



LEARN ABOUT

The Respiratory and Circulatory Systems

FIND OUT

- what breathing does for the body
- why blood is important to the body's cells

VOCABULARY

lungs
capillary
heart
artery
vein

The Respiratory System

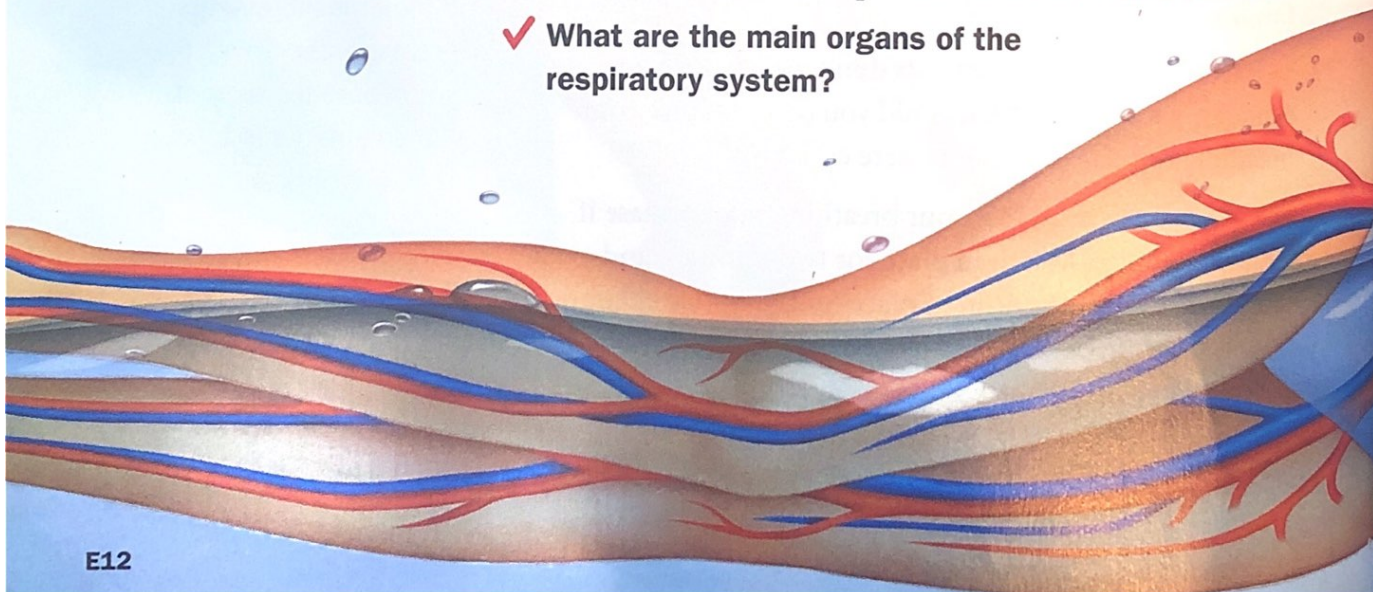
Your body's cells need oxygen to work. When you breathe in, you take in oxygen your cells need. As your cells do work, they give off carbon dioxide. When you breathe out, you get rid of carbon dioxide that cells give off.

You saw in the investigation that your breathing rate goes up as your body works harder. That's because as muscles do more work, they need more oxygen. They also give off more carbon dioxide. You breathe in and out faster to bring in more oxygen and to get rid of more carbon dioxide.

The main organs of the respiratory system are the **lungs**. Air enters your body through your nose and mouth. It goes down your *trachea* (TRAY•kee•uh) to your lungs. As you breathe in, your chest gets bigger and your lungs fill with air.

Your trachea divides to form a system of tubes in your lungs. These tubes look like the branches of a tree. The branches get smaller and smaller until they end in air sacs. All around the air sacs are tiny blood vessels called **capillaries** (KAP•uh•lair•ees). The walls of the air sacs and the capillaries are very thin. Oxygen passes easily through these walls, moving from the air sacs into blood in the capillaries. Carbon dioxide passes the other way, from blood in capillaries into the air in the air sacs.

✓ **What are the main organs of the respiratory system?**



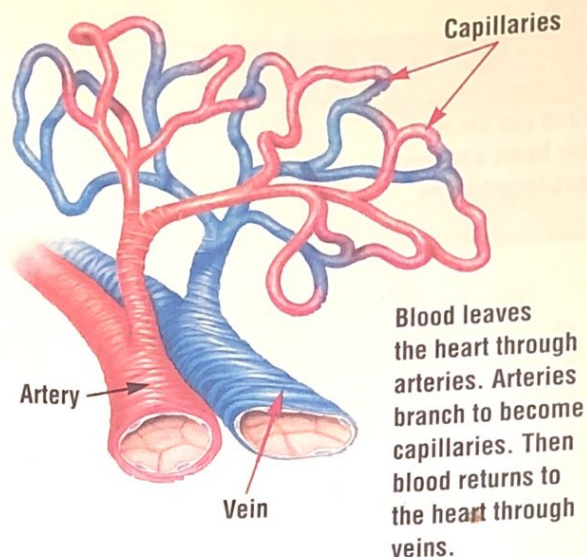
The Circulatory System

The capillaries around the air sacs in your lungs are part of your circulatory system. Your circulatory system includes your heart and all of your blood vessels, the tubes blood flows through. The job of the circulatory system is to take blood to all of your body's cells.

The **heart** is the muscle that pumps blood through your blood vessels to all parts of your body. It is only as big as your fist. It is very strong and works all the time, resting only between beats.

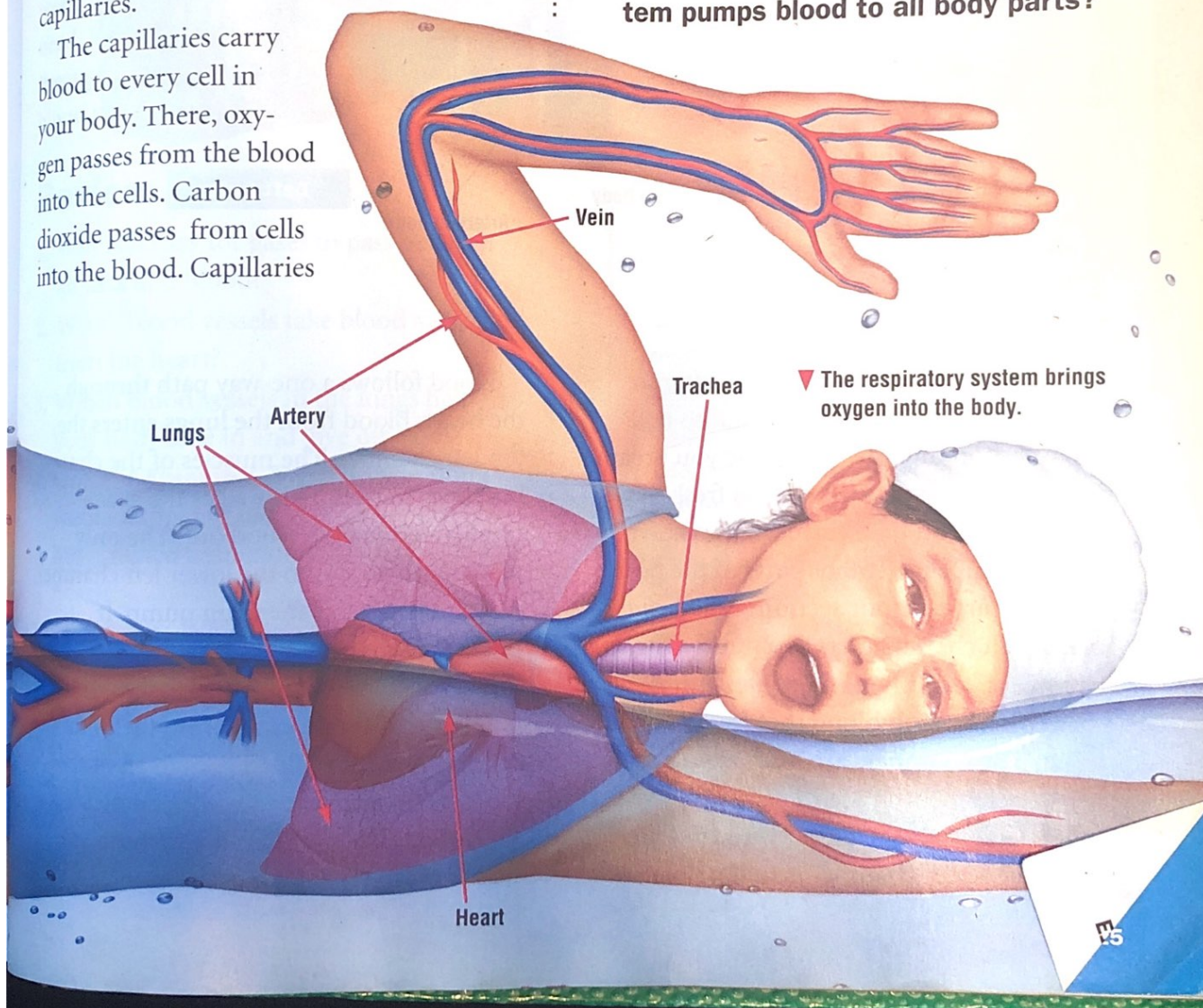
Blood leaves the heart through blood vessels called **arteries**. Arteries branch out to all parts of your body. They become smaller and smaller until they become tiny capillaries.

The capillaries carry blood to every cell in your body. There, oxygen passes from the blood into the cells. Carbon dioxide passes from cells into the blood. Capillaries

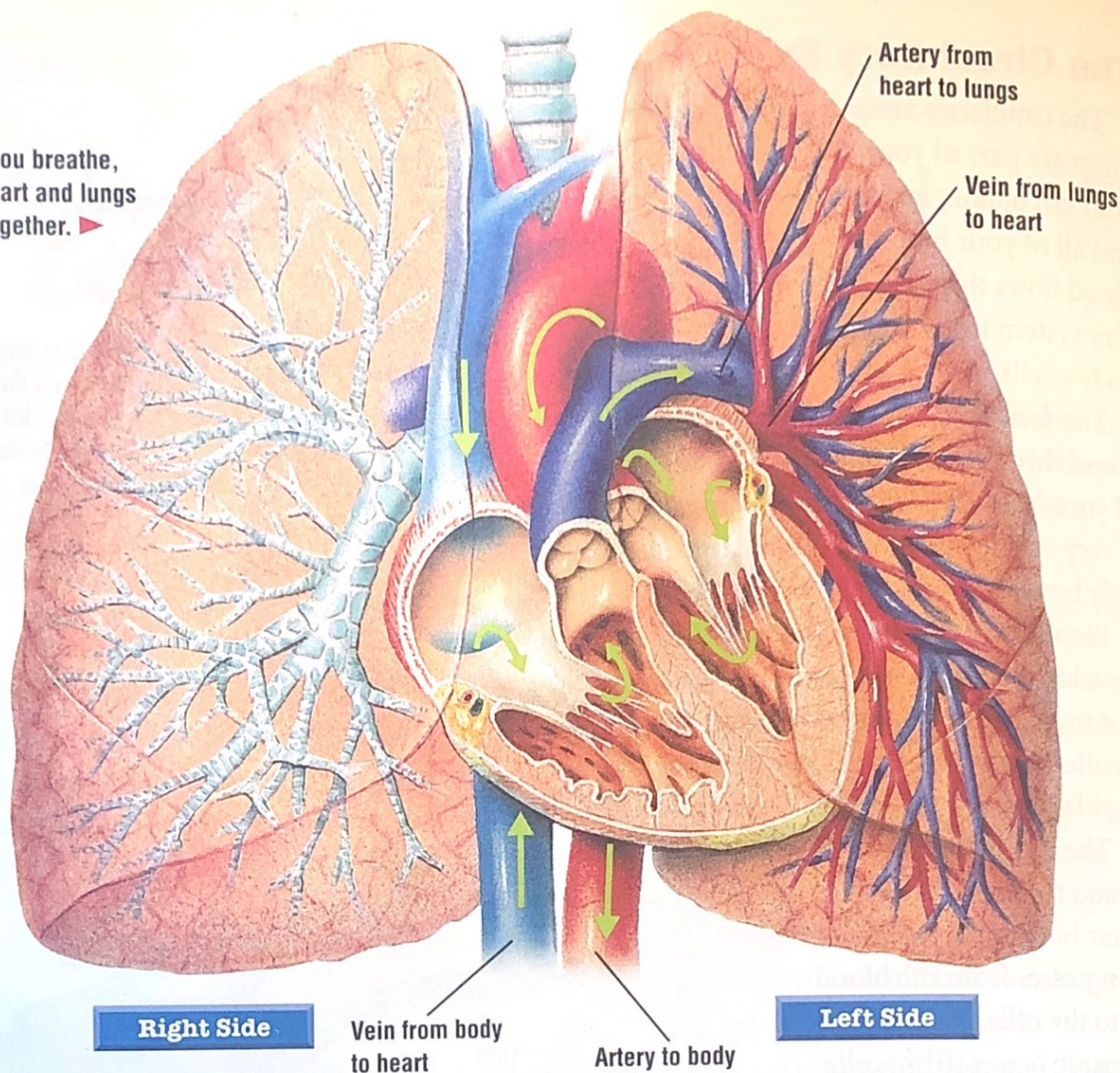


then become veins. **Veins** are the large blood vessels that return the blood to your heart.

✓ Which part of the circulatory system pumps blood to all body parts?



When you breathe,
your heart and lungs
work together. ►



The Heart and Lungs Work Together

The heart and lungs work together to bring oxygen into your body and to take away carbon dioxide. Each time you breathe in, the blood in your lungs gets fresh oxygen. This blood then travels to the heart, which pumps it to other parts of the body.

The heart has four sections called *chambers*. Each chamber acts as a pump. The chambers keep blood that enters the heart from mixing with blood that leaves the heart. The chambers are connected by openings. Each opening is covered by a valve that opens in only one direction. Each valve closes when its chamber is full.

Blood follows a one-way path through the heart. Blood from the lungs enters the top left chamber. The muscles of the chamber then shorten. This makes the space smaller, forcing the blood out. The only place it can go is into the lower left chamber.

This chamber is the main pump. It pushes blood through the whole body. When this chamber is full, it pushes the blood out of the heart and into the body's largest artery. The blood goes to all of the body, carrying oxygen to cells and picking up carbon dioxide. Then it returns to the heart.

Blood returning to the heart goes into the top right chamber. The muscles of this chamber force the blood into the chamber below.

The lower right chamber pumps the blood to the lungs. Here carbon dioxide leaves the blood and more oxygen enters. The blood is ready for another trip to the heart. It will be pumped around the body once again.

✓ **What makes blood follow a one-way path through the heart?**

Summary

Lungs are the organs the body uses to breathe. Breathing trades carbon dioxide, a waste cells give off, for oxygen, which cells need. Blood carries gases to and from cells through blood vessels. The heart pumps blood through the body.

Review

1. Why is it easy for gases to pass between air sacs and blood?
2. Which blood vessels take blood away from the heart?
3. Which blood vessels in the lungs help your body take in and give off gases?
4. **Critical Thinking** What do you think would happen if blood entering the heart mixed with blood leaving the heart?
5. **Test Prep** Which is a waste product of cells?
 - A blood
 - B water
 - C oxygen
 - D carbon dioxide



LINKS



MATH LINK

Interpret Data Knowing your target heart rate helps you exercise at a safe and healthful level. When you exercise, keep your heart rate between the maximum and minimum rates.

Exercise Heart Rate		
Age	Minimum	Maximum
8	127	180
9	$126\frac{1}{2}$	179
10	126	$178\frac{1}{2}$
11	125	178

Do you think a 13-year-old would have a higher or lower maximum exercise heart rate than an 11-year-old? Why?



WRITING LINK

Expressive Writing—Song Lyrics Write a funny song for a younger student. Tell about a molecule of oxygen that enters the lungs. Explain what happens when it refuses to go to just any cell because it wants only to visit the big toe.



TECHNOLOGY LINK

Learn more about keeping heart beats regular by visiting the Smithsonian Institution Internet site.
www.si.edu/harcourt/science