Play-doh

- Cerebrum/Cerebellum
- The Lobes (Frontal, Temporal, Parietal, Occipital)
- Limbic System
- Thalamus
- Hypothalamus
- Amygdala
- Hippocampus
- Pituitary
- Mid Brain
- Pons
- Medulla
- Neurons
- Dendrites
- Axons
- Myelin Sheath
- Acetylcholine
- Dopamine
- Serotonin
- Neurotransmitters
- Synapses
- Endorphins

“Healthy Brain” (insert a picture of your play-doh model below)

“Healthy Neuron” (insert a picture of your play-doh model below)

Now, research and answer TWO of the questions below (your teacher may assign you these). **Circle your two questions.**

What happens to the teenage brain when . . .

- A person does heroin?
- A person does marijuana?
- A person on sugar?
- A person suffers from depression?
- A person is stressed out?
- A person drinks alcohol?
- A person falls in love?
- A person exercises?
- A person has a concussion?
- A person meditates?

Answer for Question #1

Answer for Question #2

Based on the information you have learned, please manipulate your healthy brain model and photograph each manipulation and explain what happened to the brain.

Picture for Question 1

Picture for Question 2

Brain & Nervous System Structures and Functions

Central Nervous System (CNS)	Brain and Spinal Cord are parts of this nervous system division.
Peripheral Nervous System (PNS)	Spinal nerves that extend to the face, arms and legs are part of this nervous system division.
Sympathetic Division	The nervous system known for “fight or flight” response.
Parasympathetic Division	The nervous system known for “rest and digest.”
Brain stem	Part of CNS – controls “vital signs” such as heart rate and breathing.
Cerebellum	Part of brain responsible for balance and control
Frontal lobe	Part of brain associated with decision making, executive function, and motor commands
Occipital lobe	Part of brain associated with vision
Temporal lobe	Part of brain associated with hearing, memory, and speech comprehension

Parietal lobe	Part of brain which integrates vision, touch, and motor information
Limbic system	Part of brain associated with emotions and memories
Hypothalamus	Part of brain associated with the body's hormones and regulating hunger
Amygdala	Part of the limbic system and is associated with emotion related to excitement, arousal, fear and social cues
Hippocampus	Part of limbic system associated with forming new memories, fear, and spatial memory
Pituitary	A pea-sized gland located in the brain near the hypothalamus, in charge of various hormone production
Mid Brain	Part of brain stem involved in functions such as vision, hearing, eye movement, body movement, and voluntary motor function
Pons	Part of brain stem involved in motor control and sensory analysis, important for sleep
Medulla	Part of brain stem responsible for maintaining vital body functions such as heart rate and breathing

Neuron	The nervous system cells that are the brain’s “communicators”
Dendrite	Part of a neuron that receives signals from other neurons
Axon	Part of a neuron that carries signals to other neurons
Myelin Sheath	The insulating covering that surrounds an axon, helps protect nerves and improve speed of signaling
Acetylcholine	Chief neurotransmitter of the PNS, helping body calm and balance flight or fight response.
Dopamine	Neurotransmitter associated with pleasure and reward, plays important role in motivation, emotions, and addiction
Serotonin	Neurotransmitter that helps regulate mood, appetite, memory, and sleep. Low serotonin is linked to depression
Neurotransmitter	The molecule that neurons use to communicate with each other

Synapse	The communication transfer arrangement b/w presynaptic & postsynaptic membranes separated by a gap or cleft
Endorphin	Group of hormones secreted in brain and nervous system. Things like stress and exercise can stimulate the release of these “natural pain killers”