

# K-1: The Senses

## THE BRAIN: COMMUNICATION

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: COMMUNICATION

## Guiding Question

How does information from different parts of the body reach the brain?

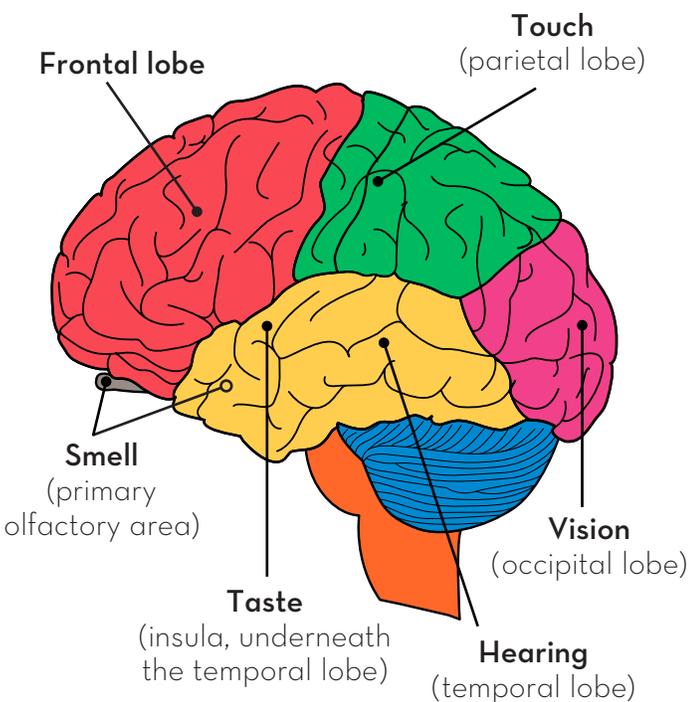
## Concepts

- The brain and nervous system receive and act on information from inside and outside the body.
- The senses gather and process different kinds of information.

## Time

**Setup:** 5 minutes

**Class:** 45 minutes



Every organism must collect and process information about the surrounding world to find food, avoid danger and locate other individuals. Even single-celled organisms are able to detect and respond to changes in their environments, such as the availability of food, that affect survival. In animals, this ability is provided by the “senses” or the sensory system—which is part of the nervous system.



Young children tend to associate the senses, such as vision or hearing, with receptor organs, such as the eyes or ears. However, the ability to receive and interpret information from inside and outside the body actually is coordinated by the brain and rest of the nervous system.

We are able to perceive, or “sense,” many different kinds of external and internal stimuli, such as light, sound, pressure, the position of our limbs, and even pain within our own bodies. Our eyes, ears, nose, skin and other sensory organs have specialized cells, called receptors, which respond to specific kinds of stimuli. For example, receptors in the nose respond to chemicals, which we



interpret as odors. Receptors in skin respond to pressure or temperature, and receptors in the eye detect light. These receptors translate information about the physical world and conditions inside the body into impulses that travel to the brain along nerve cells, also known as neurons.

Different parts of the brain are specialized to receive information from each of our senses. For example, a region of the cerebrum in the back of the brain is dedicated to processing information from the eyes. The diagram right) shows the primary processing area for each sense (vision, hearing, taste, smell, touch). It should be noted that all sensory information, except for the sense of smell, is routed through a central location deep inside the brain, known as the thalamus before being sent to the appropriate sensory area.

After being received and processed by a primary processing area, sensory signals are forwarded to other areas of the cerebrum for more complex integration. Eventually, all information gathered by the senses is combined. Input from several senses often enables us to understand a situation better than information from only one sense. Through this process, senses enable us to interpret and react to our environment; participate in the world; and learn, achieve, discover and communicate.

## MATERIALS

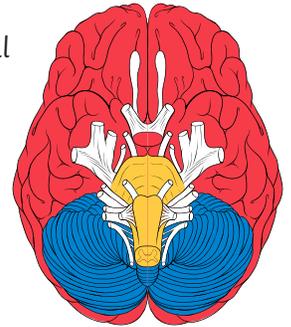
### Teacher (See Setup)

- 120-cm length of yarn
- Ball of yarn (cut sections to model spinal cord and nerves on the body model)
- Classroom human body diagram (see the activity, “The Brain: Protection”)

### Per Student Team of Two

- 45-cm length of yarn
- 10-cm sections of yarn
- Brain cutout from the “Brain Template” page (pre-cut into individual pieces by teacher)
- Pair of scissors

The 12 pairs of cranial nerves (in white), as opposed to spinal nerves, emerge directly from the brain or brainstem. Cranial nerves exchange information between the brain and parts of the body, primarily to and from regions of the head and neck.



- Set of Body Puzzle pieces to make one body
- Sheet of construction paper
- Tape or glue

## SETUP

In advance, cut out one set of body parts (“Body Puzzle” page) and a brain illustration (see “Brain Template” page) for each pair of students, unless students are able to cut out the sections themselves during the lesson.

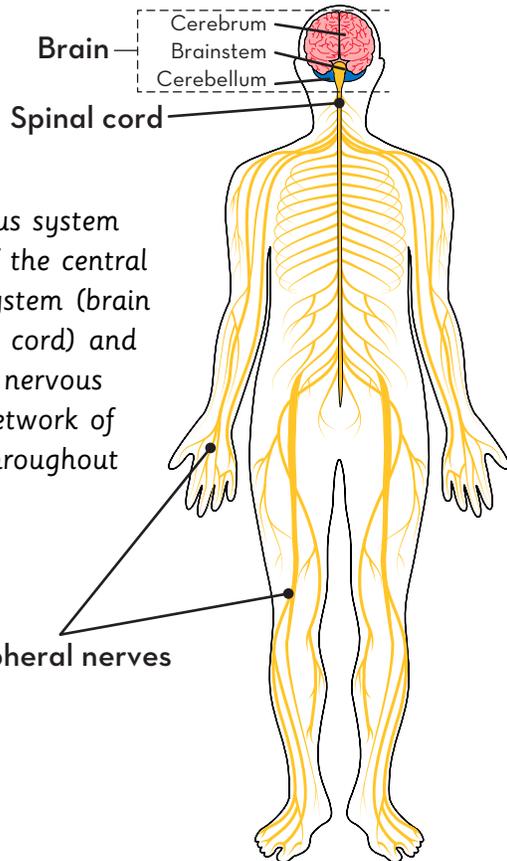
This activity is teacher-directed and best presented as whole-class instruction.

## PROCEDURE

1. Refer to the life-size body outline displayed in the classroom, and have students point to the brain. Ask, *What other parts of the body do you know?*
2. Give each student a sheet of construction paper and a set of Body Puzzle parts (or give each student a copy of the “Body Puzzle” page and let students cut out the parts for themselves). Explain that each student will assemble a set of body parts. Students may work in pairs to place body parts in the correct locations on the construction paper.
3. Check students’ work. When all students have built their models, give each student a brain cutout to place on his or her body puzzle (in the head).
4. Ask students, *Have you ever bumped your toe, cut yourself, or had a fall? Do you remember feeling*



## The Central Nervous System



The nervous system consists of the central nervous system (brain and spinal cord) and peripheral nervous system (network of neurons throughout the body).

*the pain? How do you think you received that information? Allow students time to respond. Clarify for them, Your brain received the pain messages and told you! But how does it work?*

5. Explain that the person represented in the body outline on the board has just bumped his or her toe. Immediately, he or she feels the pain. Ask, *How does a person detect an injury so quickly?* Request a student volunteer. Give him or her a piece of yarn to connect the toe to the head of the body cutout.
6. Ask, *Do you think this is how it works? Can a signal travel through air from your toe to your brain? If not, what path might it follow?*
7. Entwine several strands of yarn and extend them from the base of the brain to below the waist. Ask students what the yarn might represent. Help them

understand that nerve fibers connect all parts of the body and brain, and that the bundle of yarn represents the spinal cord. Explain that bones protect the spinal cord, just as the skull bones protect the brain. Have each student feel his or her own backbone (spinal column).

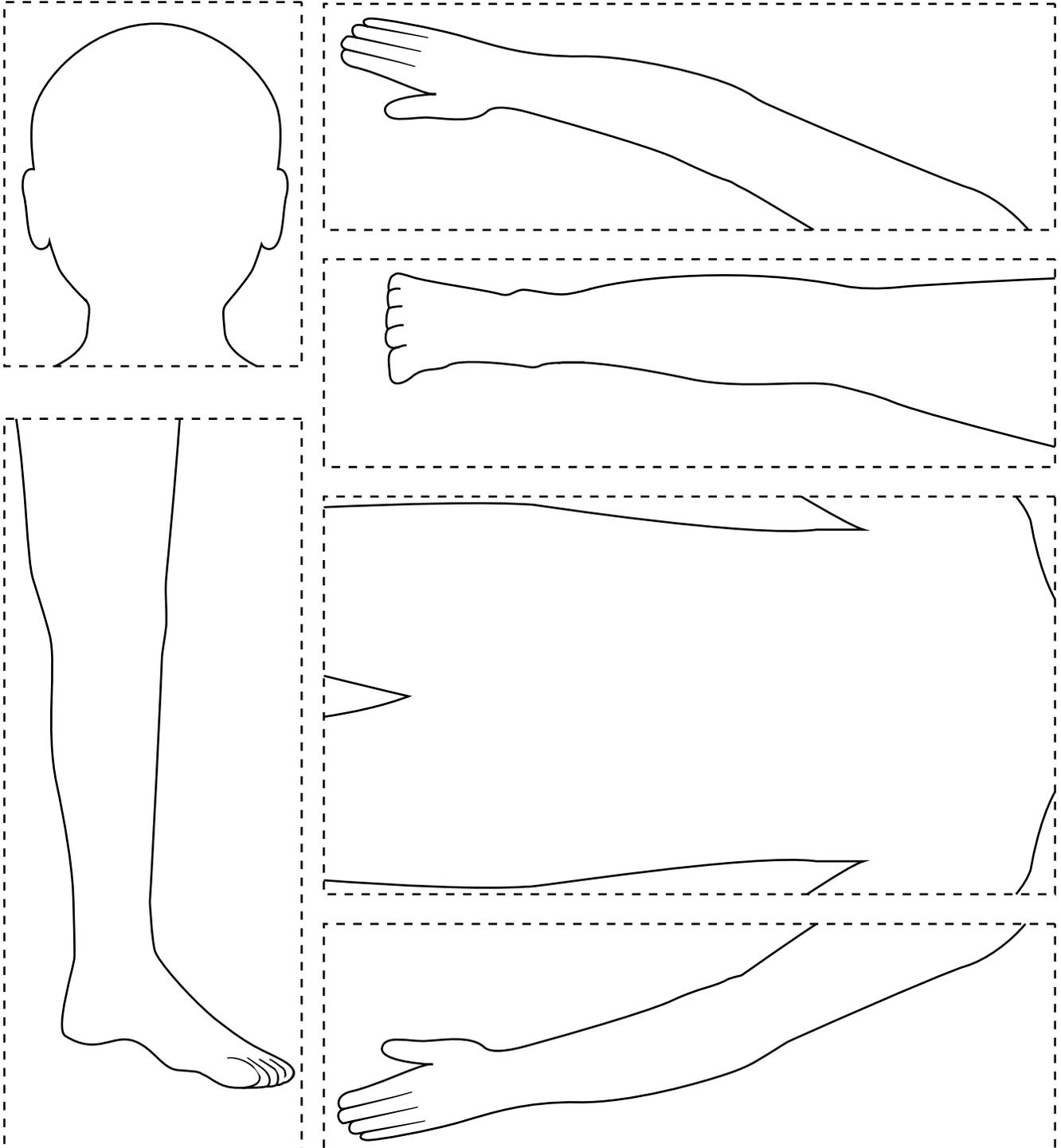
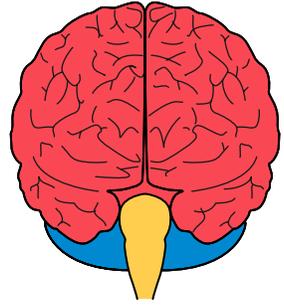
8. Extend another piece of yarn from the toe to the spinal cord, and on to the brain. Explain that nerves throughout the body send signals to the brain, and that those signals travel through the spinal cord. (Signals from the face and head are an exception; they connect through the brainstem to the brain.)
9. Have each student use several strands of yarn to create a spinal cord for his/her body puzzle, and then connect the spinal cord to the toe with an additional piece of yarn. In real life, nerves conduct signals in only one direction. So one set of connected neurons would send a pain signal to the brain, and different neurons would send messages back to muscles to move away from the source of pain.
10. Encourage students to create “nerve” connections from different parts of their puzzle bodies to the spinal cord, and from the spinal cord to the brain. The class may do this as a group by using the classroom human body diagram. Instruct students where to add connections, if you feel they need more guidance.
11. Explain that all of parts of the body, including sensory organs (eyes, ears, skin, etc.) are connected to the brain. Note that students will be learning how the different sensory receptors interact with the environment and send information to the brain.
12. If you wish to create “vertebrae” for the large classroom model, cups cut in half vertically or paper strips can serve as model for the backbone.

### RECOMMENDED RESOURCE

- Olien, Rebecca. *The Nervous System (Human Body Systems)*. (2006) Bridgestone Books. ISBN: 978-0736854122

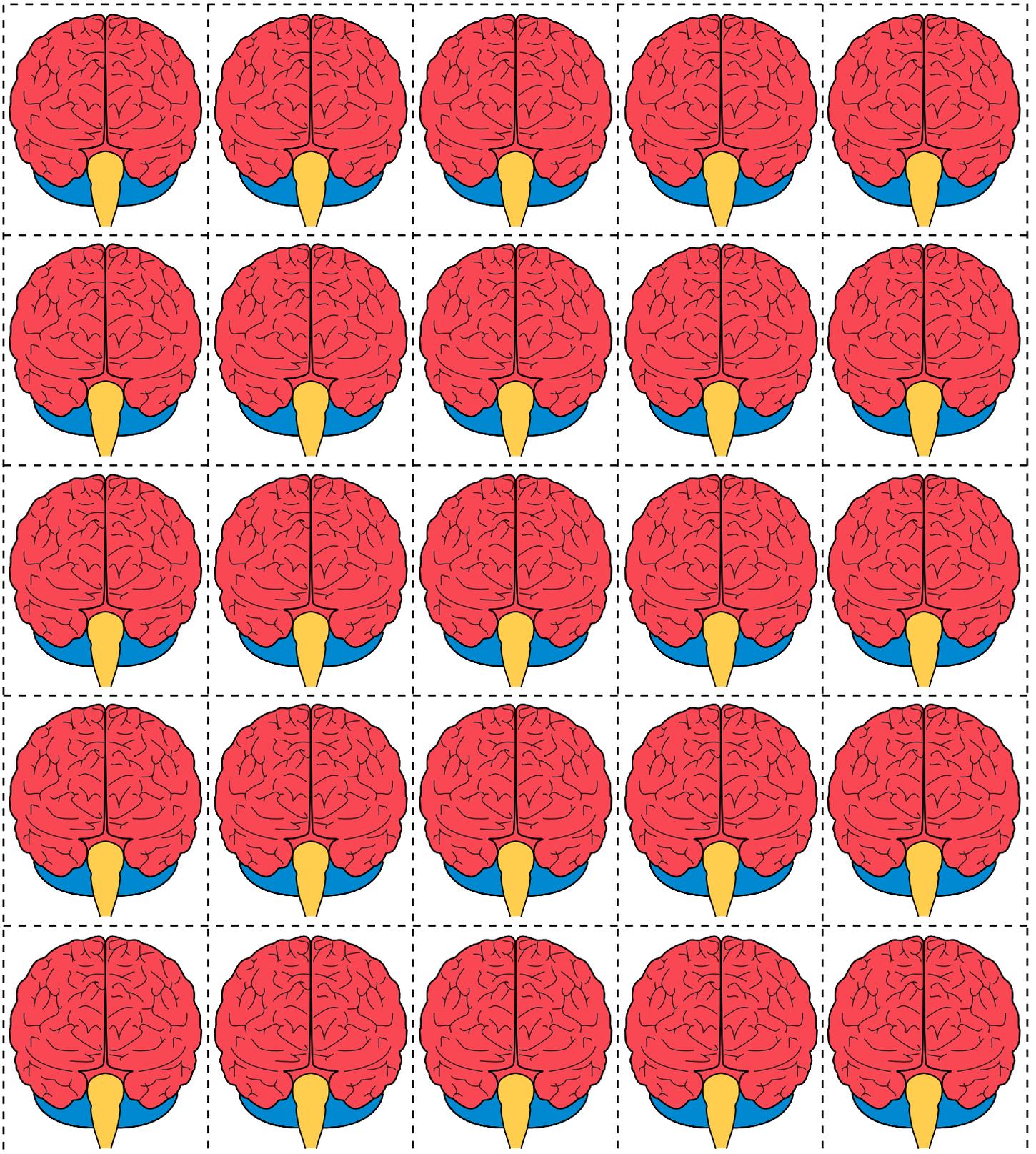


# Body Puzzle





# Brain Template





# My Science Journal

Name \_\_\_\_\_

## Drawing

## Key Words to Use

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## I Observed...

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