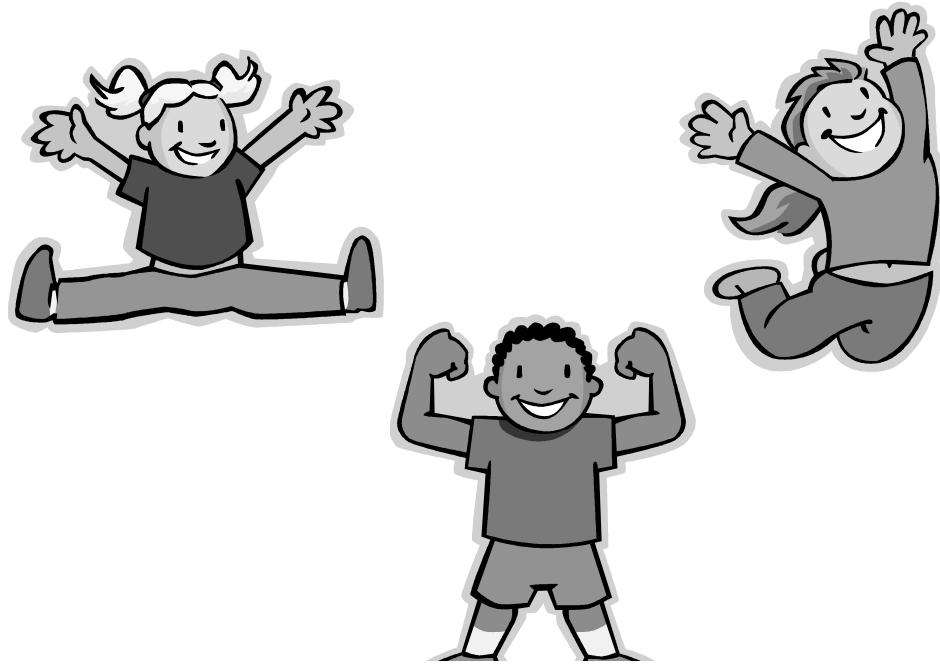




**A Collection of Learning Experiences
A Closer Look at
BODY SENSES**

Teacher Guide



Name _____

**Grade 2
Cattaraugus Allegany BOCES
Development supported by Cornell Cooperative Extension**

TABLE OF CONTENTS

Unit Overview & Format	3
Background Information.....	4
Learning Experience 1 – Getting Started.....	18
Learning Experience 2 – Eyes.....	20
Learning Experience 3 – Visual Impairment.....	24
Learning Experience 4 – Ears.....	29
Learning Experience 5 – Hearing Diseases & Impairment	35
Learning Experience 6 – Nose.....	37
Learning Experience 7 – Tongue.....	39
Learning Experience 8 – Skin & Skin Protection.....	43
Learning Experience 9 – Safety & Healthy Habits	46
More Ideas	47
Inquiry and Process Skills.....	49
Glossary.....	50
Teacher References.....	57

A Closer Look at BODY SENSES

GRADE 2

Unit Overview:

Students will develop body awareness through the use of different body parts. The body part associated with each sense is examined and diagrammed. Diseases and impairments of the senses are defined and explored. The skills emphasized in the kit are observing, discussing, manipulating materials, and describing.

Scheduling

This unit may take from five to nine weeks to complete depending upon the goals of the teacher and interests of the students. Use of the section included in this manual called More Ideas may extend the time span of this kit.

Materials to be

obtained locally:

glue	posterboard	apple
pair of glasses	construction paper	potato
hand soap	crayons	scissors
water	colored pencils	markers
chart paper	white paper	
old magazines	objects that make noise	

Caution

Remind students to wash their hands after handling any of the materials in the kit.

Small objects should be handled with care. Please do not have students taste the liquids not authorized by the teacher.

About the Format

Each learning experience is numbered and titled. Under each title is the objective for the learning experience.

Each learning experience page has two columns. The column on the left side of the page lists materials, preparations, basic skill processes, evaluation strategy, and vocabulary. The evaluation strategy is for the teacher to use when judging the student's understanding of the learning experience.

The right column begins with a "Focus Question" which is typed in italicized print. The purpose of the "Focus Question" is to guide the teacher's instruction toward the main idea of the learning experience. The "Focus Question" is not to be answered by the students. The learning experience includes direction for students, illustrations, and discussion questions. These discussion questions can be used as a basis for class interaction.

Background Information

Senses

The senses help us learn about the world around us. Without the information we receive through our five senses, we would not be able to function. Each sense is important, but each has limitations. One sense can be used to make up for another that is injured or harmed. The way to receive information most effectively is to use all our senses.

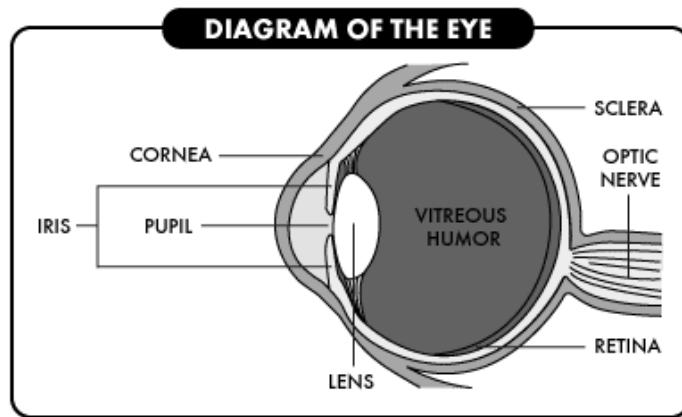
Another important aspect of learning about our senses is to become aware of physical handicaps and/or illnesses that may make it difficult for people to use their senses, though this does not make people different or lesser. The gift of our five senses to understand the world we live in must be protected and cared for.

Eyes

The eyes take in an enormous amount of information about the world around us. They send the information to your brain where it's processed so the brain knows what's going on outside of the body. The eye is about as large as a ping-pong ball and sits in a little hollow area called the **eye socket** in the skull. The eyelid protects the front part of the eye. The eyelid helps keep the eye clean and moist by opening and shutting several times a minute. It is a voluntary and involuntary action. The eyelid also has great reflexes to protect the eye. If you step into a bright room, your eyelids close to protect your eyes until they adjust to the light. If you put something close to the eye, the eyelid may flutter to protect the eye from danger or injury. The **eyelashes** on our eyelids work to keep dirt and unwanted materials out of the eye.

The white part of the eye is the **sclera**. The sclera is made of a material that covers most of the eyeball. The tiny pink lines in the sclera are **blood vessels** that deliver blood to the sclera. The part of the sclera in front of the colored part of the eye is the **cornea**. Unlike the rest of the sclera, the cornea is transparent. This is so light can travel through it. The cornea helps the eye focus as light makes its way through it. One can hardly see it because it's made of clear tissue.

Behind the cornea are the **iris** and the **pupil**. The iris is the colorful part of the eye. If someone has blue eyes, we are really saying they have blue irises. The iris has muscles attached to it that change its shape. This allows the iris to control how much light goes through the pupil. The pupil is the black circle in the center of the iris, and it lets light enter the eye. Pupils will get smaller when they are in a lot of light and larger when they are in dim light. Between the iris and the cornea is the **anterior chamber**. This chamber is filled with a transparent fluid that provides the oxygen, protein, and glucose the eye needs to stay healthy.



Refractive errors

Refractive errors occur when the bending of light rays by the cornea and lens does not focus the image correctly onto the retina. An eyeball that is too long or too short for the optics of the cornea and lens or an irregularly shaped cornea can cause refractive errors. This is called a **myopia** or nearsightedness. Myopia results either when the eyeball is too short or when the cornea is curved too much and the focused image falls short of the retina. Another refractive error is called **hyperopia** or far-sightedness. Hyperopia is the opposite of myopia. The image falls behind the retina. **Astigmatism** is a refractive error that results from a cornea that is not spherical. Most refractive errors can be corrected with prescription lenses.

Braille

The Braille alphabet was created by Frenchman Louis Braille. Mr. Braille was a blind man who wanted to read. The Braille alphabet he created is a method of writing the alphabet by using a system of 6 raised dots. Each dot has a number and people learn which dot patterns are used for each letter. Letters "A" – "J" are the basic pattern. Letters "K" – "T" repeat these letters then add one dot. Letters "U" – "Z" repeat "K" – "T" pattern but add one more dot, with the exception of "W". "W" stands alone because the French alphabet does not have a "W".

Eye Doctors

Depending on the extent of one's vision problem, there are several different types of eye doctors and eye specialists one can go see. **Optometrists** are, most often, the eye care equivalent of the "family doctor." They are trained and licensed to diagnose and treat disorders and diseases of the eyes and visual system through non-surgical means, as well as to detect the ocular manifestations of systemic disease (for example, diabetes) and refer patients to other health care specialists for eye surgery and/or further medical evaluation. Optometrists are not medical doctors (M.D. degree), but doctors of optometry (O.D. degree). **Ophthalmologists** are medical doctors (M.D. degree) who

specialize in the medical and surgical treatment of eye disease. Like optometrists, ophthalmologists also see patients for routine eye care, including prescription of eyeglasses and contact lenses. The majority of ophthalmologists have completed a surgical residency and practice in affiliation with a hospital or ambulatory surgery center. **Opticians** are eye healthcare professionals who work with ophthalmologists and optometrists to provide services related to the diagnosis and treatment of vision problems and eye disease. They assist optometrists and ophthalmologists in providing complete patient care before, during, and after exams, procedures, and surgeries. Opticians analyze and interpret eye prescriptions, determine the lenses that best meet a person's needs, oversee ordering and verification of eye-related products, dispense, replace, adjust, and repair previously ordered contact lenses, eyeglasses, and frames.

Vision Acuity

When doctors check visual acuity, one eye is covered at a time and the vision of each eye is recorded separately, as well as both eyes together. In the Snellen fraction 20/20, the first number represents the test distance, 20 feet. The second number represents the distance that the average eye can see the letters on a certain line of the Snellen eye chart. So, 20/20 means that the eye being tested can read a certain size letter when it is 20 feet away. If a person sees 20/40, at 20 feet from the chart that person can read letters that a person with 20/20 vision could read from 40 feet away. The 20/40 letters are twice the size of the 20/20 letters; however, it does not mean 50% vision since 20/20 sounds like it is one half of 20/40. If 20/20 is considered 100% visual efficiency, 20/40 visual acuity is 85% efficient.

Ears

Your ears are in charge of collecting sounds, processing them, and sending sound signals to your brain. Your ears also help you keep your balance. The ear is made up of three different sections: the **outer ear**, the **middle ear**, and the **inner ear**.

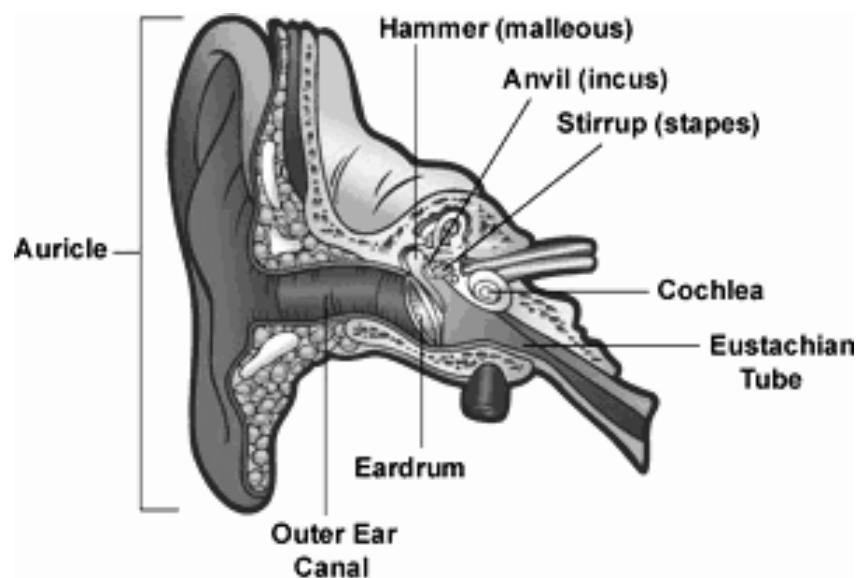
The Outer Ear is called the pinna or auricle. This is the part of the ear that people can see. The main job of the outer ear is to collect sounds. It also includes the ear canal, where wax is produced. Earwax is the yellow/golden substance that protects the canal. Earwax contains chemicals that fight off infections that could hurt the skin inside the ear canal. It also collects dirt to help keep the ear canal clean.

After sound waves enter the outer ear, they travel through the ear canal and make their way to the middle ear. The middle ear's main job is to take those sound waves and turn them into vibrations that are delivered to the inner ear. To do this, it needs the eardrum, which is a thin piece of skin stretched tight like a drum. The eardrum separates the outer ear from the middle ear and the

ossicles. The ossicles are the three tiniest, most delicate bones in your body. They include the **malleus**, which is attached to the eardrum and means "hammer" in Latin, the **incus**, which is attached to the malleus and means "anvil" in Latin and the **stapes**, the smallest bone in the body, which is attached to the incus and means "stirrup" in Latin.

Sound comes into the inner ear as vibrations and enters the **cochlea**, a small curled tube in the inner ear. The cochlea is filled with liquid, which is set into motion, like a wave, when the ossicles vibrate. The cochlea is also lined with tiny cells covered in tiny hairs that are so small you would need a microscope to see them. When sound reaches the cochlea, the vibrations cause the hairs on the cells to move creating nerve signals that the brain understands as sound.

Ears keep us balanced. In the inner ear, there are three small loops above the cochlea called **semicircular canals**. Like the cochlea, they are also filled with liquid and have thousands of microscopic hairs. When you move your head, the liquid in the canals move, too. The liquid moves the tiny hairs, which send a nerve message to your brain about the position of your head. In less than a second, your brain sends messages to the right muscles so that you keep your balance. If we spin in circles and stop, the fluid in the semicircular canals continues to move. The hairs inside the canals sense movement even though we are standing still. That's when we feel dizzy. The brain is getting two different messages and is confused about the position of the head. Once the fluid in the canals stops moving, your brain gets the right message, and we regain our balance.



Audiologist

Audiologists work with people who have hearing, balance, and related ear problems. They examine individuals of all ages and identify those with the symptoms of hearing loss and other auditory, balance, and related sensory and neural problems. They assess the nature and extent of the problems and help the individuals manage them. Using audiometers, computers, and other testing devices, they measure the loudness at which a person begins to hear sounds, the ability to distinguish between sounds, and the impact of hearing loss on an individual's daily life. In addition, audiologists use computer equipment to evaluate and diagnose balance disorders. Audiologists interpret these results to make a diagnosis and determine a course of treatment. Treatment may include examining and cleaning the ear canal, fitting and dispensing hearing aids, and fitting and programming cochlear implants. It can also include counseling on adjusting to hearing loss, training on the use of hearing instruments, and teaching communication strategies for use in a variety of environments.

Hearing Diseases and Impairments

Hearing loss can be categorized by where or what part of the auditory system is damaged. There are three basic types of hearing loss: **conductive hearing loss**, **sensorineural hearing loss** and **mixed hearing loss**.

Conductive hearing loss occurs when sound is not conducted efficiently through the outer ear canal to the eardrum and the tiny bones of the middle ear. Conductive hearing loss usually involves a reduction in sound level, or the ability to hear faint sounds. This type of hearing loss can often be medically or surgically corrected.

Examples of conditions that may cause a conductive hearing loss include:

- Conditions associated with middle ear such as fluid in the middle ear from colds, allergies (serous otitis media), poor eustachian tube function, ear infection (otitis media), perforated eardrum, benign tumors
- Impacted earwax (cerumen)
- Infection in the ear canal (external otitis)
- Presence of a foreign body
- Absence or malformation of the outer ear, ear canal, or middle ear

Sensorineural hearing loss occurs when there is damage to the inner ear (cochlea) or to the nerve pathways from the inner ear (retrocochlear) to the brain. Sensorineural hearing loss cannot be medically or surgically corrected. It is a permanent loss. Sensorineural hearing loss not only involves a reduction in sound level, or ability to hear faint sounds, but also affects speech understanding, or ability to hear clearly.

Sensorineural hearing loss can be caused by diseases, birth injury, or drugs that are toxic to the auditory system. Sensorineural hearing loss may also occur as a result of noise exposure, viruses, head trauma, aging, and tumors.

Sometimes a conductive hearing loss occurs in combination with a sensorineural hearing loss. In other words, there may be damage in the outer or middle ear and in the inner ear (cochlea) or auditory nerve. When this occurs, the hearing loss is referred to as a **mixed hearing loss**.

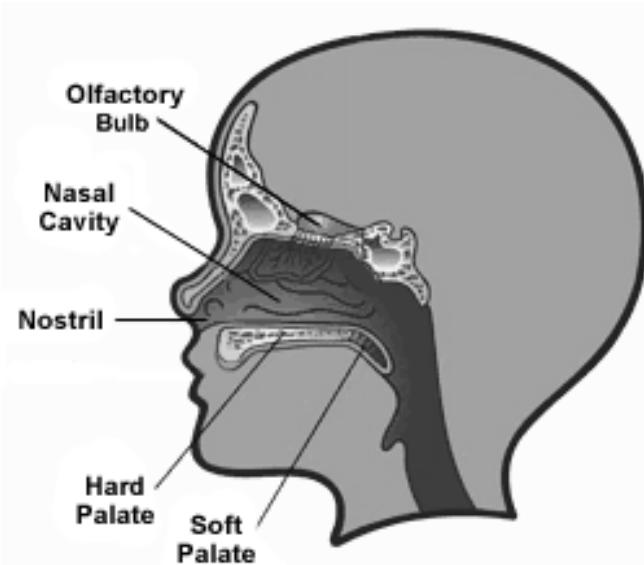
Nose

The nose allows us to smell and taste things. It is the main entrance to the respiratory system. It has two holes called **nostrils**. The nostrils and the nasal passages are separated by a wall called the **septum**. Deep inside the nose, close to the skull, the septum is made of very thin pieces of bone. At the tip of the nose, the septum is made of **cartilage**. Cartilage is a flexible material that's firmer than skin or muscle, but not as hard as bone. Behind the nose, in the middle of the face, is a space called the **nasal cavity**. It connects with the back of the throat. The nasal cavity is separated from the inside of the mouth by the palate or roof of the mouth. When you inhale air through your nostrils, the air enters the nasal passages and travels into the nasal cavity. The air then passes down the back of your throat into the trachea to the lungs. When you exhale the carbon dioxide from your lungs, the nose is the main passageway for it to leave your body. The nose also warms, moistens, and filters the air before it goes into the lungs.

The inside of the nose is lined with a moist, thin layer of tissue called a **mucous membrane**. This membrane warms the air and moistens it. The mucous membrane makes mucus that captures dust, germs, and other small particles that could irritate the lungs. The hairs in your nose trap large particles like dirt or pollen. When we sneeze, we are getting rid of the unwelcome particles before they reach the lungs.

The nose helps us figure out what is going on in our environment by allowing us to smell the smells around us. On the roof of the nasal cavity is the **olfactory epithelium**. It contains special receptors that are sensitive to odor molecules that travel through the air. There are nearly 10 million of them in the nose. There are hundred of different odor receptors, each with the ability to sense certain odor molecules. The brain interprets the combination of receptors to recognize any of 10,000 different smells.

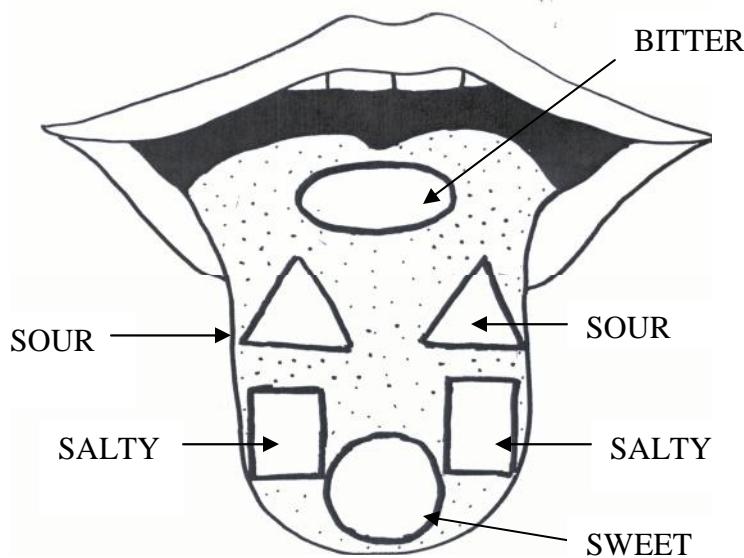
When the smell receptors are stimulated, signals travel along the olfactory nerve to the **olfactory bulb**. The olfactory bulb is underneath the front of the brain just above the nasal cavity. Signals are sent from the olfactory bulb to other parts of the brain to be interpreted as a smell you recognize. The ability to taste and smell goes together because odors from foods allow us to taste more fully.



Tongue

The tongue is used to chew, swallow, sing, talk and taste. It is made up of many groups of muscles. These muscles run in different directions to carry out all of the tongue's jobs. The front part of the tongue is flexible and can move around easily. This portion of the tongue works with the teeth to create different words. It also helps you eat by helping move food around the mouth while you chew. The tongue pushes the food to the back teeth so the teeth can grind it up. The back of the tongue also helps us form words and sounds. For example, the sounds for the letter "k" and "g" are made with the muscles in the back of the tongue. The back of the tongue is important for eating, as well. After the food is ground up and mixed with saliva, the back muscles of the tongue move and push small bits of food down into the esophagus.

The top of the tongue is rough and bumpy, while the underside is smooth in texture. The top is covered with **papillae**. Papillae help grip food and move it around while you chew. They contain your **taste buds** so you can taste all kinds of food. People are born with about 10,000 taste buds. As a person ages, their taste buds die. Taste buds can detect sweet, sour, bitter, and salty flavors. Each taste bud is made up of taste cells, which have sensitive, microscopic hairs called **microvilli**. These tiny hairs send messages to the brain, which interprets the signals and identifies the taste for you.



Skin

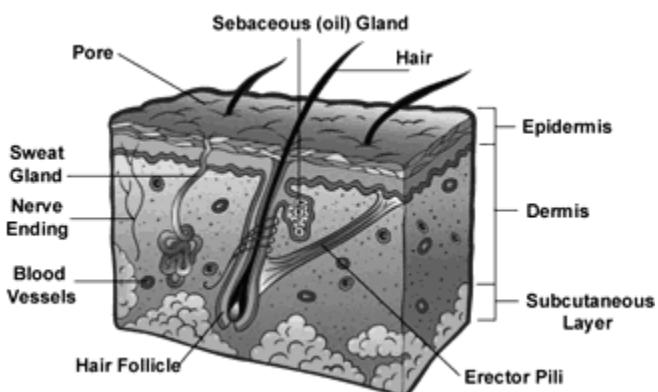
The biggest organ in the body is the skin. It covers and protects everything inside the body. It also keeps our body at the right temperature and allows us to have a sense of touch. The skin is made up of three layers. The layer on the outside is called the **epidermis**. The epidermis is the part of the skin you can see. New skin cells are constantly forming at the bottom of the epidermis. When the cells are ready, they start moving toward the top of the epidermis. As newer cells move up, older cells near the top die and rise to the surface of the skin. These old cells are tough and strong and are used to cover the body and protect it. They eventually flake off. Every minute we lose about 30,000 to 40,000 dead skin cells off the surface of our skin. Ninety-five percent of the cells in the epidermis work to make new skin cells. The other 5% make a substance called **melanin**. Melanin gives skin its color. The darker your skin, the more melanin you have. When you go out into the sun, these cells make extra melanin to protect you from getting burned by the sun's ultraviolet rays. That is why we get tan when we spend a lot of time in the sun.

The layer underneath the epidermis is the **dermis**. The dermis contains nerve endings, blood vessels, oil glands, and sweat glands. It also contains collagen and elastin. The nerve endings in the dermis tell how things feel when you touch them. They work with your brain and nervous system so your brain gets the message about what you are touching. The dermis is also full of tiny blood vessels. These keep your skin cells healthy by bringing them the oxygen and nutrients they need and taking away waste. The oil glands in the dermis are always producing **sebum**. Sebum is your skin's natural oil. It rises to the surface of your epidermis to keep your skin lubricated and protected. It also makes the skin waterproof. Sweat glands produce little drops of water or perspiration to help cool our bodies when we become hot. The sweat comes up through pores,

tiny holes in the skin that allow it to escape. When the sebum meets the sweat, they form a protective film.

The third bottom layer of the skin is called the **subcutaneous layer**. It is made mostly of fat and helps your body stay warm and absorb shocks. It also helps hold your skin to all the tissues underneath it. The layer is where you will find the start of hair growth. Each hair on your body grows out of a tiny tube in the skin called a **follicle**. Every follicle has its roots in the subcutaneous layer and continues up through the dermis. Hair follicles are found all over the body, except on the lips, palms of the hands, and soles of the feet.

The blood vessels, hair, and sweat glands cooperate to keep the body at the right temperature. It knows to keep the body at 98.6 degrees Fahrenheit (37 degrees Celsius) to keep the body and its cells healthy. The skin responds to messages from the hypothalamus, the brain's inner thermometer. When our bodies get hot, blood vessels get the signal from the hypothalamus to release some of the heat by bringing warm blood closer to the surface of the skin. Sweat glands then produce sweat to release body heat into the air.



Skin Protection

Light from the sun includes invisible **ultraviolet rays** or **UV rays**. Some ultraviolet rays penetrate the skin and when the skin has been exposed to too many of these rays, you get a sunburn. Some people sunburn faster than others. Those people with less melanin in their skin will burn faster. **Melanin** is a chemical in the skin that protects the skin from sun damage by reflecting and absorbing UV rays. People with darker skin have more melanin, but these people can still be sunburned. Sunburns can cause skin to wrinkle as people age and can cause skin cancer. People can protect themselves from sunburn by wearing sunscreen when they are in the sun and by taking frequent breaks from the sun by going indoors or moving into the shade. It is important to take these precautions between 10:00 a.m. and 4:00 p.m. when the sun's rays are the strongest. Sunscreen with an SPF of 15 or higher is recommended. The letters SPF stand for *sun protection factor* and the number rating tells you how much

longer you can stay in the sun without getting sunburned. If you normally burn after being in the sun for 20 minutes and you put on a sunscreen with a rating of 30, this sunscreen will give you 30 times the protection. Sunscreen should be reapplied every 2-3 hours and even more often if you have been swimming or sweating profusely. When we are in the water or on a boat, the reflection of the water intensifies the sun's rays so we get sunburned more quickly. Our eyes need protection from ultraviolet rays. We should always wear sunglasses in the sun, and they should have a label on them stating that they block UV rays.

Exercise

When we engage in physical activities, we breathe faster, our lungs take in more oxygen. As we breathe faster, our heart begins to pump faster to deliver the oxygen-rich blood to all parts of our bodies. Regular exercise makes bodies stronger.

Exercise Makes Your Heart Happy

The heart is a muscle. It works hard, pumping blood throughout the body. Aerobic exercise helps this important muscle get stronger. Aerobic means "with air," so aerobic exercise is a kind of activity that requires oxygen. When you breathe, you take in oxygen, and, if when doing the aerobic exercise, one may notice they are breathing faster than normal. Aerobic activity can get your heart pumping, make you perspire, and quicken your breathing. When the heart is given this kind of workout on a regular basis, the heart will get even better delivering oxygen to all parts of the body. Some examples of aerobic exercise include: swimming, basketball, jogging, walking, soccer, biking, etc. Playground activities such as skipping or jumping rope, are aerobic activities, as well.

Exercise Strengthens Muscles

Another kind of exercise can help make your muscles stronger. Those are exercises that can build strength. Push-ups or lifting weights are examples of strength building exercises. By using the muscles to do powerful things, they become stronger. For older teens and adults, this kind of workout can make muscles bigger, too.

Here are some exercises and activities to build strong muscles:

- push-ups
- pull-ups
- rowing
- bike riding
- weight lifting

Exercise Makes You Flexible

If the body is flexible, it can bend and stretch without much difficulty. Being flexible is having "full range of motion," which means you can move your arms and legs freely without feeling tightness or pain. Some exercises that are done for flexibility are:

- tumbling and gymnastics
- yoga
- dancing, especially ballet
- martial arts
- simple stretches, such as touching your toes or side stretches

Diet and Nutrition

A healthy diet includes recommended daily servings from each of the major food groups and portion sizes based on age and activity level.

New Pyramid and Servings

The U.S. Department of Agriculture Food Guide Pyramid is one way for people to understand how to eat healthy. A rainbow of colored, vertical stripes represents the five food groups plus fats and oils. Here's what the colors stand for:

- orange - grains
- green - vegetables
- red - fruits
- yellow - fats and oils
- blue - milk and dairy products
- purple - meat, beans, fish, and nuts

The USDA changed the pyramid in spring 2005 because they wanted to do a better job of telling Americans how to be healthy. The agency later released a special version for kids. The girl climbing the staircase up the side of the pyramid shows kids how important it is to exercise and be active every day.

The Pyramid also tells us to:

- **Eat a variety of foods.** A balanced diet is one that includes all the food groups. Have foods from every color, every day.
- **Eat less of some foods, and more of others.** You can see that the bands for meat and protein (purple) and oils (yellow) are skinnier than the others. That's because you need less of those kinds of foods than you do of fruits, vegetables, grains, and dairy foods.

The bands start out wider and get thinner as they approach the top. That shows that not all foods are created equal, even within a healthy food group like fruit. For example, apple pie might be in that thin part of the fruit band because it has a lot of added sugar and fat. A whole apple would be down in the wide part because you can eat more of those within a healthy diet.

- **Make it personal.** Everyone needs to personalize the mix of foods they need to eat and how much they should be eating.

Serving Size

How much one should eat to stay healthy depends on a variety of factors such as, your age, gender, and activity level. Kids who are more active burn more calories, so they need more calories. Listed below are some estimates for how much you need of each food group.

Grains

Grains are measured out in ounce equivalents. Here are ounce equivalents for common grain foods. An ounce equivalent equals:

- 1 piece of bread
- 1/2 cup of cooked cereal, like oatmeal
- 1/2 cup of rice or pasta
- 1 cup of cold cereal

* 4- to 8-year-olds need 4-5 ounce equivalents each day.

* 9- to 13-year-old girls need 5 ounce equivalents each day.

* 9- to 13-year-old boys need 6 ounce equivalents each day.

We should eat a lot of whole grains, such as 100% wheat bread, brown rice, and oatmeal.

Vegetables

Vegetable servings are measured in cups.

* 4- to 8-year-olds need 1 1/2 cups of veggies each day.

* 9- to 13-year-old girls need 2 cups of veggies each day.

* 9- to 13-year-old boys need 2 1/2 cups of veggies each day.

Fruits

Fruit servings are measured in cups:

* 4- to 8-year-olds need 1-1 1/2 cups of fruit each day.

* 9- to 13-year-old girls need 1 1/2 cups of fruit each day.

* 9- to 13-year-old boys need 1 1/2 cups of fruit each day.

Milk and Other Calcium-Rich Foods

Calcium builds strong bones, so you need these foods in your diet. These servings are also measured in cups.

- * 4- to 8-year-olds need 1-2 cups of milk (or another calcium-rich food) each day.
- * 9- to 13-year-old girls need 3 cups of milk (or another calcium-rich food) each day.
- * 9- to 13-year-old boys need 3 cups of milk (or another calcium-rich food) each day.

Yogurt, cheese, or calcium-fortified orange juice can be substituted for milk.

Meats, Beans, Fish, and Nuts

These foods contain iron and other important nutrients. These foods are measured in ounce equivalents.

An ounce equivalent of this group would be:

- 1 ounce of meat, poultry, or fish
- 1/4 cup cooked dry beans
- 1 egg
- 1 tablespoon of peanut butter
- a small handful of nuts or seeds

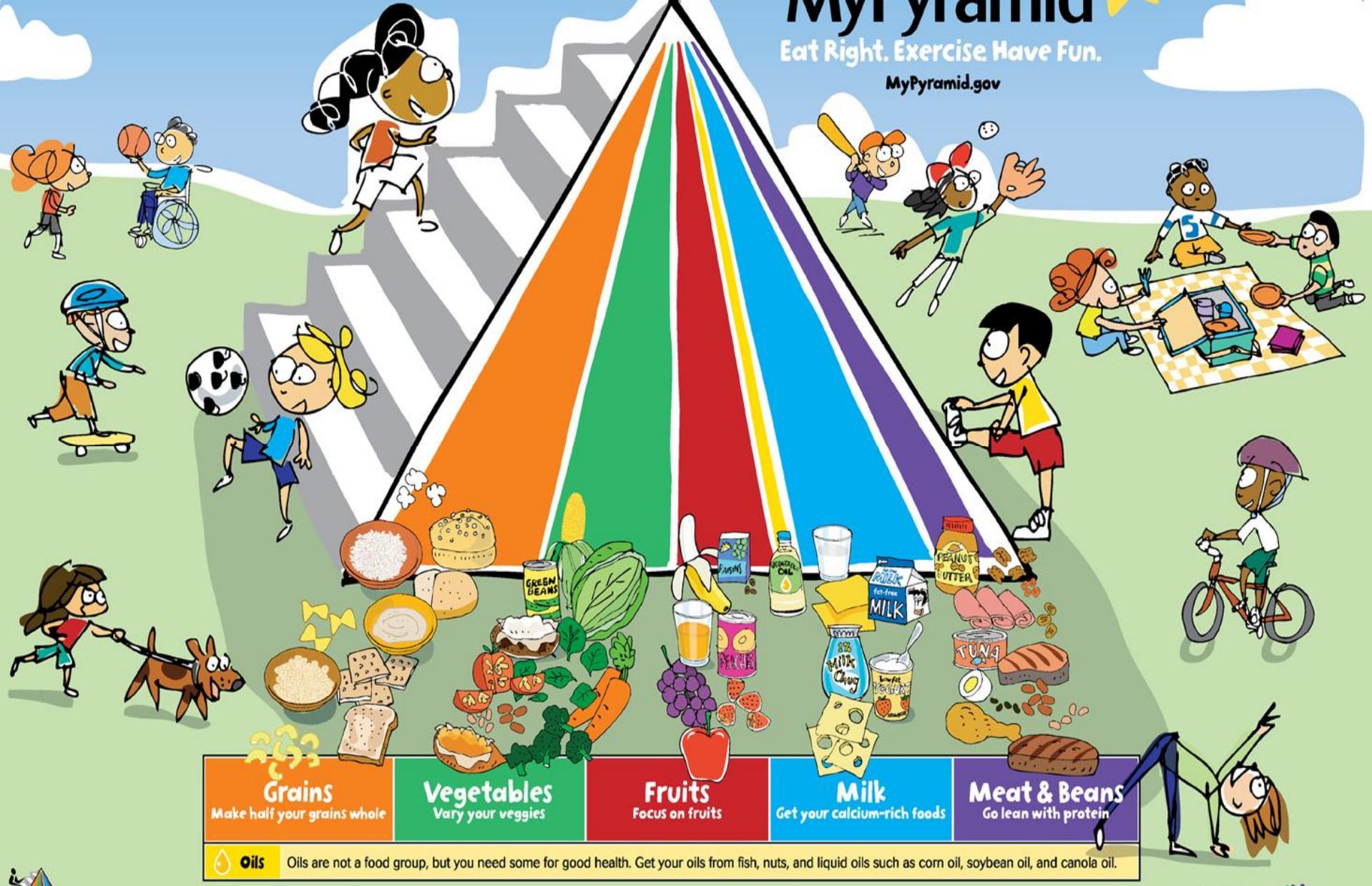
- * 4- to 8-year-olds need 3-4 ounce equivalents each day.
- * 9- to 13-year-old girls need 5 ounce equivalents each day.
- * 9- to 13-year-old boys need 5 ounce equivalents each day.

MyPyramid

For Kids

Eat Right. Exercise. Have Fun.

MyPyramid.gov



★ Find your balance between food and fun

★ Fats and sugars – know your limits

U.S. Department of Agriculture
Food and Nutrition Service
September 2005
FNS-581



USDA is an equal opportunity provider and employer.

Learning Experience 1 – Getting Started

Objective: Students will name the five senses and the organs that help us experience those senses.

Materials:

For the student groups:

Pictures of organs of 5 senses (in binder pocket)
Book- Through Grandpa's Eyes by Patricia Machlan
Construction paper* or Chart paper*
Old magazines*
Markers*
Glue*
Scissors*

*provided by teacher

Preparation:

Read background information on p. 4 - 13. Gather old magazines for students to use in this Learning Experience. Also, decide the paper type and sizes to be used in the collage.

Basic Skills Development:

Classifying
Manipulating Materials
Discussing
Collecting

Evaluation Strategy:

Students will name the 5 senses and the organs associated with those senses.

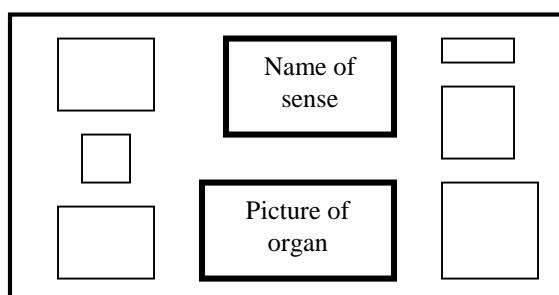
Vocabulary:

Senses	Mouth
Eye	Tongue
Ear	Skin
Nose	

What are the five senses?

Review with students the names of the five senses. Record the names of the senses on five pieces of construction paper. Discuss with students the experiences they have with their senses and the related organs that help us experience our senses. Ask students to give examples of using their senses in the classroom (sounds of students in the hall, taste their snack, see chalkboard, feel pencil, etc.)

Divide student into five groups. Give each group one of the senses written on construction paper and a picture of the organ associated with each sense. Student groups are to paste the name of the sense they have been assigned and the picture of the sense organ on a large piece of construction paper or chart paper. Students are to then find pictures in old magazines depicting the sense they have been assigned and glue those pictures to the large piece of construction paper.



Learning Experience 1 – Getting Started cont.

Page 2

Post collages in the classroom and ask group members to explain the pictures included in their collage.

Discussion Questions:

What do our senses bring us?

Which of 5 senses do you use the most? Why?

If you went for a walk outside, how would you use your 5 senses?

Read the book Through Grandpa's Eyes by Patricia MacLachlan to students to emphasize the way the senses work together.

Discussion Questions:

Did you like the story? Explain.

What are some different ways Grandpa understands his world through his senses?

How does John try to understand what his Grandpa is doing?

How can Grandpa see with his fingers?

How do John and Grandpa feel about each other?

Learning Experience 2 – Eyes

Objective: Students will examine the parts of their eyes in a mirror, name the parts, and explain their function.

Materials:

For each student:

Body Senses Student Activity Book

Hand mirror

For the class:

Eye model

Script for eye model

Hand mirror

Book – Look At Your Eyes by Paul Showers

Preparation:

Read background information on p. 4 - 5.

Basic Skills Development:

Observing

Discussing

Gathering Data

Organizing Data

Interpreting Data

Evaluation Strategy:

Students are to label the parts of the eyes and explain the function of the main parts.

Vocabulary:

eye	sclera
eyebrow	blood vessel
eyesight	optic nerve
eyelid	aqueous humor
eyelash	
pupil	
iris	
cornea	
lens	
retina	
vitreous body	

How do our eyes work?

Session 1

Begin the Learning Experience by reading the book, Look At Your Eyes by Paul Showers. The book will ask students to look for special characteristics about their eyes. Provide students with a handheld mirror. Students can look at the parts of their eyes as they are referenced in the book. The book explains what eyelids, eyelashes, and eyebrows are and that eyes come in a variety of colors. Explain that the color portion of the eye is the *iris*. Student will also observe their *pupil* and how it expands and contracts with the amount of light in a room. Page 19-21 of the book demonstrates that for students. Students should look for the black spot in the center of their eye and pay attention to its size. It may start off small because the room is well lit. Next, have students close their eyes for 30 seconds. Students should observe their pupil after the 30 seconds. It should start off larger, and they should see it get smaller due to the light in the room.

Before moving to the next session, take a poll of student

Learning Experience 2 – Eyes, cont.

Page 2

eye color in the classroom. Record results on the chalkboard. Assist students in completing the graph of results on page 1 of the Activity Sheet for Learning Experience 2 in the Body Senses Student Activity Book. Compare results of graph with other classroom results, if possible.

Discussion Questions:

How do our eyes help us?

What color are your eyes?

Why did your pupil become larger when you closed your eyes?

Why did the pupil become smaller again?

Session 2

Students are to now examine the specific parts of the eye. Use the eye model provided in the kit to help students identify the parts of the eye. A script is provided on the next page in this teacher's guide to help you take students through the parts of the model. On page 2 of the Activity Sheet for Learning Experience 2, a diagram of the parts of the eye is provided for students.

Students are to label their diagram on the activity sheet. A word bank on the activity sheet is provided to help students with their labeling. Discuss with students why each part of the eye is important and how the parts interact to help us see.

SCRIPT: Eye Model

The model of the eye before you is enlarged six times. Let's look at some of the outside parts of the eye before we take it apart.

The large beige object on top with the number 23 on it is the ***tear gland***. Its job is to make tears which clean and wash out eyes. When you get something in your eye, what happens? (pause) Right, you get tears in your eye to wash it out. That's the job of the tear gland.

The large red parts on the outside of the model are muscles (numbers 1, 20, 19, 15). These move the eye up, down, in and out. Move your eyes up (pause), down (pause), and side to side (pause). The muscles on your eyes are what make it possible for you to do this. Now, let's look at the eye model again.

The eye needs lots of blood to keep it healthy and working well. You can see the small red lines on the outside. These are the veins and arteries, or blood vessels that keep blood flowing in and out of the eye.

In the center of the back of the eye a white part (number 16) is sticking out. This is the optic nerve that carries what you see from your eye to your brain.

Let's now look at the front of the eye again. The white part of the eye is the sclera, number 2 on the model. The white part of the eye is for protection and helps the eye keep its shape.

The colored part around the pupil is the iris. This is a Greek word meaning rainbow. People have irises of different colors. We inherit the color of our iris from our parents. The iris is the part of your eye that changes the size of your pupil.

The black spot in the very center of the front of the eye is the pupil. When it is dark around us, the iris changes to make the pupil larger to let in more light, so that we can see better. If it is very bright around us, the iris changes to make the pupil smaller to keep out some of the light.

Now, let's take the eye apart and look inside as we lift the top of the eyeball straight up. Now, look at the model. Turn it sideways and look at the bulge on the front of the eye. You can see through this curved part. This is the cornea. It contains many nerves, which are sensitive to touch and pain. The cornea helps protect the eye. When it feels pain, it tells you to move your head out of danger quickly.

We carefully remove the cornea and the iris and gently put them down. Now, we can see the lens of the eye. It is right behind the iris and the pupil. It is clear and

SCRIPT: Eye Model, cont.

rounded on both sides. Its job is to let light in and focus it on the back of the eye so you can see. Muscles also change the shape of the lens so you can focus and see both far and near.

Let's carefully lift out the lens and put it down gently. The larger transparent ball is called the vitreous body. In a real eye, it is filled with a jelly -like substance that you can see through. This jelly-like substance helps to keep the shape of the eye.

One last part of the eye to notice can be seen in the bottom part of the eye. It is the part that you took off first. Look at this again, number 17 on the inside. The inner layer is called the retina. Light lands on this retina and makes an upside – down image of what you are seeing. The optic nerve then carries this picture from the retina to the brain. The brain turns the picture right side up and tells you what you are looking at.

Let's put the eye back together very carefully. First, put the lens in front of the vitreous body back together and the iris and cornea together. Then, place them in front of the lens. Last, put the top of the eye straight down on the model.

Learning Experience 3 – Visual Impairment

Objective: Students will explain the different types of visual impairments, infections, and disorders of the eye and how they affect the eye.

Materials:

For each student:

Body Senses Student Activity Book

Glitter

Popcorn kernels

Glue*

Pair of glasses*

Hand soap*

Water*

For student groups:

Posterboard/Construction paper*

For the class:

Eye model

Eye (Snellen) Chart

Book - Glasses Who Needs Them by

Lane Smith

Spectacles by Ellen Raskin

Glasses, Glasses Oh What Do I

See by Karen Smith Stair

Louis Braille by David A. Adler

Lenses! Take a Closer Look by

Siegfried Aust

Crayons/Colored pencils*

White paper*

*provided by teacher

Preparation:

Read background information on p. 5 - 6. Have the Snellen Eye Chart posted in the classroom. The school nurse may be available to help with this Learning Experience.

Basic Skills Development:

Observing

Discussing

Describing

What are the different types of visual impairments?

Session 1

Begin by asking students what “spectacles” are. You may have a pair of spectacles on hand to show students. Read the book, Spectacles by Ellen Raskin, to students. Ask students for signs that a person may need glasses (blurred vision, headaches, eyes that water or itch frequently).

Then read Glasses, Glasses Oh What Do I See by Karen Smith Stair to students.

Discussion Questions:

Why did the boy in the story visit the “I” (Eye) doctor?

What did the boy have to do when he got there?

What was the first thing he saw with his new glasses?

How did glasses help?

Introduce the vocabulary word *visual impairment* to the students. Explain that there are several different types of impairments such as being farsighted, nearsighted, or blind. Ask students what can be done when someone has a visual impairment. Students may indicate the need to go to the

Learning Experience 3 – Visual Impairment, cont.

Page 2

Evaluation Strategy:

Students will list the different types of visual impairments and infections/disorders and explain how they effect the eye.

Vocabulary:

visual impairment	conjunctivitis
far-sighted	sty
near-sighted	disorder
blind	spectacles
ophthalmologist	germs
optometrist	
optician	
infection	

doctors for an eye exam. Introduce students to three kinds of eye care specialists. **Optometrist** is most often, the eye care equivalent of the "family doctor." They are trained and licensed to diagnose and treat disorders and diseases of the eyes and visual system through non-surgical means.

Ophthalmologist is a medical doctor (M.D. degree) who specializes in the medical and surgical treatment of eye disease. Like optometrists, ophthalmologists also see patients for routine eye care, including prescription of eyeglasses and contact lenses. The majority of ophthalmologists have completed a surgical residency and practice in affiliation with a hospital or ambulatory surgery center.

Optician is an eye healthcare professional who works with ophthalmologists and optometrists to provide services related to the diagnosis and treatment of vision problems and eye disease. They dispense, replace, adjust, and repair previously ordered contact lenses, eyeglasses, and frames.

Explain to students that each of these doctors is needed to help us take care of common eye problems. During an eye exam, doctors have patients check their visual activity on an eye chart or Snellen chart to examine how well a person sees at various distances.

Learning Experience 3 – Visual Impairment, cont.

Page 3

Read the rest of the book Glasses, Glasses Oh What Do I See to students, as the main character of the story visits the eye doctor. Ask students to review the Snellen eye chart posted in the classroom. Find the spot in the classroom that is 20 feet away from the chart. Students can then stand in that spot with one eye covered. Students can then attempt to read the chart. The school nurse can help with these measurements.

Discussion Questions:

What are some common eye problems?

What was your visual acuity?

Students will see that people need glasses or contact lenses to improve their vision. Read the books, Glasses Who Needs Them? by Lane Smith. Students are to discuss the crazy suggestions and illustrations shown as the boy completes his visit to the eye doctor. Ask each student to create a silly drawing of an animal “friend” wearing glasses and write a statement to go with the drawing.

Session 2

Introduce the words infection and disorder to students. Explain to students that common eye problems can be caused by an infection or disorder of the eye. The infection is caused by germs entering the body. Germs often enter our body from our hands. When we then rub our eyes, the germs can cause an infection in our eye. Ask students if they have ever heard the term “germs”.

Discussion Questions:

What are germs?

How do germs travel?

Can germs get inside our bodies? How?

Explain to students that we can't see germs, so they are to pretend that the small pieces of glitter you place in several students' hands are germs. Ask these students to shake hands with other students in the classroom, who in turn shake hands with others, until all members of the class have some glitter on their hands.

Discussion Questions:

How many of you have some of the “germs” on your hands?

How did they get there?

How might we be able to get rid of these “germs”?

What if we were to touch our eye with these “germs” on our hands?

Learning Experience 3 – Visual Impairment, cont.

Page 4

Discuss the importance of correct hand washing. Demonstrate the proper way to wash our hands, which include these steps:

- Get a paper towel first, and place it within reach of the sink.
- Turn on the warm water and put soap on your hands. Rub hands together for 20 seconds -- as long as it takes to say the ABCs.
- Rinse thoroughly -- this is very important.
- Use the towel to turn off the faucet.
- Get another towel and dry your hands. If the bathroom you are in has an air blower, hit the button with your elbow, not your hand.

Ask students to now follow your example so they can remove the “germs” from their hands.

Discussion Questions:

Why is washing your hands so important?

Do you think that washing your hands without soap would work as well in preventing germs? Why or why not?

At what time of day is it most important to wash your hands? Why?

Discuss with students the eye diseases that are contracted at school or at home from germs we come in contact with. Write the names of two eye infections on the chalkboard: **conjunctivitis** and **sty**. Ask students to share any experiences they have had with them. Commonly known as pinkeye, conjunctivitis is an inflammation of the conjunctiva, the clear membrane that covers the white part of the eye and lines the inner surface of the eyelids. A sty is a pimple that forms in either the upper or lower eyelid. It is an infection caused by bacteria that normally live peacefully on the eyelid skin surface. When the conditions are just right the bacteria feast on dead cells and other debris, resulting in the small pimple. Use the eye model to show students where the infection is located in each case. Ask students to explain the differences between the two eye infections (sty on eyelid, conjunctivitis is on the membrane that covers cornea and inside eyelid).

Eye disorders are different in that the conditions can be caused from birth, injury, heredity, weak eye muscles, or high fever. Often these disorders can be corrected. Write the names of three eye disorders on the chalkboard: **wall eyed**, **crossed eyes**, **colorblindness**. When the eyes don't line up or move together properly, it can be known as cross eyed or wall eyed. If an eye deviates inward, it is said they are cross-eyed; if it deviates outward, it is wall eyed. These conditions are often caused by a mismatch in the strength of the muscles moving

Learning Experience 3 – Visual Impairment, cont.

Page 5

the eye. One or both eyes may be affected. Again, use the eye model to illustrate. Colorblindness is a hereditary condition in which one cannot see certain colors. The retinal nerve cells include rods and cones. The rods and cones react to light because they contain pigments that change when light strikes them. The cones are responsible for color vision. There are several kinds of pigments present in three types of cone cells. If there is some problem with the pigments in the cones, the eye will not see colors in the usual way. If just one pigment is missing, the eye might have trouble seeing certain colors. Red-green colorblindness - where red and green might look the same - is the most common form of colorblindness, followed by blue-yellow colorblindness. Ask students to share any experiences they have had with these disorders.

Divide students into groups to create a poster that would encourage other children to wash their hands. The poster should show the steps involved in hand washing process. These posters could be hung around the school to encourage other students in school to become better hand washers.

Session 3

Explain to students that some people are visually impaired or blind. The book, Louis Braille by David A. Adler, will help students empathize with those who have severe visual impairment and blindness. Discuss their impressions of the book.

Discussion Questions:

What things can Louis do that you also can do?

How did Louis' other senses help him?

Why did Louis feel that it was necessary to invent his own code for reading and writing?

Ask students to get into groups of 3 and ask them to come up with ideas of how they could assist someone they saw that was visually impaired or blind. Ask students to share their ideas with the class. On page one of the Activity Sheet for Learning Experience 3, in the Body Senses Student Activity Book, students will see the Braille alphabet illustrated. Review with students how the alphabet is structured. Then on page 2 of the Activity Sheet, students are to write their name in the top row of squares provided. They are to use their pencil to color in the correct dots below each letter of their names that represents that letter in the Braille alphabet. Then students are to glue popcorn kernels to each dot and allow to dry. Once kernels have dried to the paper, students can then “read” their names with their fingertips to get an understanding of how blind use Braille. You can also show students how letters are capitalized in Braille and the arrangement of dots for numbers.

Learning Experience 4 – Ears

Objective: Students will label the parts of the ear and describe differences between sound waves/vibrations and decibels measured of various sounds.

Materials:

For each student:

Body Senses Student Activity Book

For the class:

3 Disposable Eye Masks

Ear model

Script for ear model

Tuning fork

Ping-pong ball

String

9 oz cup

5 - # 62 rubberband

5 - # 82 rubberband

5 - # 18 rubberband

5 - # 16 rubberband

Objects that make noise*

Water*

*provided by teacher

Preparation:

Read background information on pages 6 - 7. Attach string to ping pong ball for use in Session 2.

Basic Skills Development:

Discussing

Observing

Describing

Evaluation Strategy:

Students will label the parts of the ear and describe their understanding of sound waves and vibrations and decibels of sound.

How do we hear noises around us?

Session 1

Begin this Learning Experience by asking for six student volunteers. Three students will be blindfolded. The other three students will be given different objects that make noise.

Blindfolded students will guess what they heard. Repeat the activity with six different students and three different objects.

Discussion Questions:

Was it easy or difficult to guess what objects made different noises? Explain.

Introduce the word “hearing” to students by writing it on the chalkboard. Hearing is the act or process of perceiving sounds when the sound waves are processed and recognized by the brain.

Examine the model of the human ear with students. A script is provided on pages 29 - 30 in the teacher’s guide to help take students through the parts of the model. Be sure to point out to students the outer, middle, and inner ear. Ask students to then label the main parts of the three ear sections on the Activity Sheet for Learning Experience 5 in the

Learning Experience 4 – Ears, cont.

Page 2

Vocabulary:

ear	semicircular canal
hearing	earwax
sound	pinna
outer ear	stirrup
middle ear	hammer
inner ear	eustachian tube
auricle	eardrum
anvil	cochlea
vibrate	auditory nerve

Body Senses Student Activity Book. A word bank is provided.

Session 2

Introduce the word “vibrate” to students and discuss its meaning. The word means to “move back and forth quickly”. Then show students what happens when an object vibrates. This can be done by tapping a tuning fork on the bottom of your shoe and asking students to listen to the sound. The vibrations are making sound waves that travel through the air to our ears then to the parts of the ear to the brain. Tap the tuning fork again and ask students to feel its vibrations with their hand. Strike the tuning fork again and touch it to a ping-pong ball suspended by a piece of string to show how waves travel through solids. Strike the tuning fork again and touch it to water in a glass to show how sound waves travel through a liquid. Explain that we cannot see sound waves, however, through these activities we can see how they travel. Use the ear model to explain where these sound waves enter the ear and travel to the brain. Students can also hum as they feel the vibrations on their noses and throats with their fingers. Instruct them to hum at a high pitch and at a low pitch.

Learning Experience 4 – Ears, cont.

Page 3

Discussion Questions:

What does vibrate mean?

What causes sound? (an object moving back and forth very fast)

How do vibrations travel? (through the air as sound waves)

Did you feel any difference when humming at a high or low pitch?

If so, what difference did you feel? (humming high produces faster vibrations)

Use a rubber band instrument to help students visualize the relationship between speed of vibration and the sound produced. Stretch a thick rubberband (# 64 & 82) between two fingers then ask a student to pluck it. Do the same with a thin (#16 & 18) rubberband.

Discussion Questions:

Which rubberband makes a higher pitched sound? (thinner)

Which rubberband makes a lower pitched sound? (thicker)

Which rubberband vibrates faster? (thinner)

Which rubberband vibrates slower? (thicker)

Ask students what the term “noise pollution” is. Create a list on the chalkboard or chart paper of different types of noise pollution (ex. cars, lawn mower, loud music, airplanes, shouting). Discuss the effects of noise pollution.

1. Too much noise makes us uncomfortable, nervous, and tired.
2. Loud noises damage eardrum and hair cells in cochlea. The ringing sound in our ears after loud noise is an indication that hair cells are irritated (show on ear model).

Decibels (dB) measure sound. They tell us how loud a sound is. On page 2 of the Activity Sheet for Learning Experience 4, ask students to complete a graph showing the following decibels of sound:

Whisper – 30 dB
Talking – 60 dB
Loud Shout – 80 dB
Electric Blender – 90 dB
Mower – 110 dB
Rock music w/amplifiers – 120 dB
Jet takeoff – 150 dB

There are two columns not labeled on the graph. These two columns can be used on other loud noises of the class's choice. Class members can then research how many decibels their choice noises emit.

Learning Experience 4 – Ears, cont.

Page 4

To culminate this Learning Experience, discuss ways to reduce noise pollution, such as:

- public transportation/bike riding
- walking
- recycling
- hang clothes out to dry
- reduce volume TV/radio

SCRIPT: Ear Model

The human ear has two jobs. The first is hearing. The ear changes sound waves into nerve impulses to be carried to our brain so that we can hear. The ear's second job is to help us keep our balance. To do these jobs, our ear has three main parts: the outer ear, the middle ear, and the inner ear. All three help us to hear. The inner ear helps our balance. We will now look at these parts on our ear model.

The outer ear is the most familiar to us. It is the large beige part of the model. Another name for the outer ear is the pinna. It is made of cartilage and skin. It is shaped to catch sound waves, rather like a funnel. Animals whose lives depend on being able to hear very small sounds, like rabbits and foxes, have very large outer ears. Their large ears help them to catch more sound waves and hear very well. After the outer ear catches the sound waves, they travel down a canal. This auditory canal is pink on the model. If wax collects in this part of the ear, you cannot hear well. Sometimes people must go to the doctor to have wax removed from the auditory canal with a special instrument. Notice on the model that the canal passes through the skull. These bones are beige and pink on the model. The delicate middle and inner ears are deep inside your head and are protected by your skull. The bones of your head also help carry sound waves into your ear.

As sound waves travel down the auditory canal, they run into the eardrum. This is part of the middle ear. This eardrum vibrates with every sound wave that reaches it. Carefully pull this removable part straight out. Look at it closely. The eardrum is number 10. Notice that it is set in a ring bone and has two small bones attached to it. These two small bones are also part of the middle ear. Bone number 12 is called the hammer. Bone number 11 is called the anvil. Because they are attached to the eardrum, they will vibrate when the eardrum does and help us hear. They are the smallest bones in our body and they will never grow. They stay the same size all your life.

Now, let's carefully lay the eardrum part down. The inner ear is the next removable part. We will carefully lift it straight up from the model. Notice number 13 on this part. This is a third small bone, called the stirrup. In your ear, it works with the hammer and the anvil. It vibrates when they do, with the eardrum, to help you hear. When this stirrup vibrates, the sound waves are carried to the curled part of the inner ear. It looks like the shell of a snail. This is called the cochlea and it is labeled number 31. Inside the cochlea are many, many tiny hairs of different lengths. The ends of the hairs are connected to nerve endings. All of these nerve endings are brought together in the large white part on the back of the inner ear. This is called the auditory nerve. It is number 33. The auditory nerve carries the sound message to the brain, which tells us what we are hearing.

SCRIPT: Ear Model, cont.

Remember the ear has two jobs: hearing and balance. All three parts help with hearing. The inner ear also helps with balance. Notice the three large tubes on the top of the inner ear. These are semicircular canals. All three of these tubes are filled with fluid. They help with the second job of your ear, keeping your balance. No matter how you turn your head, the fluid always tells your brain which way you have moved.

Now, put the inner ear down carefully. Look at the large model again. See the long pink tube leading down from the ear. It is number 19. This is the Eustachian tube. This tube leads to your throat. If you are going up in an elevator or an airplane, or you are driving high in the mountains, your ears might feel “plugged”. If you swallow or open your mouth wide, the tube receives more air and “unplugs” your ears. This happens because swallowing makes the air on both sides of your ear drum the same again. Let's put the ear back together again. Carefully set the inner ear back on the model. The three tubes and the auditory nerve should be on the top. Now, hold the eardrum so that the two bones are at the top. Then place the eardrum into its slot.

Learning Experience 5 – Hearing Diseases and Impairment

Objective: Students will name causes of hearing impairments/diseases and name tools to help those with these impairments.

Materials:

For each student:

Body Senses Student Activity Book

For the class:

Otoscope (not for actual use)

Hearing aid model

Book – A Button In Her Ear by Ada B. Litchfield

Book – Moses Goes to School by Isaac Millman

Preparation:

Read background information on pages 8 - 9.

Basic Skills Development:

Observing

Discussing

Manipulating Materials

Evaluation Strategy:

Students will name causes of hearing impairments and identify tools to help the hearing impaired.

Vocabulary:

earache

antibiotics

otoscope

hearing aid

sign language

Why do some people have difficulty hearing?

Show students a picture of an otoscope. Ask students if they know what this instrument is used for. They may recognize it as an instrument with a light in it that their doctor uses to examine their ear canal. Ask students to give reasons why they would want to have their ear examined by a doctor. List these reasons on the chalkboard.

Examples:

1. cause of earaches (infection, foreign object in ear, wax build-up).
2. loss of hearing.
3. humming, whistling, ringing in the ear.
4. feel dizzy, loss of balance.

Hearing loss is a result of two types of concerns:

1. vibrations don't reach inner ear because of blocked canal or infection or earwax.
Solved: antibiotics or removal of ear wax/object
2. Problem in cochlea or nerve to brain.
Solved: Possible need of hearing aid.

Learning Experience 5 – Hearing Diseases and Impairment, cont.

Page 2

Ask students if they are familiar with a hearing aid. It is an electronic device that brings amplified sound to the ear. It includes a microphone, amplifier, and receiver. Show students a picture of a hearing aid and explain that this hearing aid is soft and fits in the ear canal. Explain to students that hearing aids are beneficial for people who suffer hearing loss. Read the book [A Button In Her Ear](#) by Ada Litchfield.

Discussion Questions:

How did Angela's parents discover she was having a hearing problem?

What did the doctor do to help?

How did Angela adapt to her hearing aid?

How do hearing aids make life better for those with hearing problems?

Some other actions that help with hearing loss are lip reading and sign language. Read the book [Moses Goes to School](#) by Isaac Millman and discuss how the character communicates with his classmates. Have students review the American Sign Language ABC chart on the Activity Sheet for Learning Experience 6 in the [Body Senses Student Activity Book](#). Practice signing each letter with students. Ask students to sign their names to their partner. Say the names of students without making any sound. Invite students to guess whose name was said. Students can then pair up with a partner and try lip reading what they are saying.

Discussion Questions:

When do people lip read or use sign language?

Do you find lip reading difficult?

What was the most difficult part of sign language?

How is Moses different from us?

In the book, how is Moses like all of us?

As an extension, students can learn, sign and sing “Take Me Out to the Ball Game”, from the book.

Learning Experience 6 – Nose

Objective: Students will explain the function of the nose and identify the parts of the nose.

Materials:

For each student:

Body Senses Student Activity Book

Hand mirror

For the class:

Book – You Can't Smell a Flower With Your Ear by Joanna Cole

Poster of nose

Preparation:

Read background information on pages 9 - 10.

Basic Skills Development:

Discussing

Observing

Organizing Data

Evaluation Strategy:

Students will explain the function of the nose and name the parts of the nose.

Vocabulary:

nose

olfactory bulb

nasal cavity

cartilage

sinus cavities

What function does the nose play for our bodies?

Pass out hand mirrors to students and ask them to make observations of their nose. Ask students questions about their nose's appearance and have them raise their hand if their nose matches various descriptions.

Sample Questions:

Raise your hand if you have a :

Long nose?

Short nose?

Pointy nose?

Freckles on your nose?

Bump on your nose?

Read the book You Can't Smell a Flower With Your Ear by Joanna Cole to students. Concentrate on pages 30-41. Discuss the many functions of our nose.

1. Used to smell.
2. Helps provide air to breathe.
3. Helps assist with tasting and speaking.

Use page 1 of the Activity Sheet for Learning Experience 7 in the Body Senses Student Activity Book to label the parts of the nose. Use the poster of the nose to aid in the help of identifying its parts. The word bank on the activity sheet is provided to assist students on labeling the

Learning Experience 6 – Nose, cont.

Page 2

picture provided. Discuss the function of each nose part.

Discuss some smells that are pleasant (flowers, food, soap, perfume) and unpleasant (garbage, mildew, exhaust). Also explain that our nose allows us to smell things that keep us from danger (burning smell, gas smell). Students can them complete the word web on page 2 of the Activity Sheet for Learning Experience 7 naming the smells they know.

Discussion Questions:

What helps us smell?

What do you think are pleasant smells?

What do you think are unpleasant smells?

What smells indicate danger?

Learning Experience 7 - Tongue

Objective: Students will identify the various taste locations of the tongue and test these locations by placing various substances/liquids on the tongue.

Materials:

For the class:

Salt
Sugar
Confectioner's sugar
Baking powder
Cocoa powder
Mixed sugar/cinnamon
4 packets of lemon juice
4 9 oz tumblers
5 pieces of black construction paper
Book – Taste by Mandy Suhr
Teaspoon
Water*
Apple*
Potato*

For each student:

Body Senses Student Activity Book
Double lens magnifier
5 cotton swabs
Mirror
Water*
Glue*
Scissors*
Crayons*
*provided by teacher

Preparation:

Read background information on page 10 - 11. Cut up apple and potato into pieces prior to this learning experience.

Basic Skills Development:

Observing
Discussing
Manipulating Materials
Describing
Generalizing

How do we taste our foods?

Place the two jars labeled A & B in front of students. One jar (Jar A) contains sugar and one jar (Jar B) contains salt. The contents of the jar are to remain a mystery to students. Ask students what they think is in the jars by looking at the substances. Some of the substance could be placed on black construction paper for further student observation with triple lens magnifiers. Students will find that they may not be able to tell for sure what the substances are. Ask students what sense could we use if the sense of sight is not useful. Some may say the sense of smell. That sense may help for some of the substances, but it doesn't help much with salt and sugar. The sense of taste is what we could use. Using cotton swabs that have been moistened with water, place some sugar on one end of the cotton swab and place salt on the other end of the cotton swab. Students are to taste the substances and discover that the substances taste different even though they look the same. Follow the same procedure with the other sets of substances:

Jars C (confectioners sugar) and Jar D (baking powder)
Jar E (cocoa powder) and Jar F (mixed sugar and cinnamon).

Learning Experience 7 - Continued

Page 2

Evaluation Strategy:

Students will accurately identify taste locations on the tongue and participate in the tasting of the substances/liquids provided in the kit.

Vocabulary:

tongue
papillae
taste bud

Discussion Questions:

Are the substances in the jar sets the same?

How do you know they are not the same?

What helped you discover the substances were different?

What sense (s) did you use?

The book, Taste by Mandy Suhr can be used throughout this learning experience. It will help students to better understand their sense of taste. You may also look back on pages 36-41 of You Can't Smell a Flower With Your Ear by Joanna Cole.

Students can take their mirrors and look at their tongues for the appearance of papillae. Taste buds are too small to see, but they are between the papillae. Taste buds help us taste what is in our mouth. Students can also wash their hands then feel their tongues and describe its texture. Diagrams in the book will help students see the structure of their mouths and how their tongue is attached in their mouth.

The diagram of the tongue in the book Taste shows where different taste buds (sour, bitter, sweet, and salty) are located on the tongue Taste. Have students complete the diagram on page 1 of the activity sheet for Learning Experience #9 in the Body Senses Student Activity Book. Test the taste buds on the tongue

Learning Experience 7 - Continued

Page 3

by preparing cups with various liquid mixtures that are categorized as sour, bitter, sweet, and salty. Fill the cups halfway with warm water. Then dissolve 2 -3 teaspoons of salt in Cup 1, sugar in Cup 2, and baking power into Cup 3. The lemon juice can be poured into a cup.

- Cup 1 – Salt water (salty)
- Cup 2 – Sugar water (sweet)
- Cup 3 - Lemon juice (sour)
- Cup 4 – Water with baking powder dissolved in it (bitter)

Each student should be given two cotton swabs. Each end of the swab can be dipped into the cups of water then touch the swab to his/her tongue. Remind students there is “No Double Dipping.” Students can then describe if the liquid they taste is bitter, sour, salty, or sweet. Students can use the diagram of the tongue to point out what area of the tongue helped them find that taste. On page 2 of the activity sheet for Learning Experience 9, students can give an indication of whether or not they liked each taste by circling the “smile” face or “frown” face. A similar learning experience can be completed with various types of food that are considered salty, sweet, sour, or bitter.

Discussion Questions:

- What are the four flavors the tongue can recognize?
- How would you describe the taste of each of the liquids?
- What foods taste sour?
- What foods taste salty?
- What foods taste sweet?
- What foods taste bitter?
- What kinds of food do you like to eat best?
- How does our sense of smell help our sense of taste?
- What happens when we plug our nose and try to taste foods?
- What does food taste like when we have a cold?

Discuss the relationship between our sense of smell and sense of taste. Seventy-five percent of what we perceive as taste actually comes from our sense of smell. Odor molecules from food give us most of our taste sensation. When food is put in our mouth, odor molecules from that food travel through the passage between our nose and mouth to the olfactory receptor cells at the top of the nasal cavity. To demonstrate for students, cut up an apple and a potato to the same size pieces and distribute to students. Ask students to close their eyes

Learning Experience 7 - Continued

Page 4

and plug their nose. Then students are to lick one of the pieces. Ask students if they can tell what it is. Next, unplug your nose and eat the piece. Now can they tell what it is? This same activity can be done with other foods. Ask students to make the relationship between how food tastes when we have a cold and do not have a cold. When our nose is filled with mucus, the odor molecules can't reach the olfactory receptor cells. Our brain does not receive a signal identifying the odor. Therefore, everything you eat tastes the same.

Learning Experience 8 – Skin & Skin Protection

Objective: Students will identify various features on the surface of their skin and name the various parts of the skin layers.

Materials:

For each student:

Body Senses Student Activity Book

Double lens magnifiers

For student groups:

Construction Paper*

Glue*

Magazines*

For the class:

Book- Your Skin and Mine by Paul Showers

Preparation:

Read background information on p. 11 – 13.

Basic Skills Development:

Observing

Discussing

Describing

Evaluation Strategy:

Students will identify the parts of skin layers and features on the surface of the skin.

Vocabulary:

skin

dermis

epidermis

follicle

pore

fingerprint

hair

nerve

melanin

ultraviolet rays

How does our skin help our body?

Begin this learning experience by passing out double lens magnifiers to each student. Read p. 2-5 of the book, Your Skin and Mine by Paul Showers, to the students. Have students observe the skin on their arm. Ask students questions about what they observe.

Sample Questions:

What color is your skin? Light? Dark?

Do you have freckles?

Do you notice any markings/bumps?

Is there hair growing from your arm?

Describe what that looks like.

Review with students the different layers of the skin. The *epidermis* is the outside layer of the skin that we can see with our double lens magnifier. The *dermis* is the inner layer of the skin.

Continue reading (p. 8-19) of the book and review the different aspects of what the author discusses. For example, skin and touch, fingerprints, body temperature, and pores. Starting on p. 20 of the book the author discusses the layers of the skin - dermis and epidermis

Learning Experience 8 – Skin, cont.

Page 2

Students can then go to the diagram of the skin in layers on page 1 of the Activity Sheet for Learning Experience 8 in the Body Senses Student Activity Book. The word bank is available to help with the labeling of the diagram.

Finish reading the last few pages of the book to students. These pages discuss how the skin reacts to sun exposure. Introduce the word melanin to students and why it's so important to our skin and us. We must do other things to help protect our skin from the sun.

Discussion Questions:

How many have had sunburn before?

What did it feel like?

What activity were you doing when the sunburn occurred?

How was the sunburn treated?

Divide students into small groups. Ask student groups to discuss and answer the questions on page 2 of the Activity Sheet for Learning Experience 8 as best as they can. Then, as a class, go over group answers and provide students with the correct answers to the questions. Then, ask groups to brainstorm a list of fun things they can do outside in the summer. Students can record the group's list on graphic organizer on page 3 of the Activity Sheet for Learning Experience 8. On the left side, students list the activities and on the right side students list ways that they can protect themselves from sun exposure while doing each activity. As a final culminating activity, student groups can look for pictures in the magazines used in an earlier learning experience that shows people using sun protection (umbrellas, trees, sunscreen, hats, sunglasses, clothing). Student groups can create a collage of their pictures and have the group members then describe the protective coverings and habits they found in each picture.

Answers to page 2 of the Activity Sheet:

1. Authorities now recommend that everyone should use 15+ sunscreen.
2. Re-apply sunscreen every 2 hours or every hour if you are sweating a lot. Re-apply after swimming.
3. Sunscreens should be applied to clean dry skin at least 15 -20 minutes prior to sun exposure.
4. Limit sun exposure during peak hours of 10 a.m. and 4 p.m.

Learning Experience 8 – Skin, cont.

Page 3

5. Protect face, neck, and eyes from the sun by wearing a brimmed hat and sunglasses.
6. Loose-fitting long sleeved shirts and long pants of tightly woven fabrics are effective protection.
7. We can also protect our skin by seeking shade when possible: umbrellas, canopies, and trees.

Learning Experience 9 – Safety & Healthy Habits

Objective: Students will make personal decisions for a healthier life.

Materials:

For each student:

Body Senses Student Activity Book

For the class:

Book – Being Safe by Sindy McKay
Happy and Healthy by Sindy McKay

Preparation:

Read background information on p. 13 - 17.

Basic Skills Development:

Communicating
Making Decisions
Predicting

Evaluation Strategy:

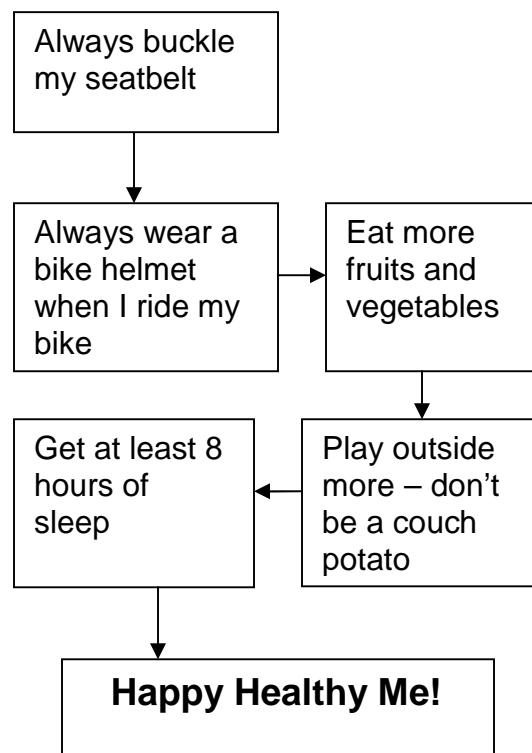
Students will make personal decisions and record their plan for a healthier life.

Vocabulary:

Fruits
Vegetables
Grains
Exercise
Healthy
Safety
Helmet

As a class, read the books Being Safe and Happy and Healthy by Sindy McKay.

Discuss how our actions can help us to stay healthy and have students complete the flow chart in the Body Senses Student Activity Book for Learning Experience 9. They should think of their own life and write down those things they could do a better job with. (See the example below.)



MORE IDEAS

Language Arts

- ◆ Research other animals and what their body senses are.
- ◆ Read Shel Silverstein poems that address concepts like good health habits.
- ◆ Write group stories about germs that go into the eye and their adventure.

Book Suggestions:

Too Much Noise by Ann McGovern
The Magic School Bus Explores the Senses by Joanna Cole
Busy Bunnies Five Senses by Teddy Slater
How Do Your Senses Work? by Judy Tatchell
The Five Senses: Touch by Margia Parramon

Math

- ◆ Have ten buttons of increasing size and an envelope. Have students remove the buttons and arrange them – left to right- in increasing size. When a student can arrange buttons in correct order, blindfold him/her to ask the student to do this task. Then discuss how it feels to do this task without the use of his/her eyes.

Arts

- ◆ Blindfold a student for 5-10 minutes (I use an older student or adult as a helper) have the student explore the classroom and tell the location he/she is at and how it feels to not have the use of his/her eyes.

Physical Education

- ◆ Play “Monkey See – Monkey Do”. Divide students into pairs and have them face each other. Have one student make a movement, the other student tries to mirror the movement.

Music

- ◆ Use a xylophone – hit a long bar – hit a short bar. Which bar makes the higher sound? (the shorter bar gives off the higher sound. The shorter the length, the higher the pitch. The longer the length the lower the sound).
- ◆ Divide students into small groups. Provide each group with some musical instruments. Have students discover sounds the instrument can make. Have students demonstrate loud and soft sounds that they can make with the instruments. This is a good outside activity.

Science

- ◆ Ask students to bring in nutritious snacks to taste, such as vegetables, fruits, cheeses, crackers, breads, seeds, and nuts. As the class is having their tasting snack, discuss what tastes they are experiencing. Use the four word cards salty, sour, bitter, and sweet to make a list of the food student's taste.
- ◆ Play "Where Am I?" Blindfold students or let them close their eyes. Stand somewhere in the room and ask "Where am I?" Have students point to the direction where your voice came from. Can also play by producing a sound such as tapping, clapping, singing, whistling, etc.
- ◆ Fill little bowls with items such as salt, flour, rice, beans, water, or ice. Use the words touch, soft, silky, smooth, rough, bumpy, cool, warm, icy, sticky, hard. Have students place his/her hand in first bowl and feel what is inside. "How does the salt feel?" Use words soft, smooth. After the student feels two or three different items, blindfold student. Place one of the bowls in front of him/her and play a guessing game. "What does this feel like?" Let the child try this guessing game on you and other students. Gradually add more items to the game.
- ◆ You will need pictures of different objects. Example: car, airplane, truck, dog, cat, house, TV, elephant, and a flannel board. Place pictures at random on the flannel board. Have students study the picture. Then have students turn his/her back while you remove one (two) pictures. Have students turn around and try to tell which picture(s) is missing. As a follow-up, discuss the visual characteristics of objects such as size, color, and shape.
- ◆ Two sets of smelling cups:

2 cups with onion slices	2 cups with peppermint extract
2 cups with peanut butter	2 cups with black pepper
2 cups with peeled banana	2 cups with perfume
2 cups with lemon slices	2 cups with orange slices
2 cups with cinnamon	2 cups with garlic
2 cups with vinegar	

 Cover the cups with foil and poke small holes in the foil. Set 2 cups of onion and 1 cup of cinnamon on a table. Let students find the two cups that have the same smell. Keep playing, changing smells each time. Increase the number of cups from which students must select the like pair.
- ◆ Let the students produce sounds with different parts of their bodies: hands, legs, tongue, teeth, and whole body. Have students close their eyes, produce a sound with one part of your body. Have children close their eyes and guess what part produced the sound they heard. Let students take turns producing different sounds for the other students to guess.
- ◆ Give each student a sheet of paper and have him or her produce a sound with it (shake, fold, tear, crumple, etc.). Give students as many sheets of paper as they need to produce the various sounds. Have students close their eyes, produce a sound and have them guess how it was produced.

INQUIRY AND PROCESS SKILLS

Classifying	Arranging or distributing objects or events in classes according to some method of system.
Collecting Data	Obtaining visible or measurable information which illustrates a specific situation.
Communicating	Displaying or transmitting information to others.
Generalizing	Drawing general conclusions from information.
Formulating Hypotheses	Constructing a proposition or assumption of what is thought likely to be true based on reasoning, which serves as a tentative testable theory.
Identifying Variables	Recognizing characteristics of objects or events, which are constant or change under different conditions.
Inferring	Making a statement based on reasoning to explain an observation.
Interpreting Data	Analyzing information that has been collected and organized and describing apparent patterns or relationships for information.
Making Decisions	Choosing an alternative from among several and basing the judgment on defendable reasons.
Manipulating	Handling or treating materials from among several and basing the judgment on defendable reasons.
Measuring	Making quantitative observations by comparing to a standard.
Observing	Becoming aware of an object or event by using any of the senses to identify properties.
Predicting	Making a forecast or estimate of what future events may occur.
Replicating	Performing acts that duplicate demonstrated symbols or patterns.
Using Numbers	Stating and applying mathematical rules or formulas to calculate or compute quantities for basic measurements.

GLOSSARY

Antibiotics:	naturally produced substance that kills bacteria, but has no effect against viruses, used as a medication
Aqueous humor:	the transparent fluid in the eye chamber between the back of the cornea and the front of the iris and pupil and fills the vitreous humor behind the lens
Auditory nerve:	a nerve that communicates impulses relating to hearing and balance from the inner ear to the brain
Anvil:	a tiny bone in middle ear that passes vibrations from the hammer to the stirrup.
Auricle:	visible part of ear, the part of the external ear that projects outward from the head
Blind:	unable to see, permanently or temporarily
Blood Vessel:	an artery, vein, or capillary through which blood flows
Cochlea:	a spiral structure in the inner ear and contains tiny hair cells whose movement is interpreted by the brain as sound
Conjunctivitis:	the inflammation of the conjunctiva, the clear membrane that covers the white part of the eye and lines the inner surface of the eyelids
Cornea:	the clear, dome-shaped tissue covering the front of the eye
Dermis:	the thick sensitive layer of skin beneath the epidermis that contains blood, lymph vessels, sweat glands, and nerve endings
Disorder:	a medical condition involving a disturbance to the usual functioning of the mind or body

Ear:	the organ of hearing and balance in vertebrates. In mammals, it is divided into three parts, the external, middle, and inner ear. The external ear collects sound, the middle ear contains small bones that amplify and transmit it, while the inner ear maintains balance and contains sensory nerve endings for detecting sound
Earache:	pain in the middle or inner ear
Eardrum:	a membrane of thin skin and fibrous tissue that vibrates in response to sound waves, located between the external and the middle ear
Earwax:	a yellowish waxy substance produced by glands in the external ear to protect the lining of the outer ear
Epidermis:	the thin outermost layer of the skin made up of several layers that covers and protects the underlying dermis
Eustachian tube:	a bony passage extending from the middle ear to the nasopharynx that has a role in equalizing air pressure on both sides of the eardrum
Eye:	the organ of sight or light sensitivity in vertebrates, usually occurring in pairs. The eye is an organ with light-sensitive rod and cone cells in the retina, which is responsible for converting light into impulses that are sent to the brain for understanding.
Eyebrow:	the arched line of hair above each eye socket
Eyelash:	a short stiff hair that grows in a row from the edge of the eyelid
Eyelid:	a protective fold of skin and muscle that can be closed to cover the front of the eyeball
Eyesight:	ability to see

Far-sighted:	unable to see nearby objects clearly ; able to see distant objects better than nearby ones
Fingerprint:	an impression of the curved lines of skin at the end of a finger that is left on a surface
Follicle:	a small tubular pit in the outer layer of skin epidermis surrounding the base of a growing hair
Germs:	a microorganism, especially one that can cause disease
Hair:	the mass of fine flexible protein strands that grow from follicles on the skin of a person or animal
Hammer:	a hammer-shaped bone, the outermost of three small bones in the middle ear that transmit sound waves from the eardrum to the inner ear
Hard palate:	the bony front portion of the roof of the mouth
Hearing:	awareness of sound made possible by vibratory changes in air pressure on the eardrums
Hearing aid:	a small device that amplifies sound to enable somebody to hear better, usually worn in or behind the ear
Infection:	a communicable disease
Inner Ear:	the fluid-filled part of the ear, including the cochlea, which is responsible for hearing, and the semicircular canals, which control balance
Iris:	the colored part of the eye. It controls the amount of light that enters the eye by changing the size of the pupil.
Lens:	a crystalline structure located just behind the iris. It focuses light onto the retina.

Melanin:	a dark brown or black pigment that is naturally present to varying degrees in the skin, hair, eyes, fur, or feathers of people and animals as well as in plants
Middle Ear:	the narrow air-filled space between the ear drum and the outer wall of the inner ear containing the three tiny bones that transmit sound vibrations
Mouth:	food and voice organ in people and animals
Nasal cavity:	the space behind the nose in the middle of the face. It is connected with the back of the throat and is separated from the inside of the mouth by the palate.
Near-sighted:	with poor distance vision; unable to see clearly objects that are far away
Nerve:	a bundle of fibers forming a network that transmits messages in the form of impulses between the brain or spinal cord and the body's organs
Nose:	the part of the face or head through which a person or animal breathes and smells
Nostril:	either of the two openings at the end of the nose of a person or animal
Olfactory bulb:	located underneath the front of the brain just above the nasal cavity. Signals are sent from the olfactory bulb to other parts of the brain to be interpreted as a smell you recognize.
Ophthalmologist:	medical study and treatment of eyes. The branch of medicine that is concerned with the diagnosis and treatment of eye diseases and conditions
Optician:	a fitter and supplier of glasses and contact lenses who does not examine eyes or prescribe corrective lenses

Optometrist:	eye examiner and lens prescriber; somebody who is qualified to carry out eye examinations and to prescribe and supply glasses and contact lenses
Optic nerve:	the nerve that transmits electrical impulses from the retina to the brain.
Otoscope:	an instrument incorporating a light and a magnifying lens, used to examine the external canal of the ear and the eardrum
Outer Ear:	the external part of the ear (pinna), the ear canal, and the eardrum.
Papillae:	a very small projection on the tongue enclosing the taste buds
Pinna:	the outer visible part of the ear, also called the auricle.
Pore:	a tiny opening in human skin, or in the skin or other outer covering of an animal, through which substances can pass. Perspiration is released through the pores.
Pupil:	the opening in the center of the iris. It changes size as the amount of light changes (the more light, the smaller the hole.)
Retina:	sensory tissue that lines the back of the eye. It contains millions of photoreceptors (rods and cones) that convert light rays into electrical impulses that are relayed to the brain via the optic nerve.
Sclera:	tough outer coating of eyeball that forms the white of the eye
Semicircular canal:	each of three tubes in the inner ear, semicircular in shape and set at right angles to one another that help to maintain balance

Senses:	any of the faculties by which a person or animal obtains information about the physical world
Septum:	a thin partition or membrane dividing something into two or more cavities including the tissue separating the nostrils
Sign language:	a system of communication by gestures as opposed to written or spoken language, especially the highly developed system of hand signs used by or to people who are hearing-impaired
Skin:	the external protective membrane or covering of an animal's body, consisting of the dermis and epidermis
Soft Palate:	the fleshy rear portion of the roof of the mouth, extending from the hard palate at the front and tapering to the hanging uvula at the rear. It elevates to close off the nasal passages when swallowing, sucking, and pronouncing some sounds.
Sound:	vibrations traveling through air, water, or some other medium, especially those within the range of frequencies that can be perceived by the human ear.
Spectacles:	a pair of glass or plastic lenses worn in a frame in front of the eyes to help correct imperfect vision
Stirrup:	a tiny, u-shaped bone that passes vibrations from the stirrup to the cochlea.
Sty:	a pimple that forms in either the upper or lower eyelid. It is an infection caused by bacteria that normally live peacefully on the eyelid skin surface. When the conditions are just right the bacteria feast on dead cells and other debris, resulting in the small pimple.

Taste bud:	a sensory receptor on the surface of the tongue that sends signals to the brain when stimulated by specific chemicals, producing the sense of taste. Taste buds are classified according to the type of material they respond to: sweet, salty, bitter, or sour.
Tongue:	the fleshy organ attached to the bottom of the inside of the mouth used for tasting, licking, swallowing, and, in humans, speech.
Ultraviolet Rays:	relating to or producing electromagnetic radiation of wavelengths from about 5 to about 400 nanometers, beyond the violet end of the visible light spectrum
Vibrate:	to shake or move back and forth rapidly
Visual Impairment:	to lessen the quality, strength, or effectiveness relating to vision or sight
Vitreous Body:	a thick, transparent liquid that fills the center of the eye. It is mostly water and gives the eye its form and shape.

TEACHER REFERENCES

Media Library

Please use the BOCES Instructional Support Website to check out the media available on this science topic. Call the media library to order media materials and to check on new materials that are available. The number to be reached is (716) 376-8260.

Web Sites

<http://www.caew-boces.wnyric.org>
<http://faculty.washington.edu/chudler/amaze.html>
<http://www.microscopy-uk.org.uk/mag/artapr00/inseye.html>
<http://faculty.washington.edu/chudler/bigeye.html>
<http://faculty.washington.edu/chudler/chvision.html>
<http://kidshealth.org>
<http://faculty.washington.edu/chudler/experi.html>
<http://library.thinkquest.org/3750/>
<http://www.hhmi.org/senses/>