RESPIRATION AND EXCRETION

Respiratory System Functions

The respiratory system is the process of taking oxygen from the air and bringing it into the body and removing carbon dioxide from the body.

In order to get energy from glucose, the cells of the body require oxygen. As we learned in Topic 4, respiration is a process that cells use to get energy by breaking down food molecules and releasing the energy that the food holds.

The process of respiration in the body creates the waste materials of carbon dioxide and water. The carbon dioxide and some of the water is eliminated from the body through the lungs.

Key Body Systems Support Respiration

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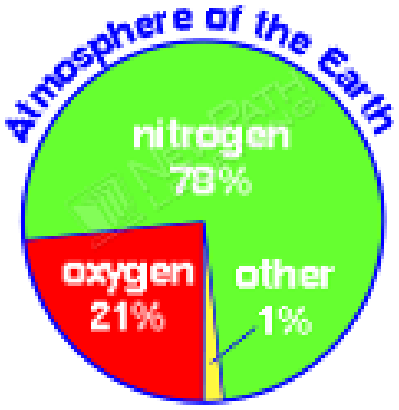
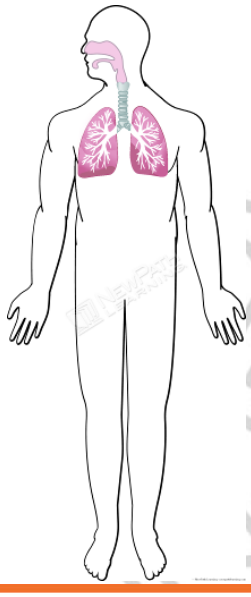
gases, so the air that we breathe is not all taken into the body.



There are many filters throughout the respiratory system that trap and eliminate pathogens and other materials. The system's structures also help to warm and moisten the air in the body.

Structures of Respiratory System

Air travels through the nose, pharynx, trachea, and the bronchi within the lungs.



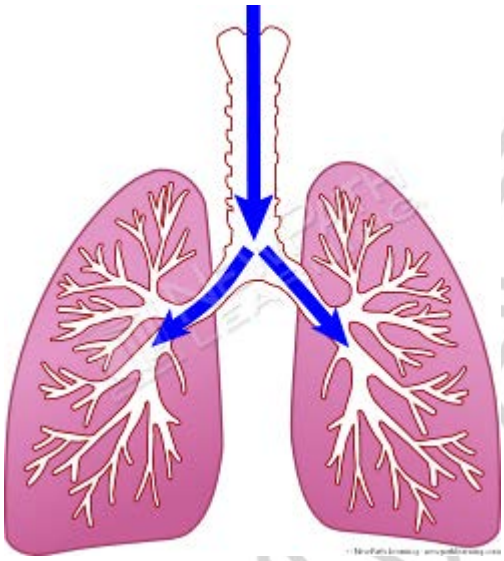
Nose: The ... the two nostrils of ... mucus that trap and e... to warm the air ent... he air then enter...

Pharynx: ...gestive system. Once through the pharynx, the air enters the trachea.

Trachea: The trachea is the airway that leads from the pharynx to the lungs and is also called the windpipe. The trachea has rings of cartilage that help it to stay open and are lined with cilia and mucus to trap invading particles.

If the lining of the trachea is irritated, you will cough causing the invading particles to be ejected from the body. The **epiglottis** seals off the opening to the trachea so that food does not enter.

Bronchi: The air then enters the **bronchi**, which are two passages that lead into the lungs.



The **lungs** are the key organs of the respiratory system.
The left bronchus leads into the left lung and the right bronchus leads into the right lung. The bronchi branch off into smaller and smaller passageways.

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Lesson Checkpoint:
What is the role of the alveoli in the respiration process?

Process of Respiration

On average, a person will take around 20,000 breaths a day! Here is what happens with each breath:

When air enters the nose, passing through the pharynx, trachea, and bronchi to get to the alveoli, oxygen will pass through the walls of the alveoli and then the walls of the capillaries (yes, there are blood vessels in your lungs) and into the blood. Carbon dioxide will pass from the blood, through the capillary walls and into the alveoli.

As a red blood cell passes through a capillary, it is loaded with carbon dioxide until it reaches the alveoli. Once the cell is next to the alveoli, the carbon dioxide quickly unloads while oxygen attaches to the hemoglobin. This is the **process of gas exchange**.

If you were to open every surface within the lungs, the surface area would be the size of an average classroom! This large amount of surface area allows the alveoli to exchange a large amount of gases.

Muscles in the respiratory process

Every breath that you take is controlled by muscles. Muscles attached to **the ribs and the diaphragm** are used when you breathe.

The diaphragm plays an important role in the breathing process. When a person inhales, the rib muscles contract, causing the chest to move up and out. The diaphragm also contracts moving downward. This allows the lungs to expand and take in air. When a person exhales, the diaphragm and rib muscles relax. This decreases the size of the ches

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The vocal cords are attached to muscles that contract and relax. This causes the vocal cords to vibrate and produces a voice.

The Excretory System

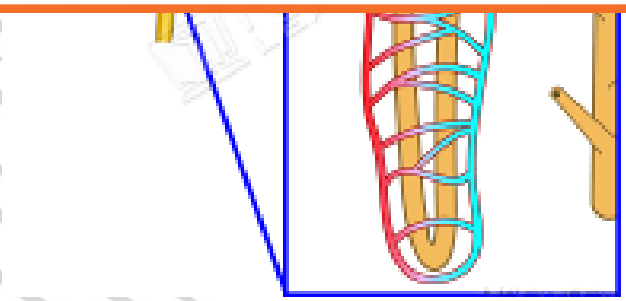
Waste products are created by respiration and need to be eliminated out of the body. The system of collecting the wastes produced by the body and eliminating them is the job of the **excretory system**. The actual process of waste removal is called **excretion**.

If wastes were not eliminated from the body, they would begin to poison the body and cause you to get sick or even die. This system is another important system in your body! Excretion eliminates potentially harmful materials from the body and helps to maintain homeostasis.

As we learned in Topic 16, kidneys are organs that eliminate wastes produced by the cells. The waste products are carbon dioxide, excess water, and **urea**. Urea is a chemical that is produced when the body breaks down proteins. All of the waste materials produced by the two kidneys are combined in a fluid called **urine**. The kidneys act like filters, removing wastes that are in the blood.

Lesson Checkpoint: What is the waste product from the processing of proteins?

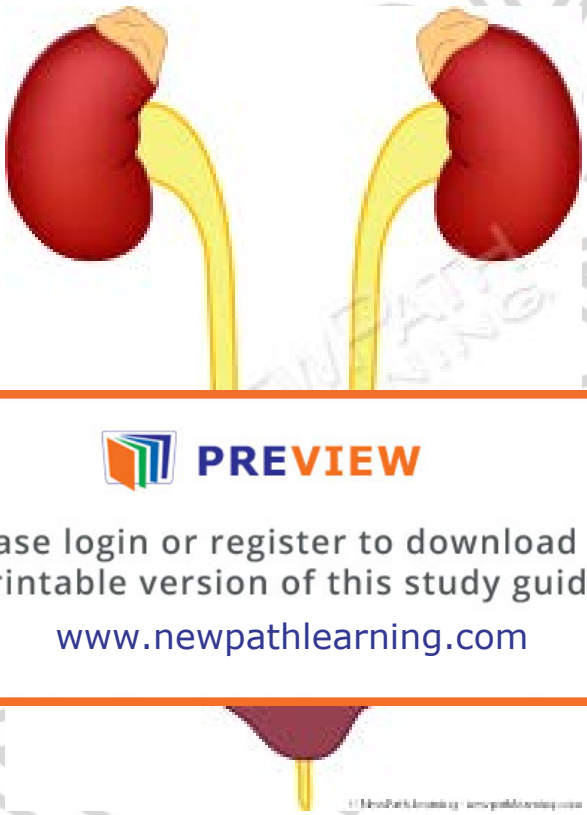
Each of the two kidneys contains a million structures called **nephrons** that filter the blood. After entering the kidneys, blood flows through smaller and smaller arteries until it reaches capillaries in a nephron. Materials such as water, glucose, urea and other wastes are filtered out of the blood.



The filtered materials then move through a capsule of the nephron. Blood and other materials stay within the capillaries. The filtered materials form urine and run through tubes. Some of the materials that were filtered are needed by the body, so they are reabsorbed into the blood. Waste products remain in the tubes and flow through the tubes out of the body by the following path.

Path of Urine Removal

- The wastes produced by the kidneys run through tubes called **ureters**.
- The ureters carry urine to a structure called the **urinary bladder**. When this structure is full, it pushes on nerves that let the body know that the urinary bladder must be emptied.
- The urine leaves the body through a structure called the **urethra**.



Lesson Checkpoint: How does your body know your bladder is full and needs emptying?

Excretion and Homeostasis

The kidneys are involved in maintaining the level of water that is in the body. The amount of water that is reabsorbed into the body depends on the conditions inside and outside the body. If the temperature is hot outside the body, the kidneys will allow more water to reabsorb than if it were cold.

It is important to keep the kidneys working the best they are able by bringing in at least two liters of water into your body everyday. This ensures that a water balance within your body is maintained.