

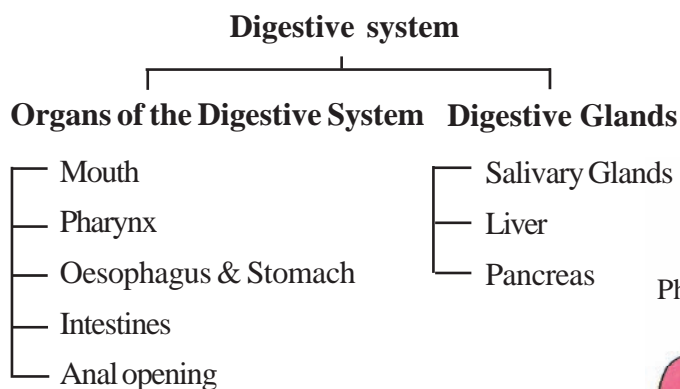
## The Structure and Functions of the Human Body

You learnt about the various parts of the plants and their functions. Similarly man and other animals are also made up of various parts or organs. These together form the organ system. All the systems work together in coordinated way so that the body functions in a balanced manner; and is healthy. Come let study the various organ systems of the human body.

### 9.1 Digestive System

What will happen if you continue working for long without eating any food? Organisms need energy to carry out their normal activities. This energy is obtained from food.

There are specific organs in the human body for digestion and for the removal of the undigested food. Together these are called the Digestive System



Study Figure 9.1 carefully and copy it in your notebook. The main organs of the Digestive system are mouth, pharynx, oesophagus, stomach, small intestine, large intestine, liver and pancreas. Taking in of food into the mouth is called ingestion. The salivary glands in the mouth secrete saliva. As food is chewed between the teeth it mixes with the saliva and becomes slimy. This food mixed with saliva moves

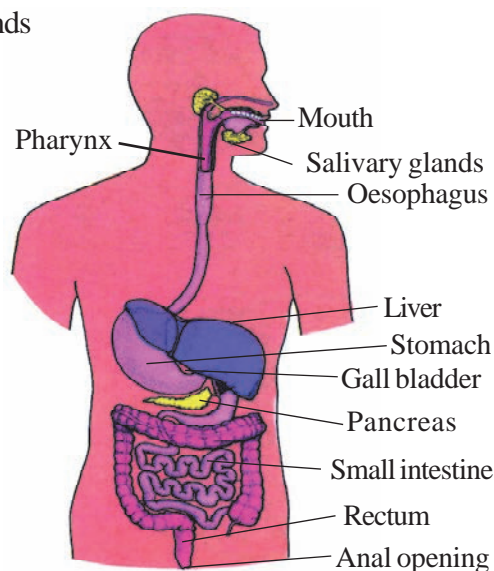


Figure 9.1 Digestive system of the human body

through the oesophagus to the stomach. Here the food is mixed with gastric juices from the stomach lining. The digestion of food starts. From the stomach the food moves to the small intestine where digestion is completed. The useful nutrients in the food are absorbed by the walls of the intestine. The undigested food is moved through the large intestine, and out through the anus.

- The process of breakdown of food into components that can be used by the body is called Digestion.
- The Alimentary Canal extends from the opening of the mouth to the anal opening.



### ACTIVITY

1

Make groups of two students each among yourself. Ask your friend to open his/her mouth. Look carefully into the open mouth and compare the teeth seen in both the jaws with the ones shown in Figure 9.2.

Based on your observation fill in the following table after copying it in your notebook.

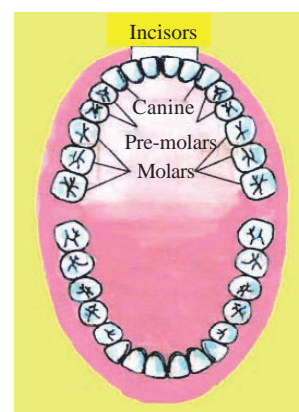


Figure 9.2 Different types of teeth



TABLE 9.1

S.No.	Shape	Work	Position	Total number	
				Upper jaw	Lower jaw
1.	Like chisel	Cutting	In front	Four	Four
2.	Pointed	Tearing shearing			
3.	Like a grinder (Chakki)	Grinding			
4.	Like a grinder	Grinding			

### Do you know ?

1. Teeth come out twice in our life– the milk teeth and the permanent teeth.
2. Adults have 32 teeth.
3. There are four types of teeth.

The tongue has taste buds that can make out things that are sweet, salty, bitter and sour (Figure 9.3)



### ANSWER THESE

1. What is the function of the salivary glands in the mouth?
2. Based on the shapes of teeth found in the human mouth write their functions.
3. Which are the tastes that we can differentiate with our tongue? Explain by drawing a picture in your notebook.
4. Write down the various organs of the Digestive system.

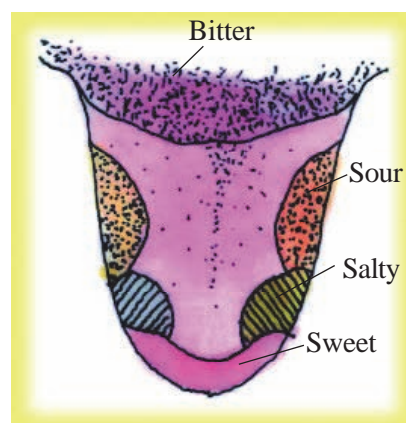


Figure 9.3 Taste buds areas of the Tongue

### The story about the stomach with the hole

*Till about 200 years ago scientists did not know what happened to food once it reached the stomach, since it was not possible to peep into the stomach. Then a surprising but interesting incident happened. In 1822 a soldier called Martin was hit by a bullet and brought to Dr Boman. He treated Martin and his wound was healed but an interesting thing happened – a hole was formed in the stomach. Through that hole it was possible to remove food from the stomach using a pipe. Martin did not suffer any problem due to the hole and he remained healthy.*

*Dr Boman continued to conduct experiments through the hole for nine long years to understand the process of digestion. He first removed the gastric juice from the stomach into a small bottle and put various food stuffs in it. He saw that the food stuff got dissolved in the gastric juice. He realized that there was a chemical reaction between the food and the gastric juice and that it could be carried out even outside the stomach.*

*You may have understood now that the digestive process is no magic.*

## 9.2 The Circulatory System

You may have seen a wound bleeding when someone is hurt. The blood comes out because the blood vessels has been cut. Blood vessels are of two types : arteries and veins. The

bluish-green tinge you see below the skin is due to the vessels called veins. They can be seen easily. The other type of vessels are located deeper and cannot be seen easily; they are the arteries. Veins carry blood from different parts of the body to the heart while arteries carry blood from the heart to various parts of the body. The heart is the main organ of the circulatory

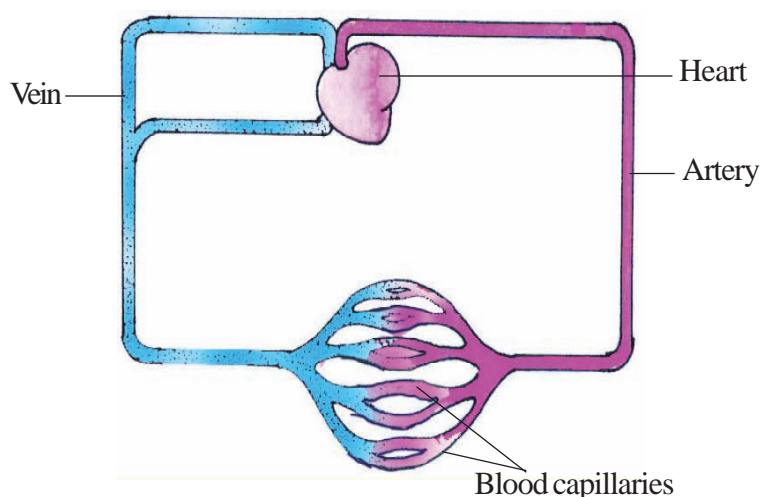


Figure 9.4 Circulatory system

system. The blood brought in by the veins to the heart is taken to the lungs where it become oxygen-rich and is brought back to the heart. The oxygen-rich blood is taken by the arteries to various parts of the body. The network of capillaries joins the arteries and the veins.

Place your hand on your chest and feel for the beat – on which side of your body is it? The organ that is beating is the heart, situated a little towards the left of the centre within the rib cage. Hence the heart, arteries, veins and capillaries constitute the circulatory system.

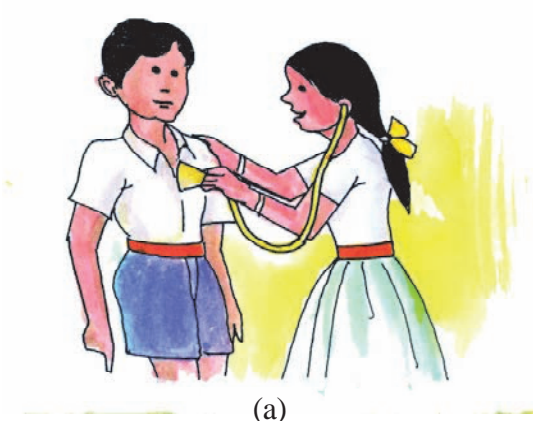
The function of the circulatory system is to circulate useful substances to various parts of the body, and useless substances to the excretory organs through blood.



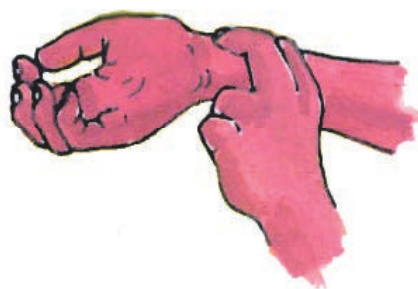
### ACTIVITY

2

Take a glass or plastic funnel and attach a rubber tube to its stem (as shown in Figure 9.5 a). Put the open end of the tube to your ears. Then place the mouth of the funnel on your friends chest and listen carefully. Do you hear a sound of something beating? This is the heart beat of your friend. You can also feel for the pulse in your wrist and count the beats (Figure 9.5 b). Similarly count the number of heart beats per minute of your friends too. Also count the number of beats after running for a while and write the values in Table 9.2 made in your notebook.



(a)



(b)

Figure 9.5 Counting the Heart Beat.

**TABLE 9.2**

S. No.	Name of student	Heart beat per minute	Heart beat per minute after running
1.			
2.			
3.			

**ANSWER THESE**

1. On an average how many times does the heart beat in any person?
2. Is the heart beat the same before and after running?

**9.3 Respiratory System**

When we breathe in (inhale) then oxygen also enters the lungs with air through the windpipe or trachea. When we exhale (breathe out) carbon dioxide comes out in the air along the same path (Figure 9.6). The blood carries oxygen from the lungs to all parts of the body and also brings carbon dioxide to the lungs.

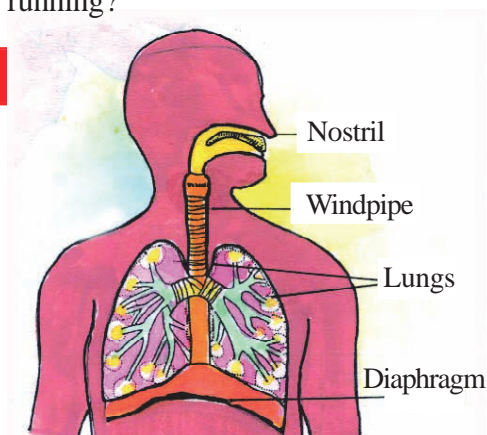


Figure 9.6 Human Respiratory System

### Do you know?

- Inside the body between the abdomen and the chest there is a layer made of muscles which is called the diaphragm. It helps in the process of breathing.
- There is hair and sticky phlegm inside our nostrils that prevent dust and germs from entering our body.



### ACTIVITY

**3**

Take a plastic bottle and cut its base as shown in Figure 9.7. Cut a balloon, stretch it and tie it at the cut end of the bottle. Fix a small balloon at one end of a glass tube or the plastic tube of a pen refill. Fix the tube in a cork as shown so that the other end is towards the outside of the bottle. Now pull the rubber sheet of the balloon downwards and push it inwards and note what happens to the balloon inside the bottle.

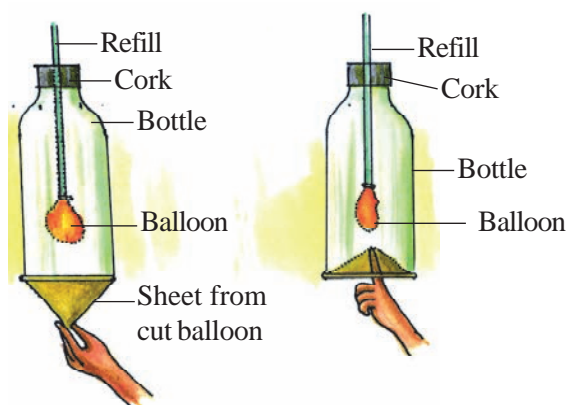


Figure 9.7 Role of Diaphragm in respiration

Now place your hand on your chest and take a deep breath. Breathe out after some time. Compare what happens in your body while breathing with what happened in the experiment given above, and understand what happens based on Table 9.3.


**TABLE 9.3**

S.No.	Experiment	Part of the body
1.	Outer mouth of the tube	Nose
2.	Long part of the tube	Trachea
3.	Balloon	One lung
4.	The cut balloon tied to the base	Diaphragm
5.	Bottle	Chest



## ACTIVITY

4

Take some alkaline phenolphthalein in two test tubes. Label one 'A' and the other 'B'. Put either glass or plastic tubes in each test tube. Blow your breath into the tube in test tube 'B'. Write what happens in each tube in the Table 9.4, made in your notebook.

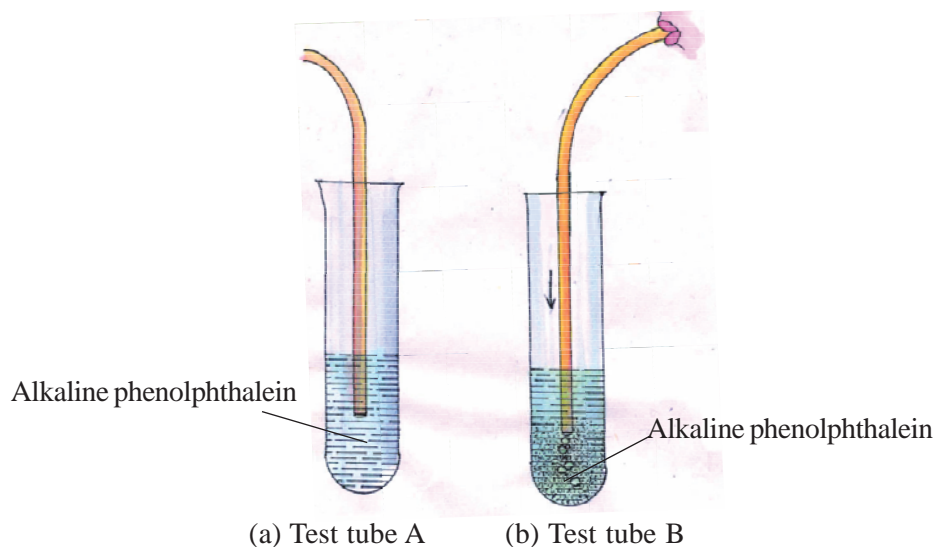


Figure 9.8



## TABLE 9.4

S.No.	Changes in the test tubes
1.	A
2.	B

The change that occurred in Test tube B was due to the carbon dioxide in the air breathed out.



## ANSWER THESE

1. We should not breathe through our mouth, why?
2. How does oxygen reach all parts of the body?
3. Write the names of the main organs of the respiratory system.
4. Draw labelled diagram of the respiratory system.



## 9.4 Excretory System

Due to the many reactions in our bodies several poisonous substances or waste products are synthesized. The accumulation of these products can be dangerous for the body. The removal of these substances from the body is called excretion.

Our body gets rid of the waste products in several ways. The solid waste accumulated in the rectum is removed through the anal opening. Carbon dioxide (gas) through the lungs, and sweat (liquid) through our skin. Another waste product is the urine. To remove this the body has the urinary system. This system consists of a pair of kidneys, a pair of ureters, urinary bladder and urinary tube (figure 9.9).

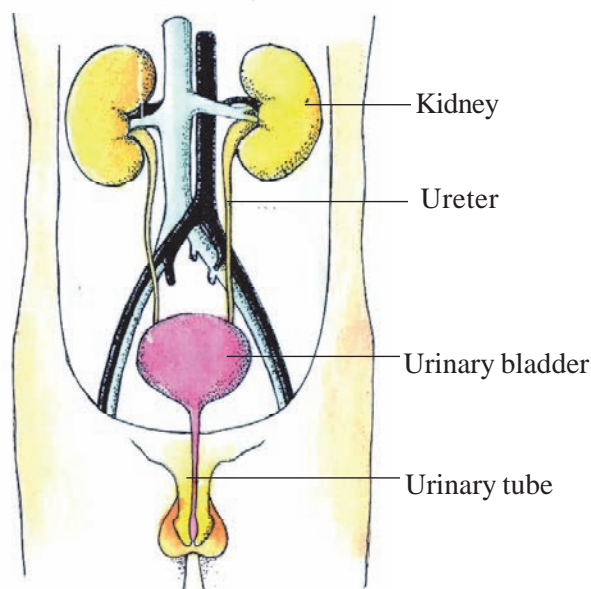


Figure 9.9 Human excretory system

The main function of the kidneys is to remove dangerous substances from the blood and synthesize urine.



### ANSWER THESE

1. What will happen if the waste products are not removed from the body?
2. Which are the waste products that are removed from the body?
3. Name the various organs of the excretory system.
4. Draw a labelled diagram of the excretory system.

If all the organs of our body perform their functions properly then our body remains healthy. Malfunctioning of any organ will make the body sick or unhealthy. In the same way if all the members of the society perform their duties properly then peace prevails in the society. Even one person in the group can cause havoc and disturb the peace of the society. So we must see to it that peace is maintained in the society.

## 9.5 Skeleton and joints

Press your fingers against hand and leg; do you get a feel of something hard pressing your fingers? The hard structures are the bones. They provide a strong support to keep body straight. This framework is known as skeleton (chapter 7 fig 7.11)



**ACTIVITY****5**

With the help of your friend tie a scale on your hand in such a manner that the elbow rests in the middle portion of the scale. Now try to bend your elbow. Are you able to bend it? Think why we cannot bend our elbow when it is tied but can easily bend it when it is not tied. Did you notice that we are able to bend or rotate our body in places where two bones of our body seem to be joined together-like elbow, shoulder or neck? These are called joints.

Main joints of our body are-

1. Ball and socket Joints: - This joint is found in shoulder, wrist and also in between hip and leg joints.
2. Hinge joints: - This is found in elbow and knee.

## 9.6 Nervous System

You have learnt that the digestive, circulatory, respiratory and the excretory systems are very closely related to each other. Imagine what would happen if these systems were not to function in coordination? If the digestive system did not digest food then how will food reach the blood? If oxygen was not made available by the respiratory system then how will the body get energy? Hence it is necessary for different parts to function in a coordinated manner. It is the function of the nervous system to maintain this coordination.

The main parts of the nervous system are –

1. Brain
2. Spinal cord
3. Nerves
4. Sensory organs

You read, you study, you play – you do all these activities according to your wish. The brain controls these activities.

We do some activities without thinking. If your foot were to fall on a thorn you would raise your foot instantly. You would do this as fast as a bulb would be lighted on switching it. These actions are controlled by the spinal cord and not the brain. Very fine thread-like structures come out from the brain and the spinal cord and go to all the sense organs and all other parts of the body. These are called nerves and they send information in both directions.

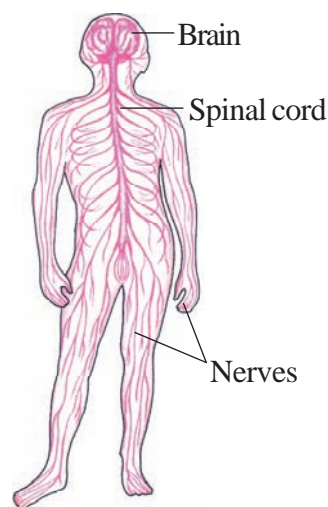


Figure 9.10 Human Nervous System

## Sense Organs

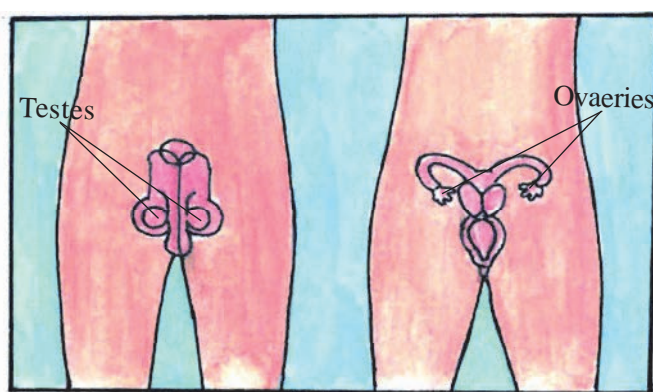
You know that we can sense the presence of light with our eyes, the sound by the ears, smell by the nose, taste by tongue and touch by skin. Hence, eyes, nose, ears, tongue and skin are our sense organs.

**ANSWER THESE**

1. What are the thread-like structures that send information to and fro called?
2. Name the main parts of the nervous system and the various sense organs.
3. Draw neat well-labelled diagram of the nervous system.

**9.7 Reproductive System**

You have learnt that all living organism produce young ones similar to themselves through the process of reproduction. Chicks come out of hens eggs that grow up to become a hen or a cock. Some animals give birth to young ones like the dog, cat, human beings etc.



*Figure 9.11 Human Reproductive Systems*

In males the reproductive organ is the testes and in females it is the ovaries (Figure 9.11).

**WE HAVE LEARNT**

- Bodies of all organisms are made up of organ systems
- The main organ systems found in the human body are – digestive system, circulatory system, respiratory system, excretory system, nervous system and the reproductive system.
- The process of digestion involves ingestion of food, its digestion, absorption and removal of solid wastes.
- The digested food is absorbed by the small intestine.
- The process of inhalation of breath and its exhalation is carried out with the help of the lungs and the diaphragm.

- The function of the circulatory system is to carry useful substances through the blood to various parts of the body and carry waste substances to the excretory organs.
- The main organs of the circulatory system are the heart, the areteries, the veins and the blood capillaries.
- The main organs of the excretory system – kidneys, ureter, urinary bladder and the urinary tube.
- The organs of the nervous system are the brain, nerves, spinal cord and the sense organs.
- Involuntary actions are carried out by the spinal cord.
- All living organisms produce off springs like themselves through reproduction.
- The main organs of reproduction are the testes and the ovaries.



## EXERCISE

### 1. Fill in the blank spaces —

1. We have \_\_\_\_\_ types of teeth.
2. The liquid waste that is excreted out is called \_\_\_\_\_.
3. The eyes are a type of \_\_\_\_\_ organ.
4. The \_\_\_\_\_ is the main organ of the circulatory system.
5. \_\_\_\_\_ is an example of an animal that gives birth to young ones.

### 2. Match the following:

- |           |              |
|-----------|--------------|
| 1. Saliva | Breathing    |
| 2. Lungs  | Reproduction |
| 3. Blood  | Digestion    |
| 4. Kidney | Circulation  |
| 5. Testes | Excretion    |

6. Brain Sense organ  
7. Skin Voluntary action

**3. Choose the right answer and write:**

1. Number of permanent teeth in human beings are –  
a. 20      b. 28      c. 30      d. 32
2. The vessels that takes blood from various organs to the heart are the–  
a. Arteries    b. Capillaries    c. Veins      d. Nerves
3. The main organ of the Nervous system is –  
a. Brain    b. Heart      c. Kidney      d. Skin
4. Which organ separates the waste products by filtration from the blood and forms urine –  
a. Lungs      b. Stomach    c. Heart      d. Kidney
5. The following is not a sense organ –  
a. Eye    b. Teeth      c. Tongue      d. ear

**4. Write answers for the following questions –**

- a. Which are the organs of the respiratory system?
- b. What does the diaphragm do during breathing?
- c. Draw a diagram of the human Alimentary Canal?
- d. Why is it necessary to have the excretion process?
- e. Through which system do substances move around in the body?
- f. What is reproduction?

**THINGS TO DO**

1. Draw a well labelled diagram of the various parts of the human body as well as its different systems. Colour them and use the charts to decorate your classroom.
2. Collect pictures and interesting articles about the human body and the body systems. Paste them in your scrap book.

