

# K-1: The Senses

## THE BRAIN: CONTROL CENTRAL

Written by

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Activities from the *K-1: The Senses Teacher's Guide* may be used alone or with integrated unit components. The Learning Brain: Senses unit is comprised of the guide, a PowerPoint® slide set, "What Sound Is It?" for use with the activity, "Our Sense of Hearing," and a student storybook, *Making Sense!* (available as a PowerPoint® file and in PDF format). All files are available free-of-charge at BioEd Online ([www.bioedonline.org](http://www.bioedonline.org)).

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# THE BRAIN: CONTROL CENTRAL

## Guiding Question

What do you know about the brain?

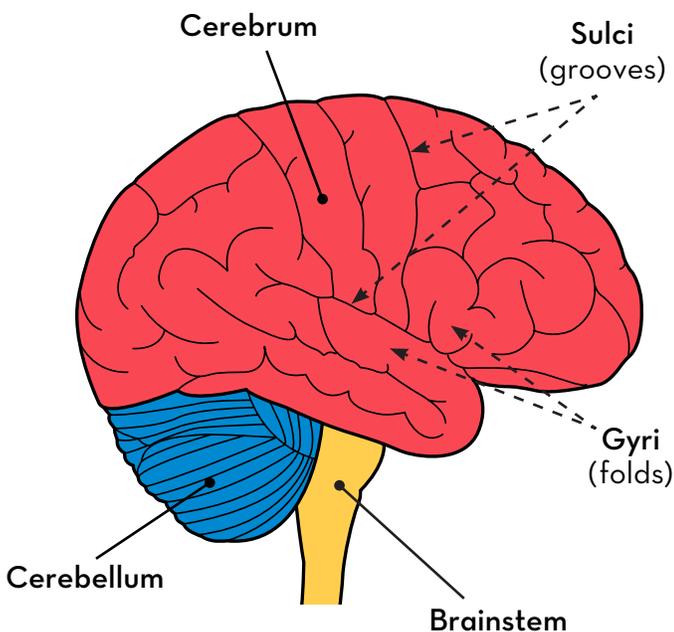
## Concepts

- The brain is the command center of the body.
- The brain has unique physical characteristics.
- The brain has three major parts, each with different roles.

## Time

**Setup:** 5 minutes

**Class:** 2 sessions of 30 minutes



**H**ave you ever wondered about the human brain? What does it look like? How much does it weigh? What does it feel like? Most of us will never see or touch a real brain, but we can share much of the excitement of neuroscience by teaching a few simple concepts about the brain.

The brain is the body’s “command center” and most complex organ. It is part of the nervous system, a communications network that extends throughout the body. The brain is enclosed within the skull dome, or cranium, a bony shell that protects the brain and forms the shape of the head. A cushion of fluid inside the cranium, and three tough membranes covering the brain—called meninges—provide further protection.

The brain is composed of many parts, each with different roles. Its three major sections are the brainstem, cerebellum and cerebrum. The brainstem, which is connected to the spinal cord, controls automatic activities, such as heartbeat, digestion, breathing, swallowing, coughing and sneezing. The cerebellum sits at the back of the brainstem. It helps muscles work together to coordinate and learn movements, and to maintain balance and posture. It also has a role in the formation of memories. The cerebrum is the largest part of the mammalian brain. It is responsible for thinking, learning, planning, remembering, language, feeling sensations, emotions, and voluntary (on command) muscle movement.

The surface of the cerebrum has folds, called gyri, and grooves, called sulci. These wrinkles allow more cerebral surface tissue (also called the cerebral cortex) to fit into the limited space within the cranium. The size and extent of folding are related to intelligence and



motor and sensory skills, with more folds indicating greater intelligence. Most mammals with large brains have highly folded cerebral surfaces.



The brain and the rest of the nervous system play a critical role in perceiving, communicating and interpreting conditions outside and inside the body. This capacity to “sense” what is happening, both externally and internally, depends on receptors in organs such as the eyes and skin—and on the brain’s ability to make meaning from the information gathered. But before we can understand the senses, we must become familiar with our “central processing unit,” the brain.

This teacher-directed activity allows young students to explore the basic functions and characteristics of their brains. It is best presented as whole class instruction, with students working in pairs to share materials.

## MATERIALS

### Teacher (See Setup)

- 11-in. round balloon (to serve as a brain model)
- Clear, re-sealable plastic bag
- LCD projector and computer or whiteboard to project the storybook

- Package of instant oatmeal
- PowerPoint® slide set and/or PDF of the student storybook, *Making Sense!* (available for viewing or download at <http://www.bioedonline.org/lessons-and-more/teacher-guides/k-1-the-senses/>)
- Scale or balance (to weigh the water-filled balloon)
- Tap water

*Optional:* Brain and skull model

### Per Student Pair

- Crayons (red, blue and yellow)
- Pair of scissors
- Tape or glue

### Per Student

- Copy of “Brain Diagram 1” and “Children’s Activities” pages
- Science notebook (for use throughout the unit)

## SETUP

Prior to class, fill an 11-inch balloon with water. Stretch the balloon, place the open end over a faucet and add approximately three pounds (48 oz, or 1,450 mL) of water. If a scale is not available, compare the balloon to something of known weight to estimate when you have reached three pounds. When full, the balloon should be approximately the size of a large cantaloupe.

Prepare the instant oatmeal according to package directions. Let the oatmeal cool and place it in a clear, re-sealable plastic bag (or other container).

As an alternative to oatmeal, you may use softened butter or shortening.

## SAFETY

Have students wash their hands after handling the oatmeal.

## PROCEDURE

1. Engage students by reading the student storybook, *Making Sense!* Explain that they will be learning about the most important part of their body, the brain.



2. Ask students, *What do you know about the brain?* After discussion, make a list of students' ideas. You also might ask questions such as, *Where is your brain? Do you think it is very heavy? What would a brain feel like if you touched it? Is the brain smooth or wrinkled? Why?* Explain to students that even though scientists have learned much about the brain, there still are many unanswered questions.
3. Bring out the brain model (water-filled balloon) and have a student assistant hold it in his or her hands. Use the "Brain Facts" (right) to expand upon students' earlier comments, and discuss the following questions.
  - Did you know that the average adult human brain weighs about 1.45 kg? (3 lbs)? That is about the same weight as this balloon filled with water. (Allow students to feel the weight.)
  - Did you know that the brain is about the consistency of cooked oatmeal, butter, or shortening at room temperature? (Allow students to touch the oatmeal.)
  - So, is the brain strong or fragile? Heavy or light?
4. Ask, *Why do you think it is important to learn about the brain?* Help students understand that the brain is the control center of the body, responsible for thinking, feelings and movements. It must be protected and cared for.
5. Ask, *Where is your brain?* [Inside the head] Have students place their hands on top of their heads. Explain that there are many parts to the brain and they will be learning about three of the most important areas. Ask, *Did you know that each part of the brain has a special job to do?* The largest part of the brain is located directly under their hands. It called the cerebrum. Have students repeat the word. Explain that the cerebrum is the "thinking" part of the brain, responsible not only for thinking, but also learning, remembering, feeling sensations and emotions, and moving muscles on command.
6. Give each student a copy of "Brain Diagram 1."

## Brain Facts



- The brain is the command center of the body.
- The brain contains about 100 billion neurons (main kind of cell in the nervous system). This number is comparable to the number of stars in the Milky Way galaxy.
- We each use 100% of our brains, not just 10%.
- An adult human brain is about the size of a cantaloupe and weighs about three pounds.
- The brain is about 80% water.
- Some people refer to the brain as "gray matter." If you look at the brain from the outside, it looks like a mass of grayish-pink wrinkles.
- The brain is divided into left and right halves, or hemispheres, connected by a wide, flat band of neural fibers called the corpus callosum.
- The two sides of the brain work together. It is a myth that a person can be "right-brained" or "left-brained." While certain functions tend to be concentrated on one side or the other, individuals don't have a "stronger" left or right brain network.
- The brain represents just 2% of the body's weight, but uses about 20% of the energy taken in as food.

Direct students to place their fingers on the cerebrum area of the brain illustration. Next, have them color the area red.

7. Have students cut out the brain diagram and glue it into their individual science notebooks.
8. Give each student a copy of the "Children's Activities" page. Explain that they will match the picture of each activity to the area of the brain that controls that activity.
9. Instruct students to look at all of the images, and



select the activities they think are related to the thinking part of the brain (reading, writing, speaking, seeing and painting). Discuss students' choices, making certain that students understand that each brain part has specific functions. Have students color the bottom section of each "thinking" picture red.

10. Have students cut out all the pictures. They should glue or tape pictures with a red band near the cerebrum (also colored red) on their brain diagram.
11. Direct students place their hands on the lower back of the head (on the curved portion of the skull above the neck). Explain that the brain part in this location is called the cerebellum, which helps muscles work together to coordinate well-learned movements (like playing a musical instrument or mastering a complicated dance). It also controls the sense of balance and is responsible for storing automatic skills that we have learned, such as reciting the pledge of allegiance or repeating quick math facts. Have students locate the cerebellum on their brain diagrams and color it blue.
12. Have students choose pictures they think are related to the "learned movement" part of the brain (skating, swimming, dancing and walking). Discuss students' selections. Have them color the bottom bands of this new set of pictures blue, and then tape or glue the images near the blue cerebellum on their diagrams.
13. Point to the brainstem on the diagram. Make sure students understand that the brainstem is located at the back of the brain, below the cerebellum, and that it is connected to the spinal cord. Have students touch the backs of their necks to feel the spinal column (bony spine that protects the spinal cord).

14. Explain that the brainstem is in charge of our automatic functions. Ask, *What do you think "automatic functions" means?* Give student examples of body functions, things we don't normally have to think about, such as breathing, swallowing, beating of the heart, digestion, blinking, and our sense of feeling awake or sleepy. Have students locate the brainstem on their brain diagrams and color it yellow.
15. Direct students to examine the remaining pictures. Ask them to consider how the actions depicted relate to the part of the brain in charge of automatic functions (breathing, sneezing and coughing). Discuss students' ideas. Then have them color the band on each remaining image yellow, and glue or tape these pictures in place near the yellow brain stem.
16. If available, bring out the brain model for students to examine. Lead a discussion of what students know and have learned about the brain.
17. To review, have each student describe a brain function and, if appropriate, the part of the brain responsible.

### EXTENSION

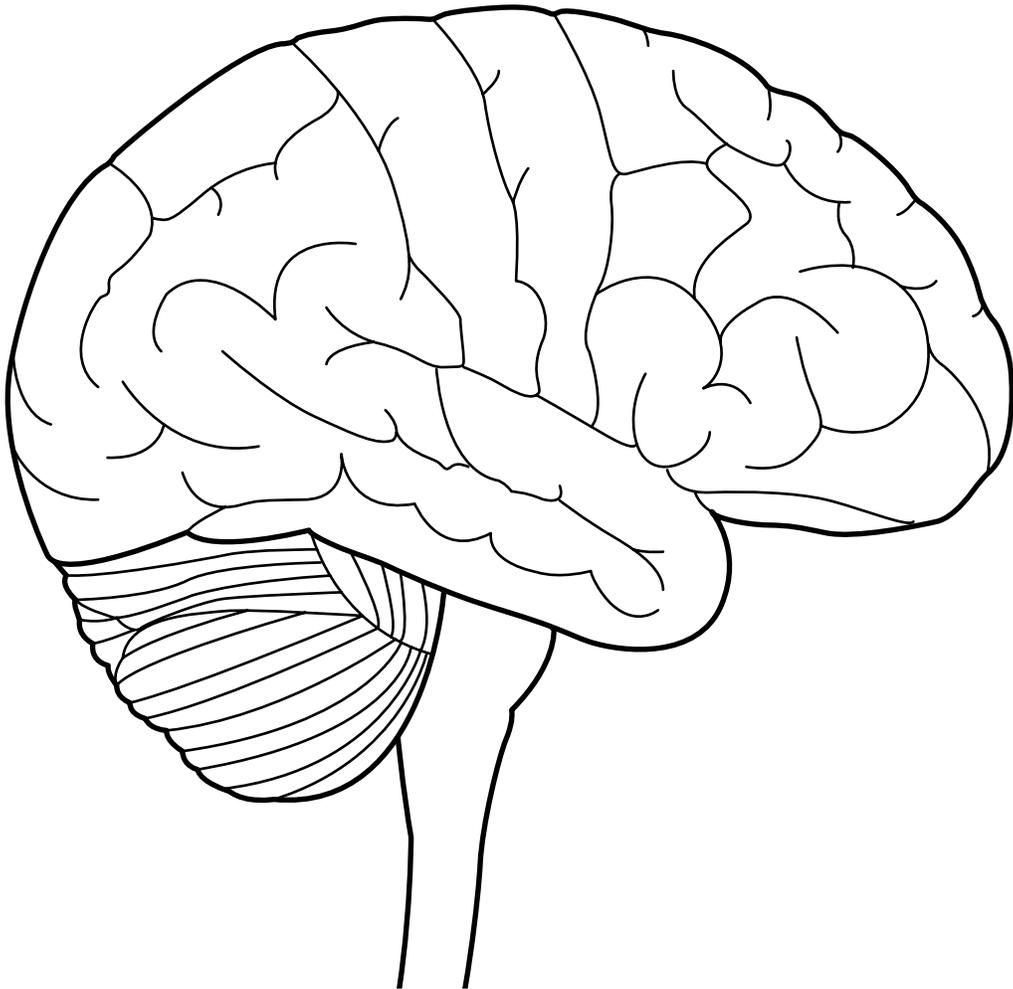
The human brain weighs about three pounds. Ask students, *What other things weigh around three pounds and are about the same size as your brain or the water balloon brain? Why do you think that the water balloon brain is about the same size as a human brain?*

### RECOMMENDED RESOURCE

- Guillain, Charlotte. *Our Brains (Our Bodies)*. (2010) Heinemann Educational Books. ISBN: 978-1432936013



# Brain Diagram 1





# Children's Activities



**Reading**



**Writing**



**Speaking**



**Walking**



**Dancing**



**Skating**



**Swimming**



**Breathing**



**Coughing**



**Sneezing**



**Painting**



**Seeing**

Illustrations: Breathing, dancing, reading, seeing, sneezing, walking, writing © Images, Coughing © Lorelyn Medina, Painting © Jane Guothova, Skating, swimming © Donggu Cho, Speaking © Stockhoppe.



# My Science Journal

Name \_\_\_\_\_

## Drawing

## Key Words to Use

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## I Observed...

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