



Classroom Teacher Preparation

Anatomy/Physiology 20: Experimenting with Our Brains

Please use the following to prepare for the next SfS lesson.

Description:

The human brain is highly adaptable system. This activity demonstrates how the brain learns to adapt to an altered situation. Students divide into small groups and learn to toss beanbags at a target while wearing prism goggles. They then remove the goggles and “unlearn” the task. Students collect data from these experiments and interpret it in the context of their brain’s adaption and subsequent communication with sensory and motor systems.

Lesson Objectives – SWBAT (“Students Will Be Able To...”):

3rd-8th

- Collect, analyze, and interpret data to identify the relationship between sensory and motor memory
- Describe how neurons constantly adapt and communicate information to the human body

Disciplinary Core Idea (DCI)

LS1 From Molecules to Organisms: Structures and Processes – LS1.D Information Processing

- (3rd-5th) Different sense receptors are specialized for particular kinds of information; Animals use their perceptions and memories to guide their actions.
- (6th-8th) Each sense receptor responds to different inputs, transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behavior or memories.

Science & Engineering Practice (SEP)

Analyzing and Interpreting Data

- (3rd-5th) Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.
- (6th-8th) Analyze and interpret data to provide evidence for phenomena.

Crosscutting Concept (CCC)

Systems and System Models

- (3rd-5th) A system can be described in terms of its components and their interactions.
- (6th-8th) Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems.

Preparation:

It is suggested that this lesson be paired with and taught after *AP19: What's In My Head*, which introduces neurons.

Room Set Up for Activities:

Students will work in groups of 3-4 (up to 8 groups possible). Each set-up will require ~8 feet of space from starting point to target. Desks may need to be moved to create floor space.



Safety:

Students should calmly toss the beanbags at the target underhand. You may still need to watch out for flying beanbags (especially during the goggle rounds!)

Related Modules:

This lesson may be taught as part of a sequence or group of related modules on **Function & Dissection**. Other modules in this sequence include:

Anatomy/Physiology 19: What's in My Head & Anatomy/Physiology 18: The Mammalian Brain – Students will receive an introduction to the human nervous system (NS), the human brain, and its functional units, the neurons, and observe a sheep brain.

Anatomy/Physiology 13: Structure of the Human Eye & Anatomy/Physiology 14: Eye Dissection - Students will learn about the physiology and function of the human eye, and dissect a sheep eye.

Anatomy/Physiology 15: Heart Dissection & Anatomy/Physiology 16: Heart Health - Students will learn about the essential functions of the cardiovascular system and dissect a sheep heart.

Anatomy/Physiology 10: Frog Dissection - Students dissect a preserved frog in order to observe the external and internal structures of frog anatomy.

For other module sequences and groups, look here: www.sciencefromscientists.org/sequences

Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state: www.sciencefromscientists.org/standards/

Lessons are matched to both national NGSS and local state standards.

After Our Visit:

Extend this lesson by putting students' declarative memory (which uses the hippocampus and cerebral cortex of the brain) to the test in this memorization challenge.

Access this Extension activity by visiting the Classroom Post found on our website at sciencefromscientists.org/cohorts. Use the name of your school/cohort and password to log in.

To help Evaluate, check out our Open Response questions online at sciencefromscientists.org/open-response-questions. They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

Additional Resources:

- Science Trek, The Brain (2:39): <https://www.youtube.com/watch?v=wiVft5eIL-E>
- BBC "Upside down world." A man learns to do simple tasks and eventually ride a bike wearing goggles that make the world appear upside down: <https://www.youtube.com/watch?v=-kohUpQwZt8>
- SciShow Kids, "Use Your Brain" (4:36): <https://www.youtube.com/watch?v=b79xio8qgiY>
- "The Man Who Couldn't Remember" – An interview with Dr. Suzanne Corkin, a neuroscientist who worked with patient H.M.: <http://www.pbs.org/wgbh/nova/body/corkin-hm-memory.html>

