

Body systems and diseases

Engage!

+ Show me your hands!

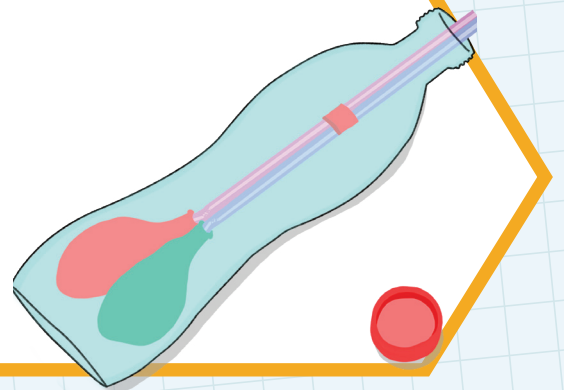
You will need cotton swabs, glue, white paint and black construction paper. Paint the palm of your hands with the white paint. Make prints of your hand on the black paper. Glue cotton swabs onto your handprints for bones.

- 1 What parts of the body do the cotton swabs represent?
- 2 What functions do they have in the human body?

Explore!

+ How do we breathe?

Objective: Make a model of the respiratory system.



Method

- 1  Work in pairs or groups. With the help of your teacher, cut the bottom off the bottle, and make a hole in the cap so you can pass the two straws through.
- 2 Push the flexible end of a straw inside each balloon and secure it with tape. Tape the straws together.
- 3 Pass the other end of the straws up through the bottom of the bottle and then the cap. Press modeling clay between the cap and straws so that no air can escape. The balloons should hang halfway up the bottle.
- 4 Cut the mouth off the third balloon, and stretch the balloon over the bottom of the bottle. Secure it with tape.
- 5 Carefully pull on the balloon at the bottom of the bottle and observe what happens. Then push the balloon back in and observe what happens.

You will need

- ☐ a craft knife
- ☐ a plastic bottle and cap
- ☐ 2 straws with flexible ends
- ☐ 3 balloons
- ☐ electrical tape
- ☐ modeling clay



Observations



- 1 What happens when you pull on the balloon at the bottom of the bottle?

- 2 What happens when you push in the balloon at the bottom of the bottle?

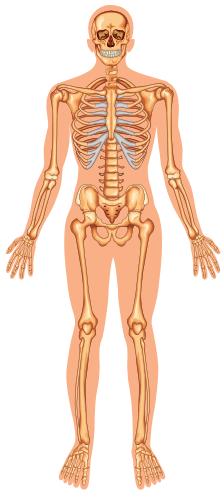
Conclusions



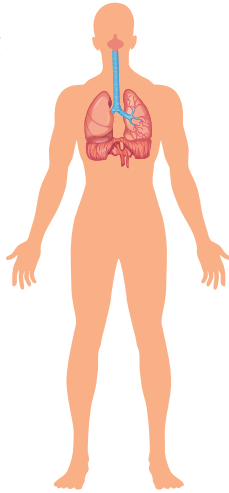
- 1 What does this model represent?

- 2 What organs do the two balloons inside the bottle represent?

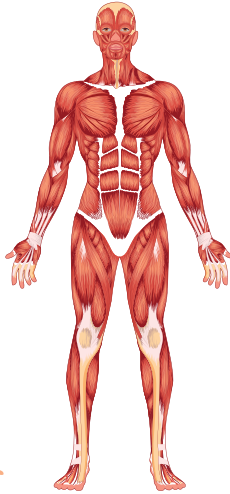
- 3  How does air enter and leave your lungs when you breathe?



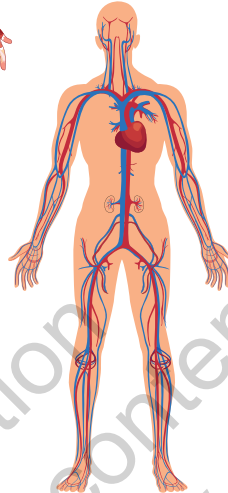
skeletal system



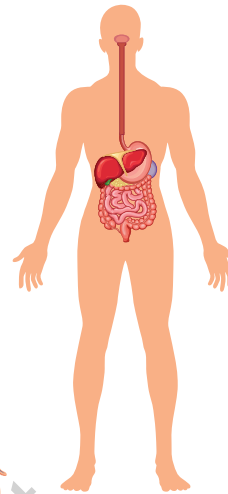
respiratory system



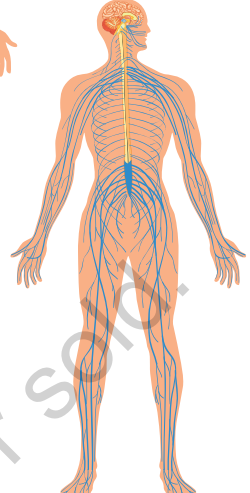
muscular system



circulatory system



digestive system



nervous system

+ What are organs and organ systems?

An **organ** is a part of the body that does a specific job. For example, the **lungs** bring oxygen into your **blood** and remove carbon dioxide from it. The liver stores energy for the body, produces chemicals that help with digestion, and works with the kidneys to clean your blood. The stomach helps digest food, and the small intestine **absorbs** nutrients from digestion into the blood. Your skin protects the inside of your body from the outside and lets you sense your environment.

Organs are grouped into **organ systems**. In an organ system, several organs work together to do a job. For example, the **heart** and the **blood vessels** make up the **circulatory system**. They work together to pump blood around the body. Blood takes oxygen and nutrients to all the **cells** and carries away carbon dioxide and waste. Another example is the **respiratory system**, which includes the nose, mouth, throat and lungs. This system brings oxygen into the body and removes carbon dioxide. The skeletal system and muscular system work together to move your body. The nervous system, which includes the brain, spinal cord and nerves, controls all the other systems and allows you to think and control your movements. The digestive system, which includes the mouth, tongue, stomach, intestines and anus, breaks down food containing carbohydrates, fats and proteins into smaller, soluble molecules that can enter the blood.

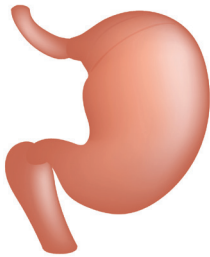
Practice

1 Match the organs with the functions.

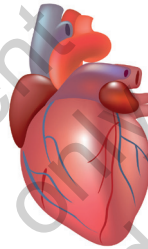
- | | |
|------------------------|---|
| a. The kidneys | protects the inside of your body. |
| b. The liver | absorbs nutrients into your blood. |
| c. The small intestine | filter waste from your blood. |
| d. The skin | stores energy and helps with digestion. |

2 Label the organs and write which organ systems they belong to.

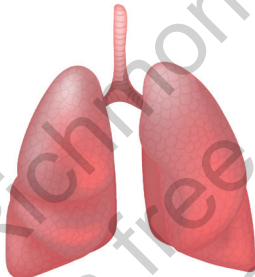
a.



c.



b.



d.



3 What do these organs do?

- a. heart: _____
- b. lungs: _____
- c. brain: _____

4  Point to where these organs are in your body.

brain heart kidneys liver lungs stomach



+ What is the function of blood in the human body?

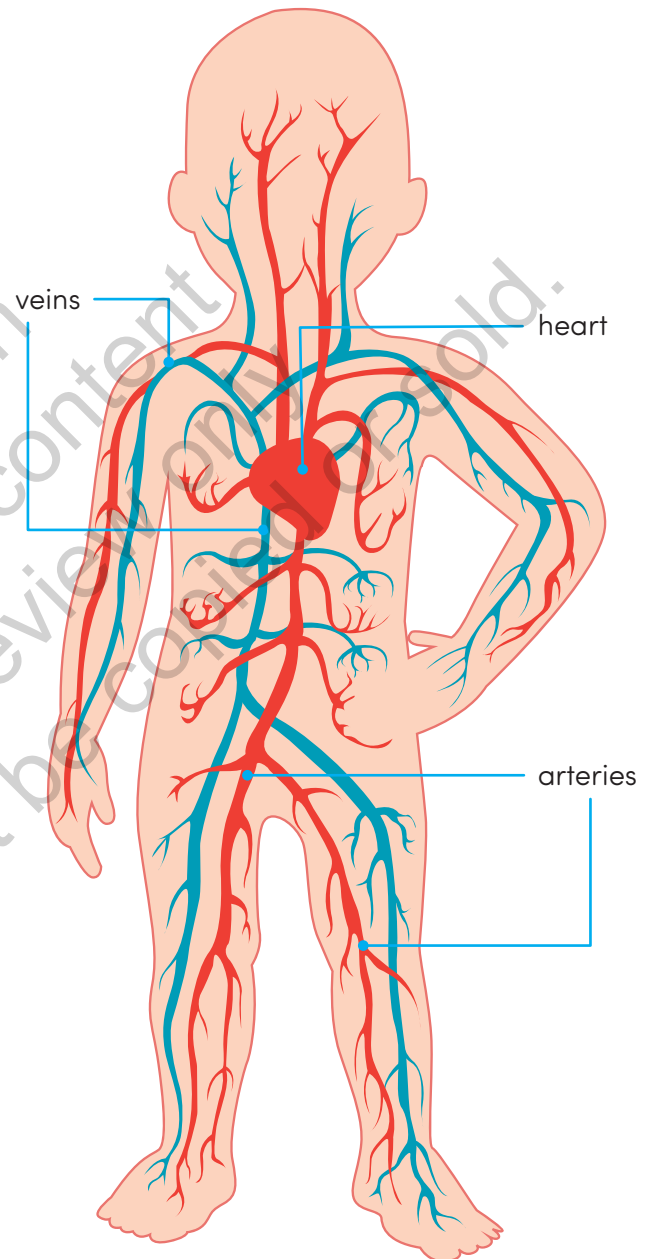
The circulatory system includes the heart, blood and three types of blood vessels:

arteries, **veins** and **capillaries**.

The main organ of the circulatory system is the heart. It pumps blood around the body. Blood carries nutrients and water from the small intestine and oxygen from the lungs to all the cells in the body.

When the heart pumps, it pushes blood out along arteries. Arteries are thick blood vessels that carry blood away from the heart under high pressure. Blood continues along the arteries throughout the body until it gets to capillaries. Capillaries are tiny blood vessels with thin walls. Cells absorb water, nutrients and oxygen from the capillaries. At the same time, blood absorbs waste and carbon dioxide from the cells. From the capillaries, blood travels back to the heart along veins. Veins are not as thick as arteries because the blood pressure is now much lower. Waste is removed from the blood in the kidneys, which turn it into urine. Carbon dioxide is removed from the blood in the lungs, where the blood absorbs more oxygen again.

This journey is continuous: after leaving the heart again, the blood picks up more nutrients from the small intestine and more oxygen from the lungs and the process repeats.

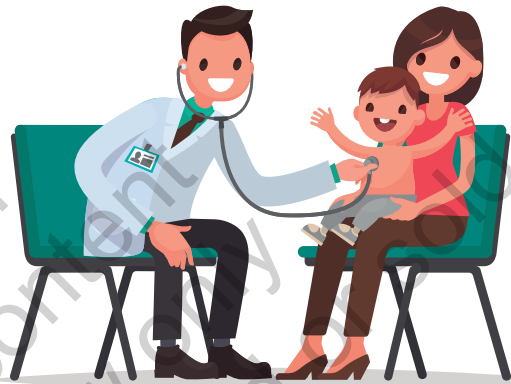


Practice

- 1 What is the function of blood in the human body?

- 2  Read the text and answer the questions.

The heart is the most important organ in the circulatory system. It beats 100,000 times a day and pumps five liters of blood every minute. A doctor counts your heartbeats with a stethoscope.



- a. Place your hand on your chest and count your heartbeats for one minute. How many heartbeats did you count?

- b. Run in place for one minute. Now, count your heartbeats again. How many heartbeats did you count this time?

- c. Did your heart beat more or less after exercise? Why do you think this is?

- 3 Complete the sentences.

- a. The _____ pumps blood around the body.

- b. Blood leaves the heart through _____ and returns to the heart through _____.

- c. Blood carries _____ and _____ to the cells.

- d. Cells absorb water, oxygen and nutrients from the _____.

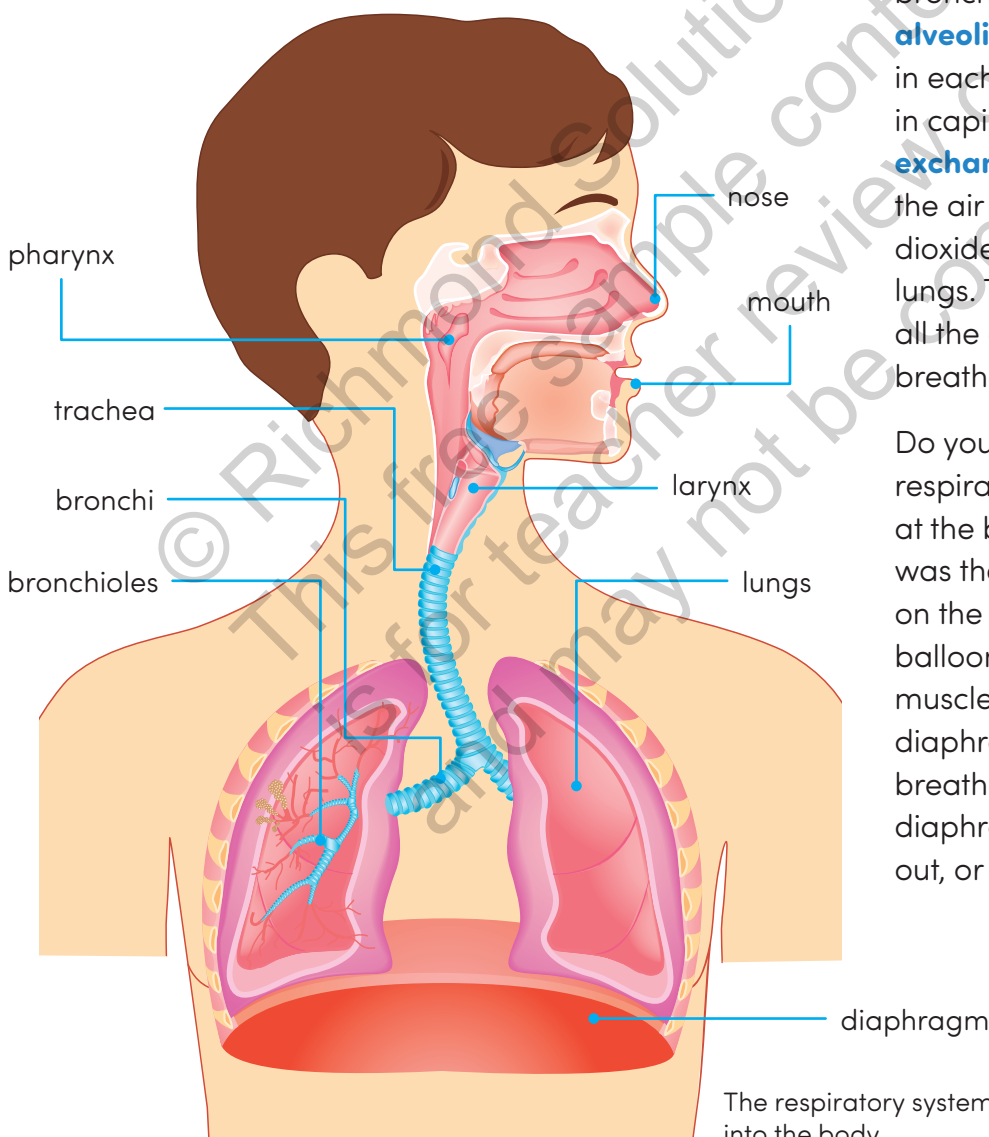
+ What is the respiratory system?

Humans, like all animals, need to eat, drink water, remove waste and breathe. Breathing allows us to get the oxygen that we need to survive. Our cells use oxygen to release energy from food during **respiration**. This process also produces carbon dioxide. Breathing removes the carbon dioxide from the body.

Oxygen gets into the blood through the respiratory system. The main organs of this system are the lungs. When we breathe in, air enters our mouth or nose. It passes down through the **pharynx**, the **larynx** and then the **trachea**. The trachea is a tube that connects the throat to the lungs. The trachea divides into two **bronchi** before reaching the lungs. In the lungs, the bronchi divide into

bronchioles. Air travels through the bronchioles to tiny air sacs called **alveoli**. There are millions of alveoli in each lung, and they are covered in capillaries. In the alveoli, **gas exchange** takes place: oxygen from the air enters the blood, and carbon dioxide from the blood enters the lungs. The blood then takes oxygen to all the cells of the body, and the lungs breathe out the carbon dioxide.

Do you remember the model respiratory system that you made at the beginning of this unit? What was the purpose of the balloon on the bottom of the bottle? This balloon represents the **diaphragm** muscle under the lungs. When the diaphragm contracts, the lungs breathe in, or **inhale**. When the diaphragm relaxes, the lungs breathe out, or **exhale**.



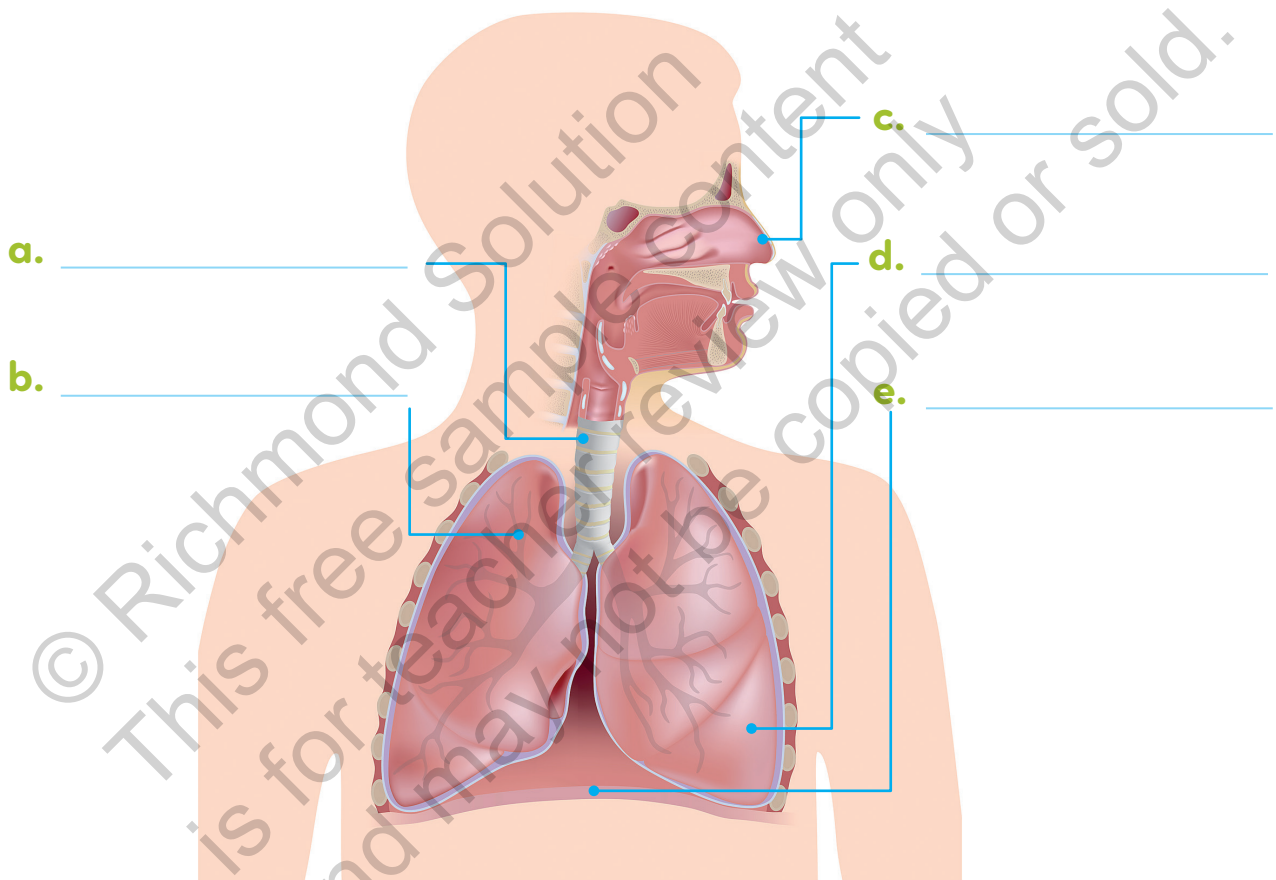
The respiratory system brings oxygen into the body.

Practice

1 Match the parts of the respiratory system with the functions.

- | | |
|-------------------|--|
| a. trachea | We inhale air through these. |
| b. diaphragm | Air passes through these to the alveoli. |
| c. nose and mouth | This connects the throat to the lungs. |
| d. bronchioles | This muscle makes the lungs expand and contract. |

2 Label the parts of the respiratory system.



3 Answer the questions.

a. Why do we need air?

b. What happens in the alveoli?



+ What causes diseases?

Infectious diseases can spread from one person to another. They are caused by tiny living things called germs, or **pathogens**, such as bacteria, viruses, fungi and parasites. When these pathogens enter the body, they may multiply and cause an **infection**.

- Infections caused by viruses include the flu, the common cold, COVID-19, hepatitis, chicken pox and HIV.
- Cholera, tuberculosis, tetanus and salmonella are caused by bacteria.
- Examples of fungal infections are athlete's foot and ringworm.
- Diseases caused by parasites include malaria and Chagas disease.

These diseases spread through contact with infected saliva, blood, urine, feces or living things. They infect different parts of the body:

- The common cold and the flu enter the body through the respiratory system when we breathe in infected air.
- Cholera and salmonella enter through the digestive system when we consume **contaminated** food or drink.
- Malaria and Chagas disease enter the circulatory system directly when an insect carrying the disease sucks on your blood.
- Athlete's foot spreads when there is contact between skin and the fungus that causes it, such as on the wet floor of a swimming pool.

Not all diseases can spread from one person to another. For example, diabetes, cancer and asthma are not caused by pathogens, and they do not spread by contact.

Coughing and sneezing expel air and other substances, including pathogens, from our lungs.



Parasites in a mosquito's saliva enter the blood when it bites someone.

Practice

- 1  Categorize the diseases. Investigate and add more.

athlete's foot Chagas disease common cold flu
malaria ringworm salmonella tuberculosis

Bacteria	Viruses	Parasites	Fungi

- 2 Match the diseases with what they infect.

- | | |
|-------------------|--------------------|
| a. COVID-19 | circulatory system |
| b. athlete's foot | respiratory system |
| c. cholera | digestive system |
| d. Chagas disease | skin |

- 3 Choose the infectious diseases.

- | | | |
|--------------------------------------|-----------------------------------|-----------------------------------|
| a. ☐ flu | c. ☐ diabetes | e. ☐ asthma |
| b. ☐ common cold | d. ☐ cancer | f. ☐ COVID-19 |

- 4  Investigate. Use the internet to research an infectious disease and complete the table.

Name of disease	
Pathogen	
Organ/System infected	
Symptoms	



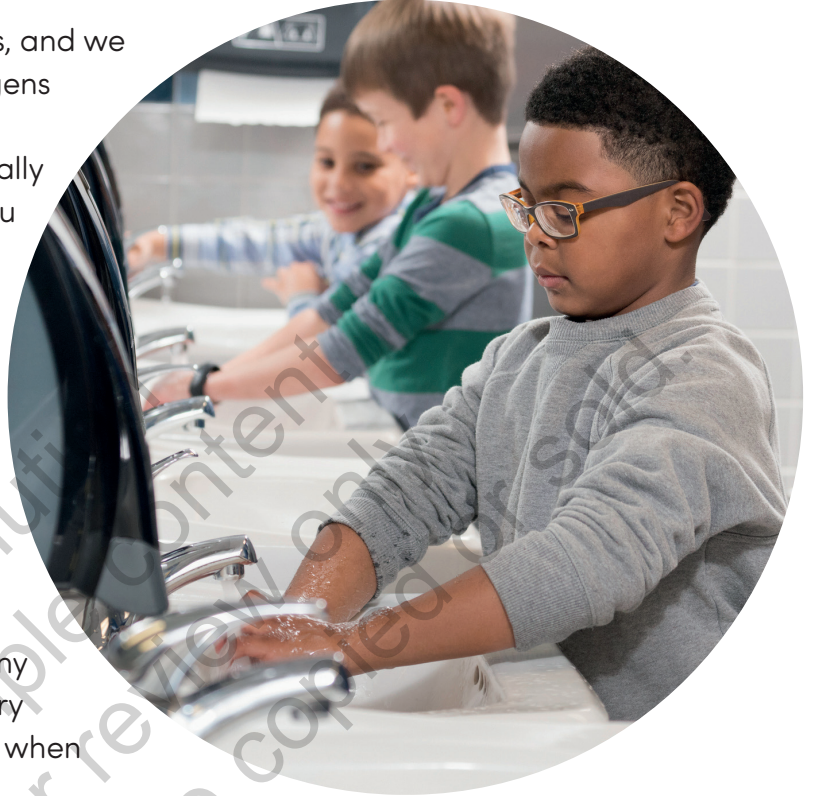
+ How can we control the spread of diseases?

Infectious diseases are spread by pathogens, and we catch infectious diseases when these pathogens enter our body. The most effective way of preventing infection is good **hygiene**, especially handwashing. Can you think of times that you should wash your hands? If washing your hands is not an option, you can use **hand sanitizer** instead.

Washing your hands is especially effective in preventing diseases that affect the digestive system, like cholera and typhoid. To avoid such diseases, you should also drink only clean water and wash raw food. Cooking food can kill pathogens if the temperature is high enough. Always cover any food left out. Flies and other insects may carry bacteria on their feet, which may infect food when they land on it.

Wearing a face mask can prevent respiratory diseases from spreading. If you have an infectious disease, a mask helps prevent pathogens from entering the air when you exhale, cough or sneeze, so other people are less likely to get infected.

In areas where malaria is common, people take several measures to avoid infection. Mosquitoes, which spread malaria, need water to reproduce, so it is important to empty containers of standing water. Screens over doors and windows prevent mosquitoes from entering a building, and sleeping under a mosquito net prevents them from biting at night. Insecticides kill mosquitoes, and some mosquito nets have insecticide in them, too.



Wash your hands after going to the bathroom, handling animals, playing outside and before preparing or eating food.



Mosquitoes can reproduce in even a small amount of water.

Practice

1 Choose the true sentences.

- a. ☐ You should always wash your hands after eating.
- b. ☐ Flies can spread bacterial diseases.
- c. ☐ Wearing a mask only protects yourself.
- d. ☐ Bacteria can infect cuts and scrapes.

2 Match the steps with the pictures.

1



2



3



4



5



6



- a. Clean your nails on your palms.
- b. Wash each thumb.
- c. Spread the soap evenly on your hands.
- d. Now, your hands are clean!
- e. Squeeze a little soap on your hands.
- f. Wash between the fingers.

3 Answer the questions.

a. What measures do you take to avoid infectious diseases?

b. What else can you do?



+ How does the human body fight disease?



Eyelashes and tears protect the eyes.

The human body has several mechanisms to prevent pathogens from entering and causing infection. Some of these are physical barriers, and others are **secretions** that kill pathogens.

Eyelashes help prevent pathogens from entering the eyes. When something gets in your eye, **tears** wash it away. Tears also prevent bacteria from multiplying.

Earwax and hairs in the ears stop pathogens from entering the ears, and earwax can also kill bacteria.

Nasal hairs catch dust and pathogens before they can get farther into the respiratory system. If any get through this first line of defense, they get caught in **mucus**, a sticky secretion in the respiratory system. Then little hairs move the mucus up to your mouth and nose. From there, it is either expelled when you cough or blow your nose, or swallowed and digested in your stomach. Mucus also contains chemicals that can kill pathogens.

Skin forms a physical barrier to stop pathogens from entering the body directly, and chemicals in sweat kill pathogens on the skin. If you cut your skin, the blood quickly **clots** and forms a **scab**. This scab prevents bacteria from entering the wound and infecting it, and it also allows new skin to grow underneath.

The stomach produces strong acids that not only help digest food but also kill any pathogens that are in it.



Ear hairs and earwax protect the ears.



Scabs stop pathogens from entering through a cut or scrape.

Practice

1 Choose the secretions and parts of the body that defend the body from infection.

a. ☐ skin

c. ☐ stomach acid

e. ☐ eyelashes

b. ☐ kidney

d. ☐ ear hairs

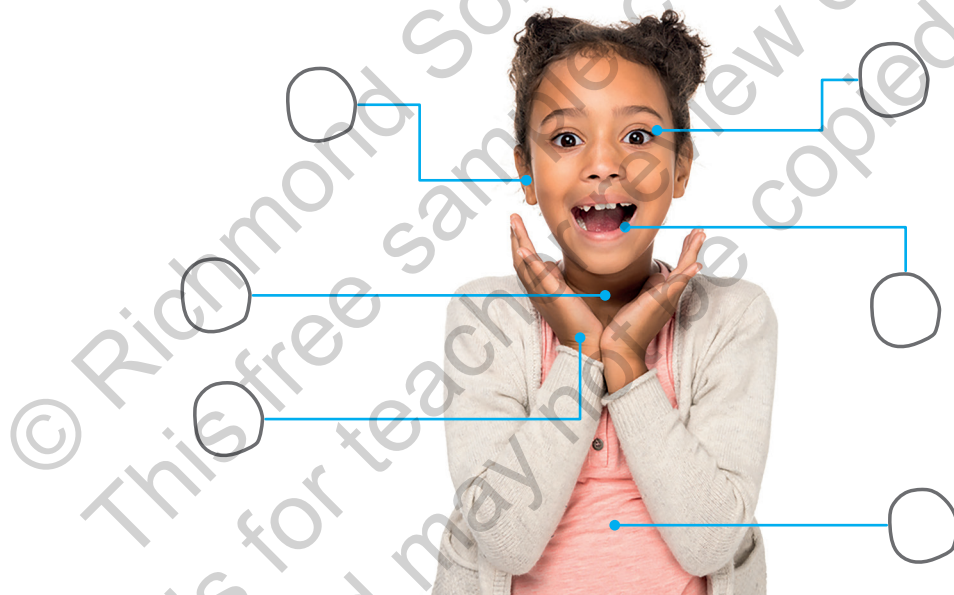
f. ☐ mucus

2 Answer the questions.

a. How does your body respond when you have a cut?

b. What else can you do to prevent pathogens from entering a cut or scrape?

3 Match the sentences about the body's defense mechanisms with the parts of the body.



a. Hairs prevent pathogens from entering, and wax kills bacteria.

b. Lashes stop germs and dust from getting in.

c. Mucus traps pathogens, and hairs move the mucus to the mouth and nose.

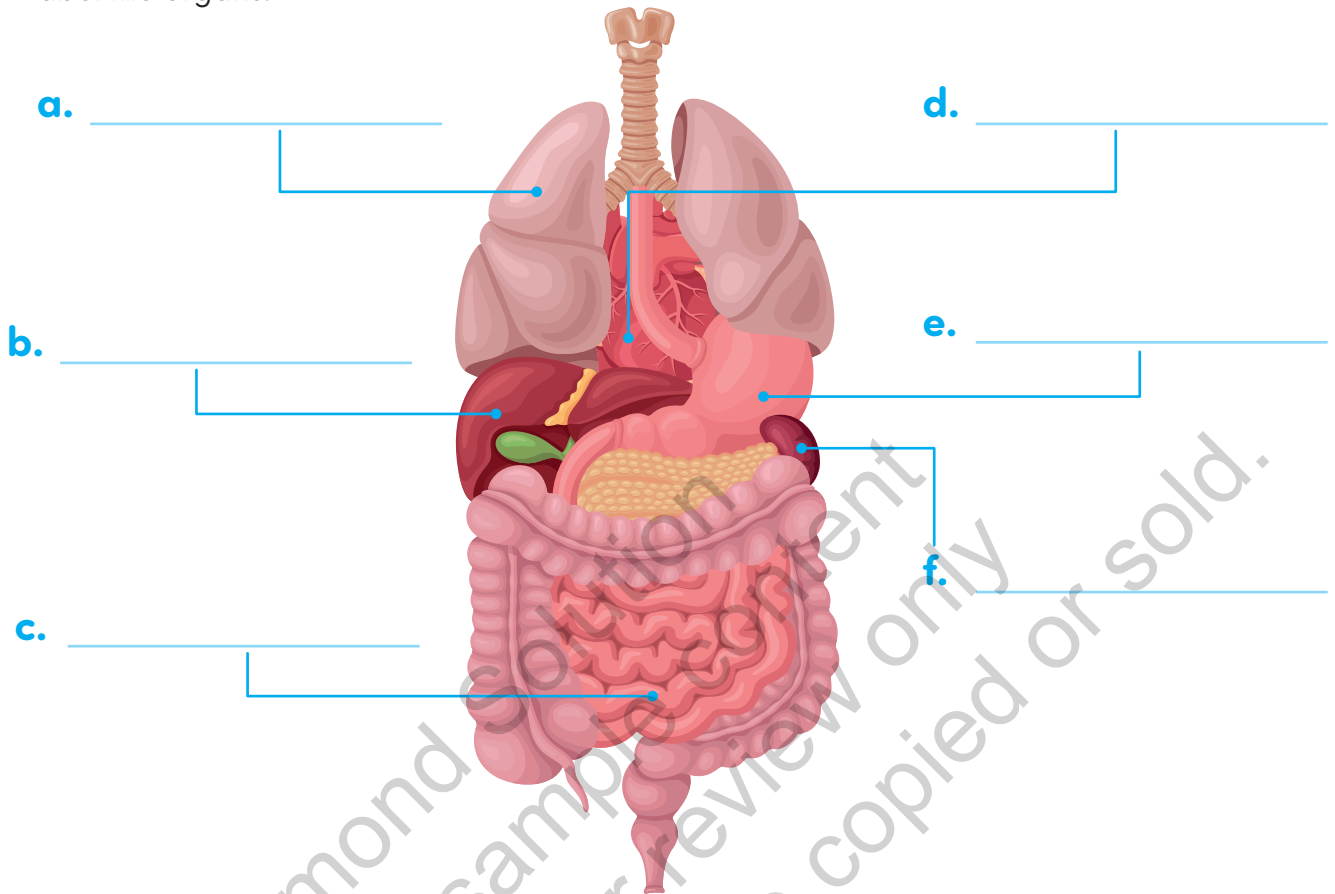
d. Acid kills any pathogens that get in here.

e. Saliva kills pathogens.

f. This protects the inside of the body, and chemicals in sweat kill pathogens.

Check my progress ✓

1 Label the organs.



2 What path does air take when you breathe? Number the organs in order.

- | | | |
|----------------------------------|---|--|
| a. ☐ trachea | c. ☐ alveoli | e. ☐ bronchioles |
| b. ☐ bronchi | d. ☐ pharynx and larynx | f. ☐ nose or mouth |

3 Choose the true sentences.

- a. ☐ Arteries are thicker than veins.
- b. ☐ Blood leaves the heart through veins.
- c. ☐ Cells absorb oxygen and nutrients from capillaries.
- d. ☐ The blood in veins is at higher pressure than in arteries.
- e. ☐ Blood absorbs oxygen in the lungs and nutrients in the small intestine.

4 Match.

- a. diseases caused by bacteria
- b. diseases caused by viruses
- c. diseases caused by fungi
- d. diseases caused by parasites

- malaria, Chagas disease
- cholera, tuberculosis, tetanus, salmonella
- flu, common cold, COVID-19, chicken pox
- athlete's foot, ringworm

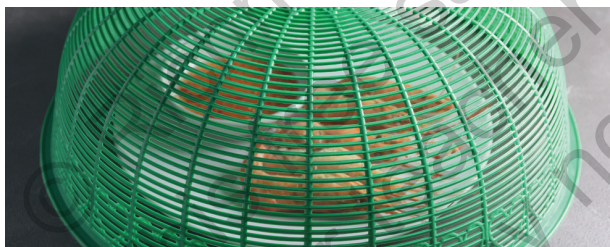
5 Explain how these measures control the spread of diseases.



- a. emptying containers of standing water



- c. washing hands



- b. covering food



- d. wearing a face mask

6 List body parts and secretions that defend the body from infection.

- a. body parts: _____

- b. secretions: _____