

12.1 Organisational levels of life

The brick wall is made up of numerous bricks. In the same manner, a bee hive is composed of numerous hexagonal units

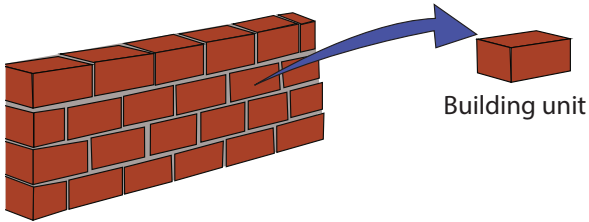


Figure 12.1 ▲ Wall made of bricks

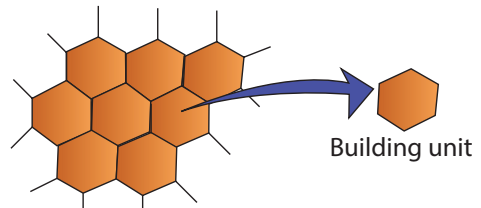


Figure 12.2 ▲ Bee hive

The living body contains large number of small building units. This basic building unit is called as the **cell**. Cell is the structural unit of living organisms.

Structural unit of plant is referred to as plant cell and structural unit of animal is referred to as animal cell.

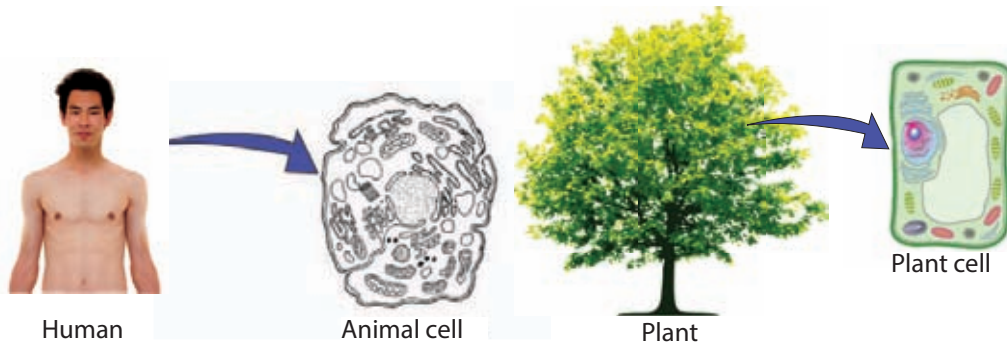


Figure 12.3 ▲ Animal cell

Figure 12.4 ▲ Plant cell

Recall the plant and animal cells observed in a previous lesson.



Activity 12.1

Observe the cells in lower epidermis of betel leaf and cheek cells, with the help of your teacher, using a light microscope.

Then try to identify plant cells and animal cells.

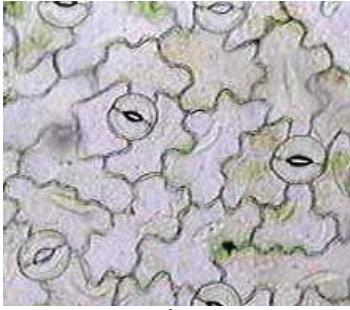


Figure 12.5 ▲ The microscopic view of cells in lower epidermis of a plant leaf

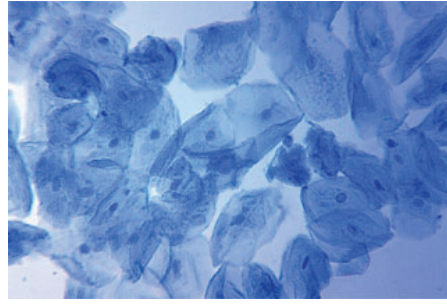


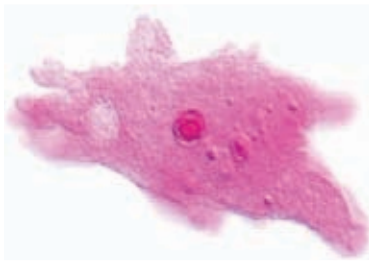
Figure 12.6 ▲ The microscopic view of stained human cheek cells



Assignment 12.1

- Collect historical information regarding discovery of cell and present them to the classroom.

Some of the organisms are represented by a single cell. Therefore, they show a simple organization. The basic functional unit of organism is called the **cell**. Some of the unicellular organisms are shown in Figure 12.7.



Amoeba



Euglena



Paramecium

Figure 12.7 ▲ Unicellular organisms (microscopic view)

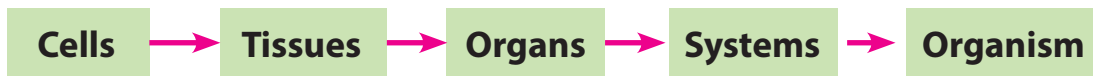


Activity 12.2

Try to identify unicellular organisms by observing a sample of water taken from fresh water pond and hay stagnated in water.

The organisational levels in living body

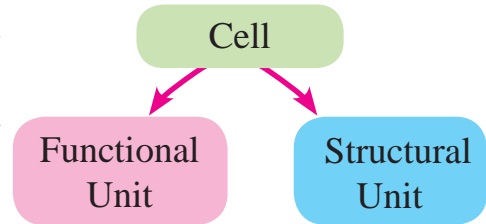
Except unicellular organisms, all other organisms are made up of few cells or large number of cells. They are called multicellular organisms. They show variations in levels of organisations. The level of organisation from simple level 'cell' to complex level 'organism' is given below.



Each and every organisational level of above is discussed in this chapter.

Cell

The cell is the basic structural and functional unit of the life. Cell is the building unit of living organisms and the simple functioning unit too.



Tissue

A **tissue** is a group of cells, organised for a specific functions.



Activity 12.3

You will need :- A permanent slide or a picture of a muscle tissue, A Slide with a lower epidermis from a plant leaf

Method :-

Observe those specimens using a light microscope. Identify different kinds of cells in them.

Tissues have following features;

- Contain same shaped cells or different shaped cells
- Perform a common function

The following diagrams show different types of tissues found in living organisms.

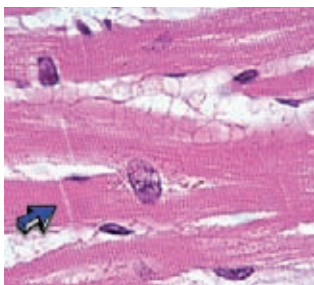


Figure 12.8 ▲ Cardiac muscle tissue

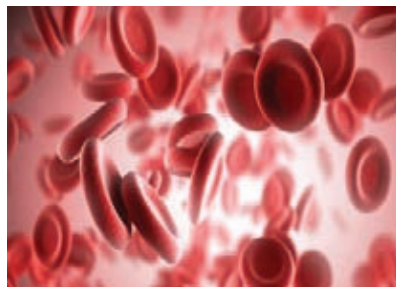


Figure 12.9 ▲ The blood tissue

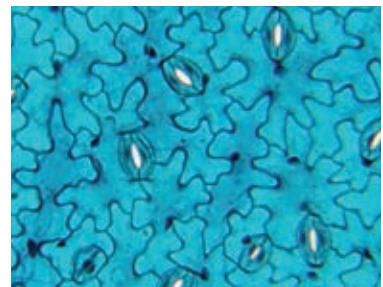
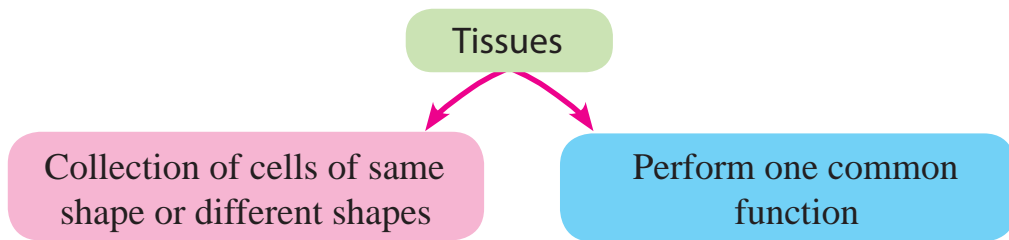


Figure 12.10 ▲ The lower epidermal tissue of the plant leaf



Organ

A collection of different tissues worked together to perform a specific function or functions is called an **organ**.

Human stomach is an organ and it is made up of different types of tissues.

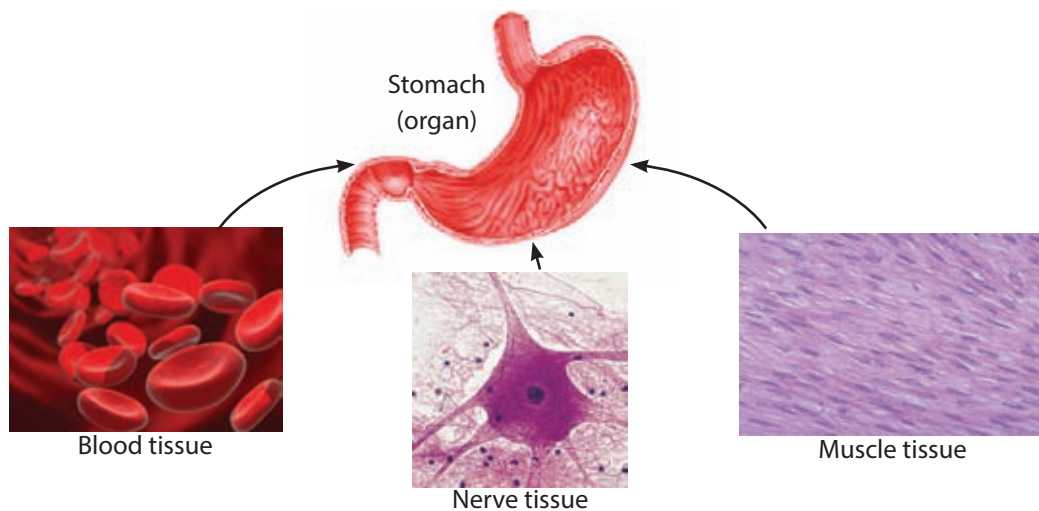


Figure 12.11 ▲ Different types of tissues in human stomach



Activity 12.4

You will need :- A plant like ‘balsam’ with a transparent stem, vessel filled with water, dye soluble in water (Kukul sayam)

Method :-

- Put the red dye into water vessel and prepare a red coloured solution.
- Put the balsam plant into the vessel in such a way that root system is submerged.
- When the stem becomes red, take a thin section of the stem and observe the cross section through light microscope.

- The tissue which transports water and mineral is coloured in red. It is called the **xylem tissue**.
- **Phloem tissue** located outside the xylem tissue, transports food in the plant body.
- In addition to xylem and phloem, there are many other tissues in stem.

Now, it is clear to you that the plant stem is composed of many tissues.

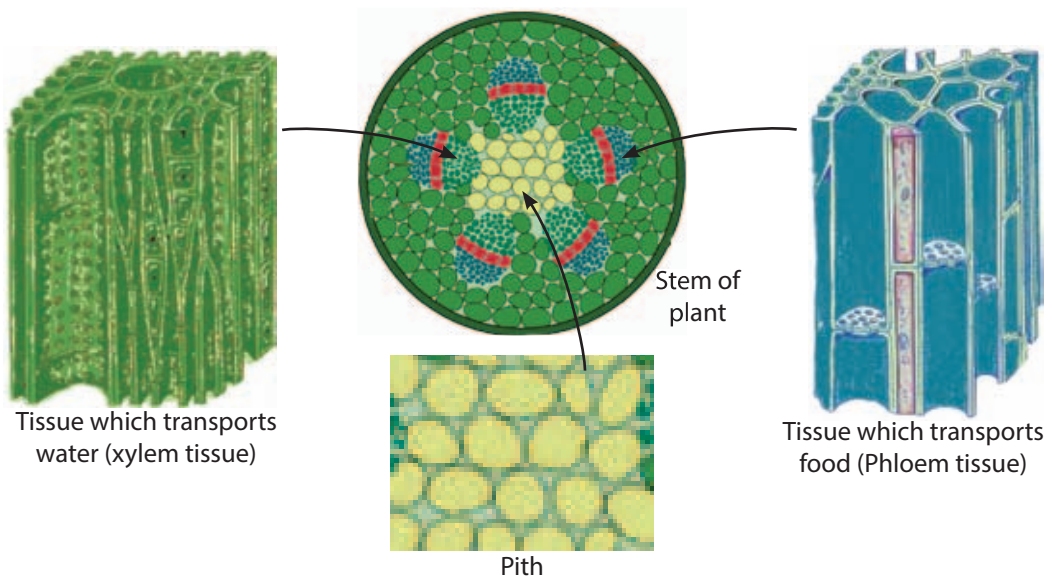


Figure 12.12 ▲ Different types of tissues in plant stem



Activity 12.5

Observe a cross section of the plant leaf using a permanent slide and study different types of tissues.

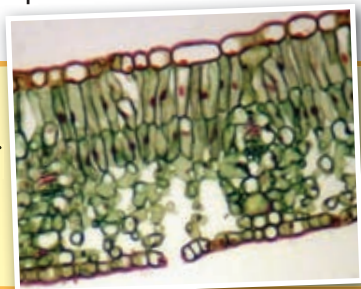
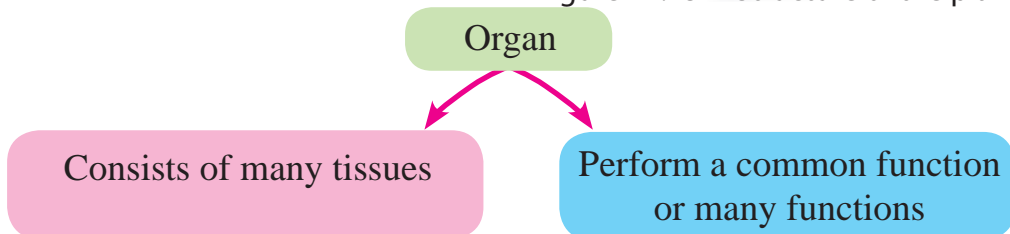


Figure 12.13 ▲ Structure of the plant leaf



System

A group of organs that perform a special function or functions is called the **system**. Figure 12.14 shows the arrangement of digestive system of man by combination of different organs.

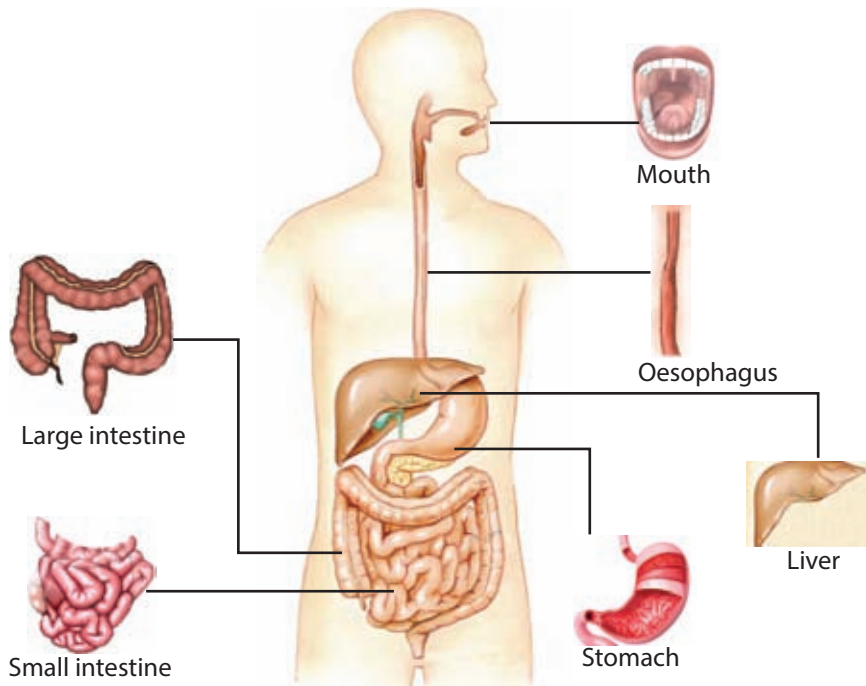
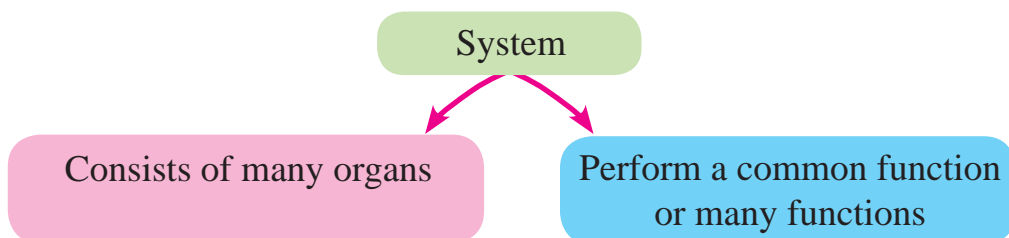


Figure 12.14 ▲ The digestive system of man



Activity 12.6

- Uproot a plant like "kuppameniya"/"kuppaimani"
- Observe different organs and systems of it
- Draw a line diagram and try to identify the organs and two systems in the plant body

Compare your findings with the Figure 12.15.

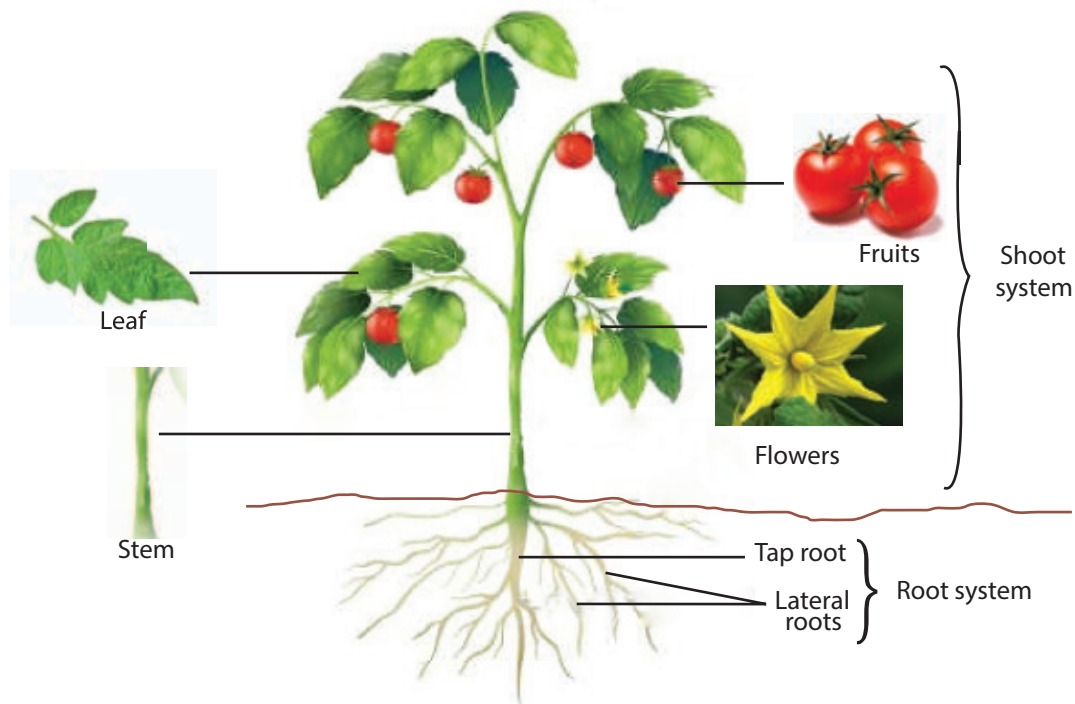


Figure 12.15 ▲ Organs and systems in the plant body

You may notice that there are two main systems in the plant body. They are;

- 1) Root system
- 2) Shoot system



Assignment 12.2

Try to identify main organs and systems in grass. Draw a line diagram and name them.

Organism

All systems of the body join together and form the body of organism. Figure 12.16 clearly display that the way of forming organism by combination of all systems in the body.

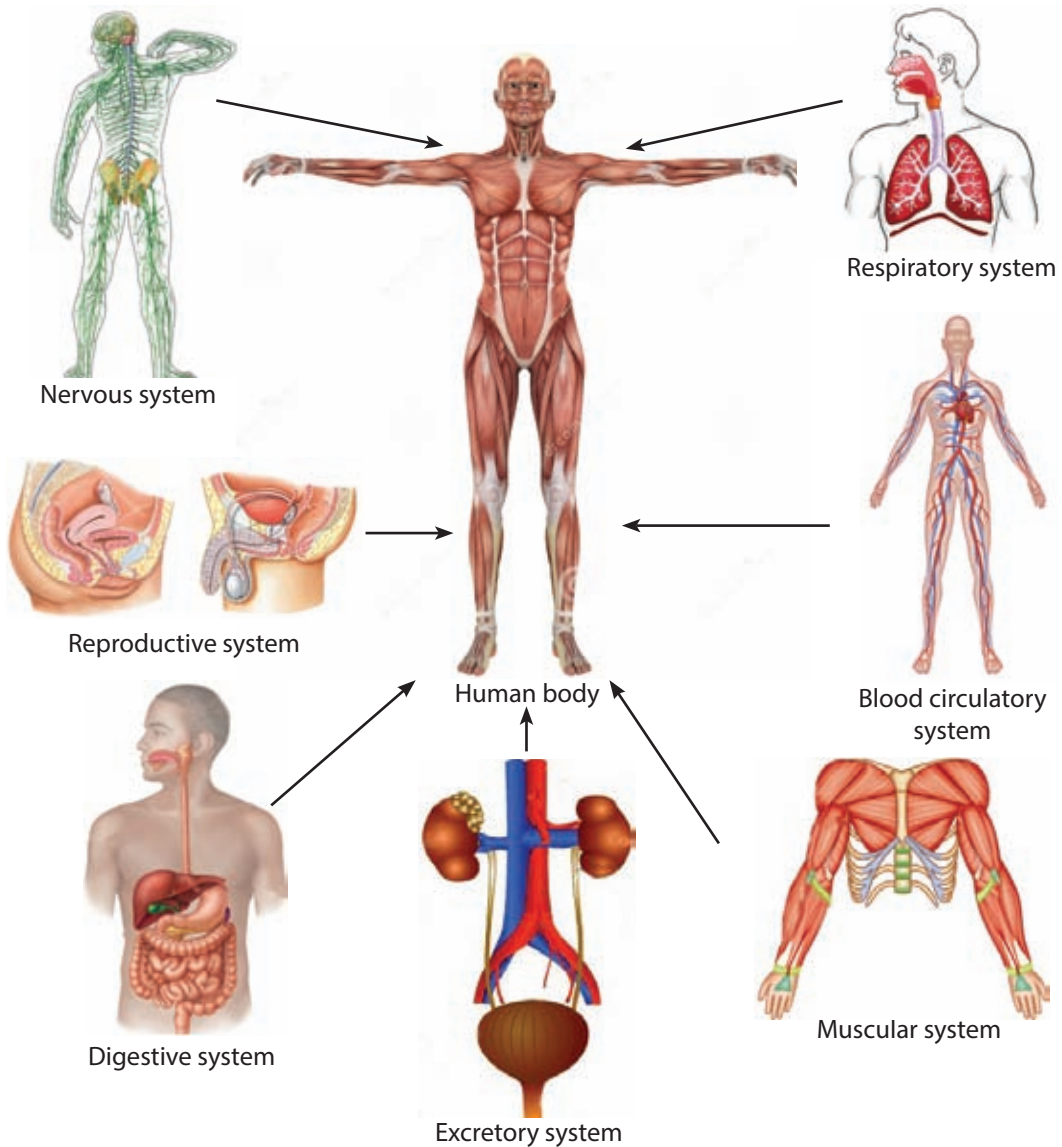


Figure 12.16 ▲ Organism consists of organ system

You have studied that the plant body is made of two systems

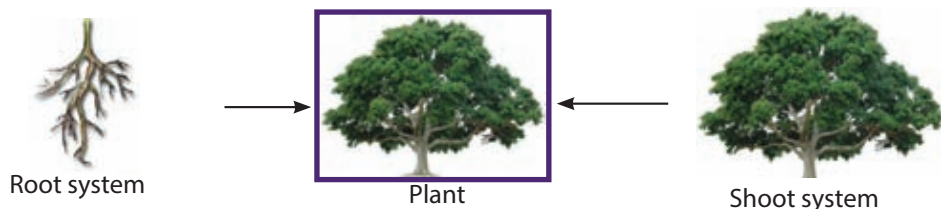


Figure 12.17 ▲ Systems which make the plant



Activity 12.7

- Make a model to show the organisational levels of life.
- Present it in the classroom.

12.2 Systems of the human body

There are various biological processes like respiration, food digestion, movement, excretion taken place in the human body. Energy is needed for the function of them.



Figure 12.18 ▲ Energy needed activities

Several reactions take place in our body when we are active with activities like playing or dancing and even when we are not doing anything. Energy needed for such activities is taken by burning or reacting the food we take, with oxygen in the cells.

Consider how oxygen and simple food is supplied to man for obtaining energy. Complex food are broken into simple components by the digestive system. Respiratory system supplies oxygen for our body. Let us study about these systems further.

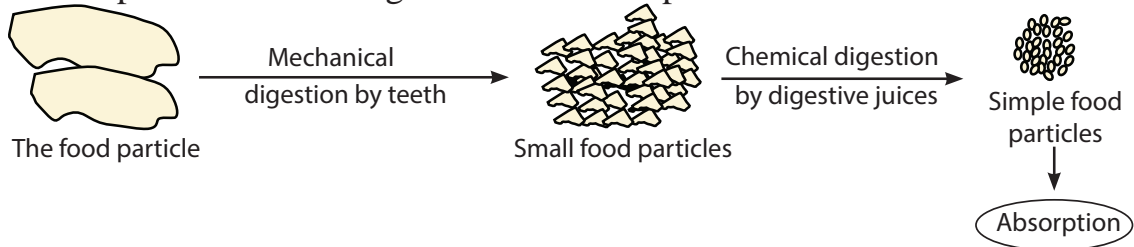
Digestive system of man

The food we eat are normally big pieces and complex. Therefore, that cannot be absorbed to the body. The breaking down of food into simple substances is called digestion. Then it can be absorbed easily.

Teeth break down food into smaller particles inside the mouth. Then, it makes easier to digest food (by digestive juices) when pass along

digestive tract. Then, those small food pieces are digested to simple pieces by the digestive juices secreted from different parts of the digestive system. Finally they are absorbed to the body.

The process of food digestion can be simplified as follows



It is not easy to digest all types of food that we take in a single organ. Therefore, the digestion takes place step-by-step in several organs.

Two main functions of the human digestive system are mentioned below.

- 1) Conversion of complex food into simple substances.
- 2) Absorption of simple food to the body.



Activity 12.8

Try to identify main parts of the human digestive system by using a model or a diagram.

Compare your findings with the following Figures.

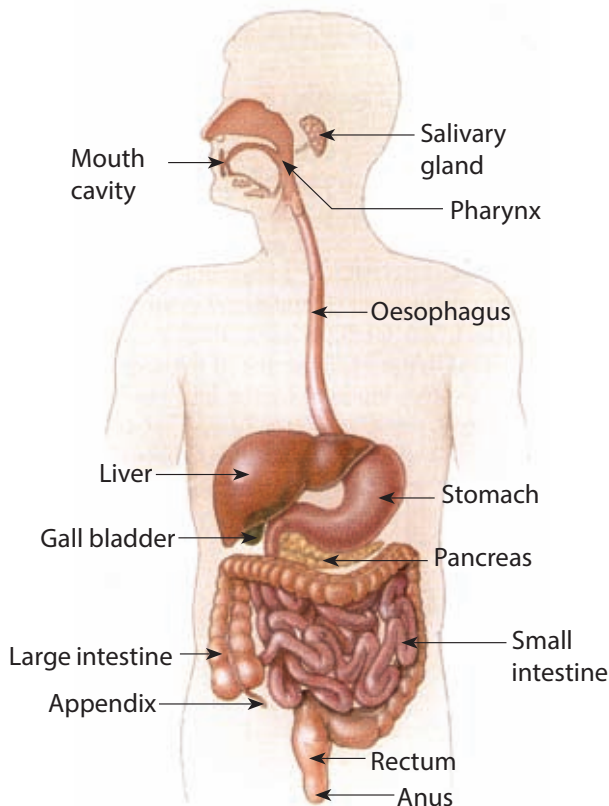


Figure 12.19 ▲ Digestive system of man (Three dimensional structure)

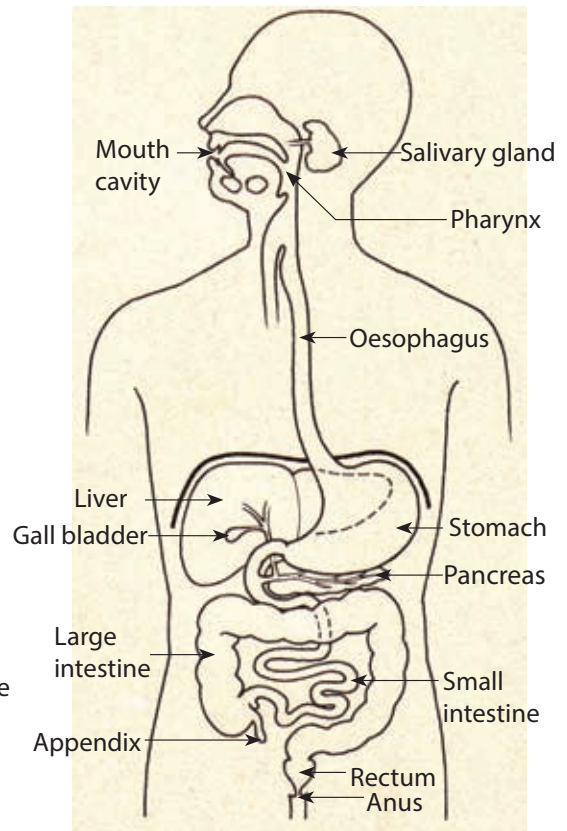


Figure 12.20 ▲ Digestive system of man (Line diagram)

The structure and functions of the organs in the digestive system is given in Table 12.1.

Table 12.1 ▼ Functions of various organs of the human digestive system

Organ	Structural features & functions
Mouth cavity	<ul style="list-style-type: none"> ● Breakdown of food particles into small pieces by teeth (mechanical digestion) ● Secretion of saliva by salivary glands to aid digestion of food ● Beginning the chemical digestion of food by saliva ● Mix food with saliva by tongue (Chemical digestion)
Pharynx	<ul style="list-style-type: none"> ● It is the common cavity of the digestive tract and the larynx ● Push the food in the mouth cavity into oesophagus
Oesophagus	<ul style="list-style-type: none"> ● Push the food in mouth cavity to the stomach.

Stomach	<ul style="list-style-type: none"> • It is a muscular sac. • Digestion is efficient due to acidic nature of digestive juices. • Food is stored in the stomach for about three hours. • Food is digested further by mixing of digestive juices in the stomach.
Small intestine	<ul style="list-style-type: none"> • It is about 6 m long folded tube. • Different types of food digest with digestive juices. • Digestion is completed and absorb digestive food to the body. • There are finger like projections called villi in the small intestine to increase the surface for efficient digestion.
Large intestine	<ul style="list-style-type: none"> • It is shorter than the small intestine, but considerably broad. • Absorption of water.
Anus	<ul style="list-style-type: none"> • It is the terminal end in the digestive system. • Semisolid faeces is released through anus.

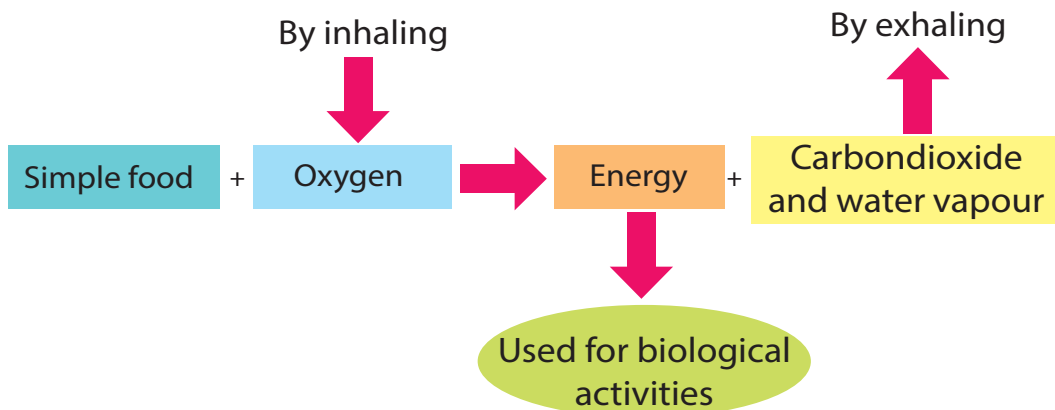


Activity 12.9

Make suitable models to demonstrate the human digestive system.

Human respiratory system

Why do animals breath? You can find out the answer by studying following flow chart.



It shows that as a result of respiration, energy is generated and that energy is used for biological activities in the body.

The process where energy is produced by reacting or burning of simple foods with oxygen is called respiration.

The intake of air needed for respiration is called **inspiration** (inhalation or breathing in).

During respiration carbon dioxide and water vapour are formed and the elimination of these byproducts is called **expiration** (exhalation or breathing out).

Accordingly, the air exchanging system in the body is called the respiratory system. Engage in Activity 12.10 to identify the major parts of the respiratory system.



Activity 12.10

Try to identify the main parts of the human respiratory system, using a model or figure in the laboratory

Use the following diagram to identify the parts of it. Compare your findings with Figure 12.21.

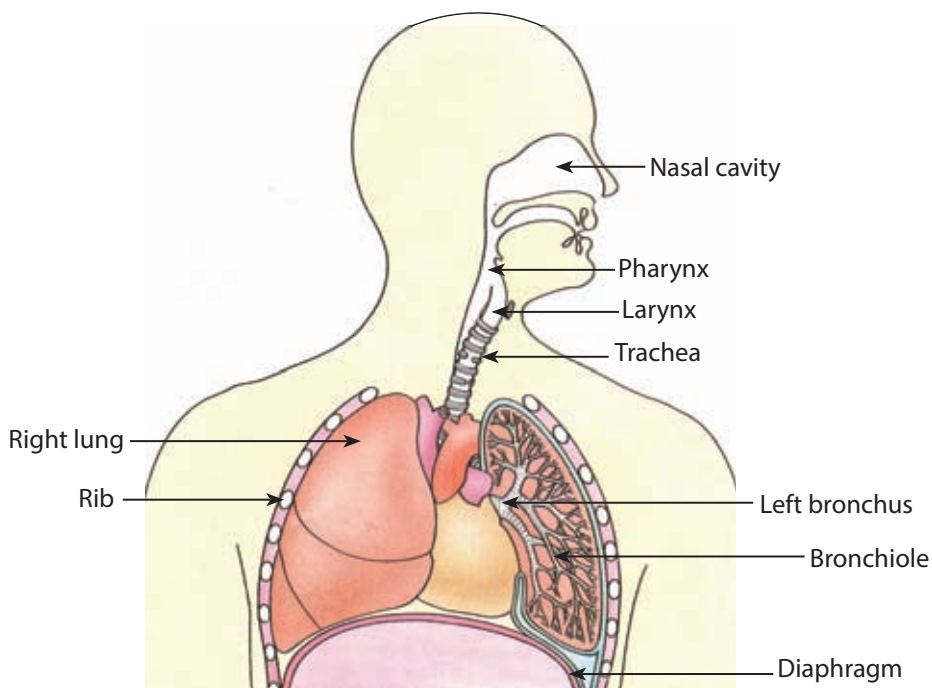
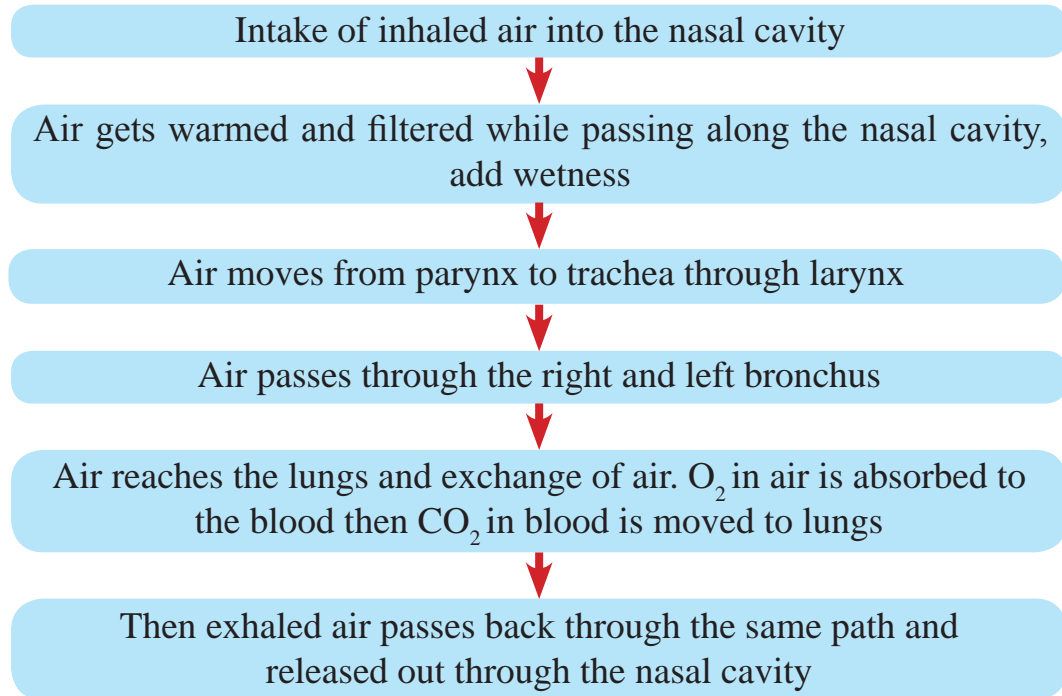


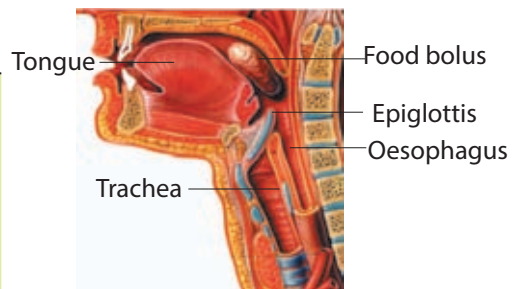
Figure 12.21 ▲ Respiratory system of human

The following flow chart explains the activities of human respiratory system.



For extra knowledge

The food bolus that comes to the pharynx passes to the oesophagus without going into the trachea as the door of the trachea is closed.



A picture showing the action of epiglottis



Activity 12.11

Make a suitable model to demonstrate the human respiratory system. Present it to the class.

The diagram given below shows the model of human respiratory system.

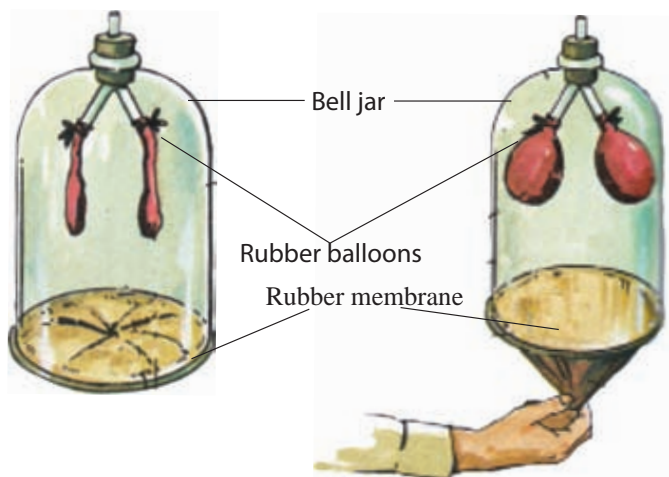


Figure 12.22 ▲ The model of the human respiratory system



Activity 12.12

The rubber membrane, rubber balloons, the bell jar and Y tubes in the figure 12.22 are represent the different parts of the human respiratory system. Name them.



Summary

- The cell is the basic structural and functional unit of the living beings.
- Order of the organisational levels of the body is,
Cells → tissues → organs → systems → organism
- Food is converted to a simple state by the digestive system so that food could be absorbed to the body.
- The respiratory process contributes to obtain oxygen needed to produce energy and excretion of carbondioxide and water vapour.
- The process where energy is produced by reacting simple foods with oxygen is called respiration.

Exercise

(01) Select the correct answer.

- (i) The structural and functional unit of living being is called
1. Cell 2. Tissue 3. Organ 4. System
- (ii) The tissue responsible to transport water and mineral through the plant body is
1. Xylem 2. Phloem 3. Cortex 4. Pith
- (iii) The organ that does not belong to the digestive system is
1. Liver 2. Trachea 3. Large intestine 4. Anus
- (iv) The organ common to the respiratory system and the food digestive system is
1. Larynx 2. Bronchioles 3. Oesophagus 4. Pharynx
- (v) Which of the following process does not occur in the small intestine?
1. Collection of pancreatic juice and bile
2. Completion of digestion
3. Absorption of digested food
4. Food is broken down to small pieces

(02) Complete the following table

Organ	Function
1. Stomach	
2. Small intestine	
3. Large intestine	
4. Nasal cavity	
5. Larynx	

Technical Terms

Cell	- ொௌலய	- கலம்
Tissue	- படுகய	- இழையம்
Phloem tissue	- பீலோயடு படுகய	- உரிய இழையம்
Xylem tissue	- ொலலடு படுகய	- காழ் இழையம்
Stomach	- ஶுமூடய	- இரூப்பை
Lungs	- பௌறூலீ	- சுவாசப்பை
Liver	- ஶகீலூவ	- ஈரல்
Bronchus	- ஶீலூப நூலய	- வரதனூளி
Root system	- மூல படீடநீய	- ஆணீவீவர்
Pharynx	- ொபநீகூவ	- தூண்டூடூ
Intestine	- ஶநீநூ	- சிறூகுடல்
Root system	- மூல படீடநீய	- ஆணீவீவர்
Shoot system	- பூரூர்ந படீடநீய	- அங்கூரத் தூகூதி
Digestion	- சீரணய	- உணவூச் சமீபூடு
Respiration	- ஶீலூபநய	- சுவாசம்