



## What Is This Module About?

Have you ever wondered what it would be like not being able to breathe? Not being able to smell the sweet-smelling flowers in your garden or your mom's delicious cooking? Can a person stay alive without breathing?

Humans, like other animals, are able to breathe because of a special system that allows oxygen to be taken into the body. This is called the **respiratory system**. The respiratory system also releases carbon dioxide. It never stops working even when a person is asleep.

This module will tell you all about the respiratory system. You will discover the parts that make up this system and their functions. You will also learn how to take proper care of your respiratory system and the diseases that can affect it.

This module is composed of four lessons:

Lesson 1 — *How the Respiratory System Works*

Lesson 2 — *The Parts of The Respiratory System*

Lesson 3 — *Diseases That Can Affect the Respiratory System*

Lesson 4 — *Taking Care of the Respiratory System*



## What Will You Learn From This Module?

After studying this module, you should be able to:

- ◆ describe the functions of the human respiratory system;
- ◆ identify the parts that make up the human respiratory system;
- ◆ describe how the human respiratory system works;
- ◆ name diseases that can affect the human respiratory system;
- ◆ identify recent inventions that enable defective parts of the respiratory system to function normally; and
- ◆ cite ways of taking care of the human respiratory system.



## Let's See What You Already Know

Before you proceed on studying this module, let's find out what you already know about the topics to be discussed. Write your answers in the blanks.

1. Name the function of the respiratory system.

\_\_\_\_\_

2. State three parts of the respiratory system.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

3. Give three diseases that can affect the respiratory system.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

4. Cite two ways of taking care of the respiratory system.

a. \_\_\_\_\_

b. \_\_\_\_\_

Well, how was it? Do you think you fared well? Compare your answers with those in the *Answer Key* on page 28.

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

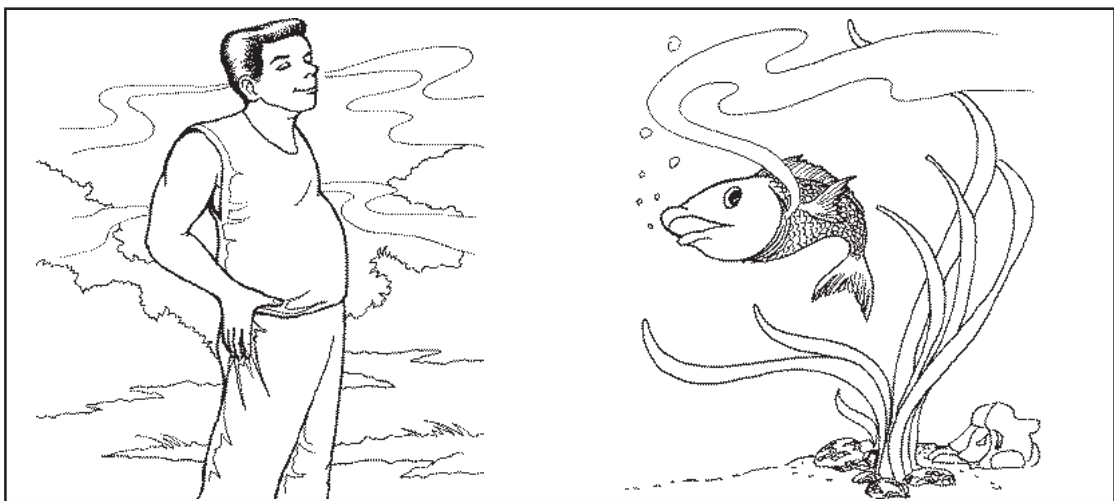
If you got a low score, don't feel bad. This module is for you and it will help you understand some important concepts that you can apply in your daily life. If you study this module carefully, you will learn the answers to all the items in the test and a lot more! Are you ready?

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

# How the Respiratory System Works

All animals breathe in oxygen. Oxygen is needed by the body in order to function properly.

However, not all animals breathe the way humans do. Fishes, for example, use gills instead of noses since they live underwater.



The special structures that allow oxygen to be used by the cells of the body make up the **respiratory system**. To **respire** means to inhale and exhale air.

This lesson will tell you about the many functions of the respiratory system. Are you ready to know more about this wonderful system in your body?



### Let's Think About This

Do you know why people breathe? Why does your respiratory system work tirelessly to bring oxygen into your body? Why is breathing important? Reflect on this before proceeding to the next part of the module.



## Let's Learn

The respiratory system is made up of organs through which air flows during **pulmonary ventilation**. What most of us call breathing, doctors call pulmonary ventilation. This term simply means that air is drawn into the body through several structures of the respiratory system. These are the same structures that carbon dioxide would need to pass through on its way out of the body.

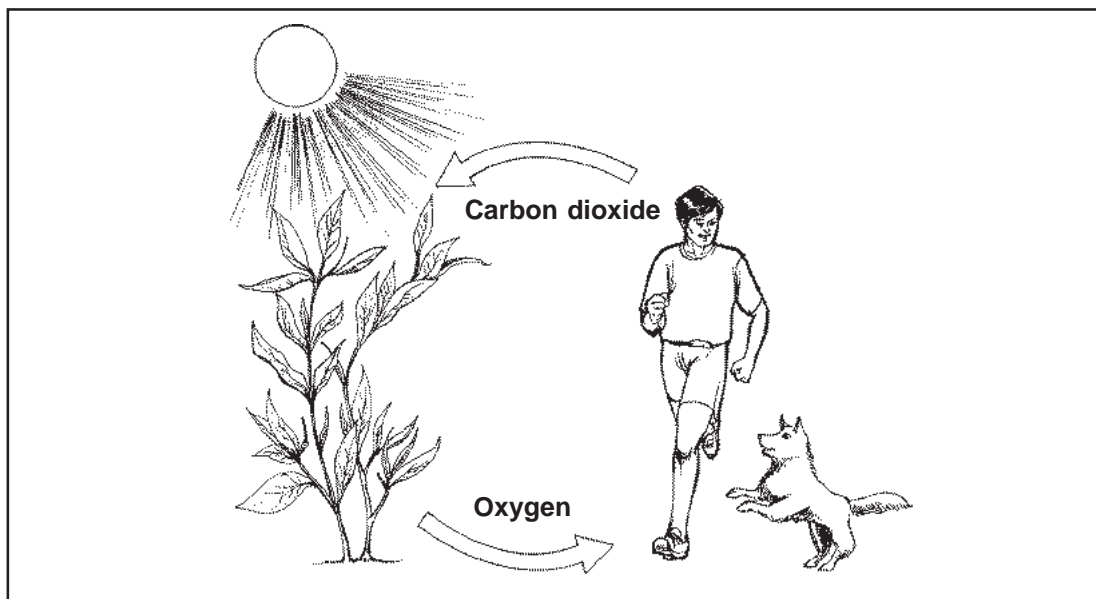
The term **respiration**, from the word “respire” refers to the act of the respiratory system which allows respiration to occur.

Respiration takes place as soon as oxygen enters the body. Oxygen helps release the energy contained in food for use by cells in the body. In the process, a by-product or waste called **carbon dioxide** is produced. Carbon dioxide is released from the body because it can harm the cells.



## Let's Think About This

Plants produce food through a process called **photosynthesis**. Oxygen is then released into the air as a product of this process.



**The Carbon Dioxide Cycle**

People take in oxygen into their bodies and release carbon dioxide in a process called **respiration**. The organisms in an environment participate in a mutually beneficial relationship called the **carbon dioxide cycle**.



## Let's Think About This

How can you tell if a person is alive? The two observable functions that indicate life are the beating of the heart and the ability to breathe. When these functions stop, so does life. Do you see now how important breathing is for humans?



## Let's See What You Have Learned

Fill in the blanks with the correct word or words.

1. \_\_\_\_\_ is the gas needed by the cells of the body.
2. The respiratory system is important for the process of \_\_\_\_\_.
3. \_\_\_\_\_ is the gas expelled from the body.
4. The word **respiration** means \_\_\_\_\_.
5. Pulmonary ventilation refers to the process of \_\_\_\_\_.

After answering this exercise, check your answers with the *Answer Key* on page 28. If your score is 5, well done! You learned a lot from this lesson. You may proceed to the next lesson. If your score is 4 or below, it's okay. But you need to study this lesson again before proceeding to the next.



## Let's Remember

- ◆ The respiratory system is important for life and life functions, because it
  - helps oxygen enter your body and helps carbon dioxide come out; and
  - enables respiration to occur.

# The Parts of the Respiratory System

In Lesson 1, you learned what the respiratory system is. It is a group of structures that allow oxygen to enter the body and carbon dioxide to come out. The respiratory system helps keep you alive. But how does it work? To understand how the respiratory system is able to carry out its function, you need to learn the structures of which it is made up.

In this lesson, you will learn about the parts of the respiratory system. You will also know how these structures work together to bring oxygen to the cells of the body in the process called respiration.



## Let's Try This

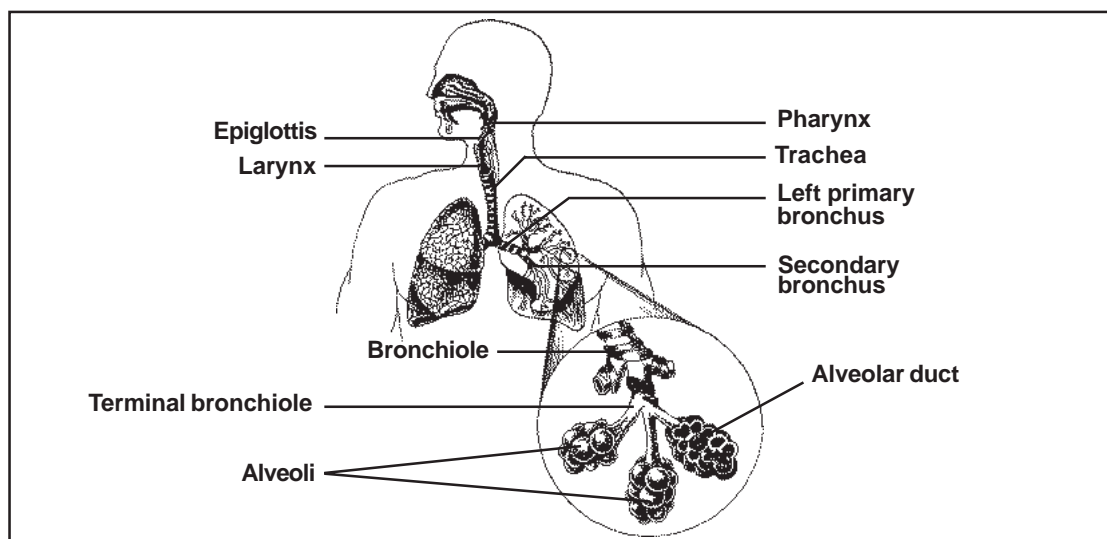
Sit comfortably on a chair. Breathe in and out. Inhale deeply and exhale very slowly. As you do so, close your eyes and imagine the structures the air is passing through. Where are these structures located?



## Let's Study And Analyze

The respiratory system is composed of organs through which air that contains oxygen flows through during pulmonary ventilation. These organs include the nasal cavity (or nose), pharynx (or throat), larynx, trachea, bronchi, bronchioles and lungs.

Study the structures of the respiratory system in the figure below.



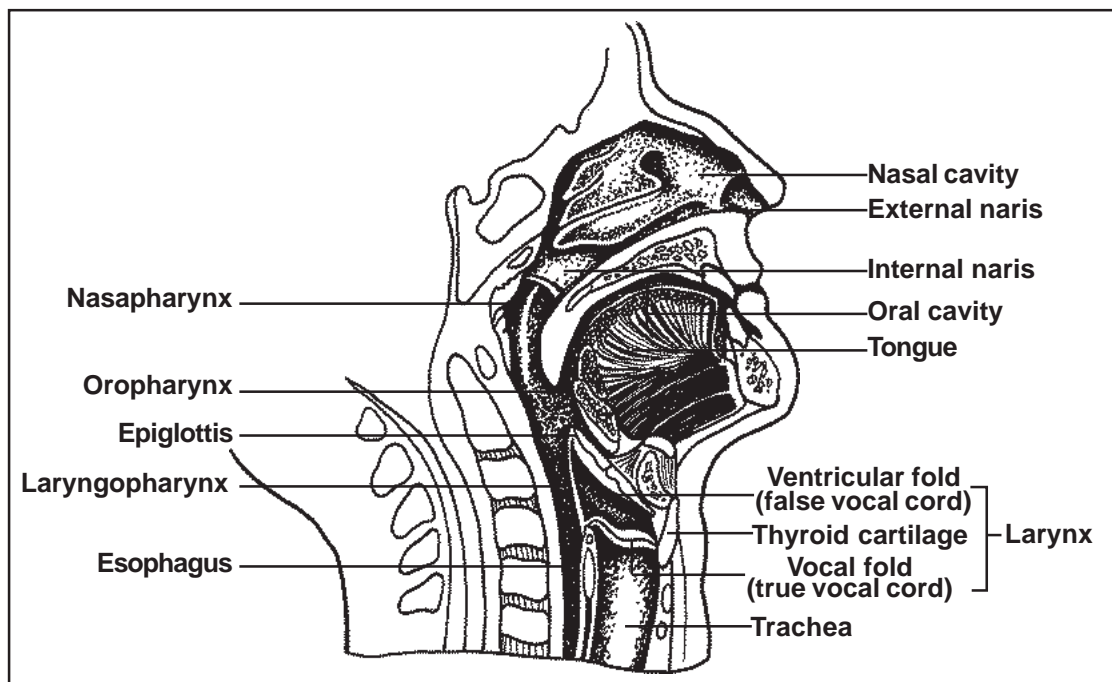
The respiratory system is a group of organs that supply oxygen needed by the cells of the body. The organs are arranged in such a way that the maximum amount of air is supplied to the body and is utilized well. The first of these organs, where air passes, is the **nose**.

The nose is the first station where air enters. The nose has two external openings called the **nostrils**. The nostrils are also called **external nares**. The nose is not just a simple passageway. It acts like an airconditioning system that filters, humidifies and warms air as it passes through.

The nose has hairs which are called **vibrissae**, that filter air. These hairs make sure that dust and other particles from the air are trapped so that they cannot enter the interior of the respiratory system. Dust and other small particles in the air might be harmful to the more delicate organs of the body.

The nose also humidifies air. This means that it provides some moisture to the air because dry air is bad for the body. It irritates the linings of the internal organs of the respiratory system. You can feel this when you stay inside an airconditioned room for a long time and start to feel your nose is drying up.

The nose also warms the air entering the body. The ideal temperature of air needs to be maintained to prevent the formation of ice crystals inside the organs of the respiratory system when you stay in a very cold environment. This also means that the nose preserves moisture. When dry air enters the nose, the air is first moistened by the mucus membranes that line the nose. In this sense, the wetness of the membranes of the other organs of the respiratory system is maintained.





## Let's Think About This

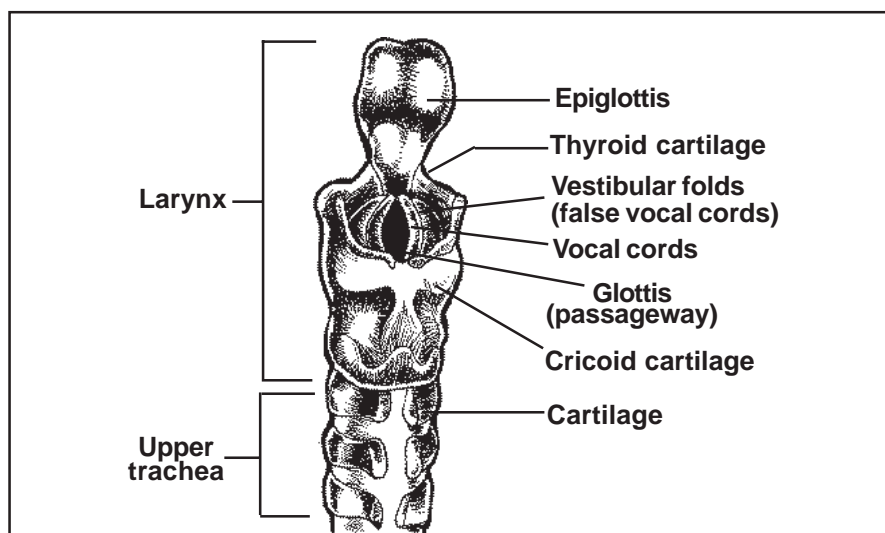
Have you ever had a cold? A cold is caused by a virus, a very small but harmful particle that causes the nose to produce a lot of mucus. **Mucus** is the syrupy fluid that comes out of your nose. When this fluid accumulates, the nerve endings of the nose used for smelling are covered up. What do you think happens to your sense of smell when you have colds?



## The Pharynx

The pharynx is commonly known as the throat. It is the second area where air passes through as it goes inside the body. The pharynx technically belongs to both the digestive and the respiratory systems because food also passes through this area. How is food prevented from going to the respiratory system?

The **pharynx** divides into two distinct structures. The trachea brings air to the respiratory system while the esophagus brings food to the digestive system. Food is prevented from entering the airway because of the presence of a special structure called the **epiglottis** which automatically closes when one swallows. Swallowing is accomplished only when the mouth is closed.







## Let's Try This

Try swallowing with your mouth open. Were you able to do it? Swallowing with the mouth open is impossible to do. This is because the mouth must first be closed to allow the epiglottis to close the airway. In this manner, food goes to the esophagus and not the trachea. This is an amazing function, because if large particles like food enter your respiratory system, you could die!

## The Larynx

The larynx or voice box is atop the trachea. It is a rigid box of **cartilage**, similar to the soft white bones of chicken. The larynx has the capability to contract. In adult males, the area of the larynx is marked by a bump in the throat called the **Adam's apple**.

When air passes from the lungs through the larynx, the membranes of the voice box, which are called **vocal cords**, vibrate. This is what produces speech. Hold your throat as you speak and feel the vibrations produced by your vocal cords.

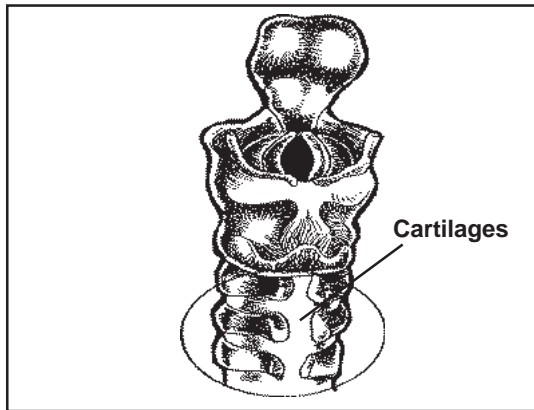
To understand how the vocal cords work, try pushing out air through closed lips. You would notice that your lips would flap or vibrate when air is forced out from the respiratory system. This is how vocal sounds are produced.



## The Trachea

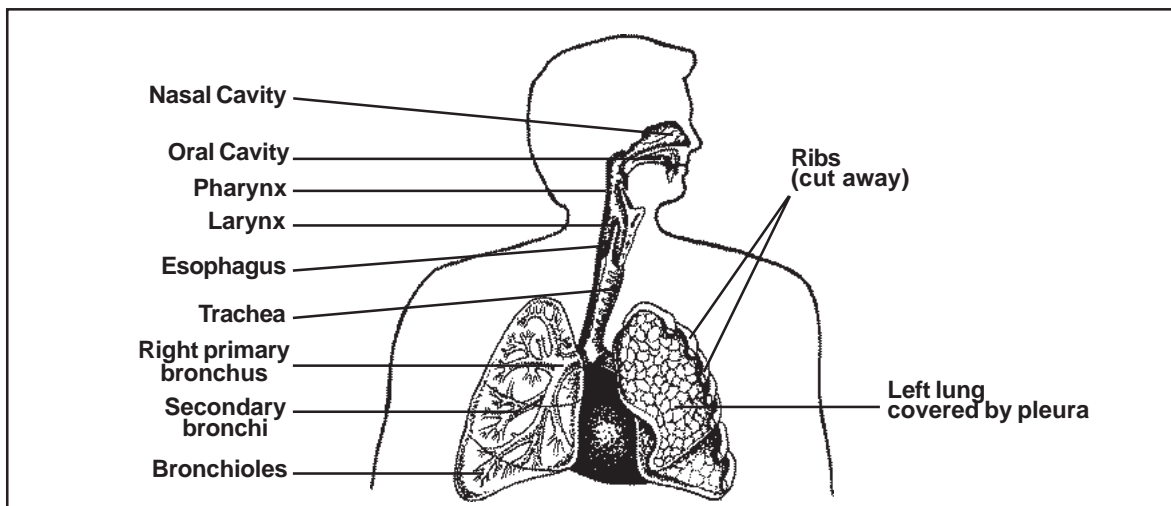
If you recall, you found out that the pharynx opens out into two structures, the esophagus and the trachea. Food and liquids force open the usually compressed esophagus during swallowing. Between swallows, the esophagus closes. The trachea, on the other hand, never closes because air is needed by the body. Air is **never pushed** into this tube, it is sucked in by the action of your lungs.

The trachea is kept open because it is surrounded by C-shaped rings of cartilage. A cartilage is like a very soft bone. Hold your earlobes. Your earlobes are made of cartilage. The trachea is kept open by cartilage, hence, everything that you breathe in will reach the other parts of your respiratory system. Be careful what you inhale! It may cause damage to the respiratory system.



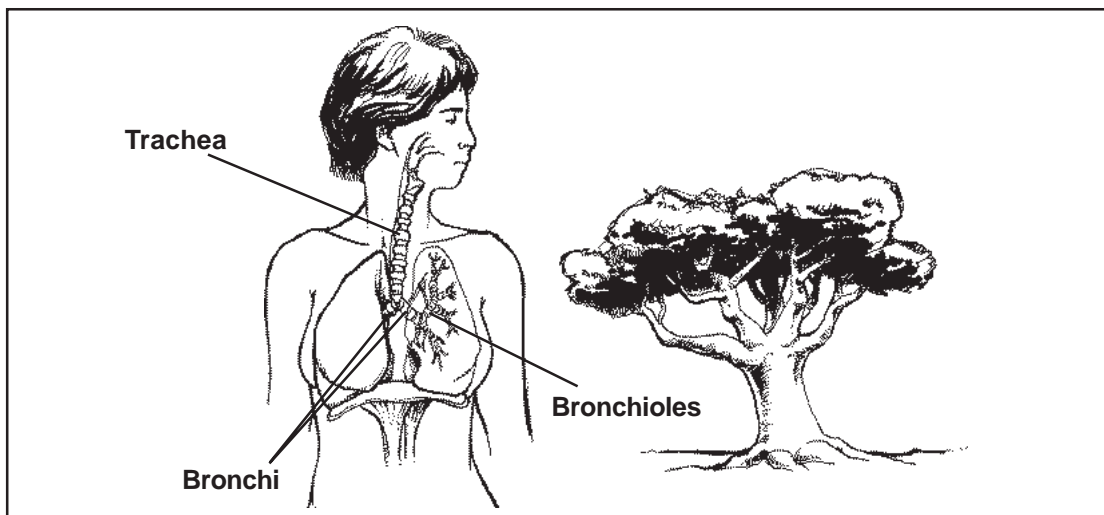
The figure on the left shows you the C-shaped series of cartilages that surround the trachea. These keep your trachea always open.

Before you proceed to the next topic, study again the structure of the respiratory system below.



## The Bronchi and Bronchioles

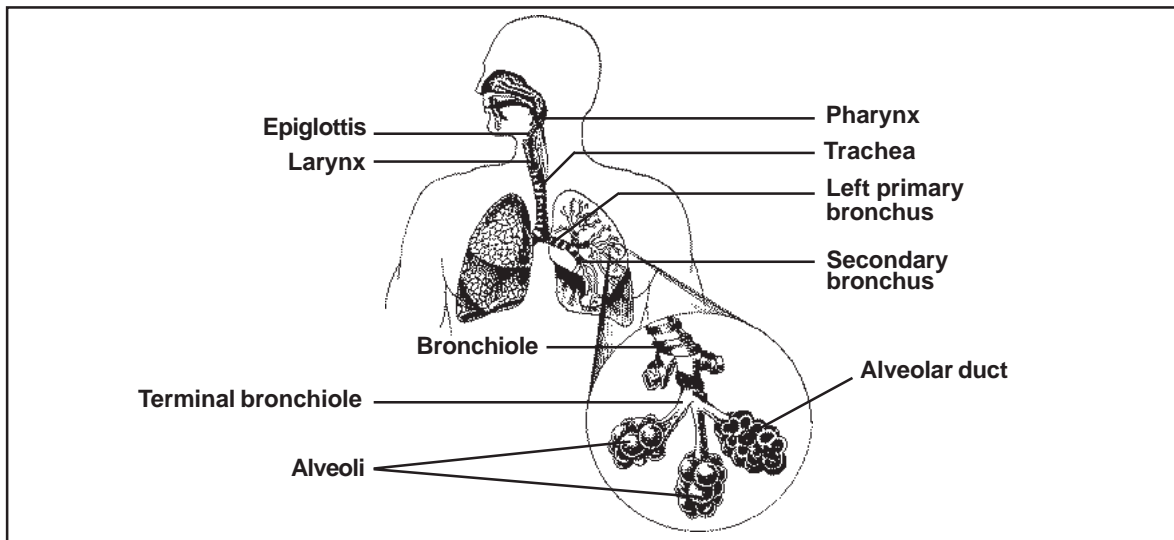
The trachea extends from the larynx to just above the level of the heart where it separates into two structures, the left and right **bronchi**. The **right bronchus** goes toward the right lung and the **left bronchus** goes toward the left lung. Inside the lungs, the bronchi again divide into smaller branches called the **bronchioles**. In this way, the respiratory system is like a tree that has a main trunk and then divides into branches, on which the leaves of the tree are found. Interestingly, the passage of the respiratory system, where air travels, is called the **tracheobronchial tree**.



## The Lungs

As a tree divides into more and more branches, you can not see the branches anymore, because they are hidden among the leaves of the tree. In the human body, the foliage or the leaves of the tracheobronchial tree are referred to as the **lungs**. Like the leaves of a tree, the lungs contain the sites of gas exchange.

The lungs are two masses of sponge-like tissue on the left and right sides of the heart inside the chest. The ribcage of the chest protects the lungs and the heart.



Inside the lungs, the bronchioles divide into the **respiratory bronchioles**, which divide further into **alveolar ducts**. These ducts feed into the air chambers of the lungs, which are called the **alveolar sacs**.

The air that enters the respiratory system, ultimately reaches the alveolar sacs. Here, oxygen is delivered for use by the body. Gas exchanges between the lungs and the blood occur in the alveolar sac, which resembles a bunch of tiny grapes or a cluster of bubbles. The sac is made up of alveoli. Gas transfer takes place in the walls of each alveolus. The alveolus has a very thin lining that allows oxygen to mix with the blood entering the lungs. This oxygenated blood is then delivered to the cells of the body by the circulatory system.



### Let's Think About This

The lungs contain about 300 million alveoli. If you combine their surface areas, the alveoli would cover 70 square meters or 750 square feet. That's roughly the size of 2 tennis courts! The process of gas exchange must really be important for the body to provide a very big surface area just for that purpose. Without gas exchange, life would not be possible!



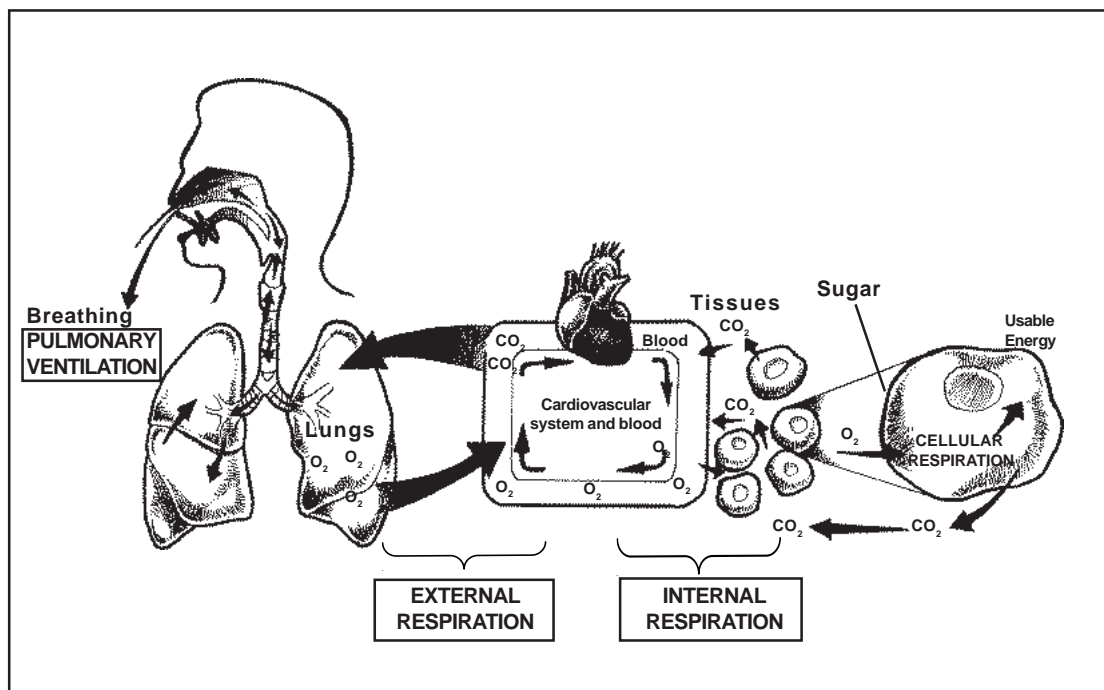
## Let's Learn

### The Process of Gas Exchange

Gases are exchanged in the alveoli. The oxygen from the air is exchanged for the carbon dioxide from the blood. Oxygen enters the blood and carbon dioxide enters the alveoli from where it is ultimately exhaled into the environment.

The ultimate task of the respiratory system is to allow respiration to occur. Respiration is not just breathing. In the human body, respiration is achieved in three levels:

1. **External respiration** — takes place when oxygen from the air moves through the alveoli toward the blood and carbon dioxide passes from the blood toward the alveoli. This is also known as gas exchange.
2. **Internal respiration** — refers to the movement of the blood from the circulatory system toward the cells and tissues of the body.
3. **Cellular respiration** — refers to the use of oxygen inside the cells to obtain energy from food.



Without the respiratory system, air that contains oxygen cannot enter the body; gas exchange will not occur and the cells cannot produce energy for the body to use. Life would not be possible without the tireless respiratory system working to supply life-giving oxygen to the body.



## Let's See What You Have Learned

Fill in the blanks with the correct word or words based on what you have learned from the previous lesson.

1. \_\_\_\_\_ is the primary task of the respiratory system.
2. The respiratory system is also called the \_\_\_\_\_ tree.
3. \_\_\_\_\_ is needed by the cells of the body to produce energy from food.
4. The \_\_\_\_\_ closes to prevent food from getting into the trachea.
5. The C shaped rings of the trachea are composed of \_\_\_\_\_.
6. Voice is produced through the vibrations of the \_\_\_\_\_.
7. The lungs contain the \_\_\_\_\_ in which gas exchange takes place.
8. The trachea divides into two \_\_\_\_\_.
9. The bronchi divide into \_\_\_\_\_.
10. The exchange of carbon dioxide from the blood with oxygen from the alveoli is called \_\_\_\_\_ respiration.

After answering this exercise, check your answers with the *Answer Key* found on page 29. If your score is 7 and above, well done! You now know more about the respiratory system. You may proceed to the next lesson.

If your score is 6 or below, it's okay. But you need to study this lesson again before proceeding to the next.



## Let's Remember

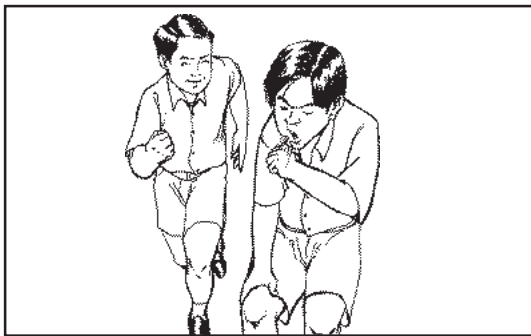
- ◆ The respiratory system is the organ system that allows respiration to occur.
- ◆ Respiration occurs in three levels: external respiration, internal respiration, and cellular respiration.
- ◆ The respiratory system is composed of air passages that ultimately lead to the lungs where gas exchange takes place.
- ◆ The first of the air passages is the nose, which filters, warms and humidifies the air entering the body.
- ◆ The pharynx opens towards the trachea and the esophagus. Food is prevented from entering the respiratory system through the closure of the epiglottis.
- ◆ The trachea is the “trunk” of the tracheobronchial tree. Atop the trachea is the larynx. It contains the vocal cords that vibrate when air is expired to produce sound.
- ◆ The trachea divides into two bronchi, each of which divides into bronchioles.
- ◆ The branching continues from the bronchi to the respiratory bronchioles to alveolar ducts and alveolar sacs.
- ◆ Individual alveoli make up the alveoli sacs. The alveolus is the site of gas exchange.
- ◆ Without the respiratory system, life would not be possible.

## Diseases that Can Affect the Respiratory System

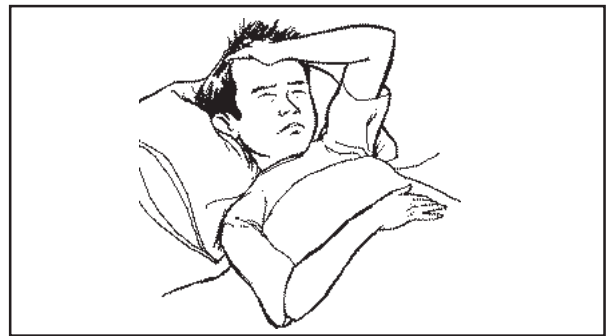
By this time, you have already learned about the function and parts of the respiratory system. You have discovered how important it is to your life. The respiratory system is vulnerable because it allows air into its passages. When air enters the passages of the respiratory system, it brings with it things that might cause more harm than good.

Find out what happened to a boy named Jose.

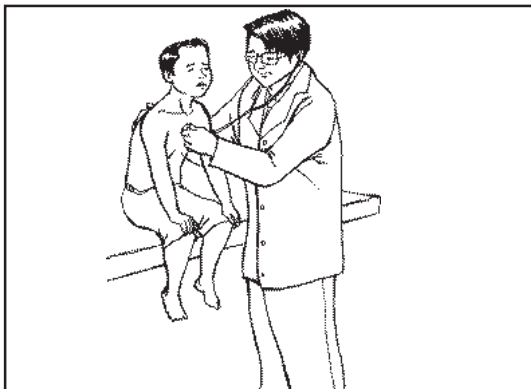
Jose's classmate had a cough and a runny nose. He had colds too. But Jose still played with him.



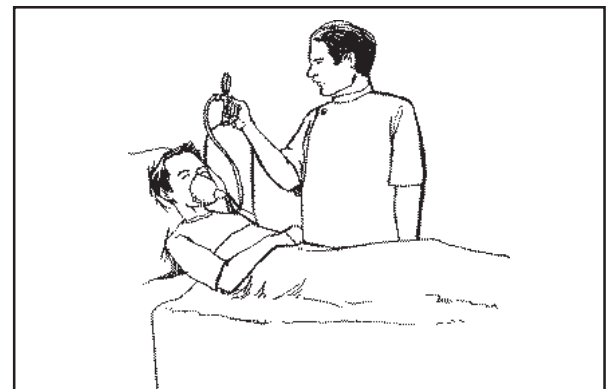
The following day, Jose woke up with a fever and cold. He was coughing, too. Because of this, he was unable to go to school.



Jose was brought to a hospital after two days because he found it very difficult to breathe. The doctor told his mother that Jose had **pneumonia**.



He stayed in the hospital for several days. He was forced to miss school. The doctors gave him a lot of medicine to make him feel better. He also had to wear an oxygen mask for a while.



Jose was lucky because he was able to recover from his illness. Nevertheless, he had to miss school for several days. His doctors suspect that he got the bacteria that causes pneumonia from his classmate.



## Let's Think About This

Imagine that you are Jose. Would you like to stay in a hospital, too? What are the fun things that you would miss if you got sick? The respiratory system's work is very important. To prove this, try holding your breath for as long as you can. How long were you able to do it?



## Let's Learn

### Disorders of the Respiratory System

The disorders of the respiratory system are usually manifested as coughing or difficulty in breathing. These are the symptoms of a disease. Below are some conditions and their symptoms.

#### 1. Pneumonia

**Pneumonia** is a disease in which the bronchioles and the alveolar sacs become inflamed due to infection. Bacteria that cause pneumonia are present even in healthy throats. When the body's defenses are weakened, the bacteria multiply and cause damage. They work their way into the lungs and get stuck in the alveolar sacs, which then get inflamed. Viruses and chemical irritants can also cause pneumonia.

A person who has pneumonia usually has a fever and cough and has difficulty breathing. The difficulty in breathing is caused by the excessive mucus secretion that prevents gas exchange. Pneumonia is cured with antibiotics that kill the bacteria inside the lungs.

Other areas of the tracheobronchial tree can also suffer from bacterial or viral infection. The suffix **-itis** (which means disease or inflammation) is attached to the name of the affected part to indicate that that part has inflammation and infection. Hence, you could have **pharyngitis**, **laryngitis**, **bronchitis** and **bronchiolitis**. These diseases are not as severe as pneumonia, but they can all cause a person to have difficulty breathing.



## 2. Asthma

*John is 12 years old. He occasionally finds himself gasping for air. Whenever he breathes, a wheezing sound is heard coming from his chest. What does John have?*

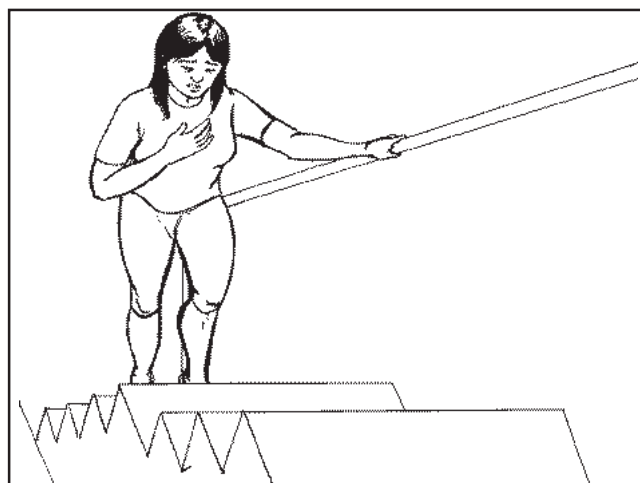


**Asthma** is a condition characterized by hypersensitivity of the lungs. The passages of the respiratory system are sensitive to allergens, which are substances that can cause irritation. This sensitiveness of the air passages serves to protect the respiratory system. However, some people's respiratory system are much too sensitive that they often suffer allergic reaction, manifested as wheezing and difficulty in breathing.

Asthma still has no cure. Drugs are either inhaled or taken to relax the constricting hyper-reactive airways. But these are just temporary measures. Asthma attacks usually occur again after a while.

## 3. Emphysema

*Diana was 14 years old when she started smoking. Her habit got to the point where she would smoke 2 to 3 packs a day. Recently, she has found it very difficult to breathe. She can not walk ten steps without stopping for rest. She also finds it very hard to climb stairs. Her doctor told her she has emphysema, and that she needs to quit smoking.*



Smoking is bad for the respiratory system. It destroys the delicate structures of the lungs and the tracheobronchial tree. It also deposits harmful substances inside the lungs. A person who smokes is 4 to 25 times more likely to develop emphysema than nonsmokers. Smoking cut short a person's life span.

Diana was diagnosed to have emphysema. **Emphysema** is characterized by abnormal permanent enlargements of the alveoli, caused by the destruction of the alveolar walls. This destruction is usually due to the chemical irritants found in tobacco smoke. There is no cure for emphysema. The alveolar walls cannot be repaired, hence smoking must be stopped to prevent further damage.

#### 4. Lung Cancer

*Buboy started smoking 12 years ago. He smokes two packs a day. For two years, he has had severe coughing episodes especially in the morning. The cough has worsened, but he still continued smoking. Later on, he began to have chest pains and difficulty in breathing. He consulted a physician, who said that he has lung cancer. Buboy felt devastated. He knows that cancer can kill. He wished he never started smoking at all but it's all too late.*

Smoking destroys the respiratory system, since harmful substances like tar and nicotine from cigarettes are deposited in the lungs. This affects the natural capacity of the lung to rid themselves of waste materials, hence more of these wastes accumulate. When the damage from chemicals becomes too much, the bronchial cells become malignant. This causes **lung cancer**, a fatal condition.

Lung cancer can be prevented by quitting tobacco smoking. Even with active medical treatment, people with lung cancer usually die within a few years after the onset of the disease.

#### 5. Rhinitis

*Ronald usually wakes up with a runny nose. He finds it difficult to breathe because of too much mucus secretion inside his nose. His mucus membranes are often inflamed. He has had this condition for years. Because of his sickness, he is often late or absent from work. Medicines given to him by his doctors work only for some time. What does Ronald have?*



**Rhinitis** is an inflammation of the nasal cavity. In the example, Ronald has allergic rhinitis. Like asthma, rhinitis is an allergic reaction to dust and pollutants. This allergic reaction causes the mucus membranes of the nose to secrete too much fluid. Allergic rhinitis is very difficult to treat because it is a recurring condition. The best way to control it is to avoid the substances that can cause allergic reactions.

## 6. Tuberculosis

*Mr. Cruz is 50 years old. For the past year, he has noticed himself losing much weight; coughing constantly; suffering from fever in the afternoons or evenings and sweating at night. One day, he noticed that there was blood where he spat on the ground. He consulted a doctor, who told him he has pulmonary tuberculosis.*

Pulmonary tuberculosis (PTB) is a common infection of the lungs that occurs especially among people living in developing countries. It is caused by bacteria called *Mycobacterium tuberculosis* which are transmitted between persons in crowded places.



The bacteria stay inside the lungs and are very hard to eliminate. However, an anti-TB drug regimen is available, which the patients usually have to take for months. If left untreated, TB can destroy the lungs and spread to other parts of the body, such as the bones and intestines.



## Let's Try This

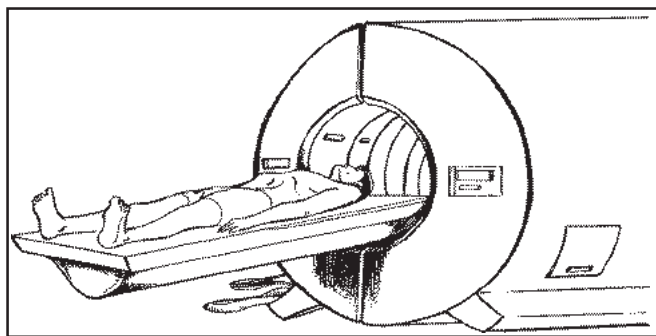
Do you know anybody who has tuberculosis? How does he or she look? You can go to a hospital and visit a patient with tuberculosis. Don't stay too close because PTB disease is communicable or easily transmitted. Think how lucky you are that you have a respiratory system that functions very well.

Because of the many diseases that can affect the respiratory system, new technological advances in the field of **pulmonology** (the study of the respiratory system) have been developed. These advances help to develop better the understanding of the structures of the respiratory system and the diseases that affect it.

### Recent Advances in Pulmonology

New instruments are currently available for the study, diagnosis and treatment of diseases and injuries that can affect the respiratory system. These technological advances enable doctors to discover new and better ways of helping patients.

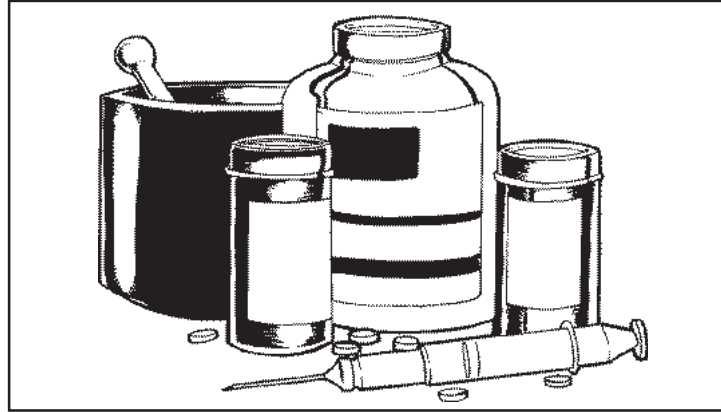
A very important technology developed to understand diseases is the **X ray** machine, which can show pictures of the lungs and the ribcage. It is quite old but is still very useful. Nowadays, doctors can use **computed tomography scan** or CT scan. A **CT scanner** is a machine that functions like an X ray machine. However, a CT scan gives a more detailed picture of the lungs and other parts of the respiratory system. It passes small amounts of harmless radiation into the body to create images of even non-bony structures, such as the lungs. An X ray, on the other hand, is like a picture of the body. It is limited, however, because it is best used only for bony structures that show up as white patterns on X-ray films.



A more sensitive machine is the **MRI** or **magnetic resonance imaging** machine. Instead of passing radiation, it passes sound waves through the body. Computers then create images out of these bouncing sound waves to show what the inside of the body looks like. An MRI can detect tumors inside the lungs.

Nowadays, doctors can also pass tubes into the tracheobronchial tree to visualize it. These tubes are called **endoscopes** and are used to assess the condition of the passages of the respiratory system. Lung transplants are now also possible. Segments of lungs are transferred from one person to another to replace damaged parts.

Drugs used for the treatment of respiratory system infections such as bronchitis, pneumonia, laryngitis and tuberculosis are currently available. More powerful drugs are being developed, and some of them are currently being used to help patients recover.



People are, indeed, learning more and more about the respiratory system because of these new technological developments. How about you, are you learning more about your respiratory system, too? Breathe deeply before you proceed.



## Let's See What You Have Learned

Write **True** on the line before each correct statement and **False** before each incorrect statement.

- \_\_\_\_\_ 1. Pulmonology is the study of the lungs.
- \_\_\_\_\_ 2. Asthma is characterized by hypersensitivity of the lungs.
- \_\_\_\_\_ 3. Rhinitis and asthma are similar.
- \_\_\_\_\_ 4. Smoking is good for the body.
- \_\_\_\_\_ 5. Pneumonia is an infection of the nose.
- \_\_\_\_\_ 6. Smoking deposits are harmful substances in the alveoli.
- \_\_\_\_\_ 7. A CT scan makes detailed study of the lungs possible.
- \_\_\_\_\_ 8. Lung cancer is caused by smoking.
- \_\_\_\_\_ 9. Tuberculosis is easy to cure.
- \_\_\_\_\_ 10. PTB is common among people in developing countries.

Check your answers in the *Answer Key* on page 29. If your score is 8 and above, congratulations! You have learned about the respiratory system well. You may proceed to the next lesson. If your score is 6 or below, you need to review this lesson before proceeding to the next page.



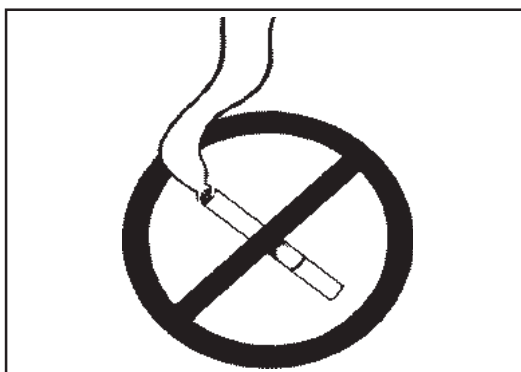
## Let's Remember

- ◆ The respiratory system is prone to diseases that can affect its functions. Coughing and difficulty in breathing are the primary symptoms of most respiratory disorders.
- ◆ Some respiratory diseases such as pneumonia, bronchitis, laryngitis and pharyngitis are infections. Antibiotics are available to fight bacteria and viruses that cause infections.
- ◆ The diseases often associated with smoking are emphysema and lung cancer. Diseases caused by allergic reactions include asthma and rhinitis.
- ◆ Recent technological advances in pulmonology are the CT scan and the MRI. Aside from these, more sophisticated medical procedures such as transplants and pulmonary endoscopy are now quite common. New drugs are also being developed to cure respiratory disorders.

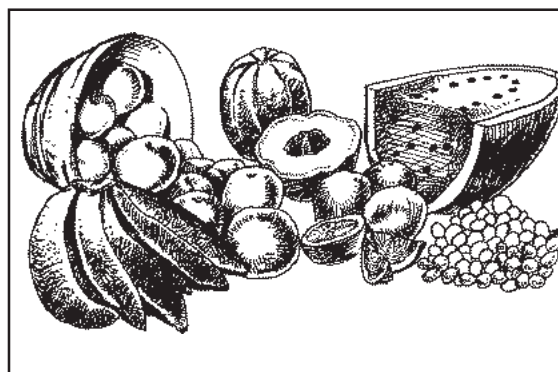
## Taking Care of the Respiratory System

In the previous lesson, you learned about some of the disorders that can affect the human respiratory system. You also discovered some recent advances in technology and treatment procedures that are used to correct the disorders of the respiratory system.

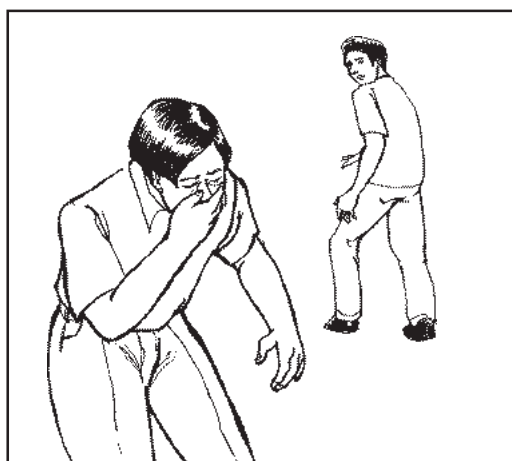
In this lesson, you will learn how to take care of your respiratory system, a very important system without which life would not exist. It is easy to take care of your respiratory system. Observe the following practices to make sure that your respiratory system remains healthy and functioning well.



Avoid smoking



Eat fruits and vegetables that contain substances that fight cancer.



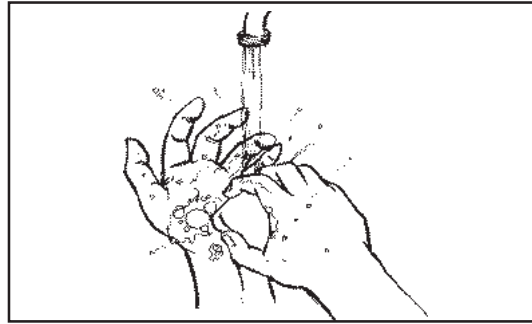
Avoid people with cough or colds. Bacteria and viruses can easily enter your body and cause respiratory infections.



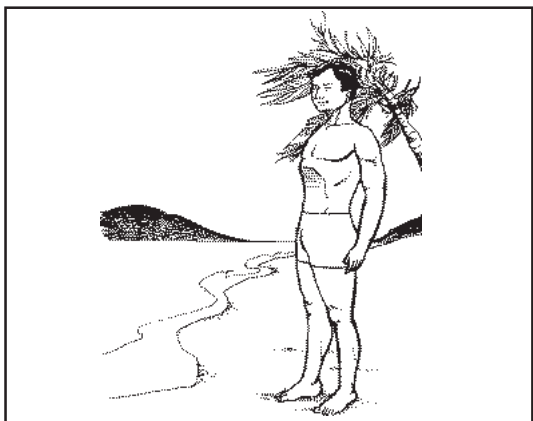
Always wear protective equipments, especially face masks when working in an environment with a lot of dust or smoke which can irritate the lungs.



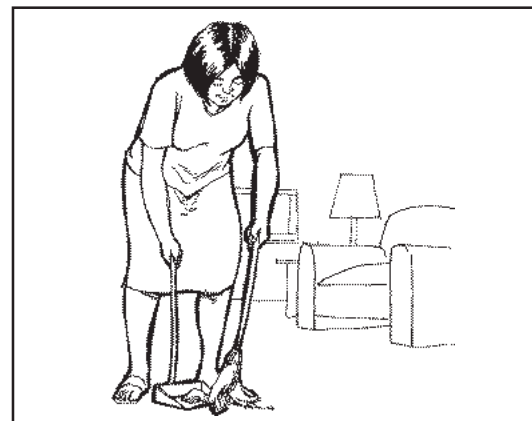
Cover your nose when you sneeze. Do not share personal items such as handkerchiefs especially when you have colds.



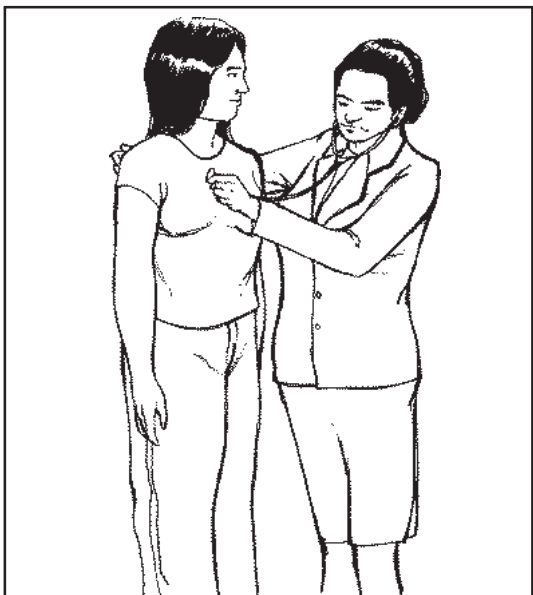
Maintain good hygiene to prevent infections.



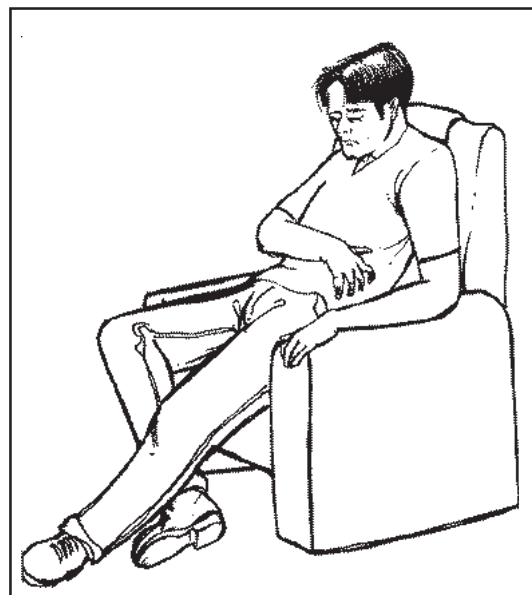
Take a vacation every now and then to get fresh air into your body.



Keep your surroundings clean to minimize dust that aggravates asthma.



Be sensitive to changes in your body. Consult a doctor when you feel something is wrong.



Rest when you are tired.





## Let's See What You Have Learned

Check the numbers that best illustrates the proper care for the respiratory system.

- \_\_\_\_\_ 1. taking a bath regularly to avoid infections
- \_\_\_\_\_ 2. smoking
- \_\_\_\_\_ 3. getting enough sleep and rest
- \_\_\_\_\_ 4. consulting a doctor only when really needed
- \_\_\_\_\_ 5. covering the mouth and nose when sneezing
- \_\_\_\_\_ 6. wearing a mask in construction sites
- \_\_\_\_\_ 7. avoiding dust and smoke
- \_\_\_\_\_ 8. eating nutritious foods
- \_\_\_\_\_ 9. relaxing when feeling stressed
- \_\_\_\_\_ 10. cleaning the nose regularly and properly

After answering, compare your answers with those in the *Answer Key* on page 30. A score of 8 or higher means that you have learned the lesson well. If your score is 7 or lower, review the items you missed.



## Let's Remember

- ◆ Taking care of the respiratory system involves the observation of some very simple habits.
  - Avoid people with cough and colds. Do not share personal items such as handkerchiefs. Cover your nose while sneezing. Use a protective mask when working in environments that have a lot of smoke and dust.
  - Avoid smoking.
  - Rest and avoid stress. Get fresh air every now and then.
  - Eat nutritious foods, especially those rich in vitamin B.
  - Consult a doctor if you notice something is wrong with your body.

You have now reached the end of the module. Congratulations! Did you enjoy studying this module? Did you learn a lot from it?

The following is a summary of the module's main points to help you remember them better.



## Let's Sum Up

This module tells us that:

The respiratory system takes in air that contains oxygen needed to maintain life.

- ◆ The respiratory system is composed of air passages that allow pulmonary ventilation and gas exchange to occur.
  - The nose warms, moistens and filters air before it enters the pharynx.
  - The epiglottis prevents food from entering the trachea.
  - The trachea is the “trunk” of the tracheobronchial tree. It branches into the bronchi, bronchioles, respiratory bronchioles and the alveolar sacs.
  - The alveoli that make up the sacs are the site of gas exchange or external respiration. Internal respiration and cellular respiration take place afterwards.



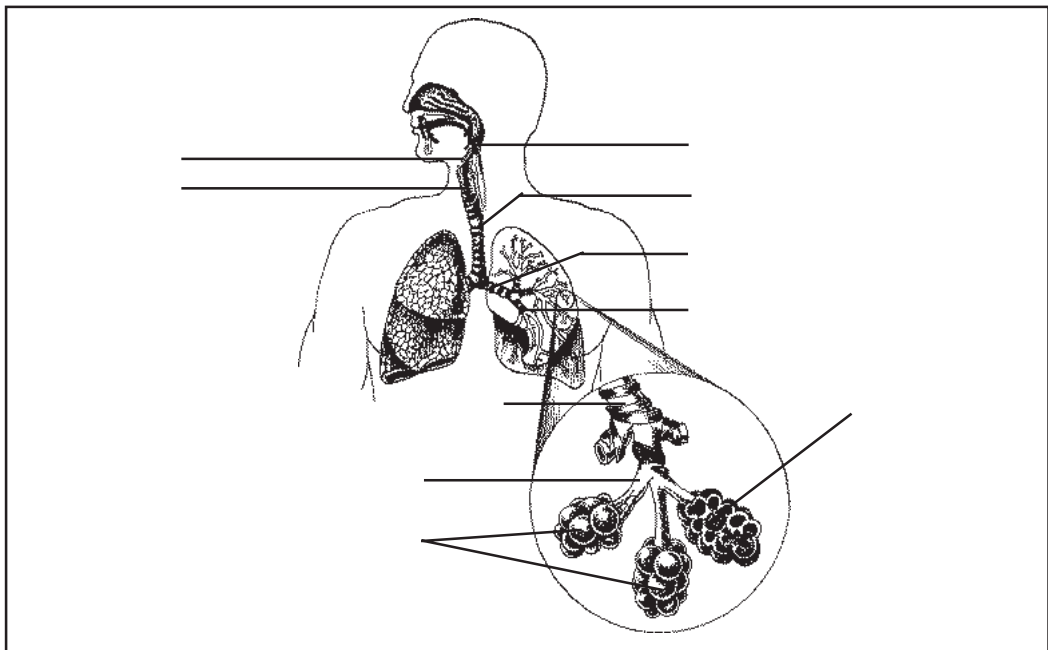
## What Have You Learned?

- A. Fill in the blanks with the correct word or words. Choose your answers from the words in the box.

Lungs	Internal respiration	Tuberculosis
Trachea	Emphysema	Olfaction
Valsalva	Pulmonary ventilation	
Epiglottis	CT Scan	

1. The exchange of gases between the blood and the cells is called \_\_\_\_\_.
2. The \_\_\_\_\_ contain the alveoli needed for gas exchange.
3. Smoking results in a condition called \_\_\_\_\_.
4. The trunk of the tracheobronchial tree is the \_\_\_\_\_.
5. Breathing is technically called \_\_\_\_\_.
6. \_\_\_\_\_ is a technological advance used to study the structure of the lungs.
7. \_\_\_\_\_ is a common disease caused by a *Mycobacterium*.
8. The trachea is closed by the \_\_\_\_\_ during swallowing.

B. Label the parts of the **respiratory system** in the figure below.



Compare your answers with those in the *Answer Key* on page 30.

If your score is

- |         |                                                                                          |
|---------|------------------------------------------------------------------------------------------|
| 0 – 5   | You need to study the whole module again more carefully.                                 |
| 6 – 10  | You should review the parts of the module you did not understand very well.              |
| 11 – 14 | Well done! Just review the items you missed.                                             |
| 15 – 18 | Congratulations! You learned a lot from this module. You are now ready for the next one. |



## Answer Key

### A. Let's See What You Already Know *(page 2)*

1. Helps oxygen enter the body and carbon dioxide to come out
2.
  - a. nose
  - b. trachea
  - c. phraynx(other possible answers: bronchi, lungs, brochioles and alveoli)
3.
  - a. pneumonia
  - b. lung cancer
  - c. rhinitis(Other possible answers: tuberculosis, asthma, emphysema, bronchitis, bronchiolitis, laryngitis, pharyngitis).
4.
  - a. avoiding smoking
  - b. covering nose when sneezing(Other possible answers: eating nutritious foods, observing proper hygiene, wearing masks, undergoing regular medical checkups)

### B. Lesson 1

#### *Let's See What You Have Learned (page 5)*

1. Oxygen
2. respiration
3. Carbon dioxide
4. exchange of gases
5. breathing or taking in air from the environment

### **C. Lesson 2**

*Let's See What You Have Learned (page 13)*

1. Respiration
2. tracheobronchial tree
3. Oxygen
4. epiglottis
5. cartilage
6. vocal cords
7. alveoli
8. bronchi
9. bronchioles
10. external

### **D. Lesson 3**

*Let's See What You Have Learned (page 21)*

1. True
2. True
3. True
4. False. Smoking increases the chances of developing emphysema and lung cancer.
5. False. Pneumonia is an infection of the alveoli.
6. True
7. True
8. True
9. False. The *Mycobacterium* that causes tuberculosis is quite resistant to drugs.
10. True

## E. Lesson 4

*Let's See What Have You Learned (page 25)*

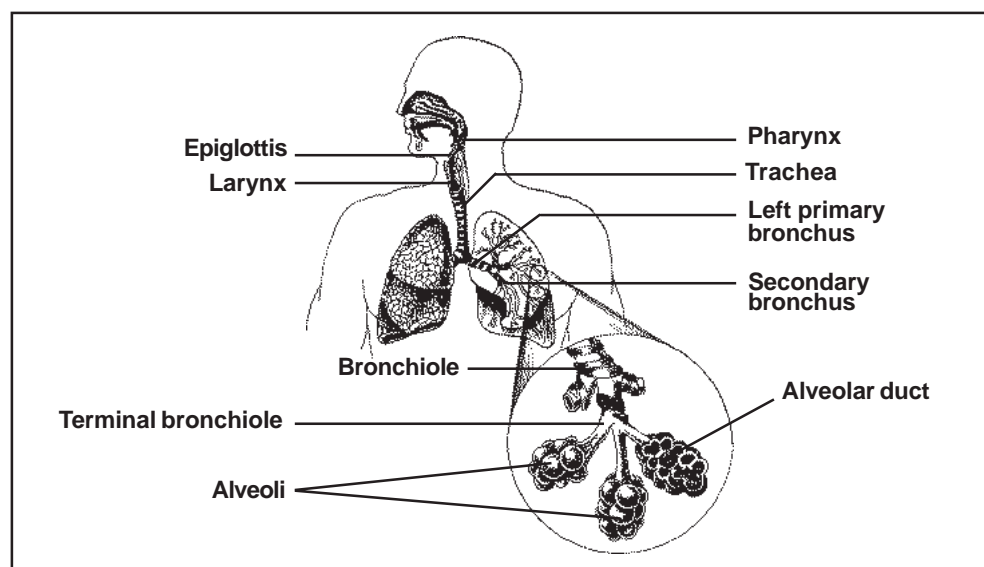
The following should be underlined.

1. taking a bath regularly to avoid infections
3. getting enough sleep and rest
5. covering the mouth and nose when sneezing
6. wearing a mask in construction sites
7. avoiding dust and smoke
8. eating nutritious foods
9. relaxing when feeling stressed
10. cleaning the nose regularly and properly

## F. What Have You Learned (pages 26–27)

- A.
1. internal respiration
  2. lungs
  3. emphysema
  4. trachea
  5. pulmonary ventilation
  6. CT Scan
  7. Tuberculosis
  8. epiglottis

B.





## Glossary

- Adam's apple** A prominent cartilage in the larynx of males
- Alveolar sacs** Saclike structures where alveoli are found
- Alveoli** Site of gas exchange in the lungs
- Asthma** A disease that affects the respiratory system, characterized by wheezing due to the constriction of hypersensitive airways
- Bronchi** The first pair of branches into which the trachea divides
- Bronchioles** Smaller branches of the bronchi
- Carbon dioxide** Waste product of respiration; exhaled gas
- Carbon dioxide cycle** Refers to the exchange of oxygen and carbon dioxide between plants and animals
- CT scan** Stands for computed tomography scan, a recent development in diagnosing diseases of the respiratory system that uses radioactive waves
- Cellular respiration** The process of utilization of oxygen by the cells of the body
- Emphysema** A disease characterized by a difficulty in breathing; usually prevalent among smokers
- Endoscopy** A diagnostic technique, wherein a tube is passed down the structures of the respiratory system for visualization
- Epiglottis** Protects the airway by closing during the act of swallowing; this prevents food from entering the trachea.
- External nares** Nostrils
- External respiration** The process of taking in oxygen from the environment to the respiratory system
- Gas exchange** The process of exchange of carbon dioxide for oxygen or vice versa
- Internal respiration** Happens in the alveoli where oxygen is exchanged for carbon dioxide
- Laryngitis** Inflammation of the larynx
- Larynx** Voice box
- Lungs** A pair of spongy organs in the chest; main site of gas exchange in the respiratory system

**Lung cancer** A disease common among smokers, characterized by the presence and multiplication of malignant growths in the lungs

**Oral cavity** Interior of the mouth

**Pharynx** The throat

**Oxygen** Gas needed by the cells to extract energy from food

**MRI** Stands for magnetic resonance imaging; a technological advance that uses sound waves to visualize the respiratory system

**Nasal cavity** Interior of the nose where air first passes through

**Pharyngitis** Inflammation of the pharynx

**Photosynthesis** The process of food production by plants using radiant energy from sunlight

**Pneumonia** Infection of the alveoli in the lungs

**Pulmonary ventilation** The medical term for breathing

**Pulmonology** The study of the respiratory system

**Pulmonologist** A medical doctor, who specializes in the diseases of the respiratory system

**Respiration** The process of production and utilization of energy

**Respiratory system** A system of organs that functions for gas exchange

**Trachea** Also known as windpipe; the area below the pharynx where air passes through

**Tracheobronchial tree** The part of the respiratory system composed of branching structures from the trachea to the alveoli

**Tuberculosis** A lung infection caused by *Mycobacterium tuberculosis*; hard to treat and common among people in crowded areas

**Vibrissae** Medical term for nose hair; trap larger particles to prevent them from entering the airway

**X ray** A means for examining the lungs





## References

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- Van de Graaff, K. and Stuart I.F. Forx. *Concepts of Human Anatomy and Physiology*. 2<sup>nd</sup> ed. Iowa: WM Brown Publishers, Iowa, 1985.
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