Identifying Information: (Group Members and Schools, Title of Lesson, Length in Minutes, Course Level)

Group Members:
  - Marilyn M. Samson – James A. Shanks Middle School
  - Miraflor Z. Buscaino – Carter-Parramore Academy

Title of Lesson - Nervous System (The Brain)

Length in Minutes: 1 class period (50 minutes)

Course level: 6th Grade (We’re working on the Grade 8 annually assessed benchmark.)

Motivation: Whole class activity (cognitive)

Part A. Bell Ringer (5 minutes)
  The illustration below shows four lobes of the human brain. (This will be projected on the smart board.) [http://faculty.washington.edu/chudler/chmodel.html](http://faculty.washington.edu/chudler/chmodel.html)

  Four Lobes of the Human Brain

  Have students answer on a piece of paper.
  What lobe is designated by label 1? 2? 3? 4?

Part B. Pretest (Copies will be provided to the students.) (5 minutes)

1. Which of the following is a part of the nervous system?
   A.) lungs
   B.) heart
   C.) spinal Cord
2. What are the two parts of the nervous system?
   A.) the central nervous system and the peripheral nervous system
   B.) the brain and the spinal cord
   C.) the neurons and the dendrites
   D.) the cerebrum and the medulla

3. What are the three main parts of the brain?
   A.) brain stem and medulla, neurons, and cerebrum
   B.) cerebellum, motor nerves, brain stem, and medulla
   C.) cerebrum, cerebellum, brain stem and medulla
   D.) cerebrum, cerebellum, spinal cord

4. Which part of the brain helps you learn new things in Science class?
   A.) cerebellum
   B.) cerebrum
   C.) brain stem and medulla
   D.) motor nerves

5. The biggest part of the brain.
   A.) cerebellum
   B.) cerebrum
   C.) brain stem
   D.) thalamus

Needed Materials & Set-Up: per class (There will be 3-4 members per group.)
Assuming there are 24 students in a class, then there will be 6 groups per class.

- 3 heads of cauliflower, cut into equal halves
- 6 boxes of food coloring (package containing enough basic colors for mixing)
- 6 ice cube trays (or stack of 3 oz. paper cups – 10 pieces)
- 6 sheets of blank paper
- 6 pads of sticky notes
- 1 pack of cotton swabs
- 1 box of toothpicks
- 6 pairs of scissors
- 6 rolls paper towels
- 6 small cups of water
- 6 plastic knives
- 6 boxes of markers
- Modeling the Brain student handout
6 posterboards

Each group will receive the following materials:

- 1/2 head of cauliflower
- 1 box of food coloring (package containing enough basic colors for mixing)
- 1 ice cube trays (or stack of 3 oz. paper cups – 10 pieces)
- 1 sheet of blank paper
- 1 pad of sticky notes
- 10 pieces of cotton swabs
- 10 pieces of toothpicks
- 1 pair of scissors
- 1 roll paper towel
- 1 small cup of water
- 1 plastic knife
- 1 box of markers
- 4 copies Modeling the Brain student handout

Outcomes:

Dimensions of K-12 Science Education Standards:
  Crosscutting Concepts – Systems and system models
  Structure and functions

Next Generation Sunshine State Standards: SC.6.L.14.5 – Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.

Content Literacy Standards:
  Reading Standards: Science and Technical Subjects – Key Ideas & Details and Integration of knowledge and idea
  Writing Standards: Science and Technical Subjects – Research to build and present knowledge
  Speaking and Listening Standards: Comprehension and collaboration

Specific Learning Outcomes: At the end of the lesson, students should be able to:
- identify the three major parts of the brain in the Modeling the Brain handout correctly
- distinguish all the major lobes of the brain in the Modeling the Brain handout
appropriately
- identify 80% of the parts and function of the brain properly
- construct a model of the brain with the appropriate lobes, parts, and functions with 80% accuracy

Presentation and Participation:

Introduction:
Pre-Lab Activity: Brainstorming (cognitive)– Group Activity (5 minutes)

Group students by asking them to count 1 – 6. Students with the same number will form a group. There should be at least 3 – 4 members in a group.

Ask students to name five ways in which they use their brain every day. Have them write their answers on sticky notes and post them on the poster board provided by the teacher. Ask one member to read their output.

Then say, “As your body’s master control center, your brain coordinates all the activities, functions, and behaviors you undertake, consciously or unconsciously, 24 hours a day, every day of your life.”

In today’s activity, you will learn about the three major regions of the brain, the four lobes of the brain and the functions they control.

Group Activity: Hands-on (Teacher will explain the directions to the students.) (20 minutes) (application)

You will do “Modeling the Brain Lab” using cauliflower. Each group will be given materials needed in this activity. Each group will assign a unique color to each structure or region on the Brain Structure and Function table below. You may paint these colors directly on the table as a key. You will paint the cauliflower brains, following the color keys you established. You will paint a total of 10 different parts of the brain. Next, you will write the name of each brain region and its associated functions on sticky notes. Make toothpick flags with these notes and stick them into the corresponding "brain" structures on the cauliflower model. Then, display the work for others to see. One member of each team will discuss in front of the class, one major area or lobe of the brain giving emphasis on the characteristics as well functions.

Brain Structure and Function table
<table>
<thead>
<tr>
<th>Brain Structures</th>
<th>Color Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebrum</td>
<td></td>
</tr>
<tr>
<td>Cerebellum</td>
<td></td>
</tr>
<tr>
<td>Brain Stem</td>
<td></td>
</tr>
<tr>
<td>Mid Brain</td>
<td></td>
</tr>
<tr>
<td>Pons</td>
<td></td>
</tr>
<tr>
<td>Medulla Oblongata</td>
<td></td>
</tr>
<tr>
<td>Frontal Lobe</td>
<td></td>
</tr>
<tr>
<td>Occipital Lobe</td>
<td></td>
</tr>
<tr>
<td>Parietal Lobe</td>
<td></td>
</tr>
<tr>
<td>Temporal Lobe</td>
<td></td>
</tr>
</tbody>
</table>

Reference: [http://sites.google.com/site/gw8science/Home/brain-Webquest](http://sites.google.com/site/gw8science/Home/brain-Webquest)

**Group Discussion/Presentation of the Brain Model (10 minutes)**

**Questions: (3 higher order—analysis, synthesis, evaluation)**

1. What are the three major areas of the brain?
2. How would you classify the major lobes of the brain?
3. How would you compare the functions of the different parts of the brain?

**Reflection:**

**Discussion after the activity follows:**

1. In this model, what does the cauliflower represent?
2. Why is it sliced in half?
3. Based on your model, what are the three major areas of the brain? What are the four lobes?

**Post Test:** same as the pretest

**Summary: (exit card)**

Have students write a sentence about what they have learned for today’s lesson

**Expected Student Responses:**

The central nervous system consists of the brain and spinal cord.

The largest region of the human brain is the cerebrum, which controls learning, judgment, and voluntary actions of muscles.

- The cerebrum is divided into right and left hemispheres. Each deals primarily
with the opposite side of the body.

- The outer layer of the cerebrum is the cerebral cortex. It processes information from the sense organs and controls body movements.
- The cerebrum is divided into four lobes namely, frontal, occipital, parietal, temporal lobes.

The cerebellum is the second largest region of the brain. It receives information about muscle and joint position and coordinates the actions of these muscles.

The brain stem connects the brain and spinal cord. It regulates the flow of information between the brain and the rest of the body. It is composed of the midbrain, pons, and the medulla oblongata.

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**Safety: (Teacher’s Lab Resource Life Science, Interactive Science)**

The laboratory safety rules are posted on the wall. There will be discussions to remind the students before the activity for them to follow. Emphasis will be on the following safety rules:

1. Safety Goggles. Wear safety goggles to protect your eyes in any activity involving chemicals, flames, or heating, or glassware.
2. Lab Apron. Wear a laboratory apron to protect your skin and clothing from damage.
3. Sharp Objects. Scissors, scalpels, knives, needles, pins, and tacks can cut your skin. Always direct a sharp edge or point away from yourself and others.
4. Plant Safety. Handle plants only as directed by your teacher. If you are allergic to certain plants, tell your teacher; do not do an activity involving those plants.

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**Transformative:**

*(Accommodations for at least 2 special needs students)*

A. ELL student
- Extra time to complete assignments
- Assistance with instructional activities
- Modified written instructional materials
- Teach vocabulary
- Encourage use of graphic organizers and drawings
- Limit number of problems/questions according to proficiency
Monitor comprehension
Ask higher level questions frequently

B. ESE students
- Extra time to complete assignments
- Assistance with instructional activities
- Promote cooperation with small groups
- Encourage use of graphic organizers and drawings
- Limit number of problems/questions according to proficiency
- Monitor comprehension
- Ask higher level questions frequently
- Focus on thinking skills (predict, classify, observe…)

Utilize:

Part A: Administer the post test (same as the pretest) **5 minutes**
Part B: Those who did not get 80% mastery of the post test, have the students review the Key Concept statements. (Copies will be provided to the students.)

The central nervous system consists of the brain and spinal cord.
The largest region of the human brain is the cerebrum, which controls learning, judgment, and voluntary actions of muscles.
- The cerebrum is divided into right and left hemispheres. Each deals primarily with the opposite side of the body.
- The outer layer of the cerebrum is the cerebral cortex. It processes information from the sense organs and controls body movements.
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Part C: (Homework)

As an extension, have students research about how cell loss accounts for some of the changes in mood, memory, and behavior associated with Alzheimer’s disease. Emphasize that just as all the organs in the body need to work together to keep us alive, all the regions of the brain must work together to help us carry out many of
the activities we perform every day. What might happen when some of those regions begin to deteriorate?

After the evaluation and the objective was not met, the teacher needs to modify the lesson by providing some reinforcement or enrichment activities like video presentation, computer simulations, or brain games.