

## Exploring The Five Senses

# Create a Sensory Superhero Comic

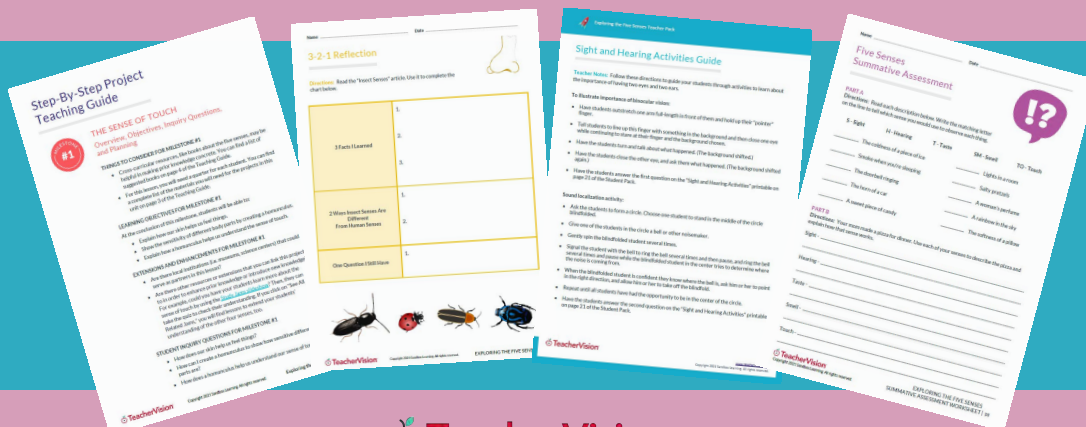


Science Project-Based Learning Grades 4-6

Explore the 5 Senses

Experiment with Taste, Touch, Smell

Create a Comic About a Sensory Superhero



# Lesson Plan: Exploring the Five Senses

## ABOUT THIS PROJECT-BASED LESSON

This project-based learning unit is designed to teach and reinforce the concepts in an elementary science unit on the five senses and can be used in conjunction with existing curriculum materials.

The project is divided into 5 Milestones; each Milestone includes a self-contained student project activity. Done in sequence, the Milestones connect to enable students to produce a comprehensive capstone activity.

The minimum suggested duration for completing this project is 5 class periods. However, it is completely flexible and can be lengthened or shortened as necessary, based on available class time and interest level.

## HOW TO USE THIS TEACHING GUIDE

Each Milestone for this project-based learning unit includes detailed daily activities presented in step-by-step order, with teaching notes, instructional guidance, and page references to resources and materials included in the Teacher Pack and Student Pack.

Daily activities are organized for you as follows:

- **Prepare (Bell-ringer/opener activity)**  
Use these short opening activities at the beginning of class.
- **Present (Lecture/model)**  
Use this portion of the lesson to deliver new subject material and project information, and to model any instructions or activity required for Produce or Participate elements.
- **Produce (Student project work)**  
Use this portion of the lesson to allow students to work independently or in small groups on activities and other project elements.
- **Participate (Student/group share)**  
Use this portion of the lesson to allow students to share out any project, research, or presentation materials.
- **Practice (Homework/assessment/independent)**  
Use this optional portion of the lesson, if desired, to give students homework activities.

# Step-By-Step Project Teaching Guide

---



## THE SENSE OF TOUCH

### Overview, Objectives, Inquiry Questions, and Planning

#### THINGS TO CONSIDER FOR MILESTONE #1

- Cross-curricular resources, like books about the five senses, may be helpful in making prior knowledge concrete. You can find a list of suggested books on page 4 of the Teaching Guide.
- For this lesson, you will need a quarter for each student. You can find a complete list of the materials you will need for the projects in this unit on page 3 of the Teaching Guide.

#### LEARNING OBJECTIVES FOR MILESTONE #1

At the conclusion of this milestone, students will be able to:

- Explain how our skin helps us feel things.
- Show the sensitivity of different body parts by creating a homunculus.
- Explain how a homunculus helps us understand the sense of touch.

#### EXTENSIONS AND ENHANCEMENTS FOR MILESTONE #1

- Are there local institutions (i.e. museums, science centers) that could serve as partners in this lesson?
- Are there other resources or extensions that you can link this project to in order to enhance prior knowledge or introduce new knowledge? For example, could you have your students learn more about the sense of touch by using the [Study Jams slideshow](#)? Then, they can take the quiz to check their understanding. If you click on “See All Related Jams,” you will find lessons to extend your students’ understanding of the other four senses, too.

#### STUDENT INQUIRY QUESTIONS FOR MILESTONE #1

- How does our skin help us feel things?
- How can I create a homunculus to show how sensitive different body parts are?
- How does a homunculus help us understand our sense of touch?

## ASSESSMENT FOR MILESTONE #1

- **Formative Assessment for Individual Activity:** Check each student's "Creating a Homunculus" printable on page 11 of the Student Pack. Make sure the sizes of the body parts match the information on their "Collecting Data for a Homunculus" printable on page 10 of the Student Pack.
- **Formative Assessment for Group Activity:** Have each group share one way their drawings were the same and one way they were different.
- **Summative Assessment:** Have the students complete the response printable on page 12 of the Student Pack for the Inquiry Question, "How does a homunculus help us understand our sense of touch?"

### Student Pack

- Page 9
- Page 10
- Page 11
- Page 12

### Teacher Pack

- Page 6

## Project Activities for Milestone #1: The Sense of Touch

### PREPARE (Bell-ringer/opener activity)

Tell the students that they will be investigating how the brain interprets sensory information. Give each student a quarter and "The Sense of Touch" printable on page 9 of the Student Pack. Have the students follow the directions on the page and answer the question. Use the sample answers on "The Sense of Touch Answer Key" on page 6 of the Teaching Guide to discuss the answers.

### PRESENT (Lecture/model)

Use slides 1-3 of the "[Sense Organs: Skin, Nose, Tongue](#)" PowerPoint to review important information about the sense of touch. Have the students fill in the notes on the bottom of "The Sense of Touch" printable.

### PARTICIPATE (student/group share, group activity)

Tell the students that a homunculus is a picture of a person with some parts larger than they should be. Show them the sample homunculus on slide 1 of the "Sense Organs: Skin, Nose, Tongue" PowerPoint. Discuss why the girl's tongue, hands, and feet are larger than the rest of her body parts.

Tell the students that today they will create their own homunculus to show how sensitive their different body parts are. Give them the "Collecting Data for a Homunculus" printable on page 10 of the Student Pack. Have them follow the directions to determine the sensitivity of their different body parts.

Give the students the “Creating a Homunculus” printable on page 11 of the Student Pack. Have them draw their own homunculus based on the data they collected.

Put the students into groups of 3 or 4. Have them compare and contrast their drawings.

**Formative Assessment:** Have each group share one way their drawings were the same and one way they were different.

### **PRACTICE (Homework/independent work/extensions)**

Give each student the writing response template on page 12 of the Student Pack and ask them to write an answer to the inquiry question for this Milestone: “How does a homunculus help us understand our sense of touch?”

### **ASSESSMENT**

**Formative Assessment for Individual Activity:** Check each student’s “Creating a Homunculus” printable on page 11 of the Student Pack. Make sure the sizes of the body parts match the information on their “Collecting Data for a Homunculus” printable on page 10 of the Student Pack.

**Formative Assessment for Group Activity:** Have each group share one way their drawings were the same and one way they were different.

**Summative Assessment:** Have the students complete the response printable on page 12 of the Student Pack for the Inquiry Question, “How does a homunculus help us understand our sense of touch?”



## SENSE OF SMELL

### Overview, Objectives, Inquiry Questions, and Planning

#### THINGS TO CONSIDER FOR MILESTONE #2

- Use the “Setting Up for the Super Sniffer Activity” printable on page 8 of the Teaching Guide to prepare the classroom before the students arrive.

#### LEARNING OBJECTIVES FOR MILESTONE #2

At the conclusion of this milestone, students will be able to:

- Explain how we are able to smell things.
- Complete the Super Sniffer Activity to determine whether it is easy or hard to remember a scent.

#### EXTENSIONS AND ENHANCEMENTS FOR MILESTONE #2

- Could you have the students learn about the senses of other living things? Have them read the “Insect Senses” article on page 13 of the Student Pack and complete the “3-2-1 Reflection” printable on page 14 of the Student Pack.

#### STUDENT INQUIRY QUESTIONS FOR MILESTONE #2

- How can your sense of smell be used to find a missing person?
- What is your favorite scent? How does your sense of smell work to allow you to smell that scent?

#### ASSESSMENT FOR MILESTONE #2

- **Formative Assessment for Individual Activity:** Check each student’s “The Sense of Smell” printable on page 15 of the Student Pack. Use “The Sense of Smell Answer Key” on page 7 of the Teaching Guide to check their answers.
- **Formative Assessment for Group Activity:** Have each pair of students share their answers to the two discussion questions at the bottom of the “Super Sniffer Activity” printable.
- **Summative Assessment:** Have the students complete the response printable on page 17 of the Student Pack for the Inquiry Question, “What is your favorite scent? How does your sense of smell work to allow you to smell that scent?”

### Student Pack

- Page 15
- Page 16
- Page 17

### Teacher Pack

- Page 7
- Page 8

## Project Activities for Milestone #2: Sense of Smell

### PREPARE (Bell-ringer/opener activity)

Just before class, pop some microwave popcorn. Put the popcorn in a bowl out of sight but in a location where the smell will be noticed by the students when they enter the classroom. Have the students turn and talk about what the smell of popcorn reminds them of. Call on students to share their ideas.

Give the students “The Sense of Smell” printable on page 15 of the Student Pack. Give them a few minutes to write about a smell that they associate with a special memory. Call on students who would like to share what they wrote.

### PRESENT (Lecture/model)

Use slide 4 and the top of slide 5 of the [“Sense Organs: Skin, Nose, Tongue” PowerPoint](#) to review important information about the sense of smell. Have the students fill in the notes at the bottom of “The Sense of Smell” printable. Use “The Sense of Smell Answer Key” on page 7 of the Teaching Guide to discuss the answers.

### PARTICIPATE (Student/group share, group activity)

Prepare the students for the Super Sniffer Activity by telling them that they are going to become bloodhounds to find a “missing person”. Read aloud the “Background Information” and “Activity” sections of the “Setting Up for the Super Sniffer Activity” printable on page 8 of the Teaching Guide.

Give the students the “Super Sniffer Activity” printable on page 16 of the Student Pack. Put the students into pairs. Have them follow the directions to complete the activity and answer the questions.

**Formative Assessment:** Have each pair of students share their answers to the two discussion questions at the bottom of the “Super Sniffer Activity” printable.

### PRACTICE (Homework/independent work/extensions)

Give each student the writing response template on page 17 of the Student Pack and ask them to write an answer to the inquiry question for this Milestone: “What is your favorite scent? How does your sense of smell work to allow you to smell that scent?”

### ASSESSMENT

**Formative Assessment for Individual Activity:** Check each student’s “The Sense of Smell” printable on page 15 of the Student Pack. Use “The Sense of Smell Answer Key” on page 7 of the Teaching Guide to check their answers.

**Formative Assessment for Group Activity:** Have each pair of students share their answers to the two discussion questions at the bottom of the “Super Sniffer Activity” printable.

**Summative Assessment:** Have the students complete the response printable on page 17 of the Student Pack for the Inquiry Question, “What is your favorite scent? How does your sense of smell work to allow you to smell that scent?”





# THE SENSE OF TASTE

## Overview, Objectives, Inquiry Questions, and Planning

### THINGS TO CONSIDER FOR MILESTONE #3

- If your students have any food allergies, you may need to adjust some of the foods used in this lesson.
- Use the “Setting Up for the Mapping Tastes Activity” on page 10 of the Teaching Guide and the “Setting Up for the Super Tasty Activity” on page 11 of the Teaching Guide to prepare for the activities.

### LEARNING OBJECTIVES FOR MILESTONE #3

At the conclusion of this milestone, students will be able to:

- Identify the parts of the tongue that experience different tastes.
- Explain how the sense of taste is related to the senses of sight and smell.

### EXTENSIONS AND ENHANCEMENTS FOR MILESTONE #3

- Could you have your students use the [WISC-Online website](#) to learn more about how the sense of taste works? When they complete the lesson, they can label the parts of the mouth that contribute to the sense of taste.

### STUDENT INQUIRY QUESTIONS FOR MILESTONE #3

- What parts of your tongue allow you to taste different flavors?
- How is your sense of taste related to your senses of sight and smell?

### ASSESSMENT FOR MILESTONE #3

- **Formative Assessment for Individual Activity:** Check each student’s “Test Your Taste Buds” printable on page 20 of the Student Pack.
- **Formative Assessment for Group Activity:** Have each pair of students share their answers to the two discussion questions at the bottom of the “Super Tasty Activity” printable.
- **Summative Assessment:** Have the students complete the response printable on page 24 of the Student Pack for the Inquiry Question, “How is your sense of taste related to your senses of sight and smell?”
- **Summative Assessment:** Have the students complete the “Five Senses Quick Quiz” on page 12 of the Teaching Guide. Use the “Five Senses Quick Quiz Answer Key” on page 13 of the Teaching Guide to correct the quizzes prior to starting Milestone #4.

## Student Pack

- Page 18
- Page 19
- Page 20
- Page 21
- Page 22
- Page 23
- Page 24

## Teacher Pack

- Page 9
- Page 11
- Page 12
- Page 13

# Project Activities for Milestone #3: The Sense of Taste

## PREPARE (Bell-ringer/opener activity)

Name some foods, and have your students shout out the first things that come to mind. For example, you could say “cake,” and your students could shout out “birthday parties”. Try this activity with hot chocolate, pumpkin pie, and cotton candy.

Tell your students that like smells, tastes are often associated with memories.

Give the students “The Sense of Taste” printable on page 18 of the Student Pack. Have them write about a taste that brings back a bad, or unpleasant, memory. After a few minutes, call on students to share their responses.

## PRESENT (Lecture/model)

Use the bottom of slide 5 and slide 6 of the [“Sense Organs: Skin, Nose, Tongue” PowerPoint](#) to review important information about the sense of taste. Have the students fill in the notes at the bottom of “The Sense of Taste” printable. Use “The Sense of Taste Answer Key” on page 9 of the Teaching Guide to discuss the answers.

## PARTICIPATE (Student/group share, group activity)

Give the students the “Mapping Tastes” printable on page 19 of the Student Pack. Pass out one sample food at a time, and have the students taste the food and fill in the chart. Once the students have tasted all 4 samples, pass out the “Test Your Taste Buds” printable on page 20 of the Student Pack. Have the students compare this “Tongue Map” with the one they made on the “Mapping Tastes” page. They can also match the foods with the correct parts of the tongue that taste them.

Prepare the students for the Super Tasty Activity by telling them that they are going to see what it would be like without the senses of sight and smell. Read aloud the “Background Information” and “Activity” sections of the “Setting Up for the Super Tasty Activity” printable on page 11 of the Teaching Guide.

Give the students the “Super Tasty Activity” printable on page 21 of the Student Pack and the “Super Tasty Data Sheet” printable on pages 22 and 23 of the Student Pack. Have them follow the directions and record their results on the data sheet.

**Formative Assessment:** Have each pair of students share their answers to the two discussion questions at the bottom of the “Super Tasty Activity” printable.

## **PRACTICE (Homework/independent work/extensions)**

Give each student the writing response template on page 24 of the Student Pack and ask them to write an answer to the inquiry question for this Milestone: “How is your sense of taste related to your senses of sight and smell?”

## **ASSESSMENT**

**Formative Assessment for Individual Activity:** Check each student’s “Test Your Taste Buds” printable on page 20 of the Student Pack.

**Formative Assessment for Group Activity:** Have each pair of students share their answers to the two discussion questions at the bottom of the “Super Tasty Activity” printable.

**Summative Assessment:** Have the students complete the response printable on page 24 of the Student Pack for the Inquiry Question, “How is your sense of taste related to your senses of sight and smell?”

**Summative Assessment:** Have the students complete the “Five Senses Quick Quiz” on page 12 of the Teaching Guide. Use the “Five Senses Quick Quiz Answer Key” on page 13 of the Teaching Guide to correct the quizzes prior to starting Milestone #4.



# THE SENSES OF SIGHT AND HEARING

## Overview, Objectives, Inquiry Questions, and Planning

### THINGS TO CONSIDER FOR MILESTONE #4

- You might want to have your students complete the second activity on the “Sight and Hearing Activities Guide” on page 17 of the Teaching Guide in small groups so it takes less time. You will need a blindfold and a bell for each group if you choose to do it this way.

### LEARNING OBJECTIVES FOR MILESTONE #4

At the conclusion of this milestone, students will be able to:

- Explain how our eyes work to allow us to see.
- Explain how our ears work to allow us to hear.
- Explain whether they think the sense of sight or the sense of hearing is more important.

### EXTENSIONS AND ENHANCEMENTS FOR MILESTONE #4

- Could your students review the five senses by exploring the [DK Find Out](#) website? After they click on all of the senses and read about them, they can click on the question mark to take the quiz.

### STUDENT INQUIRY QUESTIONS FOR MILESTONE #4

- How do our eyes work so we can see?
- How do our ears work so we can hear?
- Do you think your sense of sight or your sense of hearing is more important? Why?

### ASSESSMENT FOR MILESTONE #4

- **Formative Assessment for Individual Activity:** Check each student’s “The Senses of Sight and Hearing” printable on page 31 of the Student Pack. Use “The Senses of Sight and Hearing Answer Key” on page 16 of the Teaching Guide to check their answers.
- **Formative Assessment for Group Activity:** Have the students share their answers to the two questions on the “Sight and Hearing Activities” printable.
- **Summative Assessment:** Have the students complete the response printable on page 33 of the Student Pack for the Inquiry Question, “Do you think your sense of sight or your sense of hearing is more important? Why?”

## Student Pack

- Page 31
- Page 32
- Page 33

## Teacher Pack

- Page 16
- Page 17

# Project Activities for Milestone #4: The Senses of Sight and Hearing

## PREPARE (Bell-ringer/opener activity)

Have the students turn and talk about why animals have two eyes and two ears. Call on students to share their answers.

## PRESENT (Lecture/model)

Give the students “The Senses of Sight and Hearing” printable on page 31 of the Student Pack. Use the slides in the [“Sense Organs: Eyes and Ears” PowerPoint](#) to review important information about the senses of sight and hearing. Have the students fill in the notes. Use “The Senses of Sight and Hearing Answer Key” on page 16 of the Teaching Guide to discuss the answers.

## PARTICIPATE (Student/group share, group activity)

Give the students the “Sight and Hearing Activities” printable on page 32 of the Student Pack.

Engage the students in 2 activities to illustrate the importance of having 2 eyes and 2 ears. Follow the directions on the “Sight and Hearing Activities Guide” on page 17 of the Teaching Guide.

**Formative Assessment:** Have the students share their answers to the two questions on the “Sight and Hearing Activities” printable.

## PRACTICE (Homework/independent work/extensions)

Give each student the writing response template on page 33 of the Student Pack and ask them to write an answer to the inquiry question for this Milestone: “Do you think your sense of sight or your sense of hearing is more important? Why?”

## ASSESSMENT

**Formative Assessment for Individual Activity:** Check each student’s “The Senses of Sight and Hearing” printable on page 31 of the Student Pack. Use “The Senses of Sight and Hearing Answer Key” on page 16 of the Teaching Guide to check their answers.

**Formative Assessment for Group Activity:** Have the students share their answers to the two questions on the “Sight and Hearing Activities” printable.

**Summative Assessment:** Have the students complete the response printable on page 33 of the Student Pack for the Inquiry Question, “Do you think your sense of sight or your sense of hearing is more important? Why?”



# FIVE SENSES PROJECT

## Overview, Objectives, Inquiry Questions, and Planning

### THINGS TO CONSIDER FOR MILESTONE #5

- The students will use the [Make Beliefs Comix](#) website to create their own comic strips. This website is completely free, but your students will need to create an account so they can save their work.

### LEARNING OBJECTIVES FOR MILESTONE #5

At the conclusion of this milestone, students will be able to:

- Write a story about themselves as a superhero with a “super sense”.
- Create a comic strip that demonstrates a “super sense”.
- Explain why the brain is important to our senses.

### EXTENSIONS AND ENHANCEMENTS FOR MILESTONE #5

- Could you have your students go on a scavenger hunt to use their senses? Give them the “Senses Scavenger Hunt” printable on page 34 of the Student Pack. Have them look around the classroom for something that fits each description. They should add one thing to each category to describe something else they found.

### STUDENT INQUIRY QUESTIONS FOR MILESTONE #5

- How can I write a story about myself as a superhero with a “super sense”?
- How can I turn my story into a comic strip?
- What would happen to your senses if you didn’t have a brain? Why?

### ASSESSMENT FOR MILESTONE #5

- **Formative Assessment for Individual Activity:** Check the students’ “Nervous System and Senses” printable on page 35 of the Student Pack.
- **Formative Assessment for Group Activity:** Use the “Five Senses Project Rubric” on page 20 of the Teaching Guide to assess the students’ projects.
- **Summative Assessment:** Have the students complete the response printable on page 38 of the Student Pack for the Inquiry Question, “What would happen to your senses if you didn’t have a brain? Why?”
- **Summative Assessment:** Give the students the “Five Senses Summative Assessment” on page 18 of the Teaching Guide. Use the “Five Senses Summative Assessment Answer Key” on page 19 of the Teaching Guide to correct the assessments.

### Student Pack

- Page 35
- Page 36
- Page 37
- Page 38

### Teacher Pack

- Page 18
- Page 19
- Page 20

## Project Activities for Milestone #5: Five Senses Project

### PREPARE (Bell-ringer/opener activity)

Give the students the “Nervous System and Senses” printable on page 35 of the Student Pack. Show the students the video "[Healthy Bodies 9: Nervous System and Senses](#)". Have them write five new facts they learned. When the video is over, allow the students to share what they wrote.

### PRESENT (Lecture/model)

Give the students the “Super Senses Project Guidelines” printable on page 36 of the Student Pack. Go over the requirements with the students. Demonstrate how to use the [Make Beliefs Comix](#) website. Use the “Getting Started” button on the website to go over the important steps your students will need to use to make their comics.

### PARTICIPATE (Student/group share, group activity)

Give the students the “Super Sense Story” printable on page 37 of the Student Pack. They should work on the Super Senses Project and use the Make Beliefs Comix website to create their superhero comic strips.

When the students are finished, have them print their comics and share them with you and with the class.

**Formative Assessment:** Use the “Five Senses Project Rubric” on page 20 of the Teaching Guide to assess the students’ projects.

### PRACTICE (Homework/independent work/extensions)

Give each student the writing response template on page 38 of the Student Pack and ask them to write an answer to the inquiry question for this Milestone: “What would happen to your senses if you didn’t have a brain? Why?”

### ASSESSMENT

**Formative Assessment for Individual Activity:** Check the students’ “Nervous System and Senses” printable on page 35 of the Student Pack.

**Formative Assessment for Group Activity:** Use the “Five Senses Project Rubric” on page 20 of the Teaching Guide to assess the students’ projects.

**Summative Assessment:** Have the students complete the response printable on page 38 of the Student Pack for the Inquiry Question, “What would happen to your senses if you didn’t have a brain? Why?”

**Summative Assessment:** Give the students the “Five Senses Summative Assessment” on page 18 of the Teaching Guide. Use the “Five Senses Summative Assessment Answer Key” on page 19 of the Teaching Guide to correct the assessments.





**Exploring The Five Senses**

# Teacher Pack





# Table of Contents

---

Materials Needed for the Projects in this Unit .....	3
Books About the Five Senses .....	4
<b>Milestone #1 Resources</b>	
Sense Organs: Skin, Nose, Tongue Teacher Notes .....	5
The Sense of Touch Answer Key .....	6
<b>Milestone #2 Resources</b>	
The Sense of Smell Answer Key .....	7
Setting Up for the Super Sniffer Activity .....	8
<b>Milestone #3 Resources</b>	
The Sense of Taste Answer Key .....	9
Setting Up for the Mapping Tastes Activity .....	10
Setting Up for the Super Tasty Activity .....	11
Five Senses Quick Quiz .....	12
Five Senses Quick Quiz Answer Key .....	13
<b>Milestone #4 Resources</b>	
Sense Organs: Eyes and Ears Teacher Notes .....	14-15
The Senses of Sight and Hearing Answer Key .....	16
Sight and Hearing Activities Guide .....	17
<b>Milestone #5 Resources</b>	
Five Senses Summative Assessment .....	18
Five Senses Summative Assessment Answer Key .....	19
Five Senses Project Rubric .....	20



# Materials Needed for the Projects in this Unit

---

## The Sense of Touch

- A quarter for each student

## The Sense of Smell

- A bag of popcorn

## Super Sniffer Activity

- 12 liquid scents (essential oils, cooking extracts, perfumes)
- 12 Sponges – cut in half, all the **same** color
- 12 Ziploc bags

## Mapping Tastes Activity

- Unsweetened chocolate (baker's chocolate)
- Sour candy
- Sweet candy
- Pretzels
- Paper Plate

## Super Tasty Activity

- Food samples for each student to taste two choices (They will work in pairs.):
  - 4 flavors of Lifesaver candies
  - 4 flavors of jelly beans
  - 4 flavors of applesauce
  - 4 flavors of Jello, pudding or yogurt
- Spoons – enough for each student to have 8 spoons
- Box lids or cloth to hide samples

## Sight and Hearing Activities

- A blindfold
- A bell or other noisemaker



# Books About the Five Senses

---

**Note for the Teacher:** Gather as many books as you can about the five senses.

## Suggested Books:

**Exploring the Five Senses** by Poonam Patel

**Five Senses** by Stephanie Reid

**I Hear a Pickle (and Smell, See, Touch, and Taste It, Too!)** by Rachel Isadora

**I Wonder Why Lemons Are Sour: and Other Questions About Senses** by Deborah Chancellor

**Let's Explore the Five Senses** by Candice Ransom

**Look, Listen, Taste, Touch, and Smell: Learning About Your Five Senses** by Pamela Hill Nettleton and Becky Shipe

**My Five Senses** by Alikei

**The Five Senses** by Jennifer Prior

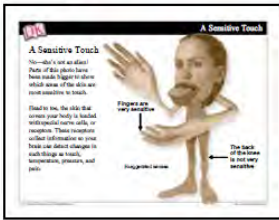
**The Five Senses** by Sally Hewitt

**The Magic School Bus Explores the Senses** by Joanna Cole

**You Can't Smell a Flower with Your Ear!** by Joanna Cole and Mavis Smith



# Sense Organs: Skin, Nose, Tongue Teacher Notes



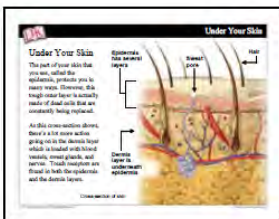
## A Sensitive Touch

On an adult, the living, leathery overcoat of skin weighs about 11 pounds. Different parts of the body have varying numbers of sense receptors in the skin for detecting touch, pressure, and vibration. This body is exaggerated to show which areas of skin have the most touch receptors, and are therefore most sensitive to touch. The hands, lips, and tongue are very large, while the arms and legs are minimized.



## Get a Grip

The skin on the palm of the hand is covered with ridges. These help the hand to grip objects when performing different tasks. Beneath the palm is a triangle-shaped sheet of tough, meshed fibers that anchor the skin and stops it from sliding over the underlying fat and muscle. When fingers touch smooth surfaces, such as glass, their ridges leave behind sweaty patterns called fingerprints. These are classified into types by the presence of three main features: arches, loops, and whorls. Each human has a unique set of fingerprints.



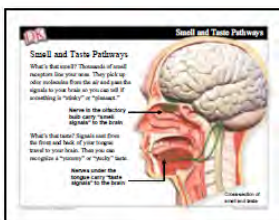
## Under Your Skin

The upper surface layers of the epidermis consist of flat, interlocking dead cells. These are filled with hard-wearing protein called keratin. The skin flakes as dead cells wear away and are replaced with new cells. New cells are produced by cell division in the lowest layer of the epidermis. The thicker dermis layer contains the sense receptors that help the body detect changes in touch, temperature, vibration, pressure, and pain. The dermis also houses coiled sweat glands and hair follicles. The sebaceous glands release oily sebum, which keeps the skin and hair soft and flexible.



## Sniff and Taste

The sense of smell is 10,000 times more sensitive than taste, so if the nose is blocked, food loses its flavor.



## Smell and Taste Pathways

This cross-section through the head shows the pathways taken by nerve signals from smell receptors high in the nasal cavity, and from taste buds in the tongue. In the nasal cavity, branches of the olfactory nerve send signals to the olfactory bulb, which carries the signals to areas at the front of the brain that identify smells. Taste signals from the front and back of the tongue travel along separate nerves to the brain stem's medulla oblongata. From here they are sent to the gustatory (taste) area of the brain where tastes are recognized.



## Taste Organ Close-Up

The muscular tongue mixes and tastes food during chewing. Its upper surface is covered with pimple-like papillae of different types. These make the tongue sensitive to taste and also to touch and temperature. The tongue's many nerves carry different types of sensory information to different parts of the brain. Taste molecules dissolve in saliva during chewing and pass into a taste bud through a pore. Here the hairs at the top of the taste receptor cells detect one of five tastes—sweet, sour, salty, bitter, or umami (savory).



## The Sense of Touch Answer Key



**Teacher Notes:** Give each student a quarter. Have them follow the directions and answer the questions. Discuss the answers as a class.

**Step 1.** Roll up your sleeve past the elbow.

**Step 2.** Use the rough edge of the quarter to touch above your elbow.

**Step 3.** Move the quarter down your inner arm to your fingertips.

What did you notice about how the quarter felt as it moved from your upper arm down to your fingertips?

*It felt rougher as it got closer to my fingertips.*

Why do you think this happened?

*The nerves in our fingertips are more numerous than in our forearms, so they are more sensitive.*

**Teacher Notes:** Use the first three slides of the “Sense Organs: Skin, Nose, Tongue” PowerPoint to review information about the sense of touch. Have your students fill in the notes. Go over the answers together.

The special nerve cells that cover your skin are called *receptors*.

Your *fingers* are very sensitive.

Touch receptors are found in the *epidermis* and *dermis* layers of your skin.





# The Sense of Smell Answer Key



**Teacher Notes:** Have the students write about a smell that reminds them of a special memory. Allow them to share what they wrote.

*Answers will vary.*

.....

.....

.....

.....

.....



**Teacher Notes:** Use slide 4 and the top of slide 5 of the “Sense Organs: Skin, Nose, Tongue” PowerPoint to review information about the sense of smell. Have your students fill in the notes. Go over the answers together.

The senses of *smell* and *taste* are closely connected.

Thousands of smell receptors line your *nose*.

They pick up odor molecules from the *air* and pass the signals to your *brain*.



## Setting up for the Super Sniffer Activity

**Summary:** Students use the olfactory sense to track and find a lost “person” to simulate a bloodhound search and rescue mission.

**Materials:** (Gather these materials before the lesson.)

- 12 liquid scents (essential oils, cooking extracts, perfumes)
- 12 sponges – cut in half, all the same color
- 12 ziploc bags

**Preparation:** (Complete these steps when the students aren’t in the classroom.)

1. Before class, cut sponges in half. Mark each pair of sponges with a letter or number identifying which scent it contains.
2. Place each pair of sponges in a ziploc bag and add scent. Seal until ready for use.
3. Before the activity, hide one sponge from each pair in the classroom or outside, with the identifying letter or number facing down. Keep the other half of the sponge in the baggie for students to smell before they start tracking.

**Background Information:** (Share this information with the students before the activity.)

Bloodhounds have an excellent sense of smell. It is estimated that their sense of smell is at least 1,000 times greater than a human’s. Police departments around the world use this super power to help track and find lost people. When a bloodhound sniffs a scent article, the air rushes through the dog’s nasal cavity and creates an “odor image” in the dog’s brain, kind of like a smell photograph. The odor image is created from a variety of smells that humans cannot detect, such as sweat, breath and skin. The bloodhound’s sense of smell is so powerful that it can use the odor image to pick out the exact scent trail it needs. Once the bloodhound finds the scent trail, it can follow the specific smell despite all the other odors in the environment. Bloodhounds have been known to follow a scent trail for more than 130 miles! Amazingly, bloodhounds can even smell a trail that is up to 300 hours old. That would be like someone walking past you wearing perfume and still being able to smell it 13 days later. Bloodhounds have several features that make them well-suited for tracking. Their wrinkly skin traps scents, and their long ears act like scent sweepers, pushing scents toward their noses.

**Activity:** (Go over the directions right before starting the activity.)

Explain to students that they will be pretending to be a pair of bloodhounds searching for a lost child. They will be given a scent article (sponge in baggie with a unique scent). Their job is to try to remember the “odor image” and find the lost child as quickly as possible. Tell the students they are **not** allowed to pick up the sponge, but they should sit down beside their lost child/sponge and wait for the teacher to check for a match between the scent article and the sponge. They may howl quietly to indicate they found a match. They are **not** allowed to go back to the original sponge for a second sniff.



# The Sense of Taste *Answer Key*



**Teacher Notes:** Have the students write about a taste that reminds them of a bad, or unpleasant, memory. Allow them to share what they wrote.

.....

.....

.....

.....

.....

.....

**Teacher Notes:** Use the bottom of slide 5 and slide 6 of the “Sense Organs: Skin, Nose, Tongue” PowerPoint to review information about the sense of taste. Have your students fill in the notes. Go over the answers together.

Nerves *under* the tongue carry “taste signals” to the brain.

Even though your tongue seems smooth, it actually has a *rough* surface.

The bumps on your tongue contain *taste buds*.

The taste receptors in the taste buds allow you to detect *sweet, sour, salty, bitter* and *savory* tastes.





# Setting up for the Mapping Tastes Activity

---

**Summary:** Students will taste different foods to determine which part of the tongue experiences each flavor.

**Materials:** (Gather these materials before the lesson.)

- Unsweetened chocolate (baker's chocolate)
- Sour candy
- Sweet candy
- Pretzels
- Paper Plates

**Preparation:**

1. Break the food items into small sample sizes.
2. Give each student a paper plate.
3. Distribute a piece of Sample #1 (unsweetened chocolate) to each student. Allow them to try it and use the "Mapping Tastes" printable on page 14 of the Student Pack to describe its taste and what part of the tongue experiences the flavor.
4. Continue these steps for Sample #2 (sour candy), Sample #3 (sweet candy), and Sample #4 (pretzels).



# Setting up for the Super Tasty Activity

**Summary:** Students will experiment with the sense of taste and its tie to the olfactory system.

**Materials:** (Gather these materials before the lesson.)

- Food samples for each student to taste two choices:
  - 4 flavors of Lifesaver candies
  - 4 flavors of jelly beans
  - 4 flavors of applesauce
  - 4 flavors of Jello, pudding or yogurt
- Spoons – enough for each student to have 8 spoons
- Box lids or cloth to hide samples

**Preparation:** (Complete these steps when the students aren't in the classroom.)

1. Set up 4 tasting stations. Each station will need spoons and a place to discard used spoons.
2. Place four flavors of a food at each station and cover the food so students cannot look at it ahead of time.

**Background Information:** (Share this information with the students before the activity.)

Senses are important to an organism's survival. A sense of taste helps animals stay away from poisonous substances and only eat food that is good for their bodies. Some animals have a highly developed sense of taste, like the catfish with 100,000 taste receptors all over its body! Cows have 25,000-35,000 taste buds, 2-3 times more than humans. This helps them distinguish between poisonous and non-poisonous plants. Few of us understand how important our sense of smell is to identifying foods. Animals are able to determine the quality of food by smelling it before eating it, especially if they have tried it before. In this activity, you will test your ability to distinguish between tastes without the aid of your senses of smell and sight.

**Activity:** (Go over the directions right before starting the activity.)

1. In pairs, students will visit each tasting station. One student will serve as the taster, and the other student will be the tester.
2. When students sit at the tasting station, the taster will close his/her eyes and pinch his/her nose tightly.
3. The tester will feed the taster a sample of the food hiding behind the box or cloth. The tester should record the flavor of the food on the data sheet, and whether the taster correctly identified the food. Repeat with a second sample. Tell the taster to say their answers softly so they do not influence the ideas of other students.
4. Repeat the test with the taster looking at and smelling both samples. Record the results on the data sheet.
5. The tester and the taster should switch roles for the other two flavors.
6. Have the students move to the next station.
7. Repeat steps 3-5 until all stations have been visited and all students have tasted two flavors of all 4 foods.

Name .....

Date .....

# Five Senses Quick Quiz

---



**Directions:** Read each question. Circle the best answer. Use information from the experiments you conducted to complete the sentences.

1. Which of these is NOT one of the main flavors your taste buds detect?

A Sweet

B Sour

C Burnt

D Bitter

My favorite flavor is ....., and the .....  
part of the tongue experiences this flavor.

2. Which other sense is very closely related to taste?

A Smell

B Hearing

C Touch

D Balance

Pinching my nose affected my sense of taste because .....  
.....

3. Which of these body parts is the most sensitive?

A The arm

B The back

C The finger

D The leg

Another body part that was sensitive was the ..... I showed this  
on my homunculus by .....  
.....

# Five Senses Quick Quiz

## Answer Key

---



**Directions:** Read each question. Circle the best answer. Use information from the experiments you conducted to complete the sentences.

1. Which of these is NOT one of the main flavors your taste buds detect?

- A Sweet
- B Sour
- C *Burnt*
- D Bitter

My favorite flavor is *Answers will vary*, and the .....  
part of the tongue experiences this flavor.

2. Which other sense is very closely related to taste?

- A *Smell*
- B Hearing
- C Touch
- D Balance

Pinching my nose affected my sense of taste because *Answers will vary*  
.....

3. Which of these body parts is the most sensitive?

- A The arm
- B The back
- C *The finger*
- D The leg

Another body part that was sensitive was the *Answers will vary*. I showed this on my  
homunculus by .....  
.....

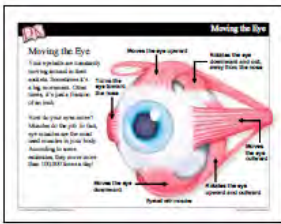


# Sense Organs: Eyes and Ears Teacher Notes



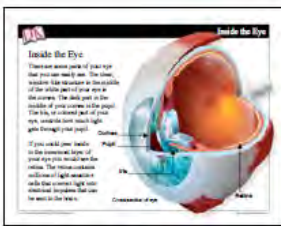
## Eyes Forward

Only one-sixth of an eyeball, including the pupil and iris, can be seen from the outside. The rest of each eyeball sits protected within a deep bowl of skull bone called the eye socket. Eyebrows, eyelids, and eyelashes protect the front of the eye by shading it from dust, sweat, and excessive light. The color of the iris depends on the amount of the brown pigment melanin present. Brown eyes have the most melanin.



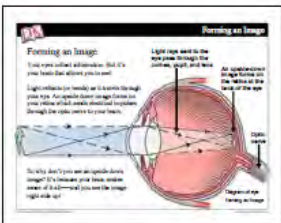
## Moving the Eye

Eyeballs swivel in their sockets to follow moving objects. They also make tiny, jumping movements when scanning a face or the words on a page. The six slim muscles that produce all these movements are attached to the sclera at one end and the skull at the other. The muscles work as a team to move the eye in all directions.



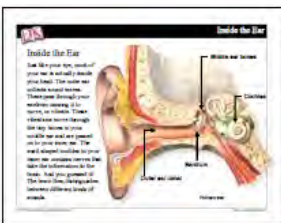
## Inside the Eye

The wall of the eyeball is a three-layered sandwich. Outermost is the tough sclera, visible at the front as the white of the eye, except where the clear cornea allows light in. In the middle is the choroid, which is filled with blood vessels that supply the other two layers. The innermost layer is the light-detecting retina. Its millions of light detecting cells send image information to the brain.



## Forming an Image

When we look at an object, light rays reflected from that object shine through and are partly focused, or bent, by the cornea. The light then passes through the pupil to the lens. Ciliary muscles adjust the lens's shape, and further focus the rays, which projects a sharp upside-down image onto the retina. The retina sends nerve signals along the optic nerve to the brain, which then turns the image the right way up.



## Inside the Ear

Most of the ear is concealed inside the skull's temporal bone. It has three main parts. The outer ear consists of the pinna (ear flap) that directs sound waves into the ear canal. The air-filled middle ear contains the eardrum and three tiny bones, the ossicles, which convert the sound waves into mechanical movement. The fluid-filled inner ear is made up of the semicircular canals, the vestibule, and the snail-shaped cochlea—the organ that converts sound into nerve signals.

The innermost part of the ear is made up of a maze of channels inside the temporal bone. These channels are lined with membranes and filled with fluid. One branch of the inner ear leads to the coiled cochlea. The vestibule contains two organs of balance, the utricle and saccule. It also houses the oval window, the membrane through which sound vibrations pass from middle to inner ears. Another balance organ, the semicircular canals, lies above the vestibule.





## Sense Organs: Eyes and Ears Teacher Notes



### Smallest Bones

The ossicles spanning the middle ear are the smallest bones in the body. They get their Latin names from their shapes: malleus (hammer), incus (anvil), and stapes (stirrup). Attached to the bones are two of the body's smallest muscles, the tensor tympani and the stapedius. If a very loud sound reaches the eardrum, these muscles contract. They damp down the eardrum's movements, and their own, to prevent intense vibrations from damaging the delicate inner ear.

The ossicles (ear bones) are tiny. The malleus (hammer) is shown here actual size. It is just over 1/4 inch (8 mm) long, almost twice the size of the stapes (stirrup).



# The Senses of Sight and Hearing

## Answer Key

---



**Teacher Notes:** Use the slides in the “Sense Organs: Eyes and Ears” PowerPoint to review information about the senses of sight and hearing. Have your students fill in the notes. Go over the answers together.

You can only see *one sixth* of your eyeball because the rest of it is inside your skull - safely protected within a deep bowl of skull bone called your *eye socket*.

*Eye muscles* are the most used muscles in your body. They move more than *100,000* times a day.

Four important parts of the eye are the *cornea*, pupil, iris, and retina.

Your eyes collect *information*, but it's your *brain* that allows you to see.

The outer ear collects *sound waves*.

The snail-shaped *cochlea* in your inner ear contains nerves that take information to the *brain*.

The bones in your *middle ear* are the smallest bones in your body.



# Sight and Hearing Activities Guide

---

**Teacher Notes:** Follow these directions to guide your students through activities to learn about the importance of having two eyes and two ears.

## To illustrate importance of binocular vision:

- Have students outstretch one arm full-length in front of them and hold up their “pointer” finger.
- Tell students to line up this finger with something in the background and then close one eye while continuing to stare at their finger and the background chosen.
- Have the students turn and talk about what happened. (The background shifted.)
- Have the students close the other eye, and ask them what happened. (The background shifted again.)
- Have the students answer the first question on the “Sight and Hearing Activities” printable on page 21 of the Student Pack.

## Sound localization activity:

- Ask the students to form a circle. Choose one student to stand in the middle of the circle blindfolded.
- Give one of the students in the circle a bell or other noisemaker.
- Gently spin the blindfolded student several times.
- Signal the student with the bell to ring the bell several times and then pause, and ring the bell several times and pause while the blindfolded student in the center tries to determine where the noise is coming from.
- When the blindfolded student is confident they know where the bell is, ask him or her to point in the right direction, and allow him or her to take off the blindfold.
- Repeat until all students have had the opportunity to be in the center of the circle.
- Have the students answer the second question on the “Sight and Hearing Activities” printable on page 21 of the Student Pack.



Name .....

Date .....

# Five Senses Summative Assessment



## PART A

**Directions:** Read each description below. Write the matching letter on the line to tell which sense you would use to observe each thing.

**S - Sight**

**H - Hearing**

**T - Taste**

**SM - Smell**

**TO - Touch**

..... The coldness of a piece of ice

..... Lights in a room

..... Smoke when you're sleeping

..... Salty pretzels

..... The doorbell ringing

..... A woman's perfume

..... The horn of a car

..... A rainbow in the sky

..... A sweet piece of candy

..... The softness of a pillow

## PART B

**Directions:** Your mom made a pizza for dinner. Use each of your senses to describe the pizza and explain how that sense works.

Sight - .....

.....

Hearing - .....

.....

Taste - .....

.....

Smell - .....

.....

Touch - .....

.....

# Five Senses Summative Assessment Answer Key



## PART A

**Directions:** Read each description below. Write the matching letter on the line to tell which sense you would use to observe each thing.

S - Sight

H - Hearing

T - Taste

SM - Smell

TO - Touch

TO The coldness of a piece of ice

S Lights in a room

SM Smoke when you're sleeping

T Salty pretzels

H The doorbell ringing

SM A woman's perfume

H The horn of a car

S A rainbow in the sky

T A sweet piece of candy

TO The softness of a pillow

## PART B

**Directions:** Your mom made a pizza for dinner. Use each of your senses to describe the pizza and explain how that sense works.

Sight - *Answers will vary.* .....

.....

Hearing - .....

.....

Taste - .....

.....

Smell - .....

.....

Touch - .....

.....

Name .....

Date .....

# Five Senses Project Rubric

	4	3	2	1
<b>Super Senses Story</b>	The story includes all the important parts of a story - characters, setting, problem, important events, and solution.	The story is missing one important story element.	The story is missing two important story elements.	The story is missing three or more important story elements.
<b>Comic Strip Length</b>	The comic strip includes at least 6 panels.	The comic strip only has 4 or 5 panels.	The comic strip only has two or three panels.	The comic strip only has one panel.
<b>Parts of the Comic Strip</b>	The comic strip includes the characters, backgrounds to show the setting, important events, and speech bubbles to show what the characters are saying.	The comic strip is missing one important part.	The comic strip is missing two important parts.	The comic strip is missing three or more important parts.
<b>Neatness</b>	All of the panels of the comic strip are neat and easy to read.	One or two panels of the comic strip are not neat and easy to read.	Three or four panels of the comic strip are not neat and easy to read.	Five or more panels of the comic strip are not neat and easy to read.

Teacher's comments: .....

.....

.....



**Exploring The Five Senses**

# Student Pack

# Table of Contents

---

## Milestone #1 Resources

Sense Organs: Skin, Nose, Tongue .....	3-8
The Sense of Touch .....	9
Collecting Data for a Homunculus .....	10
Creating a Homunculus .....	11
Milestone #1 Inquiry Question .....	12

## Milestone #2 Resources

Insect Senses .....	13
3-2-1 Reflection .....	14
The Sense of Smell .....	15
Super Sniffer Activity .....	16
Milestone #2 Inquiry Question .....	17

## Milestone #3 Resources

The Sense of Taste .....	18
Mapping Tastes .....	19
Test Your Taste Buds .....	20
Super Tasty Activity .....	21
Super Tasty Data Sheet .....	22-23
Milestone #3 Inquiry Question .....	24

## Milestone #4 Resources

Sense Organs: Eyes and Ears .....	25-30
The Senses of Sight and Hearing .....	31
Sight and Hearing Activities .....	32
Milestone #4 Inquiry Question .....	33

## Milestone #5 Resources

Senses Scavenger Hunt .....	34
Nervous System and Senses .....	35
Super Senses Project Guidelines .....	36
Super Sense Story .....	37
Milestone #5 Inquiry Question .....	38

# Sense Organs: Skin, Nose, Tongue

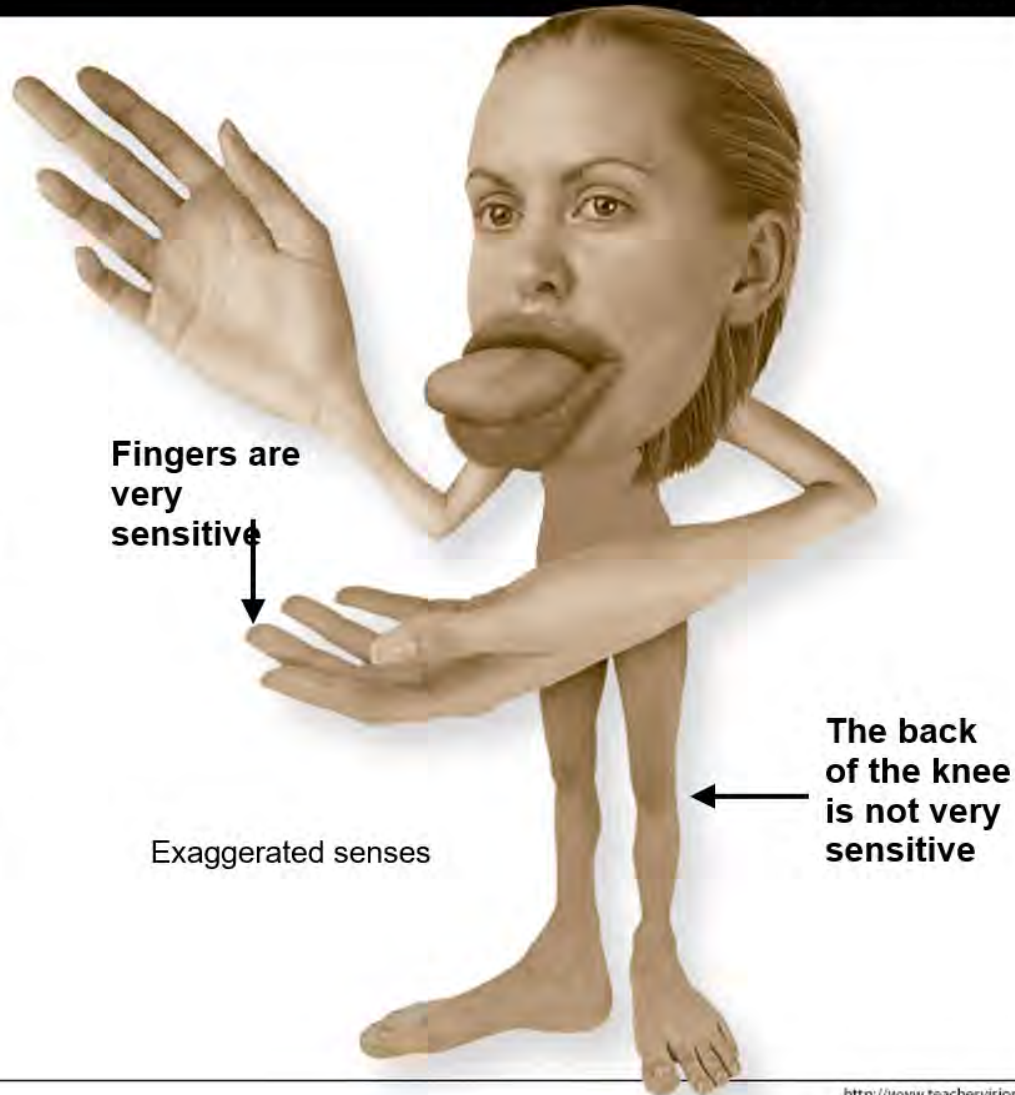


## A Sensitive Touch

### A Sensitive Touch

No—she's not an alien! Parts of this photo have been made bigger to show which areas of the skin are most sensitive to touch.

Head to toe, the skin that covers your body is loaded with special nerve cells, or receptors. These receptors collect information so your brain can detect changes in such things as touch, temperature, pressure, and pain.



© 2011 Pearson Education, Inc. All Rights Reserved.

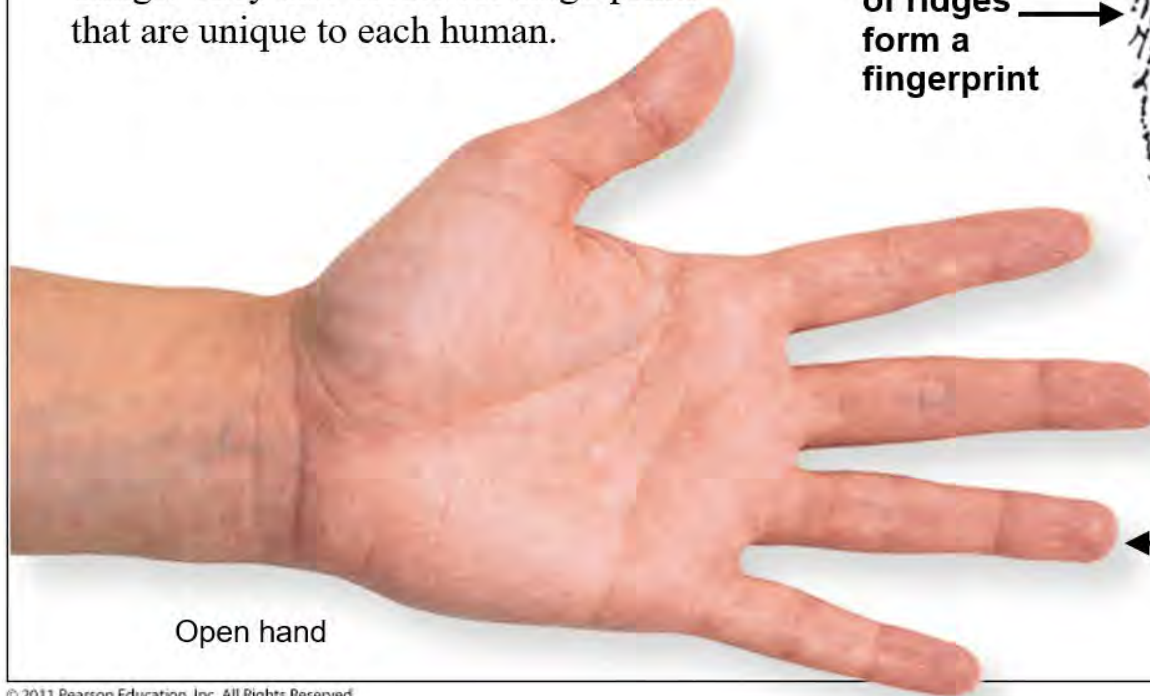
<http://www.teachervision.com>





## Get a Grip

Your hands—and especially your fingertips—have many touch receptors. The skin covering your palm and fingers is folded into patterns of tiny ridges. These ridges help you grip things. They also create the fingerprints that are unique to each human.



Swirling patterns of ridges form a fingerprint



Fingertips have many touch receptors



## Under Your Skin

The part of your skin that you see, called the epidermis, protects you in many ways. However, this tough outer layer is actually made of dead cells that are constantly being replaced.

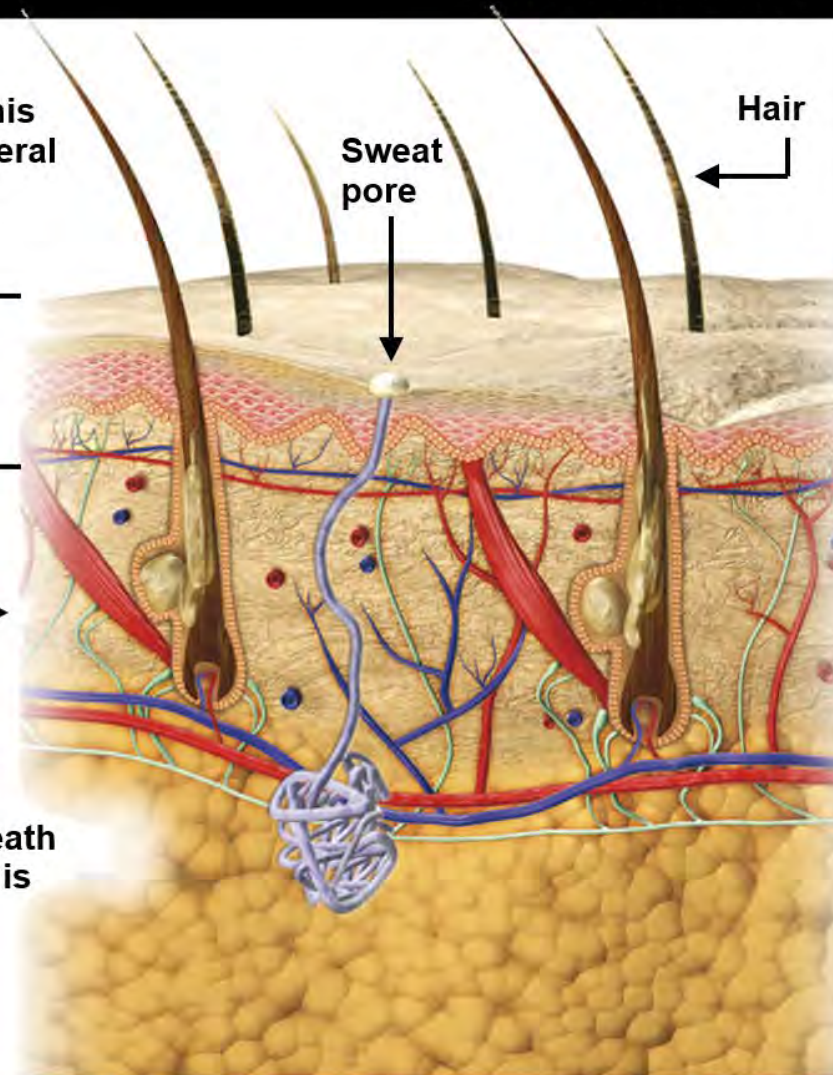
As this cross-section shows, there's a lot more action going on in the dermis layer which is loaded with blood vessels, sweat glands, and nerves. Touch receptors are found in both the epidermis and the dermis layers.

**Epidermis has several layers**

**Sweat pore**

**Hair**

**Dermis layer is underneath epidermis**



Cross-section of skin





### Sniff and Taste

Want to explore some more sense organs? Just follow your nose... and open your mouth! The sense of smell and taste are closely connected. Together, smell receptors in your nose and taste receptors on your tongue help you enjoy the flavors of different food.



Girl taking a bite of pizza



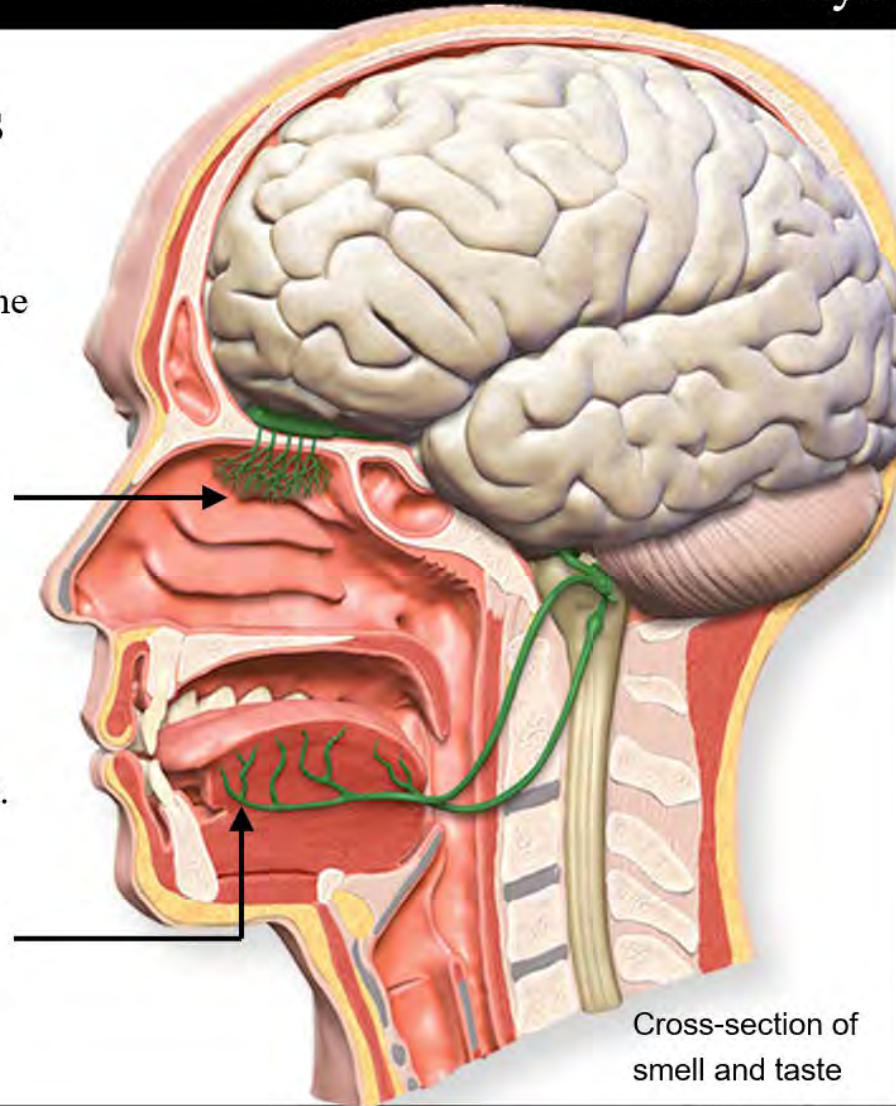
### Smell and Taste Pathways

What's that smell? Thousands of smell receptors line your nose. They pick up odor molecules from the air and pass the signals to your brain so you can tell if something is "stinky" or "pleasant."

**Nerve in the olfactory bulb carry "smell signals" to the brain**

What's that taste? Signals sent from the front and back of your tongue travel to your brain. Then you can recognize a "yummy" or "yucky" taste.

**Nerves under the tongue carry "taste signals" to the brain**





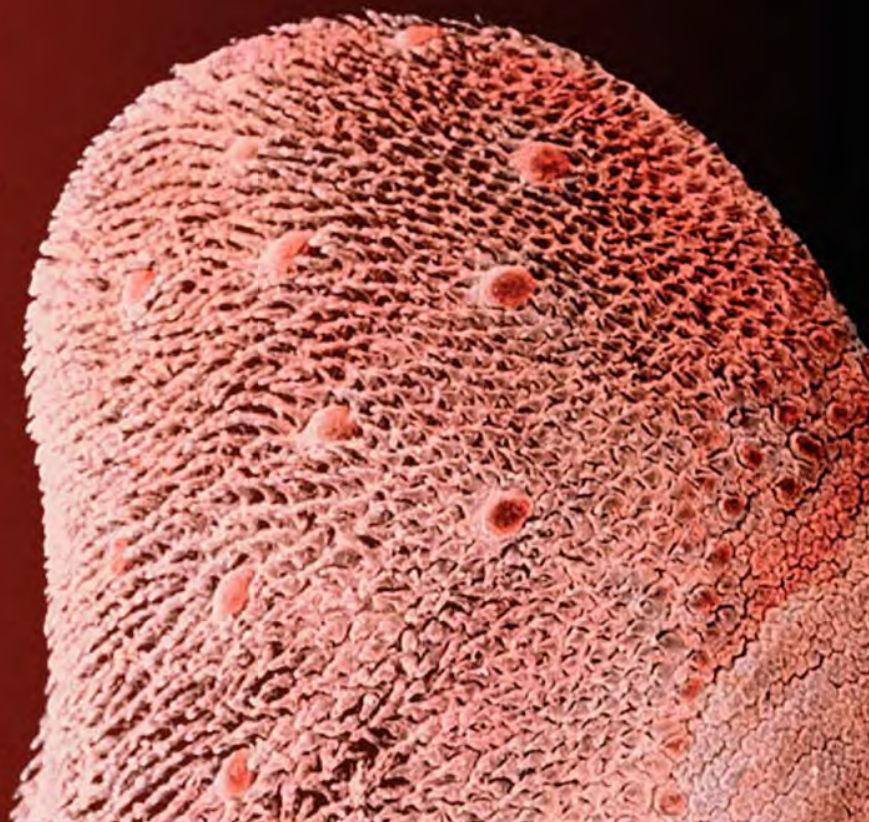


### Taste Organ Close-Up

Even though your tongue seems smooth, it actually has a rough surface. The larger “bumps” on this photo of a magnified tongue contain taste buds. The taste receptors in different taste buds help you detect sweet, sour, salty, bitter, and savory tastes.

But all of this is just a beginning! When it comes to taste, touch, and smell there's a lot more to know. So get ready to explore more and remember, you're the expert!

Magnified tongue



# The Sense of Touch



**Directions:** Follow these steps. Then, answer the questions.

**Step 1.** Roll up your sleeve past the elbow.

**Step 2.** Use the rough edge of the quarter to touch above your elbow.

**Step 3.** Move the quarter down your inner arm to your fingertips.

What did you notice about how the quarter felt as it moved from your upper arm down to your fingertips?

.....  
.....

Why do you think this happened?

.....  
.....

**Directions:** Use information from the “Sense Organs: Skin, Nose, Tongue” PowerPoint to complete the notes.

The special nerve cells that cover your skin are called .....

Your ..... are very sensitive.

Touch receptors are found in the ..... and ..... layers of your skin.

# Collecting Data for a Homunculus



**Directions:** Rub the rough edge of your quarter over each body part. Think about the sensitivity of each part. In the chart below, number the body parts from 1 to 6, with 1 being the most sensitive and 6 being the least sensitive. Then, answer the questions.

Body Part	Sensitivity (1 is the most sensitive, and 6 is the least sensitive)
Arm	
Forehead	
Finger	
Leg	
Foot	
Back	

Which body part will be the largest on your homunculus? Why ?

.....

.....

Which body part will be the smallest on your homunculus? Why?

.....

.....

Name .....

Date .....

## Creating a Homunculus

---



**Directions:** Use your data to draw your own homunculus. Make sure the sizes of your body parts match with their sensitivity numbers.

Name ..... Date .....

# Milestone #1 Inquiry Question

---



**Directions:** Use what you learned in this milestone to answer the question.

How does a homunculus help us understand our sense of touch?

.....

.....

.....

.....

.....



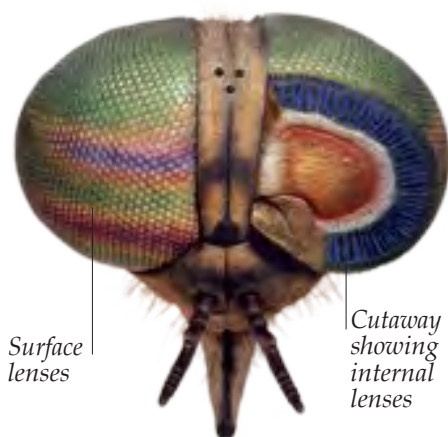
# Insect senses

Insects have incredible senses that humans do not share, so we can only imagine what the world seems like to them. Most insects have several types of eye, ear, and taste organ. They can smell tiny traces of chemicals and feel the smallest vibrations. Many can also see ultraviolet light and infrared radiation, which are invisible to us.

## Sight

Most insects have a large pair of compound eyes. A compound eye has many lenses on its surface that fit together like wall tiles. Each lens works like a mini-eye and is joined to an internal lens that focuses the image further.

Cutaway model of a horsefly's eyes



## Key Facts

- Flies, dragonflies, and mantises have the largest insect eyes. Their eyes may cover their entire heads!
- Many insects have three extra simple eyes, called ocelli, on top of their heads. These detect light but do not create a full image.
- Insects see less detail than we do, but are very alert to movement. They react in an instant, which is why flies are so hard to swat.

## Taste and smell

To an insect, tastes and smells are often more important than vision. As it goes about its life, the insect picks up thousands of chemical signals, which provide a non-stop flow of data to its brain. This information enables the insect to understand its surroundings, find food, and meet other insects.

## Key Facts

- Insect taste and smell organs are called chemoreceptors. They are located on the mouthparts, head, feet, and antennae.
- An insect's antennae are packed with tiny sensors that detect faint smells drifting in the air.
- Usually insects have long, mobile antennae to help them taste the air in every direction.
- Some bees, butterflies, and moths can smell a flower's perfume from 3 miles (5 km) away.

Flexible antenna made of many segments

Cockroach



## Touch and hearing

Antennae act as an early warning system



Longhorn beetle



Bumblebee

Insects can feel and hear using virtually their whole bodies. This is because they are covered with sensitive hair, including on their legs and antennae and all over their heads. The hair responds to touch, vibrations, and waves of sound moving through the air. In addition, most insects have several different ears, which may be on the abdomen, wings, or legs. Insects use sound to find and attract partners and to listen out for their enemies.

## Key Facts

- Insect antennae are never still—they twitch constantly to touch and investigate surfaces.
- Crickets have ears on their front legs. This is the ideal position since it allows them to feel vibrations in the ground.
- Insects can hear high-pitched sounds up to 200 kHz (kilohertz), which is well above the range of human hearing.

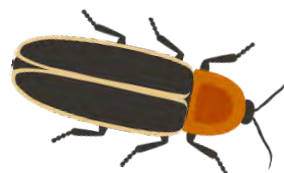
## 3-2-1 Reflection

---



**Directions:** Read the “Insect Senses” article. Use it to complete the chart below.

<p>3 Facts I Learned</p>	<ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3.</li> </ol>
<p>2 Ways Insect Senses Are Different From Human Senses</p>	<ol style="list-style-type: none"> <li>1.</li> <li>2.</li> </ol>
<p>One Question I Still Have</p>	<ol style="list-style-type: none"> <li>1.</li> </ol>



# The Sense of Smell



**Directions:** Write about a smell that reminds you of a special memory.

.....

.....

.....

.....

.....

.....



**Directions:** Use information from the “Sense Organs: Skin, Nose, Tongue” PowerPoint to complete the notes.

The senses of ..... and ..... are closely connected.

Thousands of smell receptors line your .....

They pick up odor molecules from the ..... and pass the signals to your

.....

# Super Sniffer Activity



**Directions:** Follow these directions to complete the activity.

1. You and your partner are bloodhounds searching for a lost person. You can only use your sense of smell to find him.
2. Open your baggie and smell the sponge inside. Remember the scent because you won't be able to smell it again.
3. Search for another sponge with the same scent. Do not pick it up when you find it. Sit beside it and howl quietly until your teacher checks to see if your rescue mission was successful.
4. Answer these questions about the activity.

Was it difficult to remember the “odor image” from the scent marker?

.....

.....

What types of adaptations do bloodhounds have that make them well-suited for search and rescue missions?

.....

.....

.....

Name ..... Date .....

## Milestone #2 Inquiry Question

---



**Directions:** Use what you learned in this milestone to answer the question.

What is your favorite scent? How does your sense of smell work to allow you to smell that scent?

.....

.....

.....

.....

.....

# The Sense of Taste

---



**Directions:** Write about a taste that reminds you of an unpleasant memory.

.....

.....

.....

.....

.....

.....

**Directions:** Use information from the “Sense Organs: Skin, Nose, Tongue” PowerPoint to complete the notes.

Nerves ..... the tongue carry “taste signals” to the brain.

Even though your tongue seems smooth, it actually has a ..... surface.

The bumps on your tongue contain ..... .

The taste receptors in the taste buds allow you to detect .....,

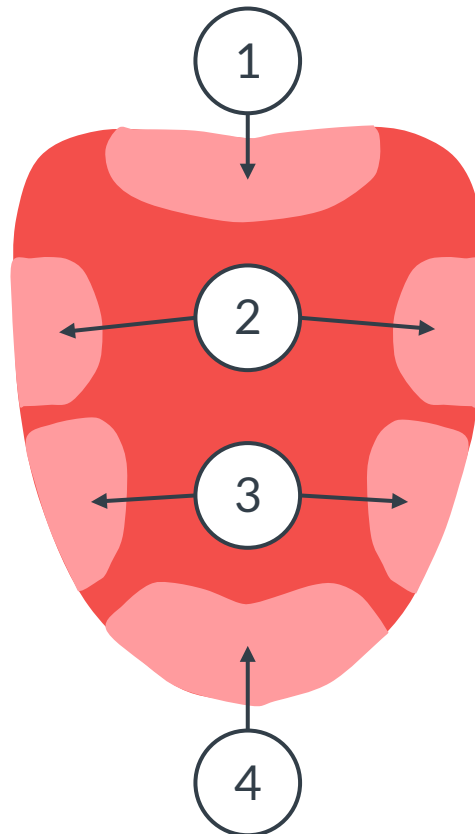
....., ....., ..... and

..... tastes.

# Mapping Tastes



**Directions:** As you taste each food, fill in the chart by writing the word to describe how the food tastes and the number on the tongue map to show which part of your tongue experienced the flavor.



Food Samples	How It Tastes (sweet, salty, sour, bitter)	Number on the Tongue Map
Sample #1		
Sample #2		
Sample #3		
Sample #4		



# Test Your Taste Buds



Have you ever taken a good look at your tongue? Look in the mirror, stick out your tongue, and see if you can see the bumpy taste buds. Identify the parts of your tongue where you taste things that are sweet, sour, salty or bitter by having a “tasting party” with some of the food items on this page. Draw the food items below on the section of the tongue that is busy doing the work!

**Tongue Map**

The diagram shows a red tongue with five taste zones labeled with arrows: bitter (top), salty (bottom), sour (left and right sides), and sweet (center). Surrounding the tongue are food items with labels: chocolate for cooking (top left), pickles (top right), pretzle (middle right), lime drop (bottom right), pizza with anchovies (bottom right), chocolate bar with nuts (bottom left), and lemon pie (middle left).

# Super Tasty Activity



**Directions:** Follow these directions to complete the activity.

1. Visit each tasting station with your partner. Take turns being the taster and the tester. The taster will sample the foods while the tester records the results.
2. The taster will close his/her eyes and pinch his/her nose tightly.
3. The tester will use a spoon to feed the taster a sample of the food hiding behind the box or cloth. The tester should record the flavor of the food on the data sheet and whether the taster correctly identified the food. Repeat with the second sample. Throw away the spoon.

\*Say your answers softly so you do not influence the ideas of other students.\*

4. Repeat the test with the taster looking at and smelling both samples. Record the results on the data sheet.
5. Switch roles for the other two flavors. Then, move to the next station. After you have completed all the stations, answer these questions.

**How difficult was it to identify the taste of the samples without looking at or smelling the samples?**

.....

.....

**What do you think is the adaptive advantage of the link between the senses of taste and smell?**

.....

.....

Name .....

Date .....

# Super Tasty Data Sheet



**Directions:** Record the results of the Super Tasty Activity in the charts below.

**Station #1:** .....

### Without Sight and Smell

Student's Name	Flavor #1	Guess #1	Flavor #2	Guess #2	% Correct Guesses

### With Sight and Smell

Student's Name	Flavor #1	Guess #1	Flavor #2	Guess #2	% Correct Guesses

**Station #2:** .....

### Without Sight and Smell

Student's Name	Flavor #1	Guess #1	Flavor #2	Guess #2	% Correct Guesses

### With Sight and Smell

Student's Name	Flavor #1	Guess #1	Flavor #2	Guess #2	% Correct Guesses

Station #3: .....

**Without Sight and Smell**

Student's Name	Flavor #1	Guess #1	Flavor #2	Guess #2	% Correct Guesses

**With Sight and Smell**

Student's Name	Flavor #1	Guess #1	Flavor #2	Guess #2	% Correct Guesses

Station #4: .....

**Without Sight and Smell**

Student's Name	Flavor #1	Guess #1	Flavor #2	Guess #2	% Correct Guesses

**With Sight and Smell**

Student's Name	Flavor #1	Guess #1	Flavor #2	Guess #2	% Correct Guesses

Name ..... Date .....

## Milestone #3 Inquiry Question

---



**Directions:** Use what you learned in this milestone to answer the question.

How is your sense of taste related to your senses of sight and smell?

.....

.....

.....

.....

.....

# Sense Organs: Eyes and Ears

**DK**

## Eyes Forward

You can't make sense of the world without your sense organs! Start with your eyes. They send tons of information to your brain. So it's no surprise that you have "built-in" structures to protect them!

You only see about one sixth of your eyeball on your face. The rest of it is inside your skull—safely protected within a deep bowl of skull bone called your eye socket.


**Eyelids protect the eye from bright light**

**Eyebrows direct sweat away from the eye**

**Eyelashes protect the eye from dust**

**Tears drain away through ducts in the corner of the eye**

Human eye



© 2011 Pearson Education, Inc. All Rights Reserved.

<http://www.teachervision.com>

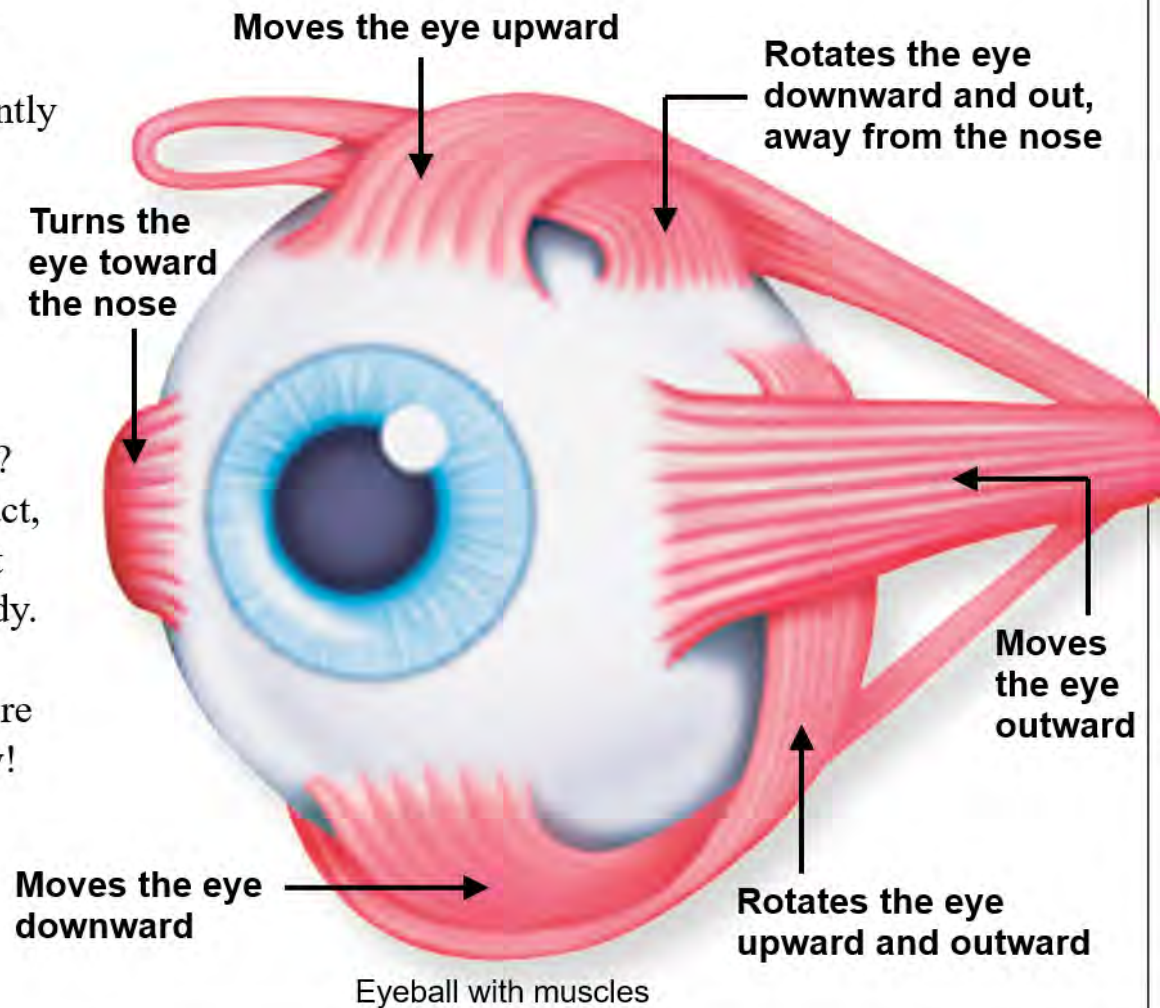




## Moving the Eye

Your eyeballs are constantly moving around in their sockets. Sometimes it's a big movement. Other times, it's just a fraction of an inch.

How do your eyes move? Muscles do the job. In fact, eye muscles are the most used muscles in your body. According to some estimates, they move more than 100,000 times a day!



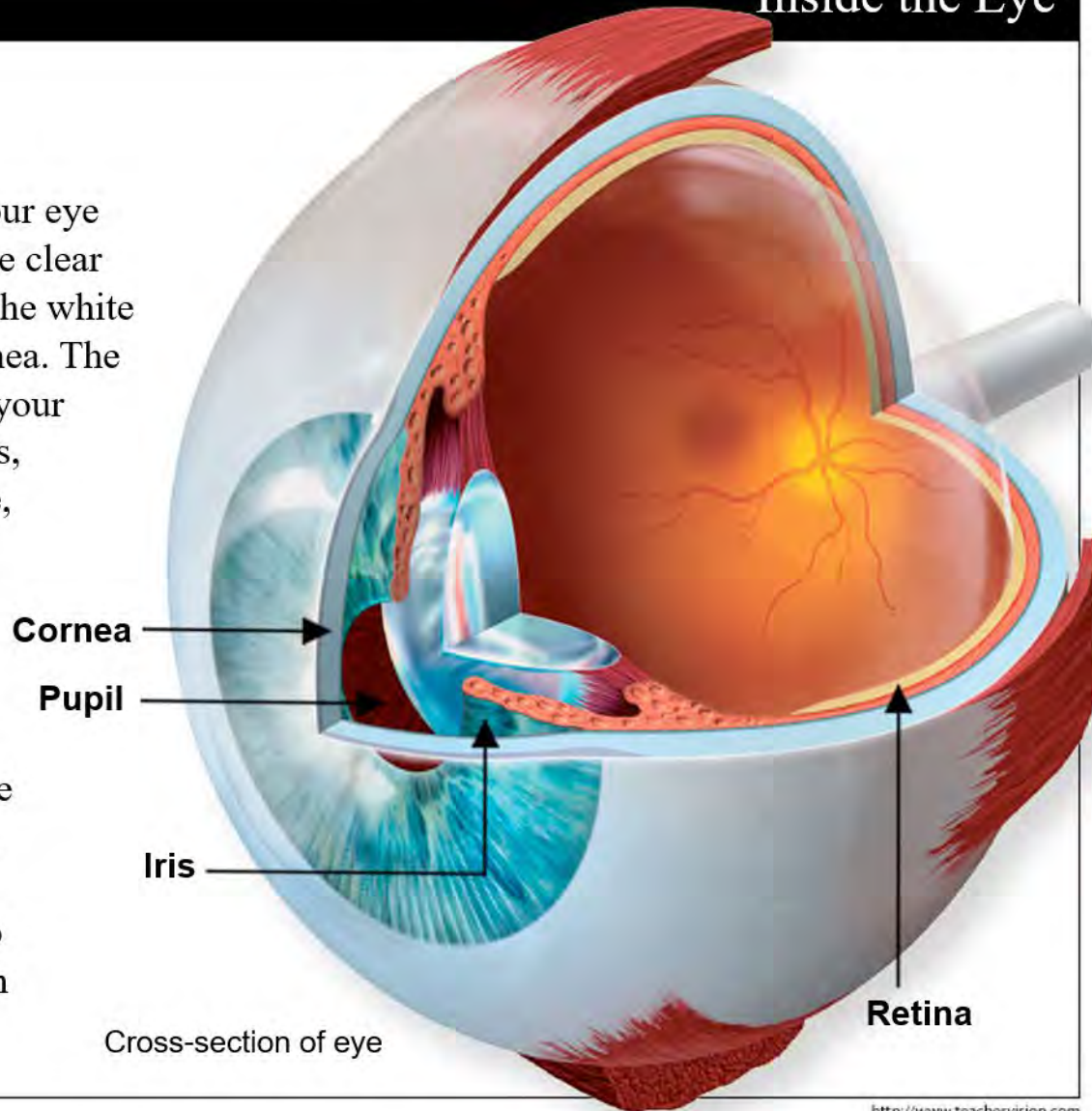




## Inside the Eye

There are some parts of your eye that you can easily see. The clear structure in the middle of the white part of your eye is the cornea. The dark part in the middle of your cornea is the pupil. The iris, or colored part of your eye, controls how much light gets through your pupil.

If you could peer inside to the innermost layer of your eye you would see the retina. The retina contains millions of light-sensitive cells that convert light into electrical impulses that can be sent to the brain.





## Forming an Image

Your eyes collect information. But it's your brain that allows you to see!

Light refracts (or bends) as it travels through your eye. An upside down image forms on your retina which sends electrical impulses through the optic nerve to your brain.



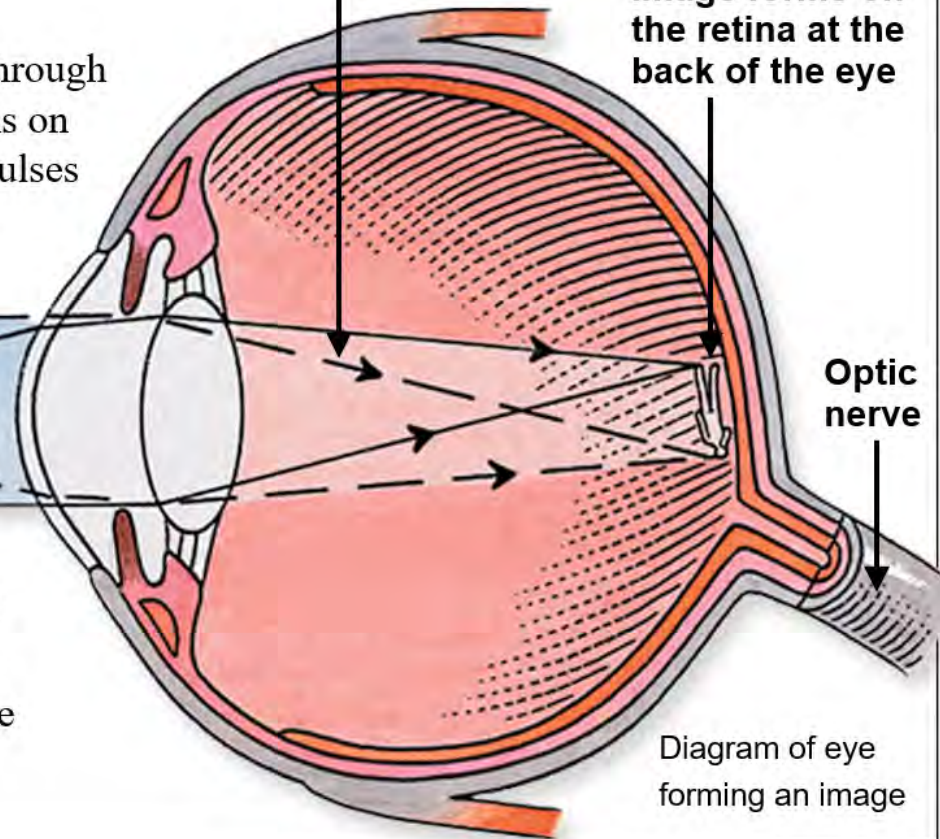
So why don't you see an upside down image? It's because your brain makes sense of it all—and you see the image right side up!

Light rays sent to the eye pass through the cornea, pupil, and lens

An upside-down image forms on the retina at the back of the eye

Optic nerve

Diagram of eye forming an image

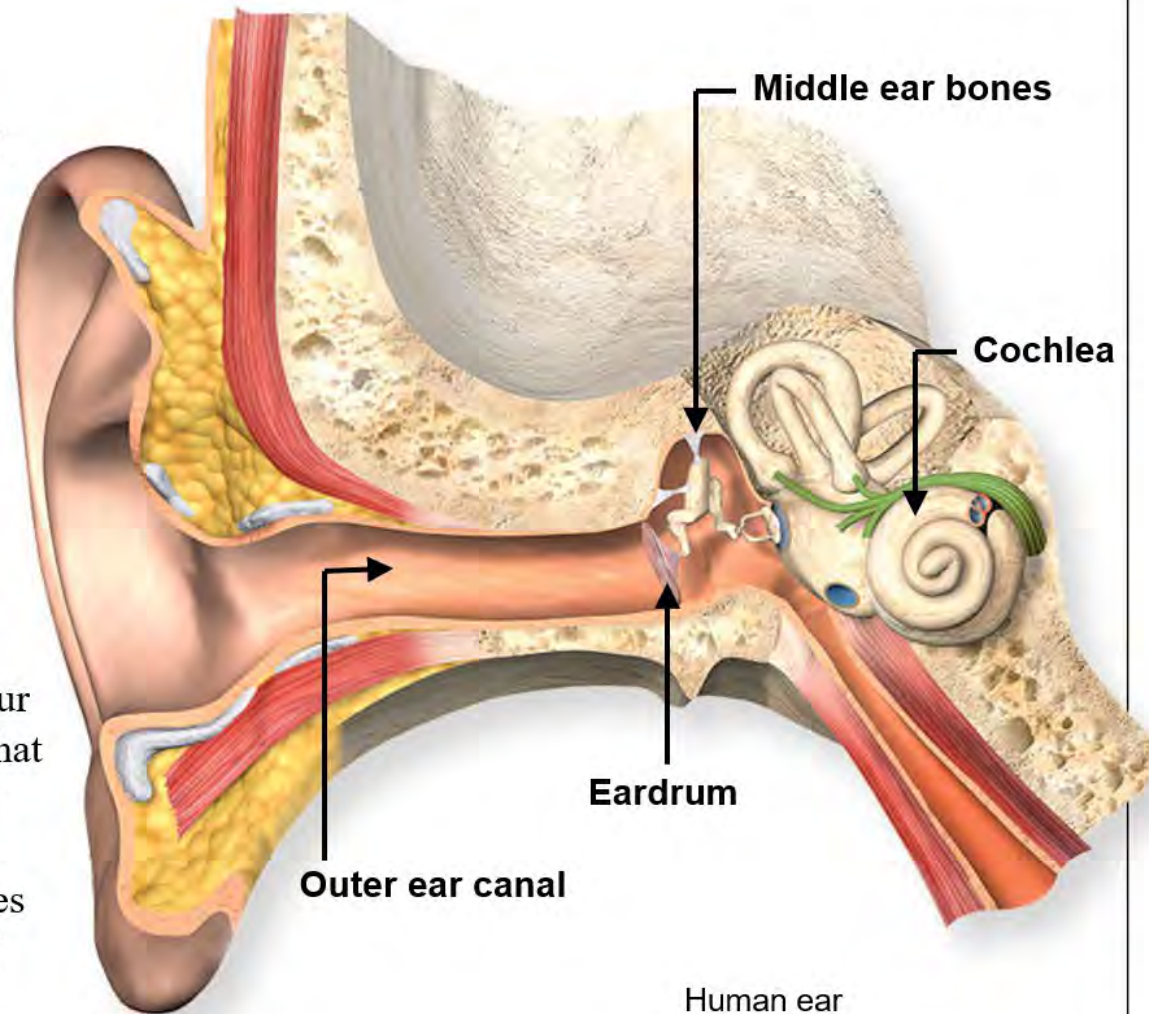






## Inside the Ear

Just like your eye, most of your ear is actually inside your head. The outer ear collects sound waves. These pass through your eardrum causing it to move, or vibrate. These vibrations move through the tiny bones in your middle ear and are passed on to your inner ear. The snail-shaped cochlea in your inner ear contains nerves that take the information to the brain. And you guessed it! The brain then distinguishes between different kinds of sounds.





## Smallest Bones

The bones in your middle ear are the smallest bones in your body. The three bones get their names from the Latin word for their shapes: malleus (hammer), incus (anvil), and stapes (stirrup). The tiny hammer bone you see in this photo is just  $\frac{1}{4}$  inch long—yet you'll hear no sound (large or small) without it!



# The Senses of Sight and Hearing

---



**Directions:** Use information from the “Sense Organs: Eyes and Ears” PowerPoint to complete the notes.

You can only see ..... of your eyeball because the rest of it is inside your skull - safely protected within a deep bowl of skull bone called your .....

..... are the most used muscles in your body. They move more than ..... times a day.

Four important parts of the eye are the ....., ....., ....., and .....

Your eyes collect ....., but it’s your ..... that allows you to see.

The outer ear collects .....

The snail-shaped ..... in your inner ear contains nerves that take information to the .....

The bones in your ..... are the smallest bones in your body.

# Sight and Hearing Activities



**Directions:** Answer these questions after you complete the sight and hearing activities.

1. Why is it important for us to have two eyes? How would our sense of sight be different if we only had one eye?

.....

.....

.....

2. How were you able to find the bell even though you couldn't see it?

.....

.....

.....





Name ..... Date .....

# Milestone #4 Inquiry Question

---



**Directions:** Use what you learned from this milestone to answer the question.

Do you think your sense of sight or your sense of hearing is more important? Why?

.....

.....

.....

.....

.....

# Senses Scavenger Hunt

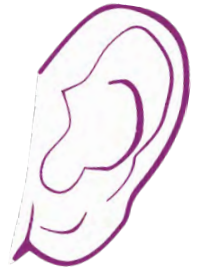


**Directions:** Go on a scavenger hunt by using your senses. Check off each box as you find something to fit the clue, and write the name of the item you found on the line. Then, add another description to each category and write an item you found to fit that clue.

<b>Sight:</b>	<input type="checkbox"/> Something red - ..... <input type="checkbox"/> Something shaped like a circle - ..... <input type="checkbox"/> ..... - .....
<b>Touch:</b>	<input type="checkbox"/> Something smooth - ..... <input type="checkbox"/> Something bumpy - ..... <input type="checkbox"/> ..... - .....
<b>Smell:</b>	<input type="checkbox"/> Something sweet-smelling - ..... <input type="checkbox"/> Something stinky - ..... <input type="checkbox"/> ..... - .....
<b>Taste:</b>	<input type="checkbox"/> Something sour - ..... <input type="checkbox"/> Something salty - ..... <input type="checkbox"/> ..... - .....
<b>Hearing:</b>	<input type="checkbox"/> Something loud - ..... <input type="checkbox"/> Something with a high pitch ..... <input type="checkbox"/> ..... - .....

# Nervous System and Senses

---



**Directions:** As you watch the video, write five new things you learned.

1. ....  
.....  
.....

2. ....  
.....  
.....

3. ....  
.....  
.....

4. ....  
.....  
.....

5. ....  
.....  
.....

# Super Senses Project Guidelines

---



**Step #1** - Pretend you are a superhero with a super sense.

**Which “super” sense will you have?**

.....

**Step #2** - Choose a superhero name.

**What will your superhero name be?**

.....

**Step #3** - Write a short story about an adventure you had and how you used your super sense on the “Super Sense Story” page.

**Step #4** - Use the Make Beliefs Comix website to turn your story into a comic strip.

**Your comic strip should include:**

- A title
- At least 6 panels
- All the characters from your story
- The important events from your story
- Backgrounds to show the setting of your story
- Speech bubbles to show what the characters are saying



# Milestone #5 Inquiry Question

---



**Directions:** Use what you learned during this unit to answer the question.

What would happen to your senses if you didn't have a brain? Why?

.....

.....

.....

.....

.....