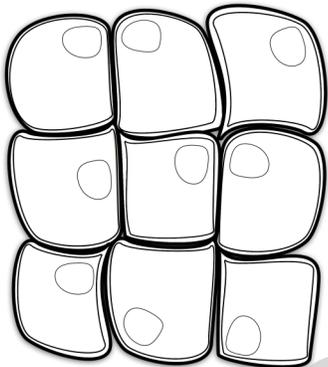


Human Anatomy and Diseases, Pt. 1

No matter how you feel about it at times, your body is amazing. It is made up of more than 200 bones, over 600 muscles, countless nerve endings, and more than 10 trillion cells. Most of the time, all of these pieces work together and keep things running smoothly without you ever having to think about it. We're going to look at many different parts of the body in this unit and some of the things that can go wrong at times. To do this, we need to get organized first.

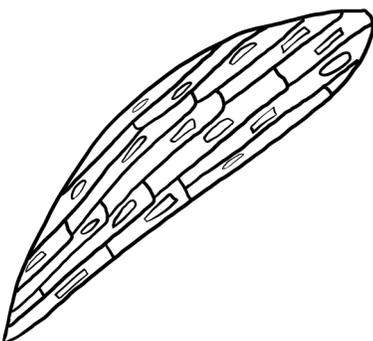
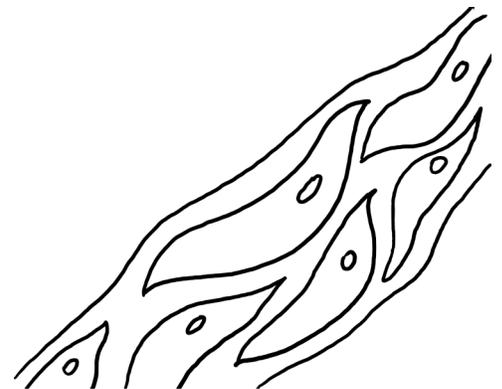


Scientists organize our bodies into **systems** that each include various organs working together to perform one or more functions. Each organ, like your heart, brain, lungs, and kidneys, is made of groups of tissues. Tissues are groups of cells that work together to do one type of job. First we'll look at the four main types of tissues in your body.



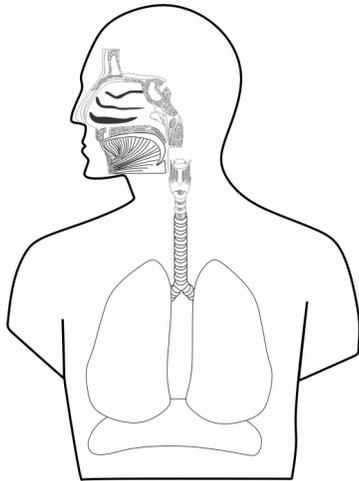
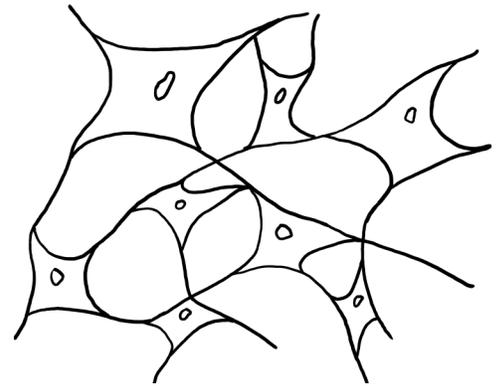
Human beings have epithelial tissue, connective tissue, muscles, and nerve cells. **Epithelial tissue** is a little bit like a wall. There is very little material between the cells because they are tightly packed. They make many of the membranes in our body, including our skin. They also form some of our glands and line certain parts of the body such as the digestive tract and the blood vessels.

Connective tissue has a lot of substance between the cells. The substance is usually made of fibers and a clear fluid. Connective tissues do the job of surrounding and connecting tissues and organs. Two examples of connective tissue are bones and cartilage. You can see how your bones work to connect the parts of your body.



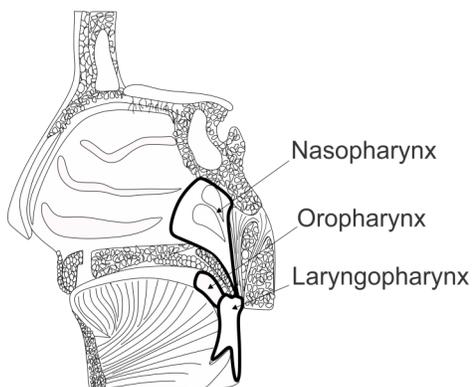
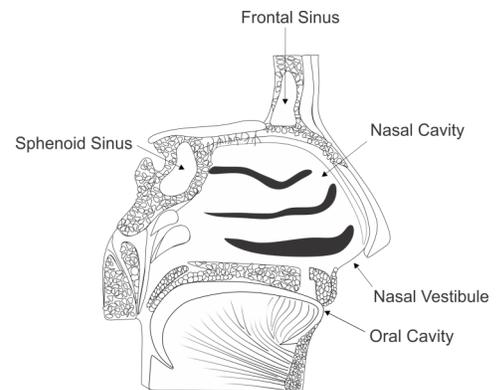
There are several different types of **muscle tissue** in our bodies because of the various jobs they have to do. One characteristic that they all share is the ability to contract and relax, which enables our bodies to move in many different ways.

The last type of tissue in our bodies is **nervous tissue**. This tissue is made of nerve cells that transmit information throughout our bodies, moving countless impulses every second. They transmit both conscious thoughts and commands we give our bodies as well as involuntary ones that we do not have to think about.



The first system we're going to look at is the respiratory system. The main job of the respiratory system is to bring oxygen into the body and get rid of carbon dioxide our bodies do not need. You know we need air to breathe, but have you ever wondered why? The cells in our body need energy. They get this energy from glucose, which is a simple sugar. But to get the energy out of the glucose, they go through a process called cellular respiration. What do you think is a critical component of cellular respiration? Right. Oxygen. Without oxygen, the cells in our bodies couldn't get the energy they need to keep going.

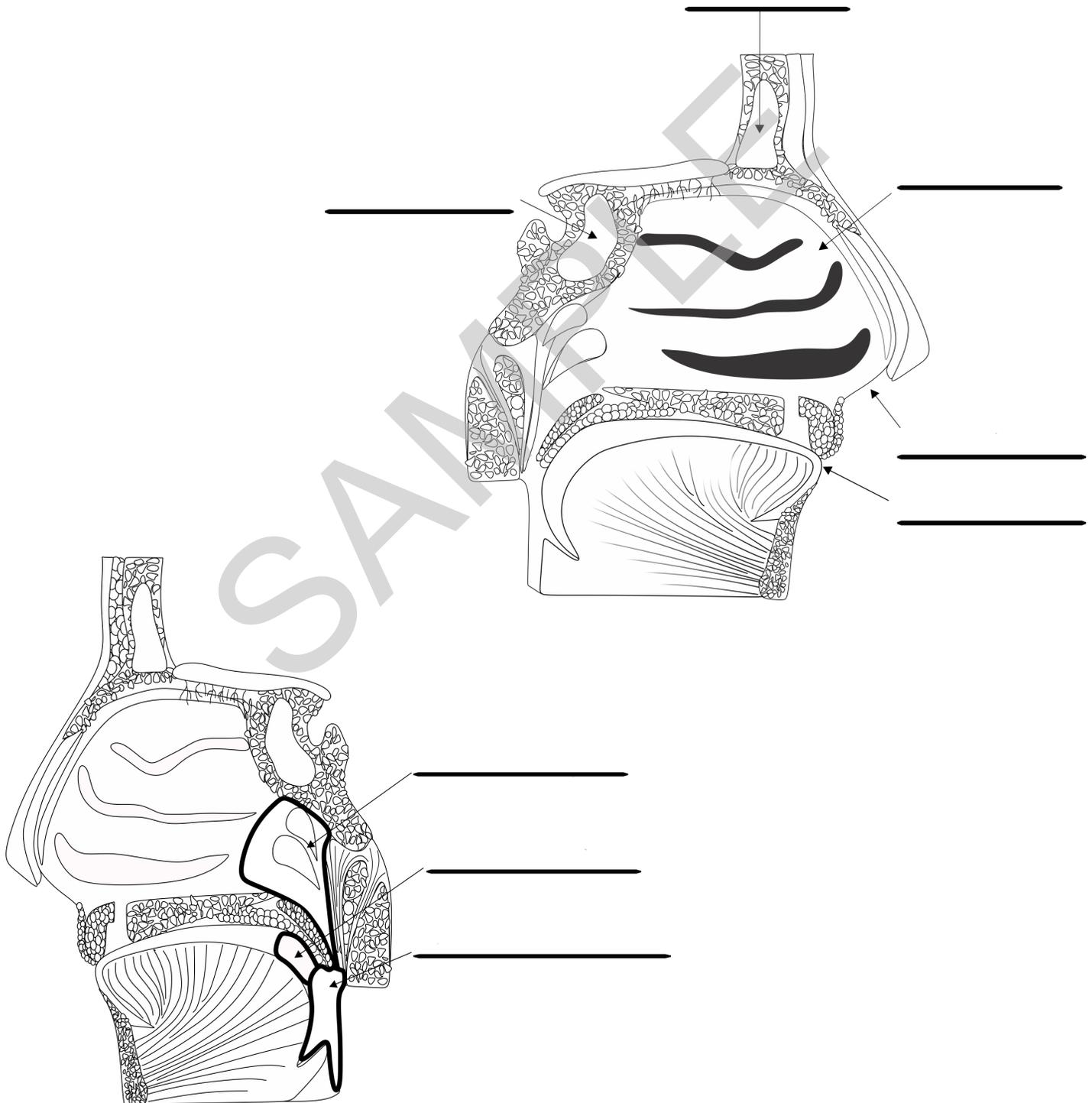
We get that oxygen from the air we breathe. **Inhalation**, or breathing in, starts with our **diaphragm**, a long muscle in the chest and the abdomen. When it contracts, we inhale, or breathe in, pulling air into our bodies through our nose and mouth. The mouth is the **oral cavity**. The very front of the nose is the **nasal vestibule**. Four groups of sinuses connect to our nasal cavity. You can see two of them in the picture on the right, the frontal sinus and the sphenoid sinus. The nasal cavity's job is to warm, moisten, and filter the air we breathe. Once it is through the nasal cavity, it moves on to the pharynx.



The **pharynx**, which comes from the Greek word for "throat" is a muscular funnel. It's made of muscle and connective tissue. It has three main sections called the nasopharynx, the oropharynx, and the laryngopharynx. Those names sound confusing, but they are not hard to tell apart if you look at what each one connects to.

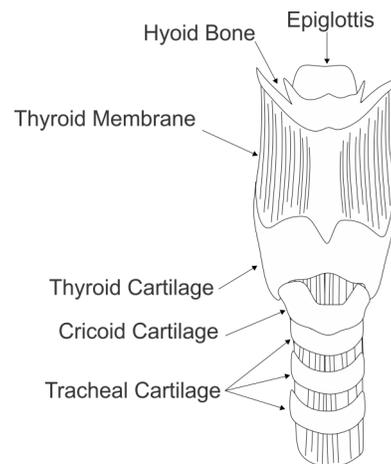
The nasopharynx is the part behind the nose. Since we know the area behind the nose is the nasal cavity, we know the highest part of the pharynx is the *nasopharynx*. The next section of the pharynx begins at the mouth or the *oral cavity*, so the next part of the pharynx is the *oropharynx*. The oropharynx travels down to the epiglottis and *larynx*, which is where the third part of the pharynx gets its name. The *laryngeal pharynx* (or *laryngopharynx*) starts at the epiglottis and goes to the esophagus.

Let's label the parts of the nose, mouth, and pharynx before we move on.



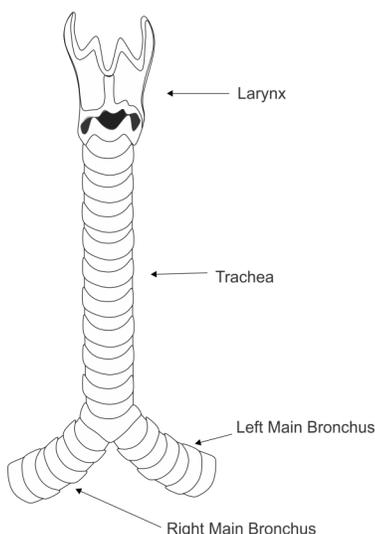
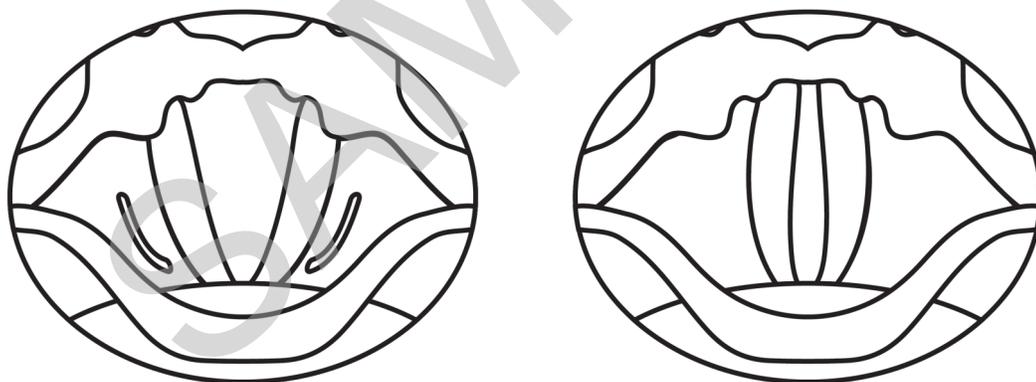
We just mentioned the **epiglottis** and the **larynx**, so let's look at them now in more detail. The epiglottis is at the top of the larynx. It is a flap of cartilage that has the job of "directing traffic." It directs food to the esophagus and keeps it from entering the respiratory tract.

The hyoid bone is a U-shaped bone that serves as an anchor for the tongue. It moves with the larynx and tongue each time you swallow.



The larynx connects the passage between the tongue and the trachea. It houses the vocal cords and is made of nine sections of cartilage. The thyroid membrane connects the hyoid bone to the first set of cartilage, the thyroid cartilage. The thyroid cartilage has two wing-like plates that form the sides of the larynx. Where they meet forms the Adam's apple. Next is a ring-like section of cartilage called cricoid cartilage. The remaining sections of cartilage are called tracheal cartilage because of where the larynx connects to the trachea.

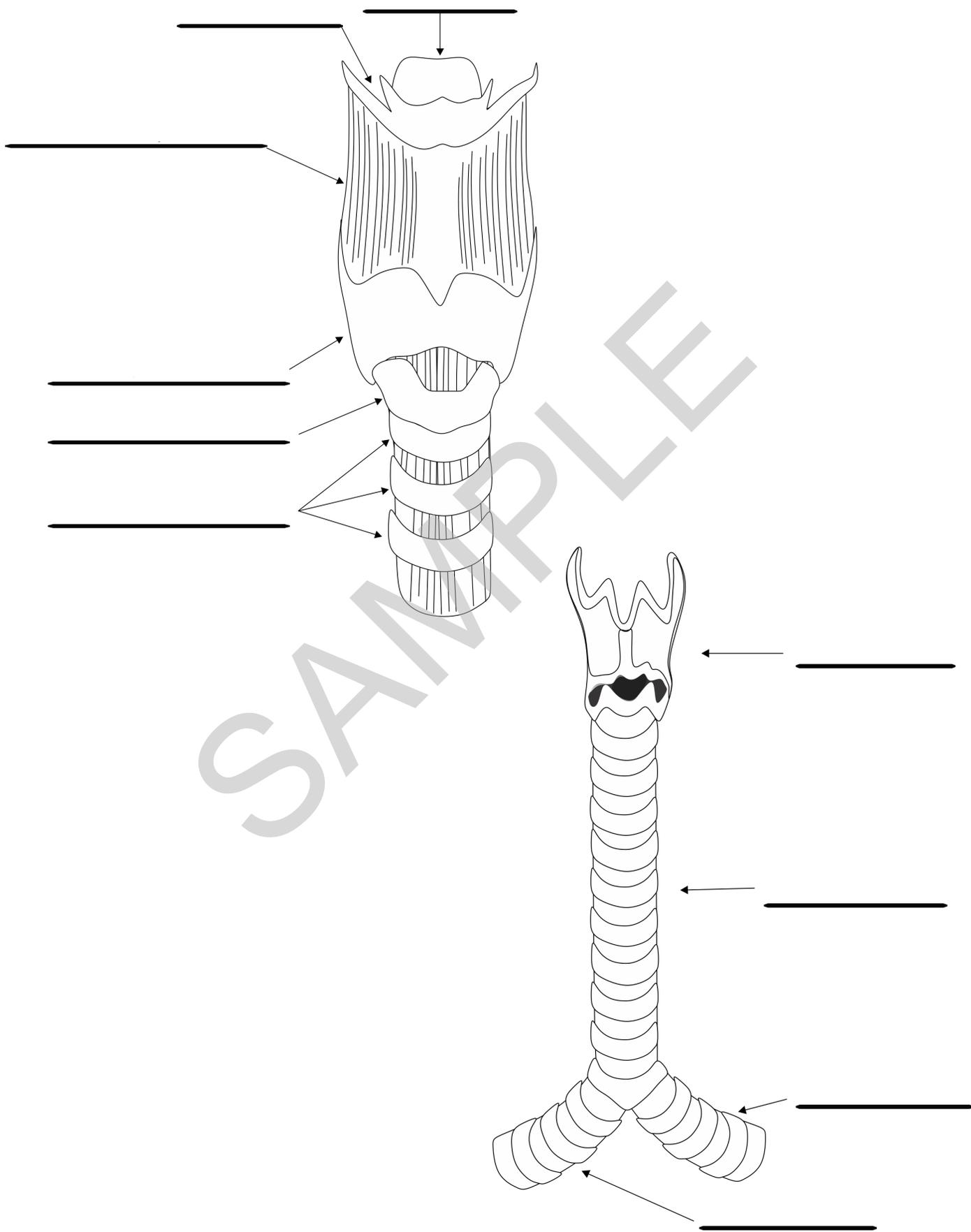
The larynx also houses the vocal cords. These are folds in the mucous membrane that line the larynx. They open for us to breathe and partly close when we talk. The air we breathe out vibrates the vocal cords and produce the sounds we use to speak.



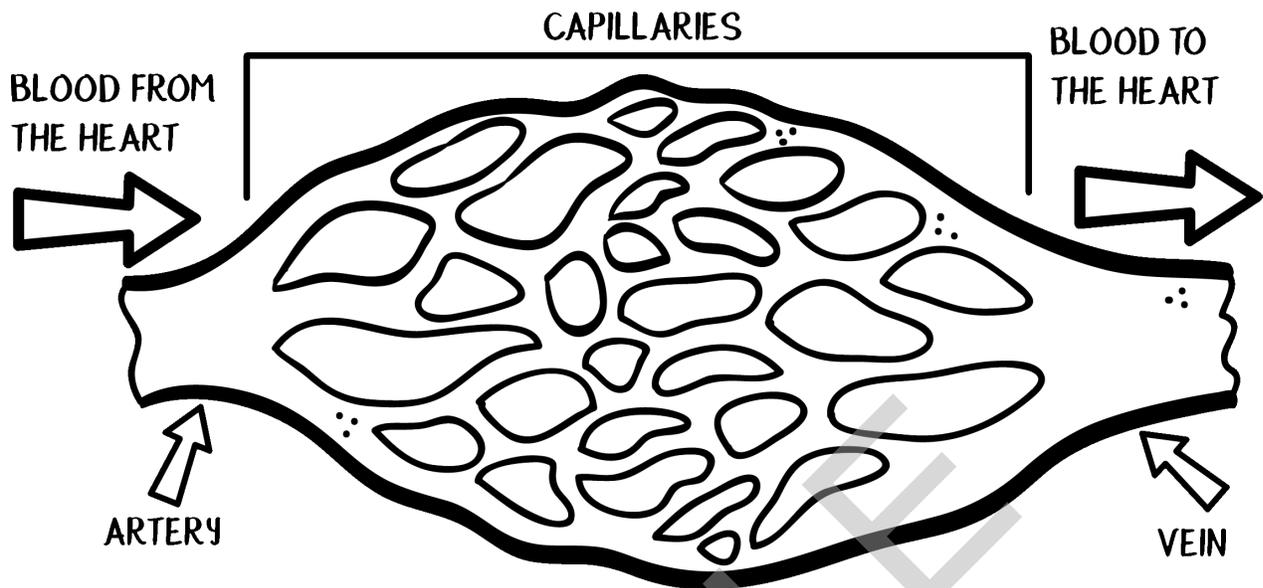
Once air has passed through your larynx, it travels to the **trachea**, which is also called the windpipe. The trachea is about 5 inches (13 centimeters) long and a little less than 1 inch (2.5 centimeters) in diameter in an adult. The trachea is ringed by rows of cartilage that hold it open.

The end of the trachea branches into two **bronchi**, or tubes, that transport the air to our lungs. They are simply called the left main bronchus and the right main bronchus.

Let's label the parts of the larynx and trachea before we move on to the lungs.

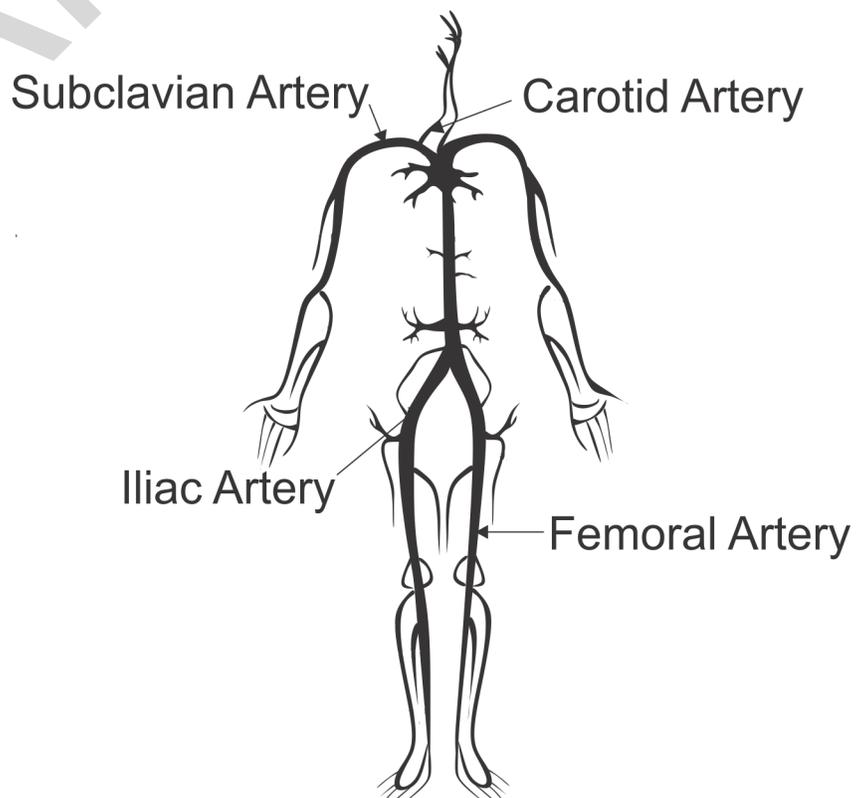


As we've already learned, there are three main types of blood vessels: arteries that carry oxygenated blood, veins that bring the blood back to the heart after it has distributed its oxygen, and **capillaries**.

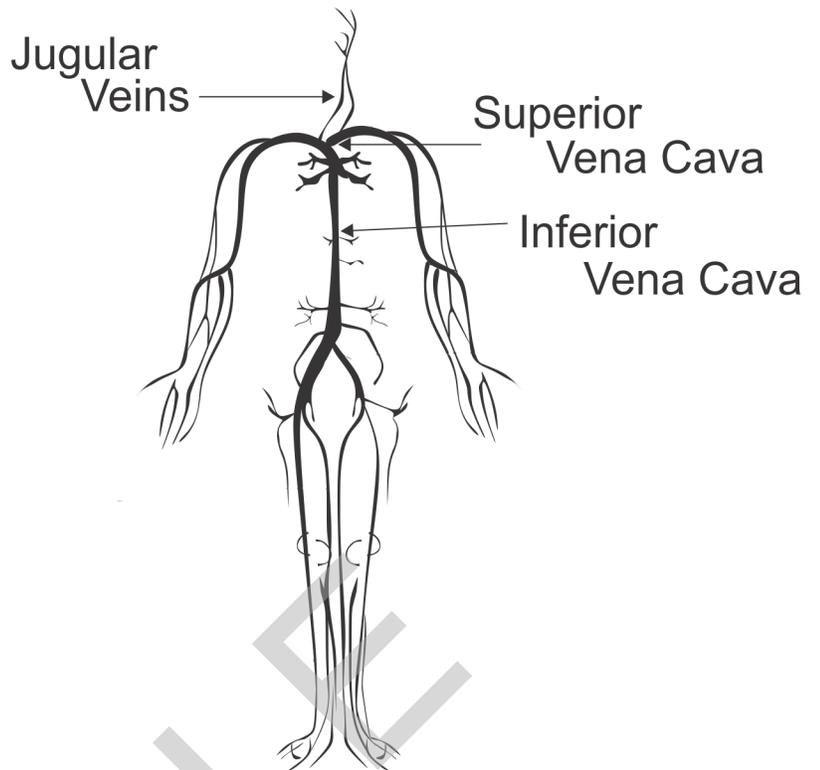


Capillaries are the tiniest blood vessels in our bodies. They connect the veins and arteries, allowing the blood cells to travel through them, though many are so small that the blood cells can only fit through one at a time. They also have thin walls, allowing nutrients to flow through them into the tissues and allowing waste tissue to travel into the blood for disposal.

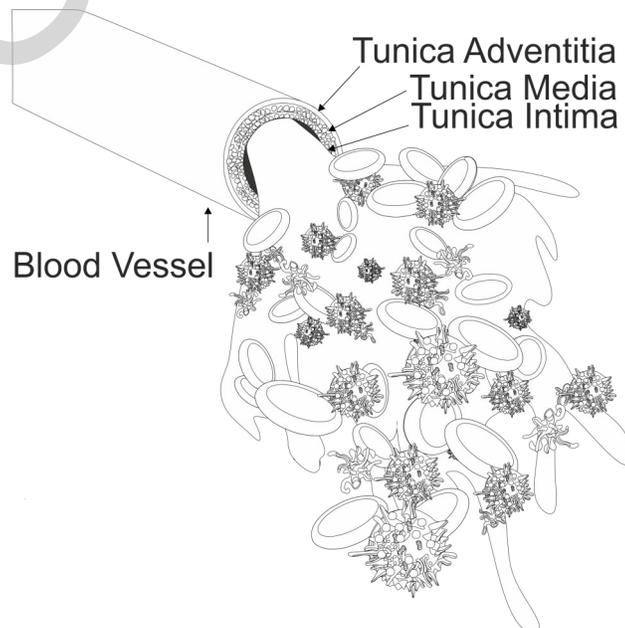
The largest artery in your body is the aorta, which we looked at when we studied the heart. Arteries run through your body, but a few of the most important are the carotid arteries, which carry blood to the head and neck; the subclavian arteries, which carry blood to the shoulders and arms; the iliac arteries, which go through the abdominal area and takes blood to the organs in the pelvis; and the femoral arteries, which carry blood through your legs.



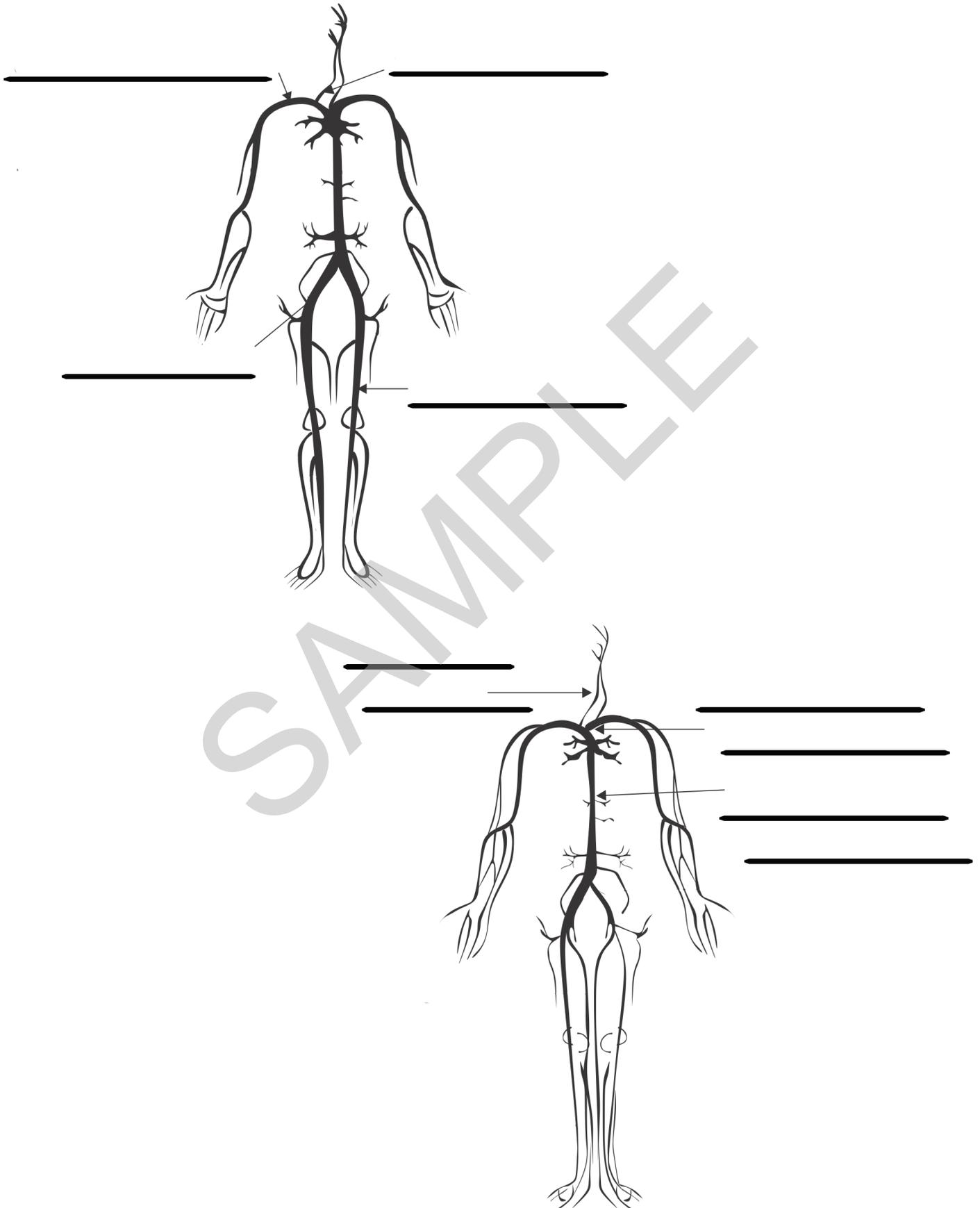
Veins, like arteries, run throughout your body, often running parallel to the arteries. Their destination is always the heart. The superior vena cava carries blood from your head and arms. The inferior vena cava carries it from your legs and trunk (the section of your body in the center, without the head, arms, and legs). The jugular veins carry blood from your brain, face, and neck.



Both the arteries and veins are made of layers. The outermost layer, the tunica adventitia, is made of elastic fibers that expand to allow the blood to travel through. They also contract, pushing the blood further along. This helps the heart not to have to work as hard because the blood vessels themselves are helping to keep the blood moving. The middle layer is made of smooth muscle cells and additional elastic fibers, and it is called the tunica media. The innermost layer, the tunica intima is made of connective tissue and more elastic fibers. To help remember the names, remember that "tunica" is from the Latin word that means "tunic" or "coat." Each tunica is a layer or coat. "Media" means "middle" in Latin, and "intima" means "inmost." "Adventitia" is harder, but it means "arrived from afar" or "foreign."



Before we look at what our blood is made of, let's review the major arteries (the top picture) and veins (the bottom picture) and their layers.



Terminology

Using what you learned, define these words in the best way you can. Use the back of the page if you need more room.

System: _____

Epithelial tissue: _____

Connective tissue: _____

Muscle tissue: _____

Nervous tissue: _____

Inhalation: _____

Diaphragm: _____

Oral cavity: _____

Nasal vestibule: _____

Pharynx: _____

Epiglottis: _____

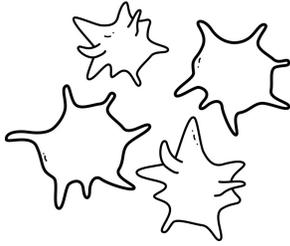
Larynx: _____

Trachea: _____

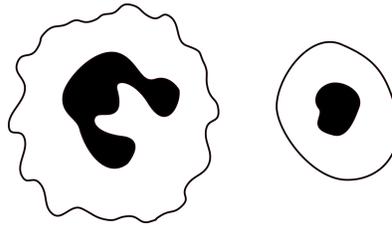
Bronchi: _____

Alveoli: _____

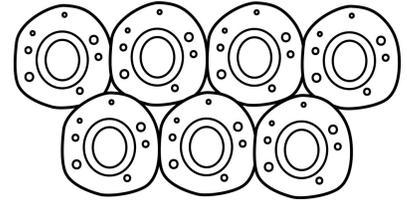
Which of the following is not a type of blood cell? Draw an X through it.



Platelet

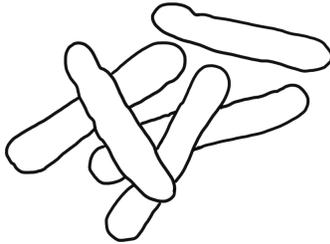


Leukocyte

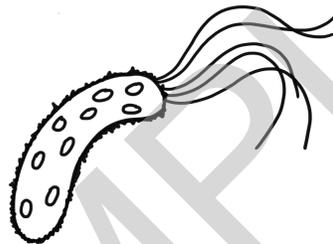


Hepatocyte

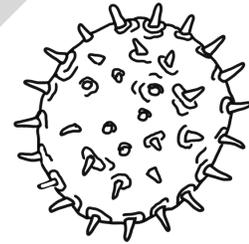
Which of the following viruses or bacteria is responsible for chickenpox? Draw a circle around it.



Tubercle bacilli



Vibrio cholerae



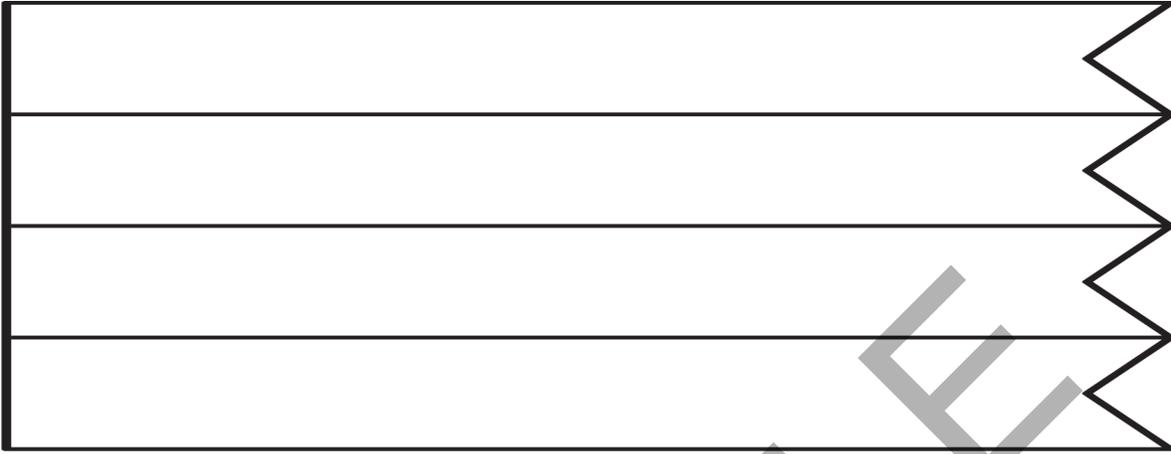
Varicella-zoster virus

Name six of the major parts of the digestive system:

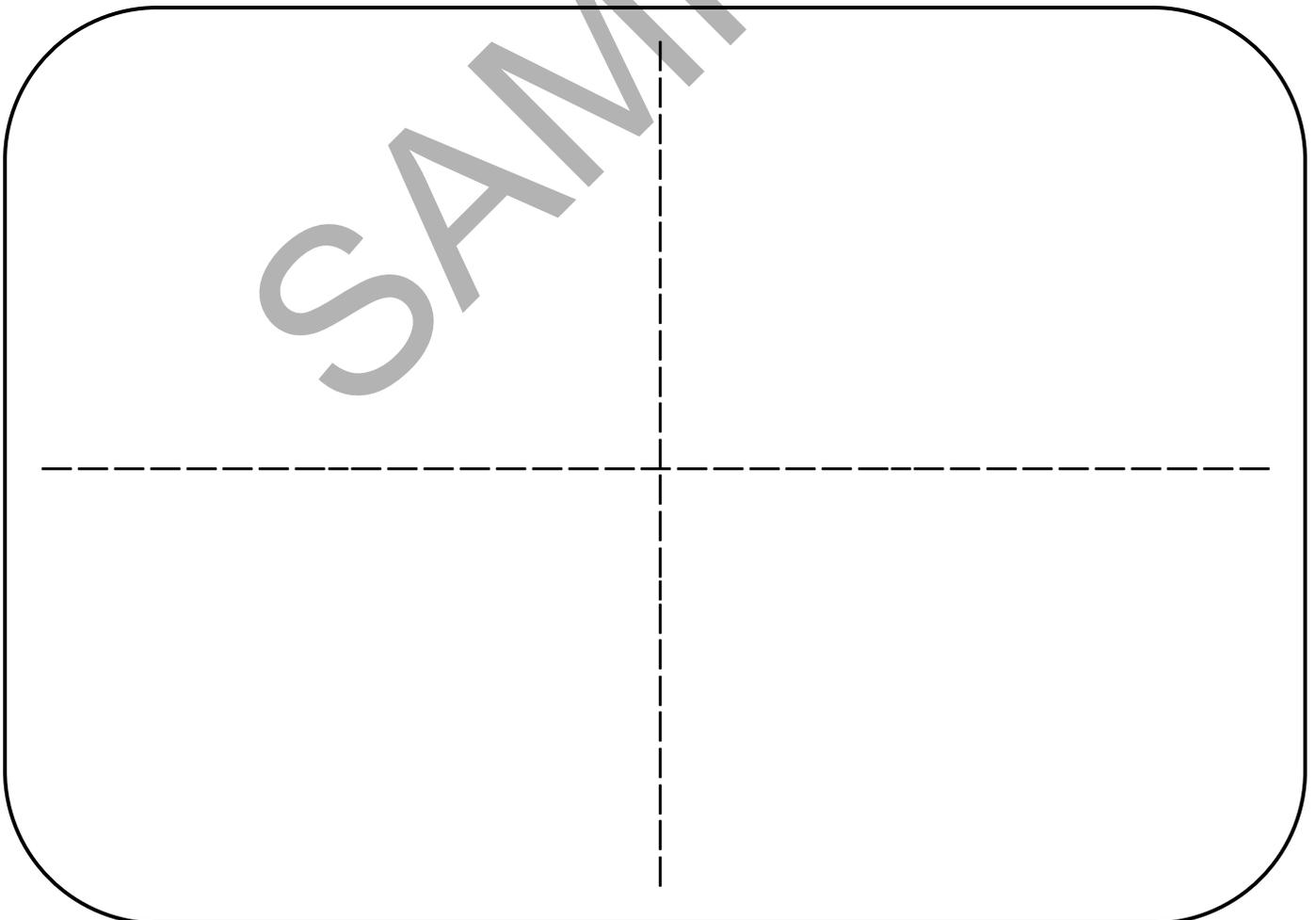
Describe the three different degrees of burns we discussed.

Human Anatomy and Diseases, Pt. 1 Notebook

We can learn about the body by organizing it into levels to study. What four levels (where each level is made of smaller parts) do scientists sometimes use?

A rectangular box divided into four horizontal sections by three lines. The right side of the box has a jagged, torn-paper edge.

Illustrate and label the four main types of tissues in your body. Summarize what you learned about each one.

A large rounded rectangle divided into four quadrants by a vertical dashed line and a horizontal dashed line. A large, light gray watermark reading "SAMPLE" is oriented diagonally across the center of the page.

Epithelial Tissue

Connective Tissue

Muscle Tissue

Nervous Tissue

SAMPLE

What is the main job of the respiratory system? _____

Why do we need air to breathe? _____

What is the diaphragm? _____

Illustrate and label the parts of the nose, mouth, and pharynx shown in the unit. Summarize what you learned about the parts.



A large, empty rounded rectangular box with a black border, intended for a student to draw and label the parts of the nose, mouth, and pharynx. A large, light gray watermark reading 'SAMPLE' is oriented diagonally across the box.

Oral Cavity

Nasal Vestibule

Pharynx

Nasopharynx

Oropharynx

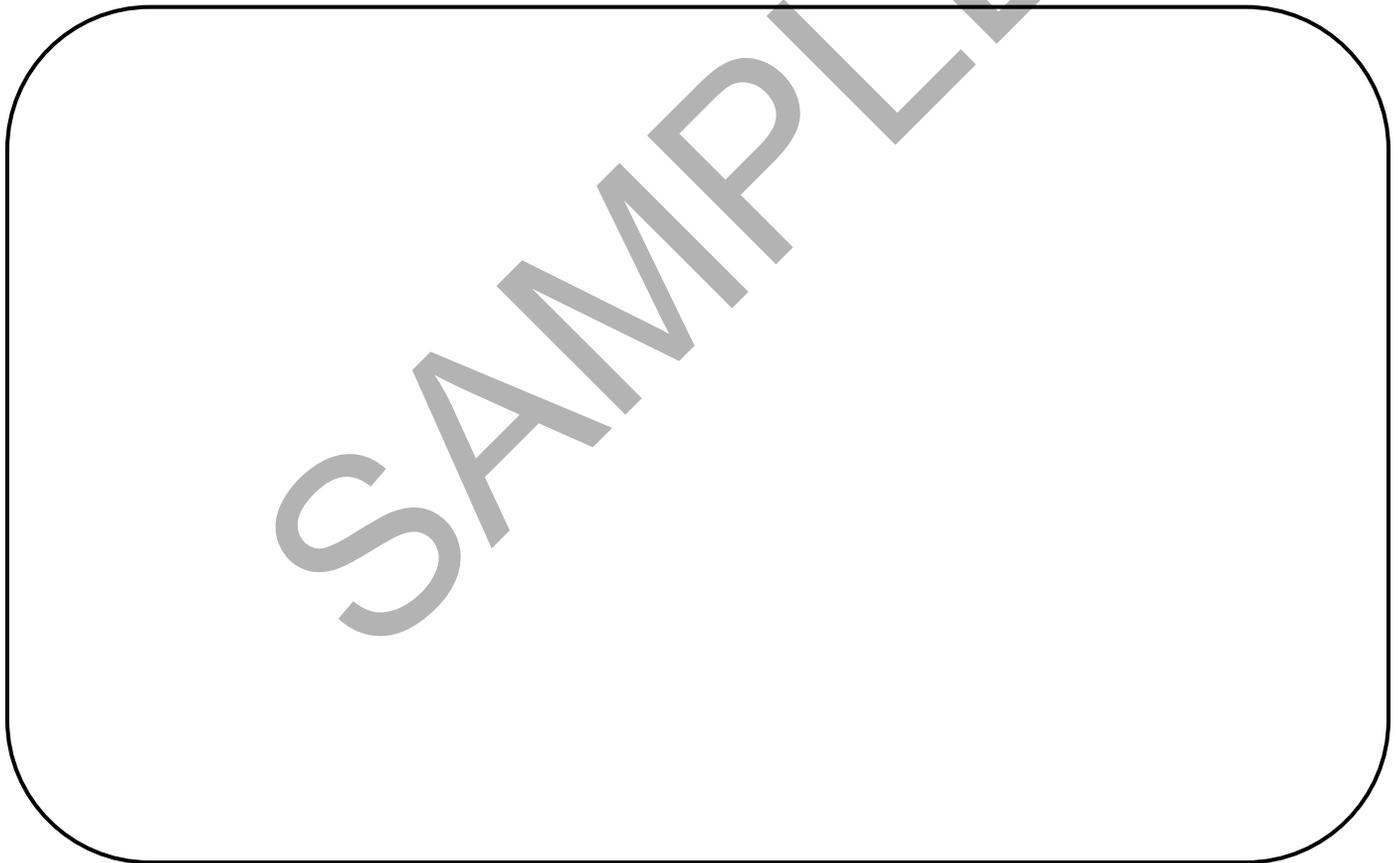
Laryngopharynx

SAMPLE

What helps us filter dust, bacteria, viruses, and other substances out of the air we breathe?

Why is the opening in the bronchi so much smaller in someone suffering from asthma?

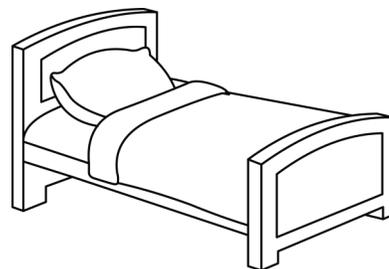
Draw and label two illustrations, one that shows the end of a healthy bronchi and one that shows signs of asthma.



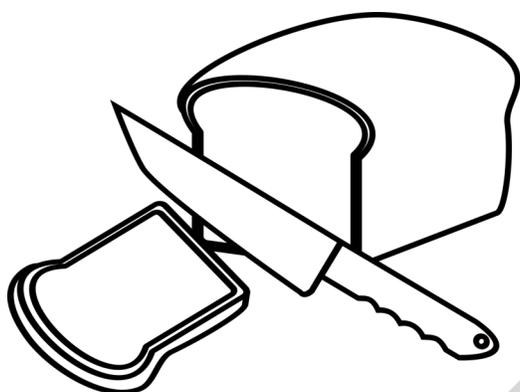
What surrounds each lung? _____

Physical and Chemical Changes

You know that everything you can see and touch is made of matter. Matter is made of molecules, and those molecules are made of even smaller atoms. Even though it's all made of atoms, matter has many different shapes and forms. The wood in your walls is different than the stuffing in your mattress (which is a good thing!). Water from your faucet is different than cotton candy.



Matter can also change. Steam and ice are both water, but they are not the same. A piece of wood can burn up in a fire. Let's look at some of the ways matter can change and then learn a little about ways it cannot change.

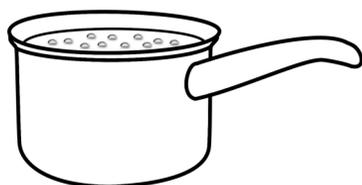


There are two basic ways matter can change. There can be a physical change or a chemical change. Physical changes happen all the time. Have you cut a piece of bread from a loaf? The bread is in a different shape now. It's in two pieces. But both the piece of bread you cut and the loaf are still bread. The substance of the bread hasn't changed, just the form.

What if you cut a piece of watermelon, chopped it up, and put it in the blender so you could make it into pulp for a smoothie? Is the pulp still watermelon? Of course it is. It's just watermelon in a different form.

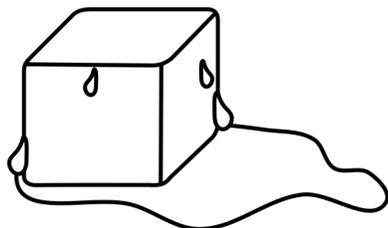
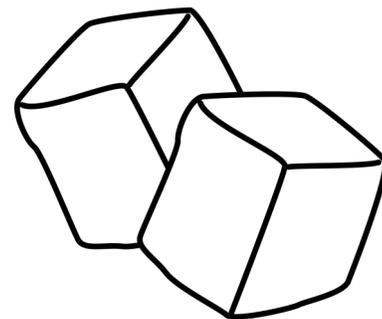


A **physical change** is a change in form or shape. When a physical change happens, you are left with the same substance you started out with. It might just look different.



What about water when it changes to steam or ice? You know that there are three basic states of matter—solid, liquid, and gas. When you heat water, you can cause it to reach the **boiling point**, which is the point where a liquid turns into a gas. Different types of matter boil at different temperatures. For example, water boils at 212 °F (100 °C), but iron boils at 5,432 °F (3,000 °C).

You can also freeze water. The **freezing point** of matter is the point where a liquid changes into a solid. Water turns into a solid at 32 °F (0 °C).



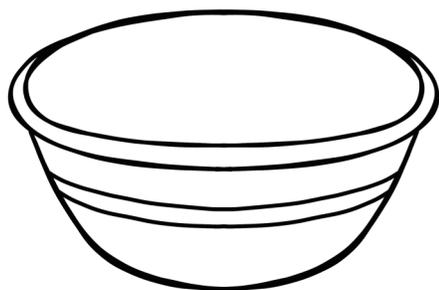
But of course, ice can also melt back into water. The **melting point** is the point where a solid becomes a liquid.

So when water freezes into ice cubes, melts into liquid water, or boils and changes into water vapor, what kind of change is that? These are all physical changes because no matter what state or form it's in, the water is still water. It looks different and acts differently, but it is still water. Nothing about the atoms in its molecules has changed. It's still two atoms of hydrogen and one atom of oxygen in each molecule, so it is still water.

What about when something like ice cubes in a glass cause the outside of the glass to drop in temperature? When the air hits the glass, some of it condenses into water droplets. The **condensation point** is the point where a gas turns into a liquid. Is this still a physical change? The answer is yes because the air is made up partly of water vapor. The air hasn't changed, but part of it has changed form from a gas to a liquid. But the water vapor was in the air all the time.



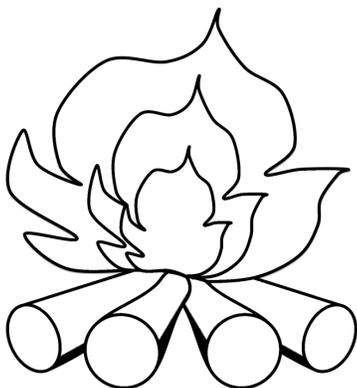
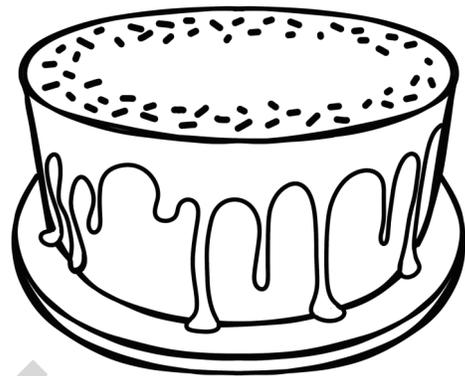
A few solids can change directly from a solid into a gas without changing into a liquid first. This is called **sublimation**. Only a few substances can do this, such as dry ice, iodine, arsenic, and camphor (moth balls).



What about when you mix together ingredients for a cake? This one gets tricky. When you have the ingredients together in the bowl, it's just a physical change. But when you bake it, something different takes place. We're going to look at chemical changes next to understand what happens.

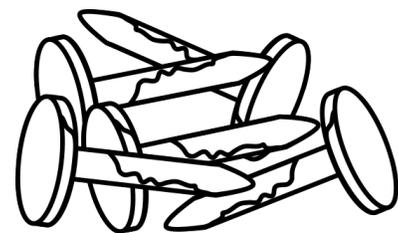
Now we know that a physical change is a change in form or shape that leaves you with the same substance. A **chemical change** is a change that happens in the molecules themselves that forms new substances.

When we bake a cake, a lot of changes happen. Heat changes some of the protein in the eggs, which makes the cake firm. Heat also causes baking powder to produce bubbles of gas, which makes the cake rise. Bubbles are often a sign of a chemical change. Another sign that it's a chemical change is that the ingredients can never be broken back down into the individual ingredients. They are permanently changed, and the molecules themselves are different in a baked cake than they were in the raw ingredients.



When you burn wood, you aren't left with wood anymore. You are left with ashes and smoke. Neither one of those can ever be wood again. As the fire burns, it gives off light and heat energy. Giving off energy is another good sign that something is a chemical change.

Sometimes, even a change in color is a sign of a chemical change. When iron and oxygen combine, a chemical change happens that produces rust. The rust isn't oxygen, and it's not iron. It's reddish-brown and not the color of the original iron. This happens on iron nails often. A chemical change has occurred.



Let's take a closer look at a chemical change in action. We're going to see what happens when we combine baking soda and vinegar. Remember that you should never try any experiment without a parent or teacher who can let you know what is safe to combine. Some combinations can be poisonous or even deadly.

Terminology

Using what you learned, define these words in the best way you can. Use the back of the page if you need more room.

Physical change: _____

Boiling point: _____

Freezing point: _____

Melting point: _____

Condensation point: _____

Sublimation: _____

Chemical change: _____

Oxidation: _____

Exothermic: _____

Endothermic: _____

Thermodynamics: _____

First law of thermodynamics: _____

Review

Circle the chemical changes shown below. Draw an X over the physical changes.



Physical and Chemical Changes Notebook

What are the two basic types of changes matter can undergo?

--	--

In a physical change, what changes? _____

Does the substance itself change in a physical change? _____

Illustrate an example of a physical change.

SAMPLE

What is a boiling point? _____

What is a freezing point? _____

What is a melting point? _____

What kind of change is it when water freezes into ice cubes, melts into liquid water, or boils and changes into water vapor?

What is a condensation point? _____

What is sublimation? _____

What are four substances that can undergo sublimation?

What part of baking a cake is a physical change? What part is a chemical change?

What is a chemical change? _____

What are two of the substances that change when you bake a cake? _____

What are bubbles often a sign of? _____

Are chemical changes permanent or temporary? _____

When you burn wood, does it undergo a physical change or a chemical change?

What does a fire give off that is another sign of a chemical change? _____

When iron rusts, what changes that is another sign of a chemical change?

Illustrate what happened in the experiment in the unit when baking soda and vinegar were combined. Summarize the basic steps in the experiment below.
(Remember not to try any experiment without a parent or teacher's permission because some can be very dangerous.)



Now summarize what happens chemically in the experiment and illustrate the chemical makeup of baking soda and acetic acid.



What causes an apple to turn brown? _____

What protects the inside of an apple from oxygen? _____

What happens when the peel is broken? What is formed, and how does the apple change color?
