

**Title:** Nervous System

Introduction: In this lesson, students will study several major organs that function as part of the nervous system. Students will enjoy games, music, video, and interaction as they learn about the nervous system and how it functions in the body.

**Learning Outcomes:**

The student will be able to describe the function of the brain, spinal cord, and nerves after modeling each body part's job in the nervous system.

The student will demonstrate that the nervous system is responsible for communication between different body parts, detecting stimuli in the body, and directing the body's responses.

**Curriculum Alignment:****Fifth Grade Science Essential Standards**

5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.

5.L.1.2 Compare the major systems of the human body (digestive, respiratory, circulatory, muscular, skeletal, and cardiovascular) in terms of their functions necessary for life.

**Fifth Grade Reading Common Core****Informational Text (Craft and Structure)**

Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

**Fifth Grade Informational and Technology Essential Standards**

5.IN.1 Analyze appropriate strategies when reading for enjoyment and for information.

5.TT.1 Use technology tools and skills to reinforce and extend classroom concepts and activities.

**National Science Standards (5-8)**

Standard A : Science as Inquiry : Students develop abilities necessary to do scientific inquiry. Students develop understandings about scientific inquiry.

**Classroom Time Required**

This lesson will take two 45/50 minute sessions.

**Teacher Preparation**

Day One:

The teacher will need to have a plan for moving desks for the two main activities today. In addition, students will need the handouts from the last two slides of the *Interactive Nervous System* document. For the model system, teachers need to prepare enough cards with body part names to insure that each child has a location in the model. (one brain, everyone else is either the spinal cord, or a nerve) The Smart lesson image (slide 4) may need to be modified if teachers have varying numbers of students so all students will know where to sit on the floor.

Day Two: The teacher will need to have access to a laptop for pairs of students, or schedule time in a computer lab for students to access the Smart Notebook files. In addition, the students will need copies of the questions that accompany the web quest. (attached) Students and teacher will need internet access to model and complete the internet research necessary. The teacher will need to place the Smart file on the laptops, or on a school server so that students can have access.

Before using the entire unit, the teacher should make sure the links for Day 2 of each lesson are still active and working. The links are located in the Smart lesson and are indicated on each slide. Please check by clicking on the noted area and see if you are redirected to the correct website. If by some chance, a link does not work- changes would need to be made to match the questions on the worksheet.

### **Materials Needed**

Day One: The teacher will need a stop watch, student handout (slides 6 from *Interactive Nervous System*), body part name cards (BRAIN, NERVE, SPINAL CORD), room for students to spread out and be active, and a video player.

Day Two: The teacher will need to have access to a laptop for pairs of students, or schedule time in a computer lab for students to access the Smart Notebook files. In addition, the students will need internet access to complete the internet research necessary.

### **Technology Resources**

For Day 1 of the lesson, the teacher will need a Smart Board or Smart software to show interactive documents and a method to show a video on You Tube or from their personal VHS or DVD copy of School House Rock/ Science Rock "Telegraph Line" .

For Day 2 of the lesson, the students will need to either be able to use a laptop individually, with a partner, or have access to a computer lab. Students need to have Smart Notebook 10 software on the computers they are accessing, because the lesson is a Smart interactive lesson.

### **Pre-Activities for Students:**

**\*\*This lesson is one of five human body lessons, and the "prior knowledge" activity could be used before any of the systems were taught. There is not a particular order for the systems to be taught, so the Circle Map would be done at the beginning of the Human Body Unit of study, before the FIRST**

system. It is not necessary to repeat this before each system, but students could be encouraged to add to their maps as part of the closing each day, then additions could be discussed prior to the start of each new system.

**Prior Knowledge:** Students should be introduced to the concept of the human body as many different parts that work together. Creating a Circle Map (slide one of the *Interactive Nervous System Slides*) to assess what students already know about the human body would be a great pre-lesson activity. This allows the teacher to be aware of what concepts, vocabulary, and possible misconceptions students may have before starting the unit.

**In order to build curiosity and interest, the following introductory activity was planned. It is not a time to teach content, just an experience to gain preliminary exposure to concepts.**

Day 1: Before starting the activities below, have students move their desks to the perimeter of the classroom so they have lots of room to sit in a circle and move around. Start discussion by asking students if they have ever played the game “Telephone” where children send a verbal message around a group and then listen and laugh at what the message ends up being. If students are not familiar with this game, you could take a minute to play it once and discuss how the message got around the circle.

Students will need the handout with the chart, (the last slide in the *Interactive Nervous System* document) a pencil, and something to write on since they are sitting on the floor.

### **Activities**

#### **1. Exploration: The Big Squeeze**

This activity is from the site <http://yucky.discovery.com/teachercenter/pg000064.htm>

Have the class sit on the floor, cross-legged in a circle. Assign one person to sit out and use a stop watch or second hand and time the activity. Start the game by having one person squeeze the ankle of the person to his or her right. Each person “passes” the squeeze to the next person as soon as they feel their own ankle get the squeeze. Continue this around the circle and stop the timer when the first person gets the squeeze back last. Allow students to record time in their charts. Divide the total time it took for the squeeze to go around the circle by the number of people in the circle to find the average time it takes for the impulse to go from the ankle to the brain and be processed into a reaction. Students will repeat this same activity with their eyes closed and record data. Allow students to voice their predictions about what will happen each time and why they feel that way. Once students have done the activity squeezing ankles twice, they will move to squeezing hands with their eyes open and then closed. Students will record all data collected in their charts. Discuss data collected and ask students to talk about why they think the results were what they were.

### **Model System**

**(Introduce learning objective to students here.)**

Share what the learning targets are for today's lesson. Explain that we are going to create a Nervous System using students as different body parts (brain, spinal cord, and nerves.)

Students will each be given a card. The card will tell them what body part they are. The students will get into a formation shown on the Smart Board displaying the body parts. Teachers may want to color code cards for visual organization and have a special way to select the brain since this is a prime location! 😊

Once students know their body part, explain that you are going to give a message to a part of the body on an extremity. Ask students how they could get their message to the brain without talking. \*If students do not say, make sure they understand before starting that students that are nerves on the arms and legs of the body will pass messages to the brain through other nerves, to the spinal cord and to the brain. They are not allowed to talk. **Students are modeling how parts of the body send messages through the nerves and spinal cord to the brain.** Once the brain receives the message he/she must quickly decide which response is appropriate and send the message back. The person that started the message should read the brain's response and act it out. (Of course ALL students will want to act it out for fun 😊) When giving out messages, be sure to give one to a person at the end of each arm and leg so that all students will pass at least one of the messages. Give one message at a time.

There are four messages for the body parts: "You want to kick a soccer ball." "A bee just stung your arm!" "You touched a hot stove!" "You stubbed your toe!"

There are also four responses the brain will send back: "Grab your toe! Cry!" "Pull your hand back quickly! Yell owe!" "Pull your leg bag and swing forward." "Swat your arm! Yell owe!" The person that is the brain gets all four of their responses to hold in order to decide what response fits the situation. **They are modeling how the brain controls our actions and responses.**

Discussion can follow about how the spinal cord has the important job of being like a central highway for all messages. This may lead to conversations regarding spinal cord injuries. "How did the brain get the message that you stubbed your toe?" (the message was passed from the toe to the brain) "How did your body know to swat your arm when you were stung?" (the message was passed from the brain to the arm) "When someone's spinal cord is injured, what type of problems might they have?" (messages cannot travel to and from the brain, lack of ability to move and control parts of the body)

When the activity is complete, have students fill out the stick figure circles, with S, N, or B to show where they are generally located in the body. This is on the handout with the chart from the "Big Squeeze" game.

Students will watch a 3 min video of School House Rock's "Telegraph Line." The video is a very upbeat way to pull all of the basic concepts together for students.

As a closing activity, go to slide 5 of the **Interactive Nervous System** slides and have students slide the part of the nervous system into the correct box. The boxes are descriptions of functions and locations of the basic nervous system parts.

## Guided Practice

### Day Two:

Display the Learning Objectives using yesterday's model system as a reference for discussion. Show students *the "Is There a Doctor in the House, Nervous System?"* Smart lesson. Tell students they are going to be "visiting" Patient 6 today and diagnosing her problem involving the nervous system.

\*At this point, have students move to computers in a lab or laptops and view the Smart lesson. Guide students to click on Patient 4 and read the patients chart. Following the directions under the chart, students will click on each of the body parts, using the text to answer the questions on the worksheet. They will continue through the worksheet clicking on the links, reading, and answering questions.

\*Students will need guidance doing this if they have never done it before. It is beneficial to instruct them to read the worksheet questions before going to each link. Also, explain to them that they should read the screen in order to locate the answers properly. As students finish, the teacher should start a discussion about what the patient's problem might have been and what the proper diagnosis and treatment would be.

### Assessment

As an informal, formative assessment, students could add to their circle map from before the lesson began to show knowledge gained from the lesson. I suggest students add learned information in a different color from the prior knowledge so they can see what they are adding to the circle map.

Formative assessments can be the students writing and recording on charts from the Big Squeeze activity, diagrams from their model system activity as well as their answers to the questions from the web quest.

In addition, students will be assessed during the last slide of Day 1 (*Interactive Nervous System*) during the closing activity. Teachers have the opportunity to print this and have students check as a more formal assessment, or have them complete the chart with a partner or the class then check.

**Modifications: This lesson provides a large variety of activities appropriate for meeting the needs of multiple learning styles.**

### Day One:

Careful consideration should be made if students cannot sit on the floor. It would be easy to do the game from day one in chairs instead of on the floor.

Also, it may be helpful to create a tape outline of the stick human body on the floor before students get into formation depending on the students involved.

### Day Two:

Some of the websites will read the text on each page aloud to students. If students need or want this modification, please provide headphones on the computer they will be working on. Students with reading disabilities will benefit from this modification because it will allow them to read the content without misunderstanding key terms from the articles. \*Students that are auditory learners would benefit from this as well.

Students may work with a partner to fill out the worksheet either dividing up the questions or sections or sharing results. This will help support students with reading and or writing disabilities by reducing the amount of required reading and writing, but still providing them with opportunities to read, write, and acquire all of the content. These students also benefit from discussing content with peers.

Early finishers should move to the additional activities noted on the Smart Slides. There is an additional video and extension activities appropriate for all levels.

Students that are gifted should be challenged to create an additional patient with different problems and their specific solutions, involving the nervous system and share these with the class.

### **Alternative Assessments**

Students could compare and contrast the “Telephone Line” video to the game “The Big Squeeze” and tell how they are alike and different. The question should be asked, “How are both of these alike and different from the Nervous System?”

There is a quiz in the “Activities” section on the “**Is There a Doctor in the House? Nervous System**” that can be checked, and students could record their score.

### **Supplemental Information**

YouTube is blocked in many schools so, advance preparation is necessary to use the video mentioned. An audio version of this song would also be effective.

### **Critical Vocabulary**

**Brain:** the control center of the nervous system

**Spinal Cord:** a long, thin, tubular bundle of nervous tissue and support cells that extends from the brain

**Nerves:** one or more bundles of fibers forming part of a system that conveys impulses of sensation, motion, etc., between the brain or spinal cord and other parts of the body

**Vertebrae:** highly specialized bones which collectively make up the spinal column.

**Websites:**

<http://kidshealth.org/kid/htbw/brain.html>

<http://faculty.washington.edu/chudler/spinal.html>

<http://faculty.washington.edu/chudler/brainfit.html>

<http://yucky.discovery.com/flash/body/pg000136.html>

[http://kidshealth.org/PageManager.jsp?lic=1&article\\_set=29673&ps=110](http://kidshealth.org/PageManager.jsp?lic=1&article_set=29673&ps=110)

[http://kidshealth.org/kid/htbw/\\_bfs\\_NSquizsource.html](http://kidshealth.org/kid/htbw/_bfs_NSquizsource.html)

**Comments:**

As students diagnose and treat the patient, it is not about that being a perfect process. The real purpose of the activity is to expose students to more informational text about each organ and provide them with an “authentic” reason to research.

**Author Info:**

Tracy Pendry is a fifth grade teacher at Shoals Elementary School in Pinnacle, NC. She is a National Board Certified Teacher and has a master’s degree in Educational Technology. Tracy loves teaching science as well as all other subjects daily. It gives her great pleasure to see students get excited and motivated to learn through the investigation process. She developed this lesson to spark students’ interest in the body system as well as to help students’ have a deeper understanding and visualization of what the nervous system does in the body. Finally, Tracy wanted students to see a personal connection to their own life as they try to diagnose and treat their patient.