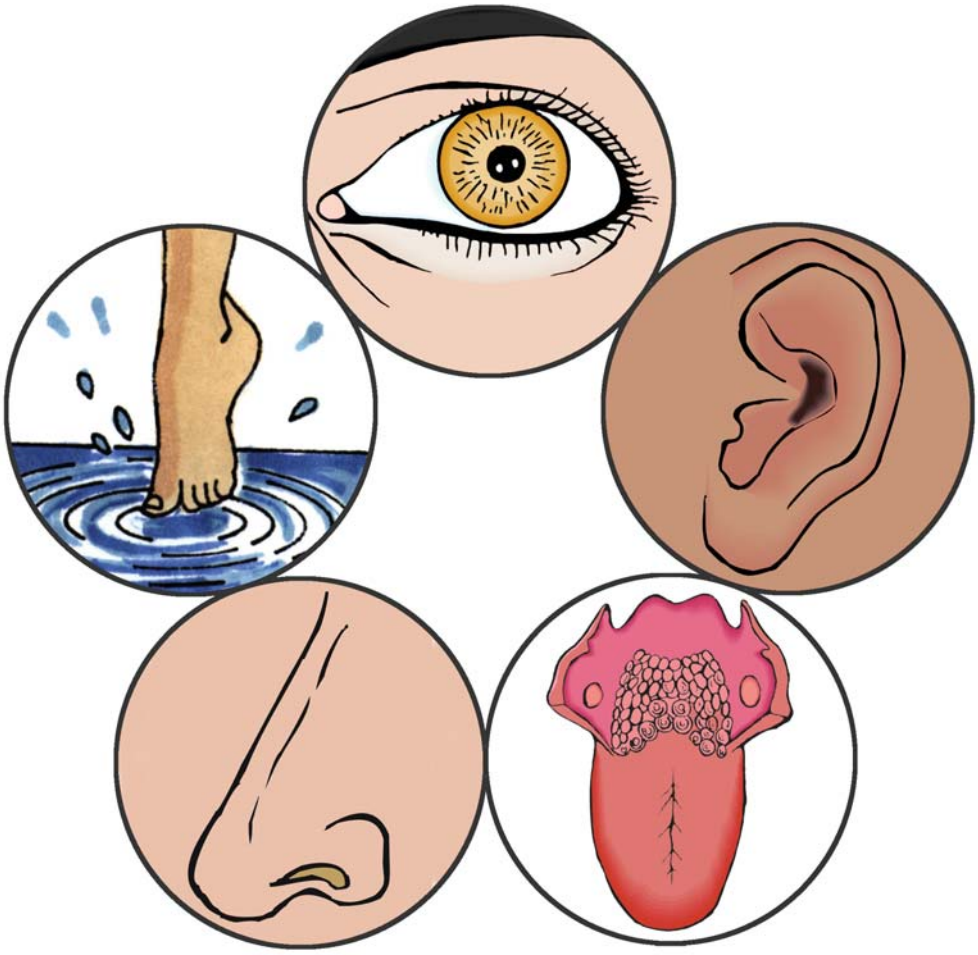
Carolina BioKits™

Human Senses

TEACHER'S MANUAL
AND STUDENT GUIDE



CAROLINA®
World-Class Support for Science & Math

Carolina BioKits™

Human Senses

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TEACHER'S MANUAL

ADDITIONAL REPRODUCIBLE MASTERS*

STUDENT GUIDE*

*Photocopy these pages as needed for use in your classroom.

Carolina BioKits™

Human Senses

NOTES

Overview

This kit provides students with materials and procedures to investigate the human senses of sight, hearing, touch, taste, and smell. The experiments in this kit explore the reception of stimuli by various sense organs, and the interpretation of this data by the brain. Students test their own senses as they rotate through 10 activity stations, each focusing on a different aspect of one of the five senses. This kit includes materials for 30 students working cooperatively in groups of 3. The activities described require approximately 15 minutes each. The activities can be performed in any order, and can be conducted over multiple class periods if necessary.

Objectives

Students will

- observe that receptor density differs between various regions of the body.
- determine the location of receptors for different taste sensations on the tongue.
- compare the length of time until olfactory fatigue occurs for two different scents.
- investigate aspects of their vision including compensation, accommodation, and locating their blind spot.
- evaluate their own hearing.

Content Standards

To view the national and local standards met by this kit, visit **www.carolina.com/correlations.**

Time Requirements

Preparation . . . . . .30 minutes

Activity . . . . . .150 minutes

Each of the 10 activities should take approximately 15 minutes for each group to complete. These activities can be conducted over multiple days, but doing so will require additional preparation time each day.

NOTES

Materials

Included in the kit:

- paintbrush
- 3 metal pins
- 180 sterile cotton swabs*
- 2 vials each of the following:*
  - peppermint oil
  - clove oil
  - sweet solution
  - sour solution
  - bitter solution
  - salt solution
- 30 green paper strips
- 30 orange paper strips
- Carolina™ two-point discriminator
- black felt inkpad (washable ink)
- grid stamp
- 120 cups
- tuning fork
- Teacher's Manual and reproducible Student Guide

*Items included in the Carolina BioKits™ Human Senses refill (RN-694507)

Needed, but not supplied

- 2 insulated foam beverage cups (7 or 8 oz.)
- 2 large pitchers or containers for ice water and hot water
- 2 Erlenmeyer flasks, 125 mL each
- 2 thermometers
- ice water
- hot water (55–60°C)
- 3 12-inch rulers
- gallon-sized resealable plastic bag
- timer
- blank white paper
- sheet protectors (optional)
- 3 index cards (optional)
- scissors
- protective eyewear
- potable rinse water (e.g., bottled water, water fountain)

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Safety

Use this kit only in accordance with established laboratory safety practices, including appropriate personal protective equipment (PPE). Ensure that students understand and adhere to these practices. Know and follow all school district guidelines for the disposal of laboratory wastes.

Background

Each set of Station Instructions contains information related to the sense or senses tested at that station.

Research has shown that, for each type of sensory reception, individual cells provide information in the same "all or nothing" manner. A stimulus either is sufficient to cause a cell to fire, transmitting a nerve impulse to the brain or spinal cord, or it is not. Each cell responds only to a certain stimulus or set of stimuli. For instance, a light receptor cell in the eye may respond only to red light. If a light receptor for red light "sees" red, it discharges. A receptor cell will only fire in response to a change in the stimulus to which it is sensitive. For example, although air is always around you, you do not feel the air unless it is moving over your skin in the form of a current or as wind.

Nerve impulses travel through nerve fibers to the brain, where the impulses are processed. By analyzing all the inputs from the sense organs, the brain interprets the appropriate responses, which we perceive as seeing, feeling, hearing, smelling, and tasting. If an injury causes the nerves in a sense organ to be damaged or severed, the brain can no longer obtain accurate information from that nerve, even if the sense organ is healthy and might be receiving impulses from stimuli.

Preparation

1. Before you conduct these exercises with your class, read the Student Guide and familiarize yourself with the activities at each of the 10 stations.
2. Make a copy of the Student Guide for each student in your class.
3. To reduce paper consumption, the Station Instructions are formatted so that you can place one copy at each station rather than copying sets for each student. Make one copy of each set of Station Instructions. For enhanced durability, you may wish to place each set of Station Instructions in a sheet protector.
4. Make a copy of the Blind Spot Diagram/Visual Compensation Indicator page.
5. Set up 10 activity stations as follows. Students will rotate through all 10 stations.

Activity 1: Light and Deep Touch

a. Use scissors to trim a few bristles from the paintbrush. Cut the bristles close to the base, so that they are as long as possible.

b. At this station, place the bristles, a pin, and the Activity 1 Station Instructions.

c. Make sure students at this station will have access to the inkpad and grid stamp. These materials will be shared with students at Station 2.

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Activity 2: Thermoreception

a. *Just before you conduct the activity:* Heat water to 55–60°C and then pour it into a foam cup.

b. *Just before you conduct the activity:* Prepare a cold water bath in a foam cup by combining ice and water.

c. Place a pin and the Activity 2 Station Instructions at this station, along with the hot water bath, the cold water bath, and a paper towel.

d. Make sure students at this station will have access to the inkpad and grid stamp. These materials will be shared with students at Station 1.

Activity 3: Two-Point Discrimination

a. Place the Carolina™ two-point discriminator and Activity 3 Station Instructions at this station.

Activity 4: Taste

a. Determine where you would like students to place the used cups after this activity.

b. At this station, place the sweet, sour, bitter, and salt solutions, along with the cups (each student needs 4 for this activity), 120 swabs (60 packages; 4 swabs per student), and the Activity 4 Station Instructions.

c. Make sure that students will have access to rinse water from a water fountain, bottled water, or other potable water source.

Activity 5: Smell (Olfactory Fatigue and Memory)

a. At this station place the peppermint oil, clove oil, 60 cotton swabs (30 packages; 2 swabs per student), 2 Erlenmeyer flasks, protective eyewear, a resealable plastic bag, a timer and the Activity 5 Station Instructions.

Activity 6: Blind Spot

a. Cut out one Blind Spot Diagram from the Blind Spot Diagram/Visual Compensation Indicator photocopy. **Optional:** Attach the Blind Spot Diagram to an index card for increased durability.

b. Place the Blind Spot Diagram and a ruler at this station, along with the Activity 6 Station Instructions.

Activity 7: Visual Compensation

a. Cut out the remaining Blind Spot Diagram, separating it from the Visual Compensation Indicator. **Optional:** Attach the Blind Spot Diagram and the Visual Compensation Indicator to index cards for increased durability.

b. Place the Blind Spot Diagram and the Visual Compensation Indicator cutouts at this station, along with the Activity 7 Station Instructions.

Activity 8: Afterimages

a. At this station, place the green paper strips, the orange paper strips, a sheet of blank white paper, and the Activity 8 Station Instructions.

Activity 9: Visual Accommodation

a. At this station place a pin, a ruler, and the Activity 9 Station Instructions.