3. When the heart contracts, the right ventricle pushes blood into the artery that carries blood to the lungs. In the lungs, blood loses carbon dioxide and picks up oxygen.
4. Oxygenated blood returns to the left atrium through veins from the lungs and then flows into the left ventricle when the heart relaxes.
5. It is pushed into the aorta from the left ventricle when the heart contracts.
6. The aorta and its branches carry oxygenated blood to different parts of the body.

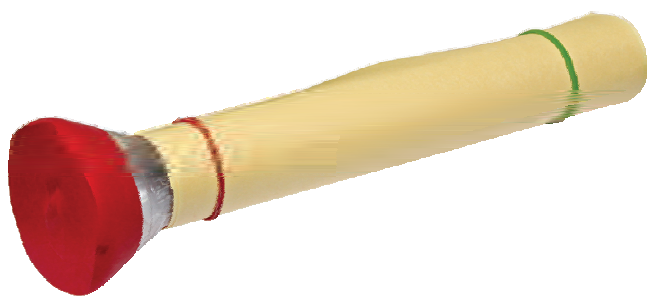
Remember that Steps 2 and 4 occur at the same time, while Steps 3 and 5 occur at the same time. To remember which side of the heart gets oxygenated blood and which side gets deoxygenated blood, think of: left oxygenated, right deoxygenated, that is, lord.

Heartbeat

One complete cycle of the heart contracting and relaxing is called a heartbeat. The heart beats about 60 to 100 times a minute. It beats slower when we are resting and faster when we are doing some physical exercise. Can you guess why? Naturally, because when the body rests, it needs less energy, which means that blood does not have to rush to supply it with oxygen.

Doctors can tell a lot about people's health by listening to their heartbeat. They use a stethoscope to do this. You too can make a simple one.

Cut off the top part of a plastic bottle to make a funnel. Stretch a piece of rubber from a balloon over the cut end of your funnel. Roll a piece of thick paper into a tube. Use tape or rubber bands to make the tube hold its shape. Attach the tube to the mouth of the bottle using rubber bands or tape. Place the funnel on the chest of a friend and the open end of the tube near your ear. Can you hear your friend's heartbeat? If you cannot, move the funnel around on the left side of the chest.



Ask your friend to jog or skip for a couple of minutes. Then listen to his/her heartbeat again. Does the heart beat faster?

New Words

circulate	move continuously in an area or closed path
chamber	hollow space inside an organ
white blood cells	tiny things in blood that fight germs
oxygenated	rich in oxygen
deoxygenated	poor in oxygen
pulse	the throbbing of the arteries caused by the heart pushing blood into them
valve	a kind of gate in a hollow organ that allows fluids to flow only one way

Main Points

- The circulatory system is made up of the heart, blood vessels and blood.
- The heart lies between the lungs, tilted a little to the left.
- It has four chambers—the upper two are called atria and the lower two are called ventricles.
- There are two types of blood vessels. Arteries carry blood from the heart and veins bring blood to the heart. Arteries lie deeper than veins.
- The aorta is the biggest artery in the body. Its branches carry blood to the whole body except the lungs, which get blood through a separate artery.
- The two big veins carrying blood to the heart are the superior vena cava and the inferior vena cava. The first carries blood from the upper part, while the second carries blood from the lower part of the body. Separate veins carry blood from the lungs.
- Deoxygenated blood is brought to the right atrium by the superior vena cava and the inferior vena cava. When the heart is relaxed, blood flows from the right atrium to the right ventricle through the open valve between them.
- Oxygenated blood is carried to the left atrium by the veins from the lungs. It flows into the left ventricle through the valve between the left atrium and left ventricle when the heart is relaxed.
- When the heart contracts, blood is pushed into the aorta from the left ventricle, and into the artery to the lungs from the right ventricle.
- One complete cycle of contraction and relaxation of the heart is called a heartbeat. Doctors hear it with a stethoscope.
- The throbbing of the arteries with each heartbeat is called the pulse. It can be checked at a few points of the body, such as, the inside of the wrist.
- A healthy diet, regular exercise, having the right weight, care of the teeth and gums, and good sleep are important for a healthy heart.

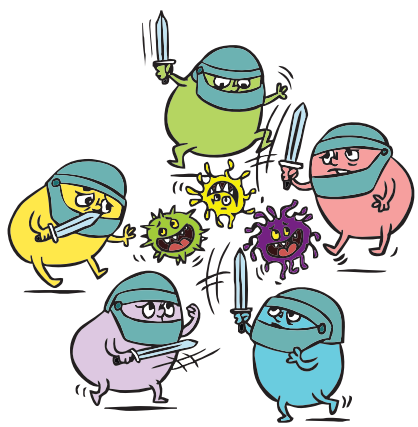
Making Connections

Do you know what getting vaccinated against a disease means? Vaccines are injections or medicines that protect us from certain diseases. Getting vaccinated means getting an injection or having a medicine that contains a vaccine. Unfortunately, there are no vaccines against some diseases, for example, malaria and chikungunya.

Babies are vaccinated against many diseases on the day they are born and then at regular intervals. Your parents may still have your vaccination booklet.

Some vaccines, for example, the polio drops given to children, provides protection for life. Others, like the vaccine against rabies, protect us for some time. By the way, if a street dog ever bites you, you must take the rabies vaccine, which is a set of five injections given over a month.

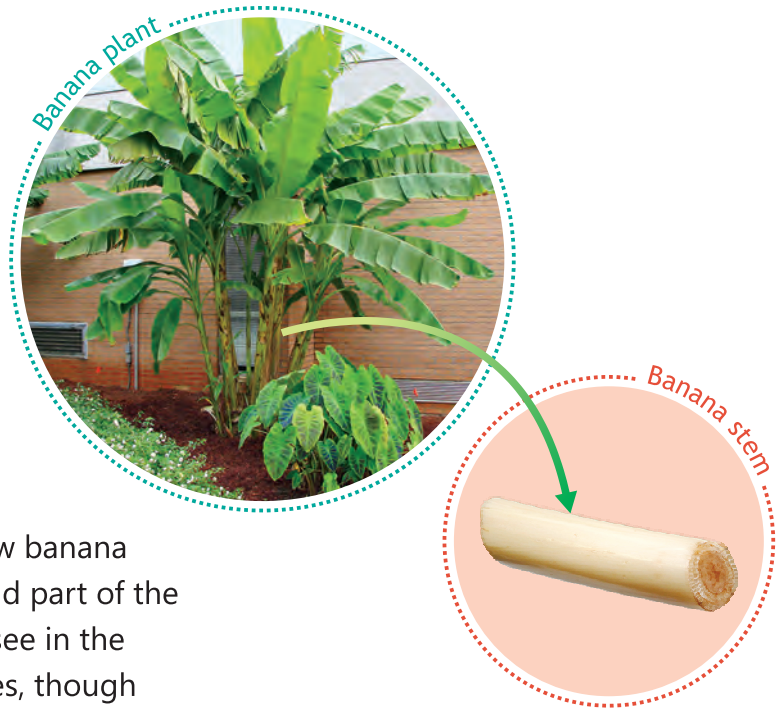
What are vaccines, you may want to know. A vaccine is a small amount of the dead or half-dead germs of a disease. When it enters your body, your body gets alerted to produce 'soldiers' to fight against it. So, if and when the real germs enter, your body is prepared to fight and kill the germs. Do you remember what white blood cells (WBCs) are? They are soldiers that fight against diseases. Your body has an army of many other types of soldiers to protect you.



Cut out the pictures of unisexual and bisexual flowers given at the end of the book. Paste them on a chart paper or your scrapbook and write two lines on each.

Making Connections

Have you ever wondered why most bananas do not have seeds? Bananas grow directly from the female parts of the banana flower without pollination. Since the ovules do not join up with pollen grains, they do not form seeds. The tiny black specks you may have seen (in the centre) while eating a banana are the ovules that did not become seeds. We grow many other seedless fruits, for example, seedless grapes, tomatoes, cucumbers and melons. And many seedless fruits grow in the wild too. Wild bananas have seeds, though.



Since bananas do not have seeds, how do new banana plants grow? They grow from the underground part of the stem. Many plants grow this way, as you will see in the next chapter. By the way, bananas are not trees, though they grow quite tall. They are herbs, and what looks like a trunk is actually a stem covered with layers of flat, broad leaf stalks. As the plant grows, the leaves slowly unfurl from the stem.

Banana stems and flowers are eaten as vegetables. Some types of bananas (sometimes called plantains or cooking bananas) are also eaten as vegetables. Banana chips are made from cooking bananas, and not the sweet bananas we normally eat as fruit or dessert.

Banana flower

Different types of bananas

Making Connections

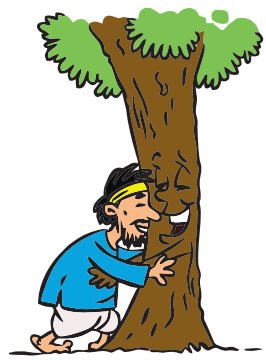
A clone is an exact copy of its parent. As we have discussed in this chapter, many plants reproduce asexually and produce clones, or copies of themselves. Do other organisms produce clones? Yes, many microorganisms do. Among the ones you are familiar with, bacteria simply divide into two. The two halves then grow into two bacteria that are exact copies of their parent. Yeast is another microorganism that is capable of producing clones. The parent grows buds, which become new yeasts.

Some animals too are capable of producing clones. Among these are starfish, sea anemones and corals. They simply divide into two, and the two halves grow into two copies of the parent. You have read about sea anemones and starfish already. Corals are very interesting creatures. Thousands of them live together in colonies in the sea. And when they die, their skeletons form what are called reefs (a kind of ridge). Coral reefs shelter many plants and animals.

The Great Barrier Reef is the world's largest coral reef system.

New Words

convert	change
consume	eat or use
decompose	break down into simpler substances
scavenge	search for and collect useful things from waste
global warming	rise in the temperature of the earth
submerge	go under water
extinct	without any living members left
drought	lack of rainfall
deforestation	clearing of forests



Main Points

- Depending on how they get their food, organisms are broadly divided into producers, consumers and decomposers.
- Plants are called producers because they make their own food. Animals are called consumers because they consume the food made by plants, directly or indirectly.
- Consumers may be divided into herbivores, carnivores, omnivores and scavengers. Scavengers feed on dead animals or the leftovers of animals killed by carnivores.
- Decomposers get their food by breaking down waste matter from animals and plants. Both scavengers and decomposers clean up waste. Decomposers also return minerals to the soil.
- A food chain describes the feeding links between organisms. Food chains maintain a balance between producers, herbivores and carnivores.
- Plants take in carbon dioxide and give out oxygen. Animals take in oxygen and give out carbon dioxide. Decomposers release carbon dioxide when they break down waste. These processes help maintain the balance of gases in air.
- Animals help plants in pollination and the dispersal of seeds. Some insects help plants by eating pests. Plants give animals shelter.
- The burning of fuels increases the amount of carbon dioxide in the air. Too much carbon dioxide in the air is leading to global warming, which is melting the polar ice cover to raise the water level in the oceans. Global warming may cause floods and droughts, and threaten the existence of many animals.
- Many animals lose their shelter when a large part of a forest is cut down. Deforestation also disturbs the interconnections between organisms living in a forest.

Do you remember that liquids are more or less incompressible, or that they cannot be squeezed into a smaller space? The reason is that the molecules of a liquid do not have enough space between them to be packed in tighter.

Do this activity in groups. You will need a large (50 mL) syringe and a balloon. Fill a little water in the balloon and tie it up to make a small ball. Take the plunger out of the syringe. Then push the ball into the syringe and put the plunger back. Push the plunger against the ball as hard as you can. The ball will not become smaller because water does not get compressed.

Solutions and suspensions

You have learnt that a solution is a mixture of substances in which you cannot tell the substances apart. In a solution of a solid (say, salt) and a liquid (say, water), the solid is called the solute and the liquid is called the solvent. In a more general way, the solute is the substance that is in a smaller quantity and the solvent is the substance that is in a larger quantity.

Tick the things that form solutions with water.

Sugar	Oil	Fruit juice
Sand	Vinegar	Talcum powder

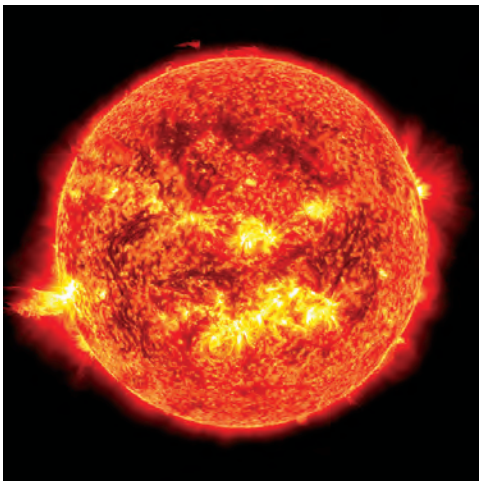
A mixture of a liquid and a solid that does not dissolve in it is called a suspension.
A mixture of sand and water, for example, is a suspension. Unlike a solution of salt and water, you can see the sand particles clearly in a suspension of sand and water.

Why is it that some things dissolve in water, while others do not? Things form solutions if their molecules are 'friendly'. Just as we link arms with friends, the molecules of a solute link up with the molecules of the solvent and fit themselves in the spaces between the solvent molecules. So, it is not possible to tell the solute apart from the solvent by looking at the mixture. The molecules of an insoluble solid, on the other hand, prefer to hold on to each other rather than mix with the molecules of the liquid.

Explore More

The sun and its family

You have learnt how important the sun is not just for us, but for all living beings. Now let us learn a bit more about the sun.



The sun

The sun is a huge ball of glowing gases, mostly hydrogen. It may seem strange, but the sun was not always around, and nor is it going to live forever. It was 'born' some 4.5 billion years ago from a giant cloud of gas and dust and it is likely to be around for another 5 billion years or so. After that it will start ageing and dying.

How come the gases that make up the sun do not fly away?
The gases remain where they are because the gravitational force of the sun holds them in place. It also pulls the earth and seven other planets so that they keep revolving (moving in a circle) around the sun instead of flying away. The planets and their moons and some other bodies that revolve around the sun make up the sun's family, which is called the solar system.

The planets and their moons

Most of the planets have moons, or satellites. Just as a planet revolves around the sun, a planet's satellites revolve around the planet. Mercury and Venus, the planets closest to the sun, do not have satellites. The earth comes next. You know the name of its satellite—the moon. Mars, the next planet, has two small satellites. The four planets

The solar system

11. Sound

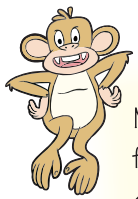
Do this activity in class. Shut your eyes and listen to sounds that your teacher makes or plays. Try to guess the source of each sound. It may be the sound of turning the pages of a book, of striking a table with a hand, of crumpling a piece of paper, and so on. Did you guess right?

Use as wide a range of sounds as you can. If possible, play natural sounds, such as the whistling of the wind through trees, the sound of waves and the calls of birds.

How sounds differ

How did you guess the sources of the different sounds? The sounds made by different things are different. The sounds made by different animals are different too. And so are the voices of different people. This difference helps us know the source of a sound.

How are sounds different? Some sounds are loud, for example, the sound of firecrackers. Some sounds are soft, for example, a whisper or the rustle of clothes. Some sounds are high (or sharp or shrill), for example, the sound of a whistle. Some are low, for example, the sound of a big drum (musical instrument) or the sound of faraway thunder. Children have high voices, while men have low voices. In addition, different sounds have a different quality or 'feel'. If two girls (or boys) sing the same song just as loudly, you can tell them apart because the qualities of their voices are different.



Many animals make warning sounds to warn their group members of danger or to frighten or fool predators. Monkeys and birds are specialists in warning signals. Some monkeys make different types of alarm calls to warn others of different types of predators, for example, leopards, snakes or eagles. The funny thing is that birds too understand these calls. Some moths make clicking sounds to tell predators that they taste bad. Some of them do actually taste bad, but other tasty moths imitate these sounds to fool predators.

New Words

pitch	highness or lowness of a sound
bass	low (sound)
vibration	to-and-fro movement
voice box	the organ (in the body) that helps to make sounds
noise	unwanted or disturbing sound
burgle	to enter a building without permission in order to steal

Main Points

- Three characteristics help us tell one sound apart from another. These are loudness, pitch and quality.
- Sound is made by vibrations.
- The vibrations of two flaps of muscle inside the voice box help us speak, sing, etc.
- Harmful or disturbing levels of noise in one's surroundings is called noise pollution.
- Noise pollution disturbs work, sleep and conversation. It may make people irritable, damage the ears and cause high blood pressure and heart problems. It may affect the growth and development of children.
- Turning down the volume of music systems and TVs, keeping machines and vehicles in good order, not honking unnecessarily, not bursting firecrackers and not using loudspeakers after 10:00 p.m. are some steps we can take to reduce noise pollution.
- Alarm sounds are made to warn people. Some examples are the sirens used by police cars and ambulances, and burglar alarms.

Exercises

A. Write one word for:

1. The highness or lowness of a sound _____
2. A sound of low pitch _____
3. A to-and-fro movement _____
4. Unwanted or disturbing sound _____
5. Enter a building without permission in order to steal _____

B. Fill in the blanks.

1. The pitch of a child's voice is _____.
2. Sound is produced when something _____.
3. The organ that helps us make sounds is called the _____ _____.
4. _____ sounds are made to warn people.
5. Noise may _____ sleep.

C. Write short answers.

1. What are the three characteristics by which we can tell one sound apart from another?
2. Give one example each of a loud sound, a soft sound, a high sound and a low sound.
3. What vibrates inside the voice box when we speak?
4. What is noise pollution?
5. Give three examples of warning sounds.

D. Explain briefly.

1. Mention the harmful effects of noise pollution.
2. Mention three ways by which we can reduce noise pollution.
3. Would you call the sound of an alarm clock or the honking of a car a warning sound? Explain why or why not.

Making Connections

Most musical instruments fall under one of three groups. In one group (guitars, sitars, etc.), sound is made by vibrating strings. In the second (flutes, shehnais, etc.), sound is made by the vibrations of air inside a hollow tube. In the third (drums, tablas, etc.), sound is made by the vibrations of a membrane (a thin sheet of material). But there are some that do not belong to any of these groups, for example, the jaltarang. The jaltarang is a set of bowls containing water. The musician plays it by striking the bowls with a kind of stick. In this case, the entire bowl vibrates to produce sound.

You can make a jaltarang with a set of glasses or bowls. Experiment with glasses of different sizes and fill them up to different levels with water. Does the pitch of the sound depend on the size of the glass or the level of water in it or both? Does the loudness change when you strike the glasses harder?

Use the pictures of Indian musical instruments at the end of the book to make a colourful chart. You can do some research and find the names of famous musicians who play these instruments.