



What Is This Module About?

We learn from the things around us. We learn from what we see, hear, feel, taste and smell. We recognize objects, sounds, smells, tastes, pleasure, pain, pressure and temperature through our sense organs — the eyes, nose, ears, skin and tongue.

Have you ever wondered how your sense organs work? What do you think would happen to your life if you lose even one of them? Would you still be able to do the things that you usually do?

This module will illustrate how important our sense organs are to our daily lives. It will discuss how they work and the diseases that may affect them.

The module is divided into three lessons:

Lesson 1 – *The Organs of Sight and Hearing*

Lesson 2 – *The Organs of Smell, Taste and Touch*

Lesson 3 – *Sensory Diseases and Their Prevention*



What Will You Learn From This Module?

After studying this module, you should be able to:

- ◆ identify the various sense organs and their corresponding senses;
- ◆ describe the structure and function of the sense organs and their importance;
and
- ◆ cite different diseases and ailments related to the sense organs and their respective symptoms.



Let's See What You Already Know

Before you start studying this module, take this test first to find out what you already know about the topic.

A. *Multiple Choice.* Encircle the letter of the correct answer.

1. Our eye is our organ for our sense of _____.
 - a. smell
 - b. hearing
 - c. vision
 - d. touch
2. The thin layer of tissue that lines your eyelids and nasal cavity is called the _____.
 - a. lining
 - b. mucous membrane
 - c. skin
 - d. dermis
3. The innermost layer of cell inside your eye is called the _____.
 - a. mucous membrane
 - b. conjunctiva
 - c. retina
 - d. choroid
4. The visible part of your ear is called the _____.
 - a. ear
 - b. auricle
 - c. flaps
 - d. shell
5. You hear sounds through _____.
 - a. vibration
 - b. music
 - c. noise
 - d. light
6. The smallest bones of your body are found in your _____.
 - a. eyes
 - b. nose
 - c. mouth
 - d. ears
7. Olfaction pertains to your sense of _____.
 - a. smell
 - b. touch
 - c. sight
 - d. taste
8. Your _____ are groups of cells inside your mouth that detect the taste of the food you eat.
 - a. tongue
 - b. teeth
 - c. taste buds
 - d. saliva

9. The biggest sense organ of your body is your _____.

- a. nose
- b. lips
- c. skin
- d. eyes

10. Your sense of touch is also called your _____ sense.

- a. olfaction
- b. vision
- c. balance
- d. tactile

B. Write the sense organs affected by the following disorders or diseases. Write **eye**, **ear**, **nose**, **tongue** or **skin** in the space provided before each number.

- _____ 1. Carbuncle
- _____ 2. Otitis media
- _____ 3. Rhinitis
- _____ 4. Sty
- _____ 5. Aguesia

Well, how was it? Do you think you fared well? Compare your answers with those in the *Answer Key* on page 51.

If all your answers are correct, very good! This shows that you already know much about the topic. You may still study the module to review what you already know. Who knows, you might learn new things as well.

If you got a low score, don't feel bad. This only shows that this module is for you. It will help you understand important concepts that you can apply in your daily life. If you study this module carefully, you will learn the answers to all the items in the test and a lot more! Are you ready?

You may go now to the next page to begin Lesson 1.

The Organs of Sight and Hearing

Have you ever wondered what will happen to you if you lost your eyes and ears? How will you ever see the beauty of life and hear the sound of music?

We learn through our senses... we learn from what we feel, taste and smell. More importantly, we learn from what we see and hear. These two are the most developed among our senses. We can easily identify our surroundings through the use of our eyes and ears.

You will learn more about your eyes and ears as you study this lesson. This lesson will discuss the functions and structures of your eyes and ears.

After you finish studying this lesson, you should be able to:

- ◆ explain how the eyes and ears function;
- ◆ identify the parts of your eyes and ears; and
- ◆ explain the functions of each part of your eyes and ears.



Let's Think About This

Go outside and take a short walk. Observe your surroundings. Where are you now? What do you see? What do you hear?

What if you can't see — will you still be able to know what is around you? How?

Even if you can't see you can learn what is happening through the sounds that you hear. But what if it's the other way? What if you can see what is happening around you but you can't hear a sound from your surroundings? Do you think you will be able to understand what is happening around you? Explain your answer.

If you answered yes, that's correct. You can still understand your surroundings by looking at them. However, it will be more difficult if you can't hear a sound. For example, someone is telling you something, it is difficult to understand him or her if you can't hear what he or she is saying.

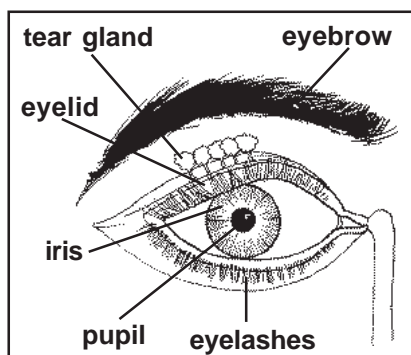
We find out about the world we live in through our senses. We learn through our senses. We see with our eyes, and our sense of sight tells us about things that are outside our bodies. Our eyes give us pictures or images of the way things look. They show us light, color, shape and size. The eyes and ears receive messages from the outside world and transmit them to the brain. Our eye is our organ for vision. Our ear, on the other hand, is our organ for hearing.



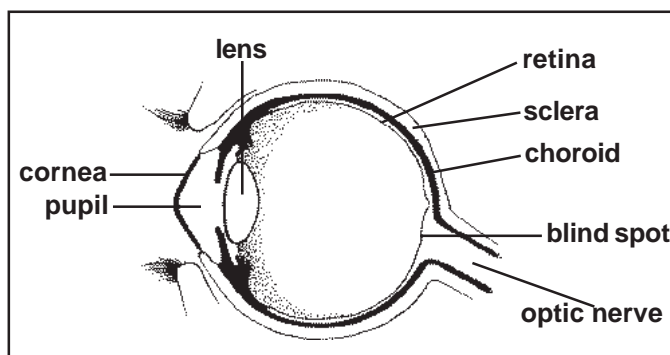
Let's Study and Analyze

How do your eyes see?

Your eye has many parts and each one of them helps you see.



Outer Parts of the Eye



Inner Parts of the Eye

Try blinking one of your eyes in front of a mirror. Can you see the skin that covers your eye every time it closes? This is called the **eyelid**. It protects your eye from tiny objects that might enter it. Below your eyelid is a thin layer of tissue called the **mucous membrane**. It is always wet because there are **tear glands** that produce tears on top of your eye behind the eyelids. The tears help clean your eye every time you close your eyelid. The short hairs on the tip of your eyelid are called **eyelashes**. They brush away tiny objects and dirt from entering your eye.

There are three cell layers or linings inside your eyeball. They are the:

- a. **Sclera.** This is the white part of your eye. In front of it, on top of the colored part of your eye (**iris**), is a transparent covering called the **cornea**. The cornea protects the lens of your eye. It also allows light rays to enter the eye and helps to focus them. A thin layer of transparent tissue covers the sclera. This tissue is known as **conjunctiva**.
- b. **Choroid.** This is the middle layer of the wall of your eyeball. It absorbs excessive light and gives rise to the **iris**, which surrounds an opening called the **pupil**.
- c. **Retina.** This is the innermost layer of your eye where light-sensitive cells are found.

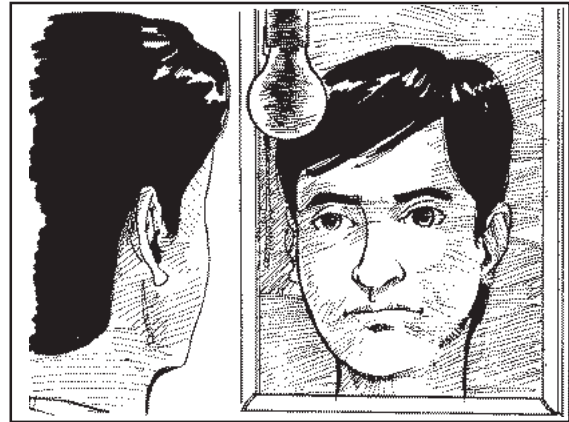


Let's Try This

To learn more about how your eye and its parts function, do the activity below.

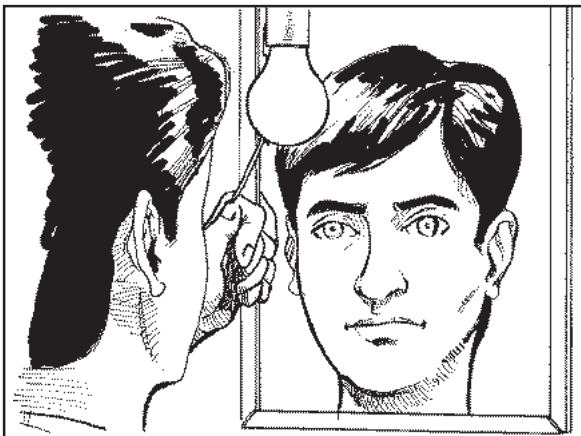
Stand near a mirror in a dimly-lit room just below a source of light. Observe the movement of your eyes.

What happened to the black dot in the middle of your eye? Did it widen (dilate)? Or did it narrow (contract)?



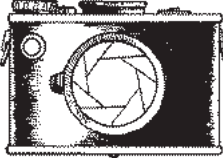

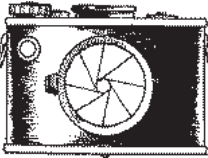

Ask someone to turn on the light. Observe the movement of one of your eyes.

What happened to the black dot in the middle of your eye? Did it widen (dilate)? Or did it narrow (contract)?



What do you think is the reason for this movement?

The activity tells you how the pupil works. To learn the answers to the questions, study the illustrations below.

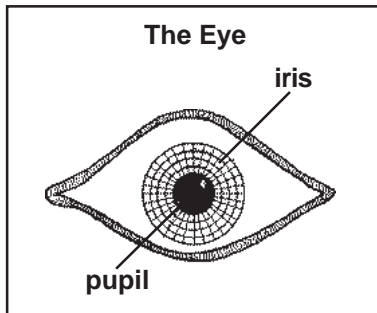
| Dim Light | | | |
|---|---|--|---|
| Opening of camera widens | Pupil widens | Camera narrows | |
|  |  |  |  |

Your eye is like a camera. It reacts to light. Can you see the black dot in the middle of the colored part of your eye? That is called the **pupil**.



Let's Learn

The pupil is like the opening of a camera. In dim light, the opening widens. In bright light, it narrows. The pupil controls the amount of light that enters the eye. If it is too bright, the pupil narrows to protect the eyes from too much light. If it is dim, the pupil widens so that more light can enter into the eyes.



The eye receives light rays that are reflected from an object. The light goes in through the pupil.

The colored part that surrounds the pupil is called the **iris**. Its color comes from a substance called **melanin**. Melanin absorbs strong light that might shock the eye. Strong light could cause blurred vision.



Let's Review

Why does a welder in a welding shop use dark protective eyewear or a welding mask while working?

Compare your answer with that in the *Answer Key* on page 51.



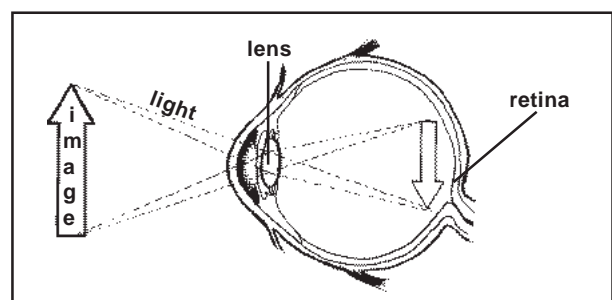
Let's Study and Analyze

You have just learned how the pupil works. Consider that stage (when light enters the pupil) as just a door or an entrance. A lot of things still happen after the light enters the door and the door closes.

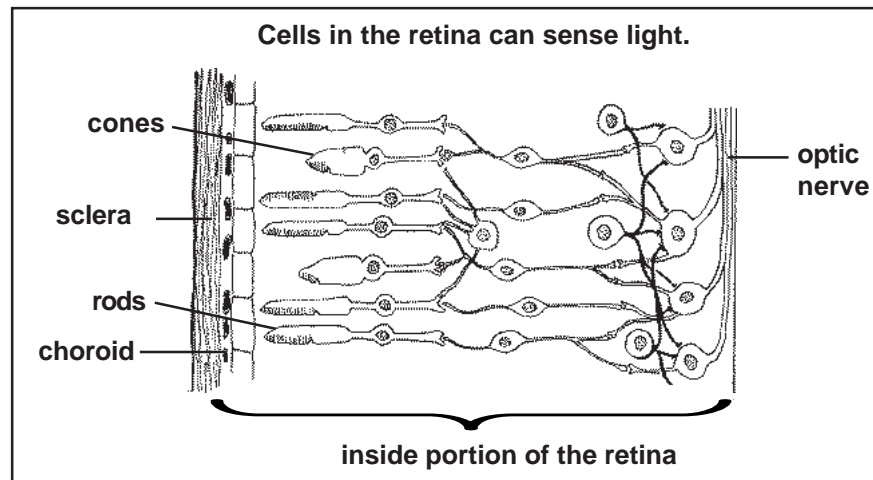
As the light enters the eye, it passes through the lens.

Refer to the illustration on page 5. Were you able to find the lens of the eye? If so, let's continue.

The lens helps at focusing the image to make it clearer. As the light goes through the lens, it turns the light upside down. The lens focuses the light rays or the inverted image on the back of your eye or on the **retina**.



As stated earlier, the retina is the innermost layer of the wall of the eyeball. Light-sensitive cells absorb light rays (inverted image), changing them into electrical signals.



There are two types of light-sensitive cells inside the retina, the **rods** and the **cones**. Do you know what they are for?

- Rods.** There are 120 million rods inside your retina. These enable the eyes to see different shades of gray and to see in the dark. They detect black and white.
- Cones.** There are 6 million cones inside your retina. These enable the eyes to see colors and sharp images in bright light. They detect color.

These cells turn the inverted image into electrical signals that travel along the **optic nerve** to the brain. It is important to note that there are **NO** rods and cones at the area where the optic nerve enters your eye. This is the **blind spot** (refer to the illustration on page 5) of your eye. The optic nerve carries the message to your brain. The brain then decodes the electrical signals, seeing the object the right side up.



Let's Review

Give the functions of the following parts of your eye:

| Structures in the Eye | Fun |
|-----------------------|-----|
| 1. Sclera | |
| 2. Cornea | |
| 3. Choroid | |

| Structures in the Eye | f |
|-----------------------|---|
| 4. Pupil | |
| 5. Iris | |
| 6. Retina | |
| 7. Lens | |
| 8. Optic nerve | |

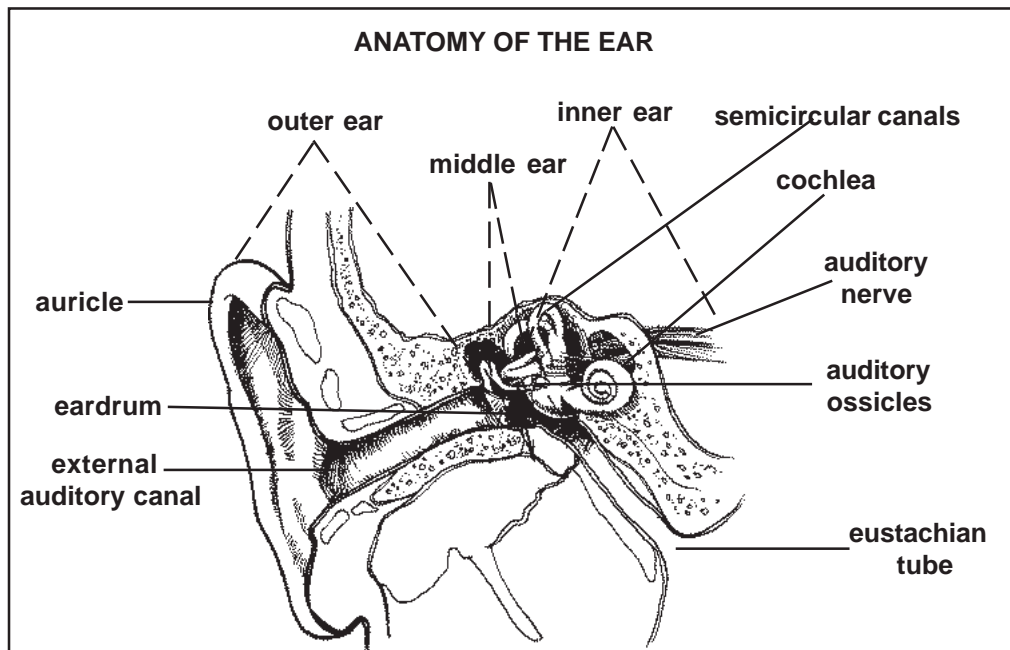
Compare your answers with those in the *Answer Key* on page 51.



Let's Study and Analyze

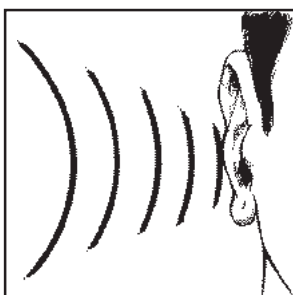
How does our ear work?

Our ear, just like our eye, has many parts that make us hear.



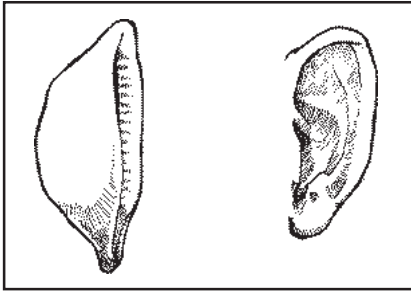
Read the discussion below on the parts of the ear to familiarize yourself with the different ear functions.

The ear is divided into three regions: the outer ear, the middle ear and the inner ear.

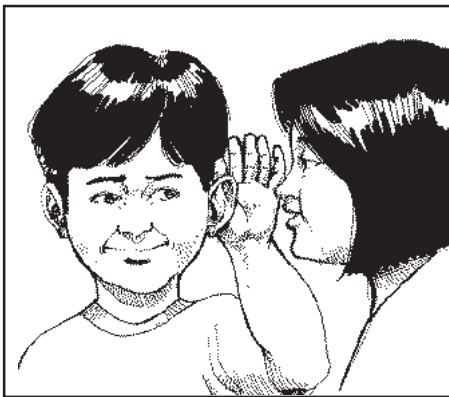


The **outer ear** is the visible part of the ear. It is composed of the **auricle** and the **external auditory canal**.

Try touching the curved flaps beside your head, which you call your 'ear.' That part is called the **auricle**. The auricle, or outer portion of your ear, is the one that collects sounds from your surroundings.



Why are your ears shaped like seashells?



Ears are shaped like seashells because that's the best way it can collect sounds from your surroundings. Isn't it that when somebody is whispering to you, you place your hand beside your ear like the child in the picture? Why do you do so?

Placing your hand beside your ear makes you hear more clearly what your friend is saying, right? This happens because your hand helps your ear pick up the sounds coming from your friend.

Get a mirror and place it beside your head. Can you see a canal or a tube? It is where the sound passes. It is called the **external auditory canal**. It is the opening of the ear. That tube goes inside your ear until it reaches the **eardrum**.

The **eardrum** is a very thin membrane or tissue. It is only .004 of an inch (0.1 mm) thick, stretched along the opening of the external auditory canal. Sounds that pass through the external auditory canal strike the eardrum, causing it to vibrate. Can you find the eardrum in the illustration on page 9? After you locate the eardrum, continue with the activity below.

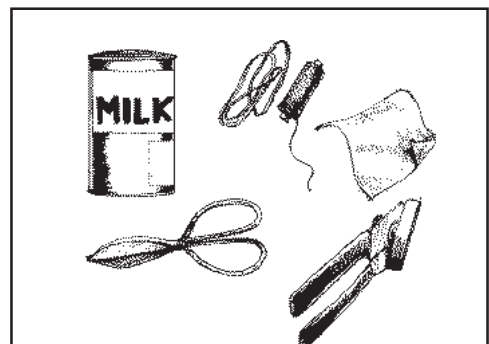


Let's Try This

Inside your ear is a drum that produces vibrations, which the brain would interpret as sounds. To learn about how your eardrum works, do the activity below.

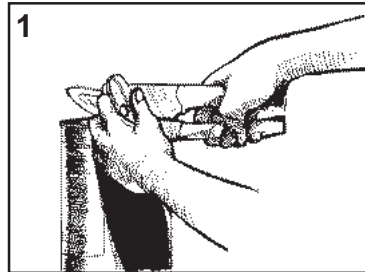
Get the following materials:

- ◆ a big can of milk
- ◆ strings or rubber bands
- ◆ a piece of cloth enough to cover the top of the can
- ◆ a pair of scissor
- ◆ a can opener

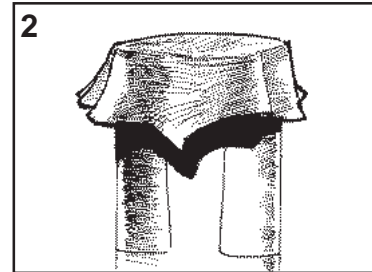


Procedure:

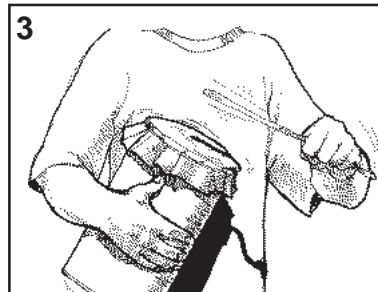
Step 1. Open both ends of the can using the can opener.



Step 2. Get the piece of cloth and cover one end of the can.



Step 3. Secure the cover by tying the cloth tightly.



Have you followed the procedure correctly? What do you have now? A drum!
Now, try tapping the top of the drum slowly.

Can you hear sounds? ____ Yes ____ No

Can you feel the vibrations? ____ Yes ____ No

If you can't feel anything, try covering your drum more tightly. Now tap your drum again. Can you feel the vibrations? Try tapping harder. As the sounds become louder, the vibrations become stronger, right? Try tapping it harder than the second time. Will you agree that if you tapped it too hard, your drum might break? ____ Yes ____ No

What if you listen to a very loud sound or music, will your eardrum break too?
Why do you say so?

If you answered yes, you are correct! What happens inside your ear is almost the same as what happens to the drum when it is tapped. You hear sounds through vibrations. You can hear the music or the voice coming from the radio because it is vibrating — it causes vibrations in the air. If the sounds you hear are too loud, your eardrums also vibrate strongly. If this happens, the eardrums might get damaged.



Let's Think About This

How do you take care of your ears?

Do you think it is important to keep them clean all the time? Why?

Have you finished answering the questions? If you take care of your ears by always keeping them clean, that's very good! If your auricles are dirty, dirt and bacteria could enter into the inner portion of your ear. Those might cause ear infections that can lead to diminished hearing or a total loss of hearing. You will learn more about ear disorders in Lesson 3.

You can keep your ear clean by using cotton buds. Put some oil on the tip of the cotton bud and gently clean your auricles. You can also insert it a little bit into your external auditory canals to clean them. Be careful not to insert the cotton bud too deep. You might damage your eardrum. Do not use sharp objects when cleaning your ears. You might damage the skin and the lines of the external auditory canal.



Let's Study and Analyze

You learned that your auricle collects sounds that pass through your external auditory canal. As they travel in the ear canal, they strike the eardrum and make it vibrate. These vibrations make the other parts of the ear, called the **middle ear**, vibrate too.

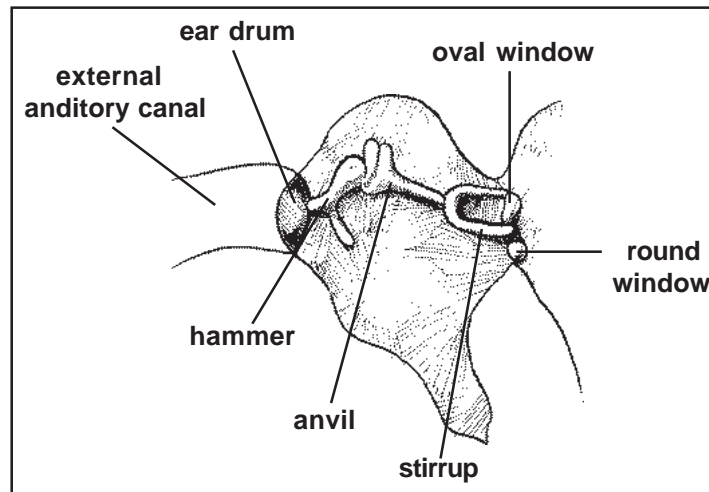
A very small cavity or pocket in the skull bone, located inside the eardrum, forms the middle ear. Inside this small pocket is a chain of three small bones, called the **auditory ossicles**. This chain of small bones stretches from the eardrum to the **oval window**. The oval window is the entrance to the inner ear, which you will learn about later.

Do you know that the three small bones found in your middle ear are the smallest bones of your body?

The three bones occur in the following order:

- ◆ **hammer** (malleus) – This bone is the largest auditory ossicle. It connects the eardrum to the anvil. It is attached to the **tympanum**.

- ♦ **anvil** (incus) – This bone is located between the hammer and the stirrup.
- ♦ **stirrup** (stapes) – This bone is attached to a thin sheath of tissue or a membrane called the **oval window**.



Middle Ear



Let's Think About This

What do you think happens when the eardrum vibrates?

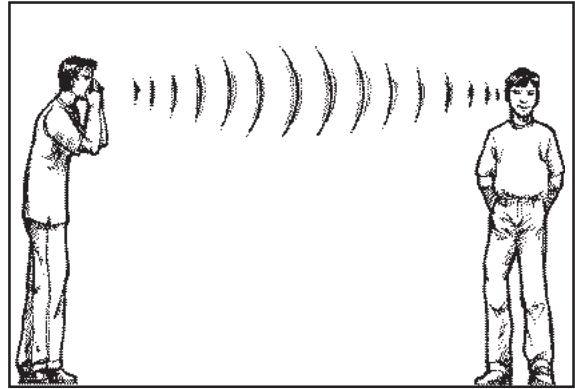
If you answered that the chain of bones in the middle ear vibrates too, you are correct!

When the sound vibrations that pass through the external auditory canal hit the eardrum, the eardrum vibrates. The vibrations that are produced in the eardrum also cause the **tympanic membrane** of the **tympanum** to vibrate. Since the hammer lies between the tympanum and the anvil, the rest of the auditory ossicles vibrate too.

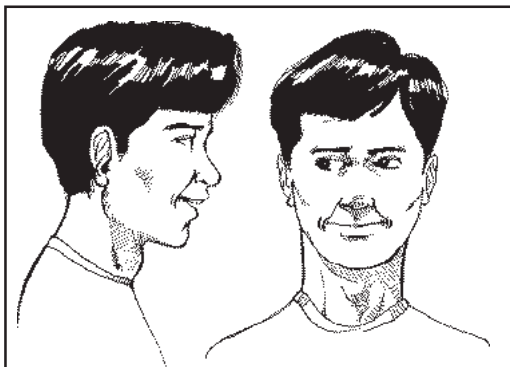
What do you think will happen to the vibrations when they pass through the small pocket in the middle ear where the auditory ossicles lie? Will they increase or decrease? Explain your answer.

Ask one of your friends to go outside with you. Ask him or her to stand 10 meters or more away from you, like in the picture on the right. Tell him or her how beautiful the day is. Did he or she hear you? ____ Yes ____ No

Why? _____



Maybe he/she heard you, but did he/she hear you clearly? Maybe not, right? He/She may even have asked you to repeat what you just said.



Try telling him/her the same words inside a small room. Did he/she hear you clearly?

____ Yes ____ No

Why? _____

The correct answer is *yes*. The same principle applies to the way your ear works. Since the vibrations pass from a relatively large part of the eardrum through the chain of bones, which have a smaller area, their force is concentrated. This concentration amplifies, or increases the vibrations.

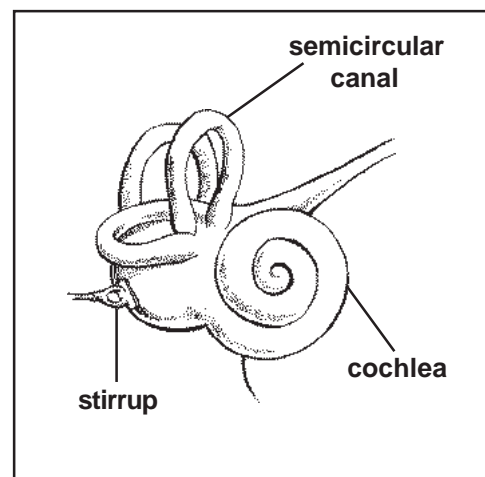
When the vibrations reach the stirrup, it (stirrup) pushes in and out of the oval window. This begins the function of the **inner ear**.



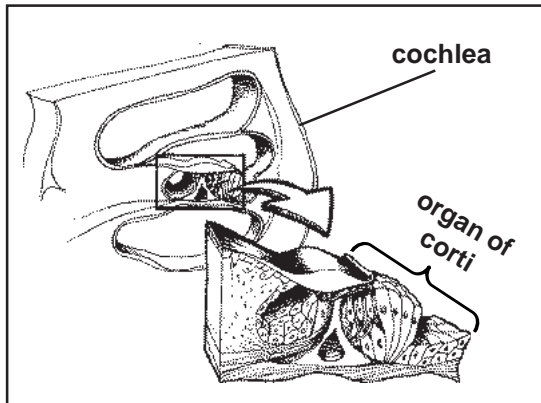
Let's Study and Analyze

The **inner ear** consists of a **cochlea** and **three semicircular canals**. These structures are filled with fluid.

The **cochlea** is the coiled structure or the shell-like structure inside your ear. It is a small bone filled with liquid. Its function is to convert sound waves to impulses that are transmitted by the **auditory nerve** to the brain.



Inner Ear



Inner Portion of the Cochlea

You have learned that when the sound vibrations reach the stirrup, the stirrup pushes in and out of the oval window. Thus, as the middle ear begins to vibrate, the cochlea begins to vibrate too. When it vibrates it makes the liquid inside it vibrate too. The vibrations of the liquid tickle the tiny hairs lining the cochlea, causing them to vibrate and send a message to the auditory nerve. The nerve also acts like an electrical wire that sends the messages to your brain. The tiny hairs are part of the **organ of corti**.

Remember, we hear through vibrations. When the brain receives the sound message, again, it figures out what the sound is, what is making the sound and what you should do about it.

Do you have any idea what makes you keep your balance?

Deep in your ear are three tubes connected to a chamber. These tubes are called the **semicircular canals**. These canals have no function in hearing but are involved in maintaining balance. They lie in three different planes and are arranged at right angles to one another. They help control balance because they are sensitive to changes in movement and direction.

Why do you get dizzy when you ride a vehicle or a boat?

As the vehicle or boat moves, its motion tends to upset your balancing system, thus, making you feel dizzy. Changes in the tilt of the angle of the body are sensed by the chamber. Irregular motions can disturb the normal functions of the semicircular canals and might result in motion sickness.



Let's See What You Have Learned

A. Give comparisons between the following pairs of objects.

1. The pupil and the opening of a camera

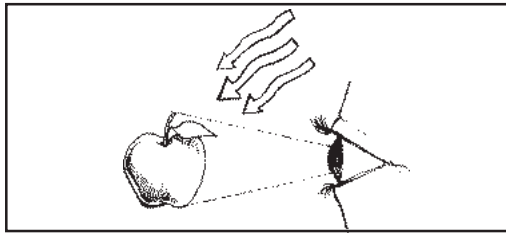
2. The auricle and a seashell

B. *Matching Type.* Match the illustrations in Column A with the descriptions in Column B. Write the matching letter in Column B on the line before the number in Column A.

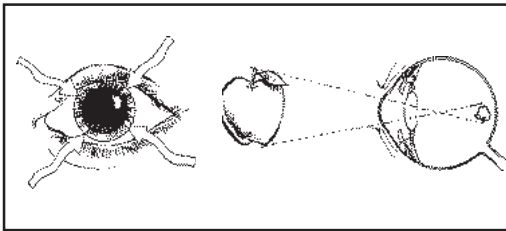
Column A

Eyes

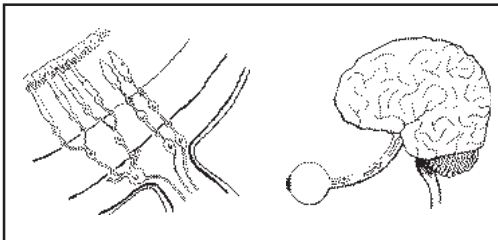
___ 1.



___ 2.



___ 3.



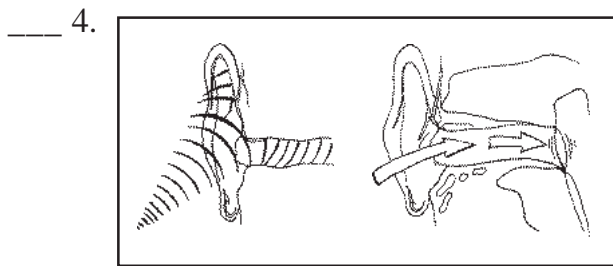
Column B

- a. The pupil widens to let the light enter the inner part of the eye. The lens focuses the image to make it clearer. An inverted image appears on the retina.

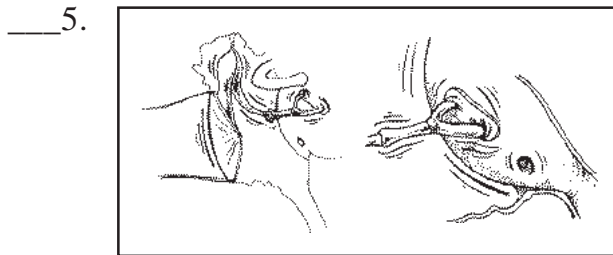
- b. Light-sensitive cells absorb light rays and change them to electrical signals. These electrical signals then travel along the optic nerve to the brain.

- c. The eyes receive light rays that are reflected from an object.

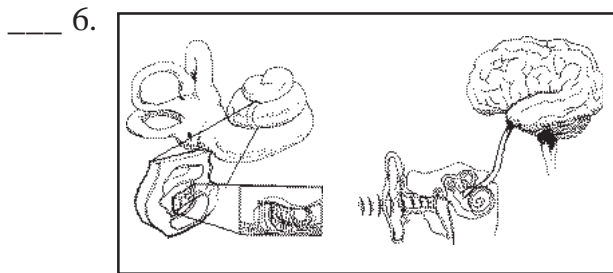
Ears



- a. The fluid within the cochlea begins to move. The hair or nerve endings of the organ of Corti are tickled by the movement of the cochlea. The nerve impulses are transmitted to the brain.



- b. Sounds are collected by the auricle and travel along the external auditory canal. They then hit the eardrum, causing it to vibrate.



- c. The eardrum vibrates, causing the auditory ossicles to vibrate too. The stirrup pushes the vibration to the oval window.

Compare your answers with those in the *Answer Key* on page 52.



Let's Remember

- ◆ The eye is the organ of vision and light perception. The sense of sight helps us recognize each other and learn about the things that we see around us.
- ◆ The ear is the organ for hearing and balance. The sense of hearing helps us recognize sounds.
- ◆ The eye is composed of many parts. It has three layers of cells: the sclera, choroid and retina.
- ◆ The eye functions through a series of steps.
 - First, light rays that are reflected from objects enter the eye through an opening called the pupil.
 - Then, the lens focuses the inverted image at the back portion of the eye that is called the retina.

- Inside the retina are light-sensitive cells — the rods, which identify black and white colors; and the cones, which are sensitive to bright light and can identify other colors.
 - These cells transform light rays into electrical signals.
 - These electrical signals then pass along the optic nerve to the brain.
 - When the cells reach the brain, the brain interprets these electric signals, thus enabling us to identify the objects we see around us.
- ◆ The ear is composed of many parts, too. It has three regions: the outer, middle and inner ear.
- The outer ear is composed of the auricle and the external auditory canal that extends up to the eardrum.
 - The middle ear is composed of a small bone pocket that contains the three smallest bones of the body — the hammer, anvil and stirrup.
 - The auricle collects sounds from the air. The sound travels along the external auditory organ and strikes the eardrum.
 - When the eardrum vibrates, so will the three small bones in the middle ear. The vibrations then pass through the oval window to the cochlea.
 - Inside the cochlea are short hairs of the organ of corti. The vibrations stimulate these hairs. The cells in the hairs then transform the vibrations into nerve impulses.
 - These nerve impulses are transmitted to the brain. The brain interprets these impulses, thus enabling us to recognize sounds.

The Organs of Smell, Taste and Touch

You have learned about the organs of sight and hearing in Lesson 1. In this lesson, you will learn about your other sense organs — those of smell, touch and hearing. You will also learn their different parts and functions.

After you finish studying this lesson, you should be able to:

- ◆ identify the different parts of your nose, tongue and skin; and
- ◆ explain how they function.



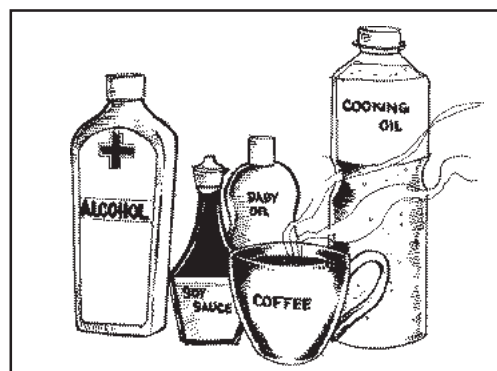
Let's Try This

Do the following activity with a partner.

Get any of the following groups of liquids:

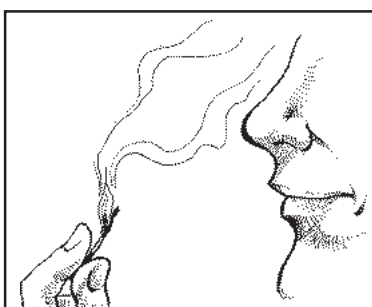
- ◆ clear liquids (water and alcohol)
- ◆ colored liquids (soy sauce and coffee)
- ◆ two kinds of oil (baby oil and cooking oil)

Ask your partner to pour the liquids in a clear container or glass.



How can you identify the liquids? What part of your body should you use to identify them?

If you answered that you can identify the liquids by smelling them with your nose, you are correct!



Let's try another one. Get a matchstick (*posporo*). Light it, then describe what happens.

Did you smell anything? How did the matchstick smell?

The matchstick burns, right? And as it burns, you can smell smoke. As the smoke enters your nose you can smell the matchstick burning. The matchstick produces a burnt odor. Were your answers similar with mine? If so, very good!



Let's Study and Analyze

Can you name some things or objects with pleasant odors? If so, list them below.

Now, list things and objects that you do not want to smell because they stink or smell bad.

The sense of smell is very important to a person. Our nose helps us know more about the world we live in than we do when we just touch things and people or just see them. It helps us recognize odors.

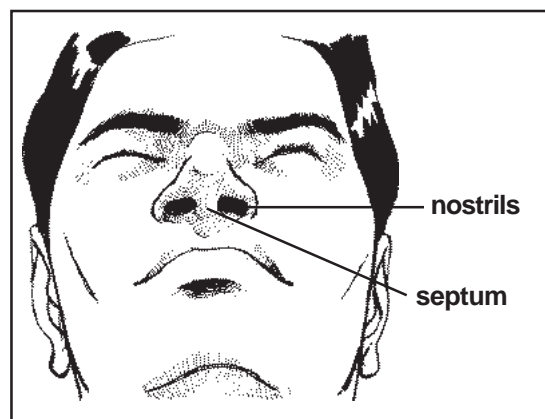
Do you have any idea how the nose works? If so, write your idea below.

Our nose, like our eyes and ears, has parts that enable us to smell many things.

The sense of smell starts with your nose, but it includes other parts of your head and your brain.

The nose is both a sense organ for smell and a respiratory organ (organ for breathing) of the body. It is located between the eyes.

The outer portion of the nose is composed of bone and cartilage, a tough flexible tissue attached to the bones. The inner portion is hollow. It is called the **nasal cavity**. A wall divides the nasal cavity. Thus, you see two holes in your nose. The two holes are called **nostrils** and the wall that divides the nasal cavity is called the **septum**.

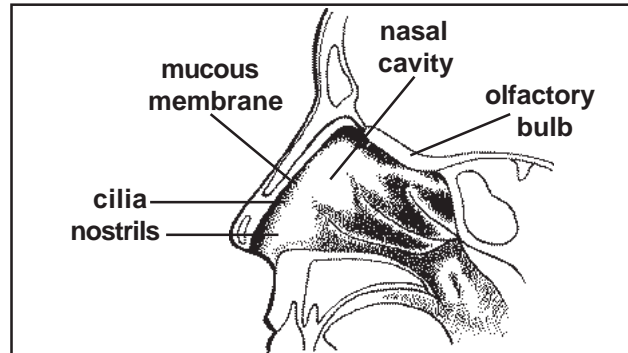


Outer Portion of the Nose

The nostrils are the openings of the nose. These are the parts of your nose where the air you breathe passes.

Have you ever wondered why there are short and tiny hairs inside your nose? What do you think these hairs are for?

The inner portion of the nose is always wet because of mucus, the sticky liquid inside your nose. Inside the nose is a wet and thin lining of tissue called the **mucous membrane**. The mucous membrane is where the fine hairs called **cilia** are found. These fine hairs filter dust and other impurities that enter your nose when you inhale. Thus, they help ensure that the air you breathe in is clean or free from impurities when it enters your lungs. The air is also moistened as it passes over the sticky nasal membrane.



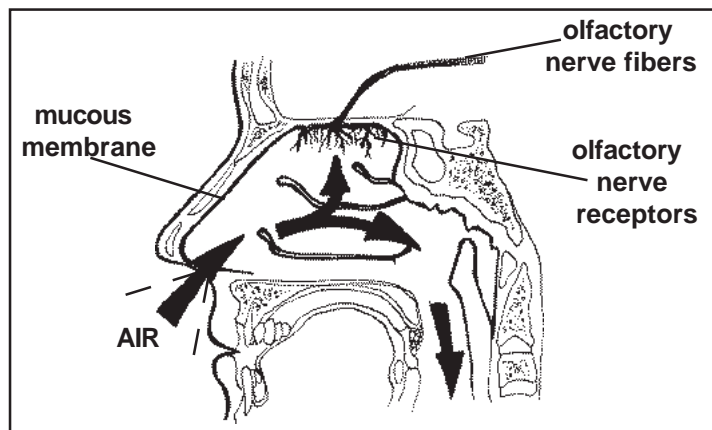
Inner Portion of the Nose

How can the nose detect odors?

You know that your nose is the organ responsible for your sense of smell. The part of the nose that is responsible for smelling actually lies in the mucous membrane on the upper portion of the nasal cavity near the septum.

It is made up of **olfactory cells** (*olfaction* is the other word for *smell*). These cells are actually nerve cells that function as receptors for the sense of smell.

These cell receptors are called the **olfactory nerve receptors**. The olfactory nerve receptors generate nerve impulses in response to chemicals in the air. These impulses are brought to the brain by the **olfactory nerve fibers**.



Air Passage Inside the Nose

The olfactory nerve fibers are the free ends of the olfactory nerve receptors. These fibers are buried in the mucus that coats the inner surface of the nasal cavity. They are stimulated by various odors carried by the air you breathe.

Nerve fibers extend from the olfactory cells to an area of the brain called the **olfactory bulb**. From there, the impulses are brought to the other parts of the brain where they are made into sensations of smell.



Let's Think About This

Let's go back to the burning matchstick. Explain how you were able to smell it using what you have just learned about your sense of smell.

Compare your answer with the one given below.

Using the burning matchstick as an example, you can understand more how your sense of smell works.

When the matchstick started to burn, tiny particles of ash that came from the match floated in the air. These small pieces of material are too small for you to see, but the nose is sensitive to them and can smell them as they travel in the air into your nose.

When the small pieces of ash “tickle” the nerve endings of the olfactory nerve, the olfactory nerve carries the message to your brain, telling it that you are smelling a burning matchstick.



Let's Review

When you have colds and your nose is all stuffed up, why can't you smell something like perfume?

Compare your answer with that in the *Answer Key* on page 52.



Let's Study and Analyze

The **tongue** is the main part of the body you use for tasting food. It carries messages to the brain about the taste of what you are eating.

Inside your mouth are small bundles called **taste buds**. These are groups of sensory cells with many nerve endings, just like the nerve fibers in your nose. They detect the taste of the food you are eating or the fluid you are drinking.

Taste buds are stimulated by chemicals that dissolve in the saliva. The four kinds of tastes are salty, sour, sweet and bitter.



Let's Try This

Get a pinch of salt, some sugar, some powdered coffee, and calamansi.

Do you know how each one tastes? If so, write their tastes below.

- a. salt = _____
- b. sugar = _____
- c. coffee = _____
- d. calamansi = _____

Dry your tongue with a clean towel. Put a small amount of salt in your tongue.

Were you able to taste anything? ____ Yes ____ No

Try doing it again, this time with sugar, then coffee, then calamansi.

Were you able to taste anything? ____ Yes ____ No

Not very much, right? What could be the reason for this?

There is another important thing to remember about the sense of taste. It is the saliva or the sticky fluid in your mouth that helps you taste your food. The saliva mixes with the food and spreads the flavor all over the tongue. The different taste buds then begin their jobs and you can tell if the food or liquid is sweet, sour, salty or bitter. If your tongue is dry or if there is no saliva in your mouth, this process will not take place. As a result, you wouldn't be able to taste anything you eat or drink.



Let's Learn

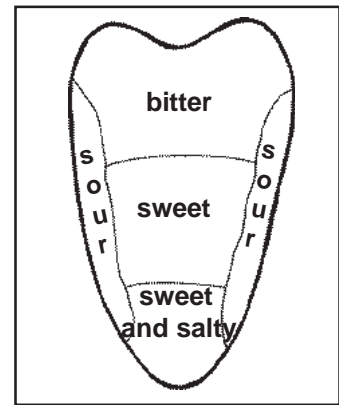
Did you know that specific tastes are perceived or "tasted" only by certain areas of the tongue?

You learned that on the surface of the tongue are small bundles of nerve endings or taste buds, right? The taste buds are grouped into four regions on your tongue. Each region perceives a certain taste, be it sweet, sour, salty or bitter. The regions are as follows:

- ◆ Sweet tastes are perceived on the middle and tip of the tongue.
- ◆ Salty tastes are perceived at the tip and edges of the tongue.

- ◆ Sour tastes are perceived on the sides of the tongue.
- ◆ Bitter tastes are perceived at the back of the tongue.

Will you be able to taste a green mango if it only makes contact with the middle part of your tongue? Explain your answer. _____



If you answered *no*, you are correct! You won't be able to taste the sourness of the green mango if it only makes contact with the middle portion of your tongue. It should make contact with the sides of your tongue for you to be able to taste it.



Let's Think About This

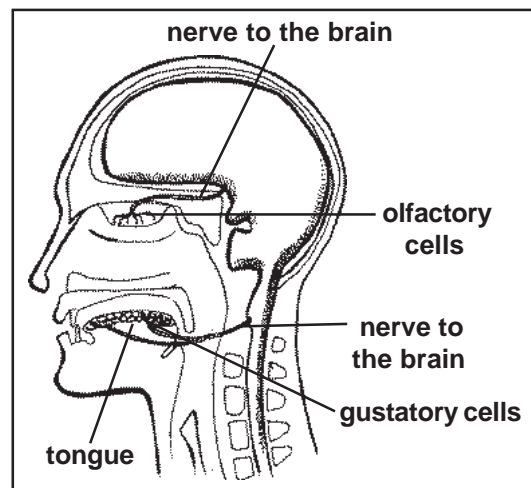
Is the smell of your food important to you? If you have colds, can you taste your food well? ____ Yes ____ No

Why do you say so?

If your answer is *no*, you are correct!

Look at the illustration on the right. The senses of taste and smell often function together. If your nose is blocked you will have a difficulty distinguishing certain flavors that you actually smell rather than taste.

Your senses of smell and taste are also known as **chemosensory organs**. The olfactory cells that detect odors and the **gustatory cells** (cells found in the nerve fibers of your taste buds) that perceive tastes are both sensitive to chemicals that you smell and taste.



Your surroundings, including the foods you eat or the liquids you drink, all release a certain amount of chemical particles in the air. The tiny particles enter your nose and stimulate the sensory cells, specifically the olfactory cells of the nose. These cells transmit the messages to your brain where specific smells are identified. The same thing applies to our sense of taste. The taste buds on the surface of your tongue are sensitive to chemicals in your food. The gustatory cells detect the taste of food.



Let's Review

Are you often tempted to eat something that smells good, spaghetti, for example? Why?

When you smell food, you can easily recognize how it tastes especially if you have tasted it before. When you smell the spaghetti, we already know that it tastes a little bit sweet, sour and salty.



Let's Try This

Do you think your sense of touch is important? Why?

If you answered that it is important, very good! Your sense of touch is very important because it enables you to do a lot of things.

What could possibly happen to you if you can't feel anything? Will you still be able to do—with ease—the things that you usually do, like drinking water, eating and doing household chores? How will you be able to hold the glass, spoon or the fork if you cannot feel that you're holding it?

Do you know what your sense of touch is and how it works? Do the following activities and answer the questions.

1. Place your palm on the table and stand on the floor barefooted. Be sure to stand firmly on the ground. Can you feel anything? Describe how you feel.

2. Put your bare foot into a washbasin (*palanggana*) with lukewarm water. What do you feel? Can you feel something wet and something rough at the same time? Explain why.

3. Ask a friend or co-learner to collect stones and objects of different sizes and shapes. Tell him/her to put them inside a bag or box. After your partner finishes his/her task, try to identify each object inside the box or bag without looking at it. Were you able to identify them all? How were you able to identify the objects if you can't see them?

Compare your answers with those in the *Answer Key* on page 52.



Let's Study and Analyze

Can you identify an object just by touching it? How about the blind, how can they read if they cannot see what they are reading?

The sense that notifies contact with an object is the sense of touch, also called the **tactile sense**. Through this sense, you know the shape, hardness or temperature of objects. You can also feel pleasure, pain and pressure through the sense of touch.

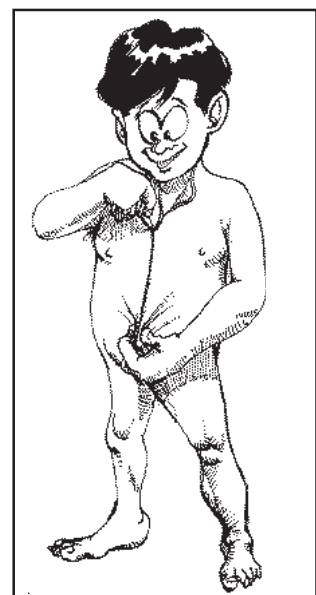
The sense of touch is very important because you use it in several ways. Its main organ is your skin. Your nails and hair are also organs of touch.

Can you list down below all the uses of your skin that you can think of?

Do you know that the skin is the largest organ of your body? In an adult, the skin could measure up to 20 square feet. It is the giant, stretchable, washable, and waterproof covering of your body that keeps your internal organs in!

Your skin covers all of your body. It protects you from heat and cold and disease-causing bacteria. It also gives you information about what is around and outside your body. When you touch something your skin tells you if that thing is wet or dry, hot or cold, rough or smooth, hard or soft.

The skin can give you a lot of messages about your surroundings all at the same time. Remember what you did earlier? When you touched the top of the table and stood barefoot on the ground, you felt the roughness or smoothness of the table and floor, didn't you? You were also able to tell if the table and floor were warm or cold, right?





Let's Think About This

Will you touch a hot object or not? Why?

How will you know that it's hot?

Most probably, you will not touch an object when you know that it is hot. Or if you do not know that the object is hot, you will remove your finger or any part of the body immediately from the hot object, as soon as you touch it.

The sense of touch provides a warning when there is a threat to the body. Pain is a signal that we need to act immediately so that we could avoid damaging our body. Without your sense of touch you might burn yourself without knowing it and accidents might happen to you.

Can you list some accidents that might happen if you lost your sense of touch? Write them down below.

Here are some of the accidents that might happen if you lost your sense of touch:

- ◆ The things you hold always has a tendency to drop because you tend to forget that they are in your hands;
- ◆ You can't feel pain, even if you wound yourself; and/or
- ◆ You get the different parts of your body burned



Let's Learn

You feel different sensations when you come in contact with objects because of your touch organs. There are many kinds of touch organs in the skin and mucous membranes. These touch organs are found near the hairs, in hairless areas and in deeper tissues.

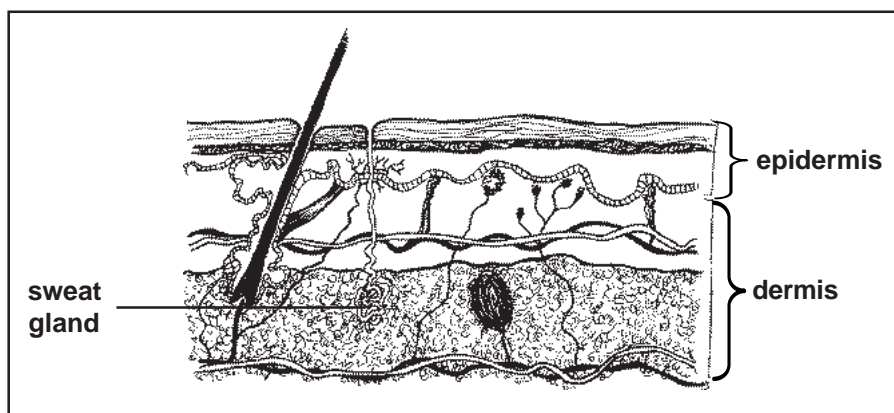
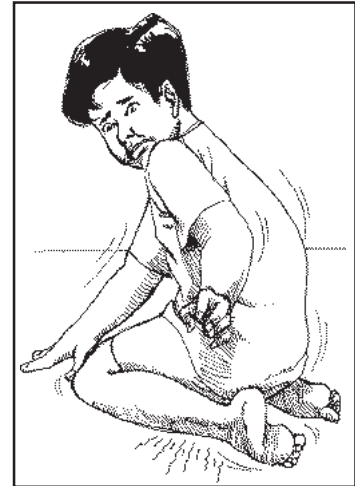
You have learned that your senses of smell and taste are made possible because of nerve endings that act as **receptors**. These nerve endings send messages to your brain. It is the same with your skin. Below the skin are intricate networks of nerves that also send messages to the brain.

Have you ever experienced numbness when you sit on your feet for a long time?

Sensations are measured below the skin by the nerve fibers or nerve endings that act as receptors. They tell your brain how to respond.

When you sit on your feet for a long time, the weight of your upper body squashes your nerves and blood vessels. When you feel the tingling sensation it just means that your nerves want you to know that they are numb.

Below your skin are layers of tissue, called the **epidermis** and **dermis**.



The **epidermis** is the outermost layer of the skin. It is the visible part of your skin. The next layer of skin is the **dermis**. This is made up of blood vessels and nerve endings.

If you look closely at the illustration of the skin you will see that there are different kinds of nerve endings or receptors. These nerve endings respond differently. Some receptors respond to pressure, some to temperature and others to pain.



Let's See What You Have Learned

Fill in the blanks with the correct answers. Then, find the answers in the puzzle that follows. The words may be found horizontally, vertically or diagonally.

1. The _____ is the outermost layer of the skin.
2. _____ is another term for *smell*.
3. _____ is the sticky fluid in the mouth that dissolves the food we eat. It spreads the flavor of the food we eat to our taste buds.
4. The _____ is the inner portion of the nose. It is hollow.
5. _____ are nerve endings or fibers that send messages to the brain.
6. The _____ is the organ for taste.
7. The _____ is the wall that divides the hollow portion of the nose.
8. _____ is another term for the sense of touch.
9. Your senses of smell and taste are also known as _____ organs because they are sensitive to the chemicals that we both inhale and taste.
10. _____ is the taste perceived in the middle and at the tip of the tongue.
11. _____ are the fine hairs found inside the nose.
12. The _____ is the main organ for the sense of touch.
13. _____ are groups of sensory cells with many nerve fibers that detect the taste of the food we eat.
14. The _____ is the inner layer of the skin. Nerve fibers and blood vessels are all around this layer.
15. _____ is the taste perceived at the back of the tongue.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | A | S | A | L | C | A | V | I | T | Y | R | S | T | R |
| T | S | D | F | D | T | S | D | C | X | Z | X | A | E | U |
| A | D | J | K | E | I | O | K | E | R | G | H | C | V | B |
| C | F | H | E | E | C | V | B | I | I | J | E | H | D | N |
| T | G | W | L | J | K | P | O | I | N | P | P | J | E | O |
| I | S | D | U | B | E | T | S | A | T | T | I | U | R | I |
| L | M | N | J | K | L | O | P | O | R | F | D | I | S | T |
| E | Y | T | E | A | S | D | R | R | I | G | E | P | Z | C |
| W | M | U | T | P | E | S | D | F | B | H | R | O | D | A |
| S | H | J | O | T | R | F | A | D | E | R | M | I | S | F |
| A | I | U | N | Y | F | I | P | L | N | M | I | L | A | L |
| I | O | P | G | Y | U | I | O | G | I | L | S | K | S | O |
| L | K | L | U | P | L | K | J | H | B | V | K | J | D | I |
| I | M | R | E | T | T | I | B | N | N | N | A | M | F | H |
| C | H | E | M | O | S | E | N | S | O | R | Y | S | G | B |

Compare your answers with those in the *Answer Key* on page 53.



Let's Remember

- ◆ Your nose, tongue and skin have many parts that enable you to smell, taste and feel.
- ◆ When odors enter your nose, nerve sensors (nerve endings in the mucous membrane) inside the nose are stimulated. These sensors send messages to the brain.
- ◆ On the surface of the tongue are thousands of taste buds that detect the tastes of the foods you eat. On each taste bud are nerve endings that send messages to your brain.
- ◆ Your tongue is divided into four regions. Each region detects one of the four tastes: sweet, sour, salty and bitter.
- ◆ Your skin is the outer covering of your body.
- ◆ It has layers, namely, the epidermis (outer layer) and the dermis (inner layer).
- ◆ In the dermis are nerve endings that detect pressure, temperature, pleasure and pain.

Sensory Diseases and Their Prevention

In the previous lessons, you learned about the importance of your sense organs to your daily life. Your sense organs help you do so many things. You learn about the outside world through them. The loss of any one of your senses will immensely affect the way you live, move and interact with people. If any disease affects your senses, it will be very hard for you to go about your usual activities.

In this lesson, you will learn about the different diseases that may affect your sense organs. If the parts and functions of the sense organs discussed in the previous lessons are not clear to you, I suggest you review them first before studying this lesson. It is important that you are familiar with how your sense organs work before you start this lesson.

After completing this lesson, you should be able to:

- ◆ cite some of the common diseases related to the sense organs;
- ◆ enumerate the signs and symptoms associated with each disease; and
- ◆ tell how these diseases can be prevented and cured.

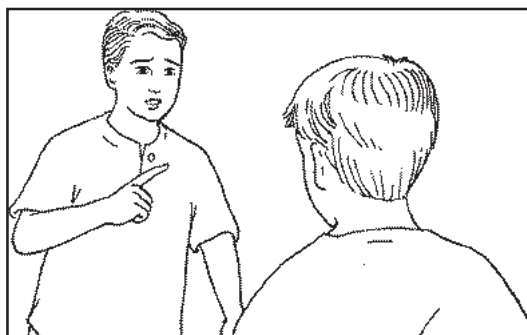


Let's Read

Your eyes play a very important role in your life. They enable you to see your surroundings.

Read the following dialogue.

On his way home from the farm, Jerry met his friend Tony.



Jerry : What happened to your eyes, Tony?

Tony : I contracted *conjunctivitis* or sore eyes.

Jerry : Isn't that contagious?

Tony : Yes, it is.

Jerry : How did you get sore eyes?

Tony : The doctor said that you can get sore eyes anywhere. I think I got this from the market where there are a lot of people. Someone who has sore eyes may have rubbed his/her eyes and touched something that I also touched. I rubbed my eyes without washing my hands, and there, I got the disease.



Let's Try This

Answer the following questions based on what you have learned from the dialogue.

1. What is conjunctivitis? _____
2. How did Tony get it? _____

3. How can conjunctivitis be prevented? _____

Compare your answers with those in the *Answer Key* on page 53.



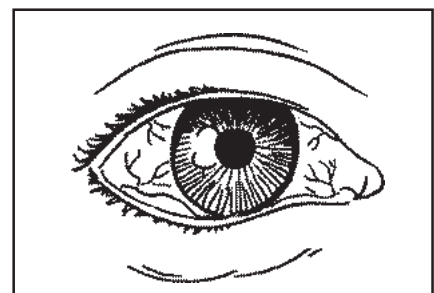
Let's Study and Analyze

Have you ever had an eye disorder?

Nowadays, if you are not careful, you may get an eye disease. Did you know that some eye diseases that are not treated immediately and properly may lead to blindness.

Listed below are some common eye diseases that need immediate treatment:

1. **Conjunctivitis** (*sore eyes*). This is also known as “pinkeye” because of the inflamed or swollen tissues or mucous membrane that lines the back of the eyelid. It is the most common infectious disease that affects the eyes, especially the eyes of children.



Have you ever had conjunctivitis? ____ Yes ____ No

If yes, can you still remember its symptoms? List them below.

The symptoms of conjunctivitis are as follows:

- ◆ The first symptom is discomfort or itching and excessive watering of the eye.
- ◆ This is followed by redness and inflammation (swelling) of the conjunctiva and the inner surface of the eyelids. There may be some pain accompanying the inflammation, but the person who has conjunctivitis might probably complain more about the discomfort in the eye. A person with conjunctivitis has the tendency to rub the eyes mainly because of the discomfort and itchiness experienced there.
- ◆ After a day or two, a yellowish-white (sometimes light green) discharge may appear around the eyes (*pagmumuta*).

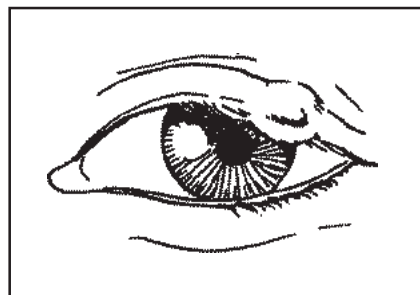
How did you treat your sore eyes?

What could possibly happen to your eyes if you rub them?

When a person has a sore eye or conjunctivitis, he/she should not rub the infected eye because the disease may transfer to the other eye. He/She should also wash his/her hands often and use separate towels so as not to spread the disease to other people. Although most types of conjunctivitis are contagious, it usually causes no danger to the eye or to the vision. However, conjunctivitis caused by bacteria is infectious. The discharge (*muta*) will somehow be thicker. If this happens, consult your doctor immediately because bacterial conjunctivitis can also cause ear infections.

2. **Sty** (*kuliti*). This is another common disease of the eye. It is a small abscess of the tissue in the eyelids near the root of an eyelash. A person may get more than one sty at a time. Have you ever heard the old belief about sties?

Have you ever had a sty? ____ Yes ____ No



If yes, did your friends laugh at you? If yes, why? _____

It is an old belief that a person gets a sty as a punishment for peeping at a naked person (*pamboboso*).

However, to be scientific, a sty is a bacterial infection caused by the *staphylococcus* bacteria.

Its symptoms include swelling, redness and pain. When the inflammation bursts, the pain is relieved, and there is immediate improvement.

To treat the sty, bathe it repeatedly with a clean cloth soaked in hot water. If it does not burst by itself, visit your nearest health center for assistance.

3. Sometimes, a foreign body gets lodged in the eye (*puwing*). If the foreign body is soft, instruct the person to close his/her eyes. Lead him/her to a bright place and tell the person to open his/her eye gently.

Look for the object that lodged in the eye. When it is located, get it out of the eye by lifting the particle with the moist corner of a handkerchief.

If the foreign body is stuck in the white of the eye, seek professional help at once. Do not try to remove the object by yourself.

Aside from what were mentioned, there are more disorders that may affect the eye. Some are listed below:

- ♦ **Farsightedness** (*hypermetropia*) — distant things are seen clearly while objects at close range are blurred. Corrective glasses or contact lenses are prescribed to correct the disorder.
- ♦ **Nearsightedness** (*myopia*) — distant objects are blurred while objects at close range are seen clearly. Eyeglasses or contact lenses can also correct this eye disorder.
- ♦ **Night blindness** (*ocrophthalmium*) — This disorder may occur if there is a dietary deficiency of vitamin A. Vision is not clear in dim light or at night. Night blindness also occurs in patients with eye disorders called *choroidoretinitis* and *glaucoma*.



Let's Review

Answer the questions below.

1. One of your brothers/sisters has conjunctivitis. What must he/she and all of you in the family do to prevent the spread of the disease?

2. Lina has a sty. Should she prick her sty with a needle to drain all the pus (*nana*) inside it? Explain your answer.

Compare your answers with those in the *Answer Key* on pages 53–54.

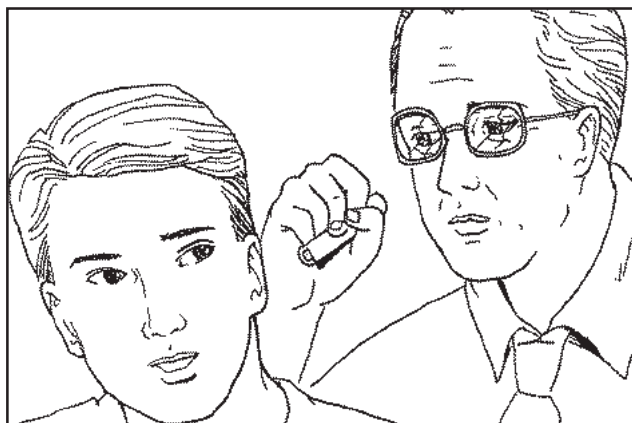


Let's Read

You learned about the importance of your ears in Lesson 1. They enable you to hear the sounds all around you. Imagine if you don't have ears. Do you think you will be able to do the things you used to do?

Your ears, if not taken care of properly, can easily be damaged. They are very important and sensitive sense organ. To learn more about ear disorders, read the following dialogue.

At the health center . . .



Jun: Good morning, Doctor.

Doctor: Good morning, Jun. What can I do for you?

Jun: Doc, last week I had a very bad cold. This morning, I woke up with a very painful left ear.

Doctor: Let's take a look at it.

Doctor: You have *otitis media* in your left ear. It's good that you have come at once to consult me.

Jun: Doc, what's otitis media?

Doctor: Otitis media is an inflammation of your middle ear. If not treated immediately, it can lead to deafness.

Jun: So how can it be treated?

Doctor: I'll give you a strong antibiotic and an antihistamine to relieve the blockage.

Jun: Thank you very much, Doc. I've got to go now.

Doctor: Anytime, Jun.



Let's Think About This

From what you have just read, what is *otitis media*?

How did Jun acquire otitis media? What are its symptoms?

How can it be treated?

Have you finished answering the questions? If so, you can compare your answers with the following discussion.

Otitis is an inflammation of the ear. When it occurs in the outer ear, or the auricle, it is called **otitis externa**. When it occurs in the middle ear the inflammation is known as **otitis media**. The inflammation of the inner ear is called **labyrinthitis**.

1. *Otitis Externa*. This is more commonly known as "swimmer's ear." It is an infection of the ear canal (external auditory canal). The ear canal is naturally acidic. The acid prevents bacteria from living in your ears.

When a person swims frequently, the water enters the ear and washes out the acid in the canal. This allows bacteria to thrive in the ear. It can be caused by a combination of bacterial and fungal infections caused by scratching of the ear, swimming or excessive sweating.

| Symptoms | Treatment |
|---|--|
| Itching, pain in the ear, slight discharge, deafness. An abscess (boil) may form. | 1. Use earplugs when swimming 2. Take prescribed antibiotics 3. Avoid scratching |

2. *Otitis Media* is an infection of the middle ear. It occurs very frequently in children, especially those under five years old.

Middle ear infections occur when the tube that connects the back of the nose to the middle of the ear does not function well. The job of this tube is to allow air to pass from the nose to the middle ear. When it is not working well, a build-up of fluid may occur in the middle ear. If this happens, the fluid that has accumulated in the middle ear will then serve as an environment for bacteria to grow and an infection to occur. The middle ear is supposed to stay dry.

Have you ever experience having a whooping cough that caused your throat to ache? ____ Yes ____ No

If it happened to you, was your ear painful afterwards? If so, what could be the reason for this? _____

If that happened to you, you might have had otitis media. This means that your eustachian tube had become swollen. The swelling of the tube had blocked the air from entering your middle ear. Then, fluid had built up in the middle ear, instead of draining out into the throat.

| Symptoms | Treatment/ |
|--|---|
| Severe earache, decreased hearing, fever, pus | 1. Use prescribed antibiotic painkillers. |
| Young children may have diarrhea, stomach pain and vomiting. | 2. Keep ear clean and dry, has ruptured. |

3. *Labyrinthitis* is an inflammation of the semicircular canals in the inner ear. Can you still remember what you have learned in Lesson 1? The semicircular canals are fluid-filled chambers that help you keep your balance, right? If you damage them, it would be really difficult to maintain your posture.

Labyrinthitis is a bacterial infection that might result from otitis media, from meningitis or occur after an ear operation.

| Symptoms | Treatment/ |
|--|--|
| <ul style="list-style-type: none">- extreme dizziness that begins gradually and peaks in 48 hours- involuntary eye movement- vomiting- loss of balance- hearing loss- ringing inside the ears | <ul style="list-style-type: none">1. If you experience the symptoms, seek medical treatment immediately.2. Don't take any medication without the approval by an ear specialist. |



Let's Review

Identify what ear disorder is being described in the following sentences.

- _____ 1. A person hears a ringing inside his/her ear, which is accompanied by dizziness and vomiting.
- _____ 2. This ear disease is acquired when a person suffers from severe colds. Earache and fever can accompany this disease.
- _____ 3. This ear disease makes a person lose his/her balance.
- _____ 4. This ear disorder develops from an infection caused by bacteria when fluids build up inside the ear.
- _____ 5. This ear disease develops when the natural acids of the ear are washed away, thus giving disease-causing bacteria a chance to live in the ears.

Compare your answers with those in the *Answer Key* on page 54.



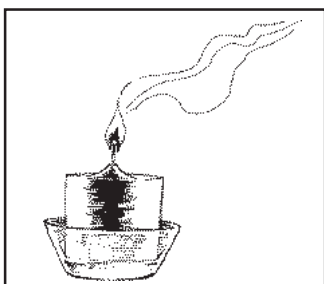
Let's Try This

Can you still remember what you have learned in Lesson 2, that is when you have clogged nose, you can hardly smell anything? Your sense of taste did not function very well either, right?

Imagine yourself permanently incapable of smelling the things around you and tasting the food you eat. Will you still be able to enjoy your life and do the things that you are used to do? Explain your answer.

There are a lot of things that you will not be able to do if you lose your senses of smell and taste. You won't be able to taste what you eat. You won't know whether the food you eat tastes good or bad. Much worse, you might eat spoiled food without knowing it. This is because you will be unable to taste and smell your food.

Smell and taste problems can have a big impact in our lives. These senses contribute significantly to our enjoyment of life, our desire to eat, and the way we deal with people. Smell and taste disorders can be serious. When your senses of smell and taste are impaired, you eat poorly and socialize less.



What's the first thing you do when you smell something burning?

Most probably the first thing you do is find out where the odor came from, right? Your senses of smell and taste can warn you about dangers such as fire, poisonous fumes and spoiled food.

What can possibly cause you to lose your senses of smell and taste?

The loss of smell and taste may be caused by **polyps** (masses of swollen membrane in the nasal cavity), hormonal disturbances (especially for females because of the menstrual cycle), dental problems or diseases of the tongue.

Have you ever entered a newly painted room? If so, what was the first thing you did?

I'm sure, the first thing you did was cover your nose, right? Do you know why you automatically cover your nose when you smell something bad? This is because your nose easily gets irritated by foul odors, especially toxic chemical substances.

What do you think will happen to your sense of smell if you inhaled too much chemicals like solvents (liquids mixed with paint)?

Prolonged exposure to certain chemicals such as insecticides and solvents can result to the loss of your sense of smell.



Let's Learn

Disorders of smell can be classified as either **hyposmia** (a decrease in sensitivity) or **anosmia** (the complete absence of smell).

There are many other causes of smell malfunction besides the ones mentioned in the earlier activity. Some of these are:

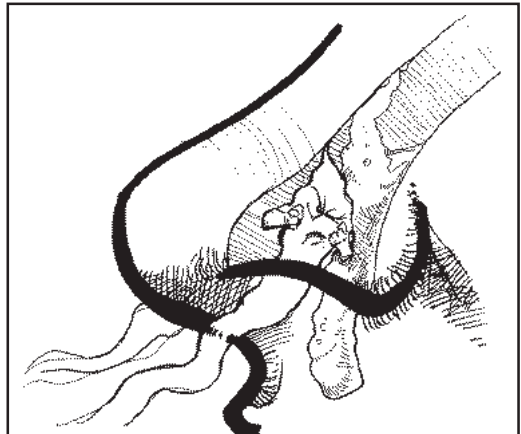


- ◆ Respiratory disorders such as nasal infections and constant allergies and colds. These conditions can block the flow of air.

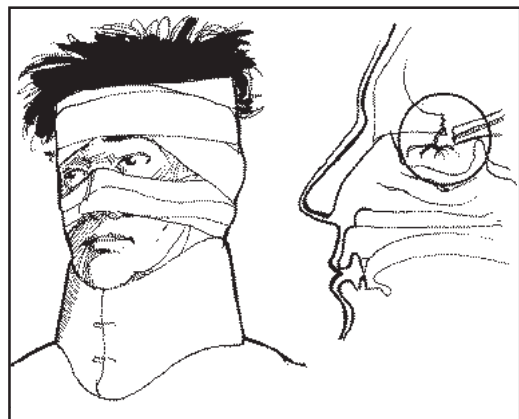
Isn't it that when you have colds you experience difficulty in breathing? Why is this so?

When you have a cold, the mucous membranes inside your nose swell (*namamaga*) and the amount of mucus produced increases. When this happens, your sensitivity to odor decreases. Allergies and *rhinitis* (an infection of the olfactory membrane) may also cause a loss of smell.

You have learned in Lesson 2 that your nose has tubes in it, right? If these tubes are stuffed up due to a common cold, you will experience difficulty in smelling because odors are prevented from reaching the smell receptors or nerve fibers. Because the ability to smell affects taste, food often doesn't taste right when you have colds.



- ◆ Viral infections or toxic destruction (solvents and gases), heavy metals and various kinds of industrial dust can also damage your sense of smell. This kind of disorder is rarely cured.
- ◆ The most common cause of permanent loss of sense of smell is head trauma. In this case, fibers of the olfactory nerves that send messages to the brain are damaged.
- ◆ Smoking can also damage your ability to identify odors and can thus reduce your sense of taste.





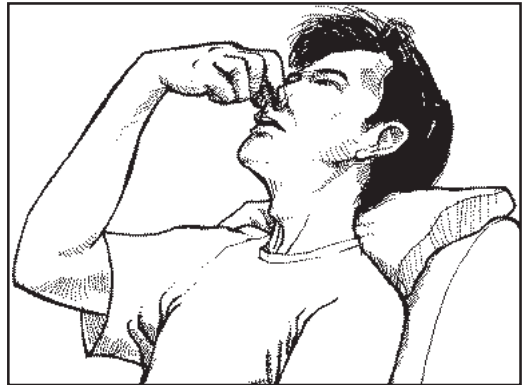
Let's Study and Analyze

Another common nose disorder that can cause a temporary loss of smell is the nosebleed. One or both nostrils may bleed, usually as a result of a local injury or disturbance inside your nose.

Most nosebleeds are not serious and occur when one of the small veins of the septum ruptures. This will usually stop without treatment or when pressure is applied to the nose.

Bleeding may also be caused by an infection (like the common cold), a blood disorder (leukemia or hemophilia), frequent picking of nose with untrimmed fingernails, high blood pressure or an abrupt change in temperature. Persistent nosebleeds should be brought to the attention of a physician.

When the nose bleeds, tell the victim to sit down with the head tilted upward while pinching the nose. Hold it for five minutes until the bleeding stops. If bleeding does not stop within 30 minutes, seek professional help. Place a gauze pad or any clean cloth in each nostril. The victim should breathe through the mouth.



Let's Try This

Answer the following questions. Write your answers in the spaces provided.

1. What are some of the disorders that can affect your sense of smell?

2. How can smell disorders be prevented?

Compare your answer with those in the *Answer Key* on page 54.



Let's Study and Analyze

You have just learned that your sense of smell is connected with your sense of taste. If you have a smell disorder, most likely, you also suffer from a taste disorder. If the sense of smell has disorders like hyposmia and anosmia, the sense of taste can be affected by disorders like **ageusia** (reduce or loss of taste) and **dysgeusia** (distortion of taste).

If a person has *ageusia*, he/she usually cannot taste food that much, or worse, he/she cannot taste food completely. Ageusia is usually caused by conditions that affect the tongue. Examples of these conditions are: a dryness of the mouth, heavy smoking, radiation treatment of the head and side effects of medicines and drugs.

Can you still remember what you learned in Lesson 2 about your tongue? We discussed that it is always wet. What's the reason for this again? What will happen if your tongue becomes dry?

Your tongue is always wet because your saliva helps dissolve the food you eat and spread the flavor to the rest of your tongue. If your tongue becomes dry you wouldn't be able to taste the flavor of the food you eat.

A person who has *dysgeusia*, on the other hand, has difficulty tasting food correctly. For example, candy might taste sour for a person who has this disorder.

Dysgeusia may be caused by the same conditions that cause ageusia.

Do you think smoking can harm your sense of taste? Explain your answer.



If your answer was *yes*, you are correct! Smoking and radiation burn the taste receptors in the tongue. Burns on the tongue may temporarily destroy the taste buds.

What will happen if your taste buds are destroyed?

In Lesson 2, you learned that your taste buds enable you to taste the flavors of the food you eat. They are the taste receptors of your tongue. If your taste buds are destroyed, you will not be able to taste food correctly. For example, if your taste buds for sweet flavors are damaged, then you will not be able to taste the sweetness of food.



Let's Learn

There are different diseases that can affect the tongue and that can affect a person's sense of taste. Listed below are some of these.

- ♦ **singaw** or herpes simplex — This is also called cold sore or fever sore. It results when another infection occurs, like the common cold. Other causes of singaw are stress or exposure to wind, sunlight, certain foods or drugs and for women, the menstrual cycle.

Herpes simplex has no symptoms. It usually appears around the lips and nose as a small blister and becomes an ulcer later on. Alum (*tawas*) or aluminum hydroxide (for stomach ulcers) can treat herpes simplex.

- ♦ **glossitis** or inflammation of the tongue — The symptoms of glossitis include pain, sometimes an ulcerated tongue, sticky and thick saliva and difficulty in swallowing. It can be treated with antiseptic mouthwashes. To reduce the pain the patient may be given an anesthetic solution.



Let's Think About This

Do you think your sense of touch is as important as your other senses? Why or why not?

If the loss of your senses of smell and taste can make things very difficult and inconvenient for you, what more if you lose your sense of touch and become unable to feel anything? Do you think you can still do the things that you used to do? Your sense of touch is very important. Without it, how will you know if your hands get stuck in a door, or if somebody pinched you and pulled your hair? How will you be able to hold something? You might break a glass if you hold it too firmly or you might drop it if you hold it too loosely. How will you know if you're holding it right?

Because your sense of touch is very important to your everyday life, you need to take good care of the organ responsible for your sense of touch, that is, you need to take good care of your skin.

How do you take care of your skin?

Among the many things you can do are:

- ◆ take a bath everyday;
- ◆ change clothes regularly;
- ◆ trim your nails regularly;
- ◆ avoid being exposed to too much heat; and
- ◆ avoid insect bites.

What would happen if you do not take care of your skin?

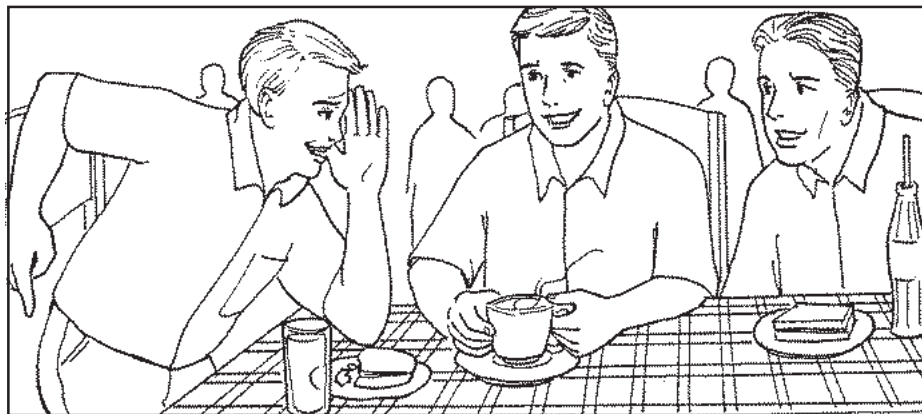
If you do not take good care of your skin, you become susceptible to skin diseases such as allergies. Read the next dialogue to learn more about skin diseases.



Let's Read

Have you ever had a skin disease before? If so, can you list down what type it was and the ill effects it gave you in the spaces below?

Read the following dialogue about skin diseases.



Ben : Hey, Oscar, why don't you sit properly?

Oscar: (whispering) Pare, I have a boil on the left part of my butt.

Bernie, Ben, Paul: Ha-ha-ha!

Ben: What actually caused the boil?

Oscar: The doctor said that boils are caused by bacteria called *staphylococcus*. The bacteria infect the hair roots or the glands where our sweat comes from.

Bernie: Boils are painful. I once had a boil under my arms. It really hurt.

Paul: Where else can boils develop?

Oscar: My doctor said that boils develop in areas where the skin is constantly rubbed, like at the back of the neck, around the groin, on the thighs and behind the knees.

Ben : So, what did the doctor tell you to do?

Oscar: He told me to soak a clean cloth in warm water and apply it repeatedly on the boil.

Paul: What will that do?

Oscar: It will hasten the development of the head of the boil. When the boil is ripe, it will drain on its own.

Paul: My brother had a boil once. Our doctor told us not to cut open the boil because the infection will spread. Since my brother's boil was on the face, the doctor prescribed an antibiotic. Antibiotics are also given for boils on the nose.

Ben: What other skin disorders could we get?

Bernie: There are a lot of germs in the air we breathe and in the water we use for bathing and drinking. We can contract skin diseases like *carbuncle*.

Paul: What's a *carbuncle*?

Bernie: It's like a boil. The skin is inflamed by the bacteria called *staphylococcus aureus*.

Oscar: Stapp—illo-coc... what? Ah okay, carbuncle. So how do you treat a carbuncle?

Bernie: If the carbuncle is acute, the doctor has to make an incision to drain the pus. Antibiotics are given by the doctor.

Ben: When I was a kid, I had *scabies*.

Paul: Wasn't that very itchy?

Ben: Indeed, it was. I even cried because of the itch.

Bernie: How was the scabies removed?

Ben : My mother brought me to the doctor. He prescribed a scabicide that was applied all over my body after every bath. It was done twice a day. I was so relieved when the scabies was treated.

Paul: What makes scabies itchy?

Bernie: I can answer that. I read it in a magazine only a week ago. Scabies is caused by the itch mite called *sarcoptes scabiei*.

Oscar: That's another Latin name to add to our vocabulary.

Paul: Go on, Bernie. Oscar, stop interrupting.

Bernie: Okay. The female mite burrows beneath the skin, lays eggs and forms tunnel-like nests. The eggs turn into larvae that mature and mate. The victim, like me, suffers an allergic reaction in the form of a very itchy rash. Scabies is very contagious.

Paul, Ben, Oscar: Yuck!



Let's Review

From what you have just read, complete the table below by providing the causes, symptoms and treatment of the skin diseases discussed in the dialogue. Write your answers inside the table.

| Diseases | Causes | Symptoms |
|--------------|--------|----------|
| 1. Boils | | |
| 2. Carbuncle | | |
| 3. Scabies | | |

Compare your answers with those in the *Answer Key* on page 54.



Let's Learn

The friends discussed a lot of skin diseases or disorders. Below is another type of skin allergy that you might want to add to your knowledge.

Atopic Dermatitis. This skin disease is more popularly known as eczema. It is an itchy, dry inflammation of the skin. It is the most common type of skin disease among children. It is usually contracted by people with sensitive skin. It usually occurs on the face, elbows, back of the knee, limbs and torso.

Although eczema is not an infectious disease, the skin may be severely affected because of too much scratching. Crusting on the surface of the skin may develop when the eczema becomes infected (especially when a person rubs his/her skin with untrimmed and dirty fingernails).

There are many external factors which may worsen the eczema. Among these are:

- ◆ Sudden changes of room temperature, strenuous exercise and hot, humid weather
- ◆ Synthetic or woolen clothing. (Children should be dressed in cotton.)
- ◆ Emotional upsets
- ◆ Cigarette smoke. In an enclosed room, smokes and fumes may irritate the skin.
- ◆ Furry pets. Avoid keeping cats and dogs in the house.

How can eczema be prevented? It can be prevented by avoiding the factors stated above. It can be treated by using ointments and lotions prescribed by a dermatologist (a doctor that specializes in skin diseases).



Let's See What You Have Learned

Complete the table below. In Column 1, you can see the different diseases that can affect the sense organs. In the succeeding columns, write the following:

Column 2 - The sense organ affected by the disease

Column 3 - Causes and symptoms of the disease

Column 4 - Treatment and prevention of the disease

| Diseases | Sense Organ | Causes/ S |
|-------------------------|-------------|-----------|
| 1. Conjunctivitis | | |
| 2. Otitis media | | |
| 3. Dysguesia | | |
| 4. Hyposmia/ Anosmia | | |
| 5. Eczema | | |

Compare your answers with those in the *Answer Key* on page 55.



Let's Remember

- ◆ Some examples of common eye diseases are conjunctivitis and sties.
- ◆ Conjunctivitis is an inflammation of the mucous membrane at the back of your eyelid. It is a bacterial infection.
- ◆ A sty is an inflammation of the tip of the eyelid. It may result from dust and dirt particles that have gotten into your eyes.
- ◆ To treat conjunctivitis and sties, avoid rubbing your eyes and wash them with warm water.
- ◆ Some examples of ear diseases are: otitis externa, otitis media and labyrinthitis.
- ◆ As a rule, always keep your ear dry because fluid inside the ear may cause infection.
- ◆ The loss of the sense of smell may result from common colds, too much exposure to toxic chemicals and head trauma.
- ◆ The loss of the sense of taste may result from burns on the taste buds, hormonal imbalances and diseases of the tongue and mouth.
- ◆ Always keep your body clean to prevent any skin diseases.
- ◆ Some common skin diseases are boils, carbuncle, scabies and eczema.
- ◆ As much as possible, avoid rubbing your skin when itchy.
- ◆ If symptoms persist, consult a doctor.

Congratulations! This is the end of the module. So how was it? Did you learn a lot? If there are some parts that are not clear to you, read them again to understand them better.



Let's Sum Up

- ◆ You learn about the world you live in through your senses. You learn from what you see, hear, smell, taste and feel.
- ◆ The eyes function like a camera. You see objects through the light reflected from the object. When light rays enter the eyes, the cells at the back of the retina transform them to electrical impulses. These impulses are carried to the brain, which then interprets these impulses as images.
- ◆ Your ears collect sounds from your surroundings. You are able to hear because of the vibrations produced by your eardrum.
- ◆ The nose, tongue and skin have cells that act as receptors. These receptors are in the nerve fibers present all over your sense organs.
- ◆ When chemicals come in contact with the receptors or nerve fibers, as in the case of the nose and the tongue, these nerve fibers send messages to the brain. The brain interprets the messages as odors and tastes.
- ◆ In the case of the skin, the nerve fibers scattered all around the dermis are sensitive to pressure, temperature, pleasure and pain.
- ◆ The loss or damage of any of your senses would mean a great loss to you. Life would not be complete because you will not be able to do the things you want and used to do. Thus, your eyes, ears, nose, tongue and skin are very important parts of your body that you must take good care of.



What Have You Learned?

A. Explain how each of your organs works.

1. Eye

2. Ear

3. Nose

4. Tongue

5. Skin

B. Answer the following:

1. Why shouldn't you rub your eye? _____

2. Why should you keep your ear dry? _____

3. Why should you avoid being exposed to toxic chemicals?

4. Why should you avoid smoking? _____

5. Why should you always keep your body clean? _____

Compare your answers with those in the *Answer Key* on pages 55–57.



Answer Key

A. Let's See What You Already Know (*pages 2–3*)

- | | |
|-----------|---------|
| A. 1. (c) | 6. (d) |
| 2. (b) | 7. (a) |
| 3. (c) | 8. (c) |
| 4. (b) | 9. (c) |
| 5. (a) | 10. (d) |

- B. 1. skin
2. ears
3. nose
4. eyes
5. tongue/taste

B. Lesson 1

Let's Review (page 7)

A welder uses dark protective eyewear or a welding mask to protect his eyes from too much light, which can cause blindness.

Let's Review (pages 8–9)

1. The sclera protects the eye. It is responsible for the formation of the iris.
2. The cornea protects the lens of the eye.
3. The choroid absorbs excessive light.
4. The pupil functions as the opening of the eye. It is where the light enters.
5. The iris controls the amount of light that enters the eye.
6. The retina is where the light rays are focused. Inside it are light-sensitive cells that transform light rays to electrical signals.
7. The lens focuses the light rays on the retina.
8. The optic nerve transports the electrical signals from the cells of the retina to the brain.

Let's See What You Have Learned (pages 16–17)

- A. 1. The pupil and the opening of the camera are both sensitive to light. They both let the light enter into the inner portion of the eye/camera. When the light is dim, the pupil and the opening of the camera widen or dilate. On the other hand, when the light is bright, the pupil and the opening of the camera narrow or become smaller.
2. The auricle and a seashell have a similar shape. The flap of the ear is shaped like a seashell so that it can collect more sounds from the surroundings.

B. Eyes

1. (c)
2. (a)
3. (b)

Ears

4. (b)
5. (c)
6. (a)

C. Lesson 2

Let's Review (page 22)

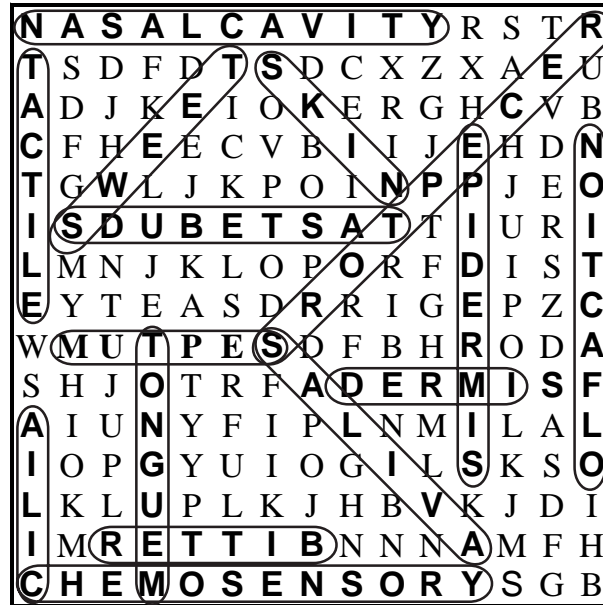
When you have a cold, your nose is stuffed up with fluid and mucus. The mucus covers the nerve endings of the olfactory nerves that are buried in the mucous membrane. Because the odor cannot reach the nerve endings, they cannot detect odor.

Let's Try This (pages 25–26)

1. Answers may vary. The surface of the table may be smooth or rough, warm or cold.
2. Answers should be similar to this: Yes. I can feel something wet and rough at the same time. I can feel the temperature and pressure at the same time because sensory nerves are scattered all throughout my skin.
3. I was able to identify the objects by feeling them. My familiarity with their features (texture, edges) helped me identify them.

Let's See What You Have Learned (pages 29–30)

- | | | |
|-----------------|-----------------|----------------|
| 1. epidermis | 6. tongue | 11. Cilia |
| 2. Olfaction | 7. septum | 12. skin |
| 3. Saliva | 8. Tactile | 13. Taste buds |
| 4. nasal cavity | 9. chemosensory | 14. dermis |
| 5. Receptors | 10. Sweet | 15. Bitter |



D. Lesson 3

Let's Try This (page 32)

1. Conjunctivitis is the inflammation of the mucous membrane that lines the inner portion of the eyelid. It also irritates the conjunctiva. It causes reddening of the eye and is commonly known as sore eyes.
2. Tony said he might have contracted conjunctivitis from the market. He rubbed his eyes without washing his hands.
3. Conjunctivitis can be prevented by always keeping the hands clean. You should avoid rubbing your eyes. As much as possible you should also avoid going to crowded places.

Let's Review (pages 34–35)

1. My brother or sister must not rub the eye infected with conjunctivitis. He/She must avoid touching things other than his/her belongings. Conjunctivitis can easily spread because it is a bacterial infection. If any other member of the family touches something that was touched by the person who has conjunctivitis, the former can also get the disease, especially if he/she touches his/her eyes with hands unwashed. Thus, the rest of us should avoid touching my infected brother's/sister's things.

2. Lina should not prick the sty in her eye. An infection may develop if she does so. A sty will burst on its own. She should be patient enough because it will disappear after a few days.

Let's Review (page 38)

1. Labyrinthitis
2. Otitis media
3. Labyrinthitis
4. Otitis media
5. Otitis externa

Let's Try This (page 41)

1. Some of the disorders that can affect the sense of smell are:
 - ◆ Hyposmia or a decrease in sensitivity to smells
 - ◆ Anosmia or a complete absence of smell

These two disorders can result from common colds and nosebleeds. Common colds and nosebleeds, if not taken care of properly, can damage the sensitive nerve endings in your nose. This can result to a loss of smell.
2. Smell disorders can be prevented if you take proper care of your nose. You must avoid damaging the inner portion of your nose. This can be done by:
 - ◆ Covering your nose when you are in industrial areas like construction sites. Dust particles and chemical substances can enter your nose and damage it.
 - ◆ Avoid inserting objects, including your fingers, inside your nose. You might damage the mucous membrane lining your nasal cavity.

Let's Review (page 46)

| Causes | Symptoms |
|---|---|
| 1. Boils are caused by staphylococcus bacteria. These infect the hair roots and sweat glands. | 1. Boils are painful lumps that can be found in the armpit, neck, groin, thigh and at the back of the knee. |
| 2. Carbuncle is caused by <i>Staphylococcus aureus</i> bacteria. | 2. Inflammation of the skin similar to a boil |
| 3. Scabies are caused by an itch mite called <i>sarcoptes scabiei</i> . | 3. Itchiness on different part of the skin |

Let's See What You Have Learned (page 47)

| Diseases | Sense Organ | Causes/Symptoms |
|---------------------|--------------------|--|
| 1. Conjunctivitis | Eye | <ul style="list-style-type: none"> - redness in the iris and sclera - excessive watering of the eyes - yellowish-green discharge - itchiness in the eye |
| 2. Otitis Media | Ear | <ul style="list-style-type: none"> - caused by a buildup of fluid in the middle ear - severe earache - decreased hearing - pus |
| 3. Dysgeusia | Tongue | <ul style="list-style-type: none"> - caused by smoking and radiation - distortion of taste - burns on the tongue |
| 4. Hyposmia/Anosmia | Nose | <ul style="list-style-type: none"> - caused by damage to the nose - decrease in ability to smell - complete absence of smell - colds - nasal infections |
| 5. Eczema | Skin | <ul style="list-style-type: none"> - dry inflammation of the skin |

E. What Have You Learned? (pages 49–50)

- A. 1. The eye functions like a camera. It lets light rays enter through an opening called the *pupil*. The lens on top of the iris focuses the light rays on the retina. Inside the retina are light-sensitive cells (rods that detect black and white colors and are sensitive to dim light, and cones that detect other colors and are sensitive to bright light). These light-sensitive cells transform the light rays to electrical signals, which pass along the optic nerve to the brain. The brain decodes the messages, thus, enabling us to recognize the objects that we see.

2. The outer part of the ear, the auricle, collects sounds from the surroundings. Sounds pass through the external auditory canal and strike the eardrum. Then the eardrum produces vibrations that will make the other parts of the ear vibrate. When this happens, the stirrup vibrates and the sounds travel to the inner ear. The fluid within the cochlea tickles the tiny hairs or nerve endings of the organ of corti. The organ of corti transforms the vibrations to nerve impulses that the brain interprets as sounds.
 3. Small chemical particles from the surroundings enter the nose through the air we breathe. Inside the nose is a hollow portion called the *nasal cavity*. The cavity is covered by a thin wet tissue called the mucous membrane. Nerve endings that detect odors are buried in the mucous membrane. When the particles touch the nerve endings, they identify the odors of these substances. They then transport messages to the brain, which interprets these as smells.
 4. When we eat, the food is dissolved by our saliva. The flavor then spreads all over the tongue. On the surface of the tongue are small bundles of nerve receptors called *taste buds*. These detect the taste of the food we eat. The nerve receptors then send the message to the brain, which interprets it as either a sweet, sour, bitter or salty taste.
 5. Our skin is very sensitive to touch, pressure, temperature, pleasure and pain. This is because beneath the skin is an intricate network of nerve endings that send messages to the brain.
- B.
1. You should not rub your eye because you might irritate it, especially if your hands are dirty. You may bring bacteria into your eye that may cause an infection. The eye is a very sensitive organ.
 2. You should keep your ear dry because fluid in your ear may cause an infection. If the inside portion of your ear is moist, bacteria may live there. Also, fluid inside the ear may block the air passage. When this happens, you may suffer from a decrease, or worse, loss of hearing.
 3. You should avoid being exposed to toxic chemicals because these can irritate your nose and skin. When toxic chemicals enter your nose, they damage the sensitive nerve endings that detect odor. Also, if toxic chemicals come in contact with your skin, you could develop skin allergies and irritations.

4. You should avoid smoking because it damages the sensitive nerve endings in your nose and tongue. You could damage your taste buds. This may result to a diminished sense of taste and smell, or worse, the complete loss of them.
5. You should always keep your body clean to protect yourself from disease-causing germs and bacteria. This is one way of protecting your skin from allergies and diseases.



Glossary

Abscess A swollen part of the body in which a thick yellowish liquid (pus or *nana*) has collected

Ageusia Reduction or loss of taste

Anesthetic Substance that makes a person or animal unable to feel pain

Anosmia Complete loss of smell

Atopic dermatitis Skin disease popularly known as *eczema*; itchy, dry inflammation of the skin

Auditory ossicles Smallest bones of your body—composed of the hammer, anvil and stirrup

Auricle The outer part of your ear

Bacterial infections Infections caused by bacteria

Blood vessels Tubes through which blood flows in the body

Cartilage A tough flexible tissue attached to the bone

Chemosensory organs Organs that are sensitive to chemicals

Choroid Middle layer of the wall of your eyeball

Cilia Fine hairs inside the nose that trap or filter dust and dirt

Cochlea Coiled structure inside the ear; converts sound waves to impulses

Conjunctiva A thin layer of transparent tissue that covers the sclera

Conjunctivitis Eye infection; commonly known as *sore eyes* or *pinkeye*

Cornea Protects the lens of the eye

Dermis Inner layer of the skin; made up of blood vessels and nerve endings

Dysgeusia Distortion of taste

Eardrum Thin tissue that is stretched along the opening of the external auditory canal

Epidermis Outer layer of the skin

External auditory canal Passage through which sounds travel

Gustatory cells Chemical-sensitive cells that detect taste

Hyposmia Decrease in sensitivity to smell

Impurities Dust and dirt

Inflammation A condition in which a part of the body is red, swollen and sore because of infection

Iris Colored part of the eye which protects it

Labyrinthitis Inflammation of the semicircular canals in the inner ear

Lens Transparent part of the eye behind the pupil; focuses light on the retina

Melanin Colored substance in the iris; absorbs strong light that might shock the eye

Membrane A thin tissue that connects, covers or lines the sensitive parts inside the body

Mucous membrane Wet and thin layer of tissue

Mucus Sticky liquid inside the nose produced by the mucous membranes

Nasal Cavity Inner and hollow portion of the nose

Nostrils Two holes or openings at the bottom of the nose where air passes

Olfaction Another term for *smell*

Olfactory cells Chemical-sensitive cells that detect odor

Optic nerve Passage through which electrical signals pass from the retina to the brain

Organ of corti Tiny hairs along the cochlea

Otitis Inflammation of the ear

Otitis externa More commonly known as ‘swimmer’s ear’; infection of the ear canal

Otitis media Inflammation of the middle ear

Polyps Any of several types of abnormal growth in the nose, e.g. pimples, lumps, boils, ulcers and abscesses

Pupil Center of the eye through which light enters

Receptor Receives stimuli and detects them

Retina Innermost layer of the eye where light-sensitive cells are located

Saliva Sticky fluid in the mouth that dissolves food and spreads flavor throughout the tongue

Sclera White part of the eye

Semicircular canals Tubes that control balance; sensitive to changes in movement and direction

Sensation Awareness due to the stimulation of a sense organ

Septum Wall that divides the nasal cavity that forms the nostrils

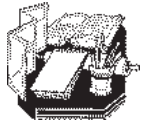
Sty A small abscess of the tissue in the eyelids near the root of an eyelash

Tactile Involving the sense of touch

Taste buds Small bundles of sensory cells that perceive taste

Tear glands Glands that produce tears

Transparent See-through; allows light to pass through so that objects behind can be clearly seen



References

KidsHealth for Parents. *Conjunctivitis* < <http://kidshealth.org/parent/infections/eye/conjunctivitis.html> >. February 20, 2001, date accessed.

Five Senses. < <http://www.sedl.org/scimath/pasopartners/pdfs/fivesenses.pdf> >. February 2, 2001, date accessed.

National Skin Center. *Information on Common Skin Diseases*. < <http://www.nsc.gov.sg/commskin/Comchill/Comchill.html> >. February 20, 2001, date accessed.

Learn.co.uk. *Learning Resources for the UK National Curriculum, Online Lessons*. < <http://www.learn.co.uk/default.asp?WCI=Unit&WCU=2873> >. February 2, 2001, date accessed.

Microsoft Encarta Online Encyclopedia 2000. < <http://encarta.msn.com/find> >. January 31, 2001, date accessed.

Entmanual.com. *Middle Ear Infections*. < [http://www.entmanual.com/middle_ear_infections_\(otitic_medina\).htm](http://www.entmanual.com/middle_ear_infections_(otitic_medina).htm) >. February 20, 2001, date accessed.

Neuroscience for Kids. < <http://faculty.washington.edu/chudler/receptor.html> >. February 19, 2001, date accessed.

Our Bodies: A Child's First Library of Learning. Virginia: Time-Life Books.

McKinley Health Center. *Sty*. < <http://www.mckinley.uiuc.edu/health-info/dis-cond/misc/sty.html> >. February 20, 2001, date accessed.

The Columbia Electronic Encyclopedia. Fact Monster Learning Network. < <http://www.factmonster.com/ce6/sci/> >. January 31, 2001, date accessed.

The Merck Manual of Medical Information—Home Edition, Ch. 72. < http://www.merck.com/pubs/mmanual_home/sec6/72.htm >. February 20, 2001, date accessed.

Treating Nose Disorders. < <http://www.rx.com/reference/guides/ailments/fg7ch13.jhtml> >. February 20, 2001, date accessed.