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غير مصرح ب التداول هذا الكتاب
خارج وزارة التربية والتعليم والتعليم الفنى

Student's Book

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Preface

This book **Science and You** achieves the objectives of developing curricula in order to cope with the 21st century. According to the following educational directions:

- Activating the relation between Science and Technology in the science domain and its reflection on the development process.
 - Emphasizing the suitable situations that distinguish the effect of the scientific and technological progress in producing knowledge.
 - Selecting students practicing their active and conscious behavior toward using the technological outcomes.
 - Developing students' abilities in the scientific thinking methodology, then the possibility to move from learning depending on receiving knowledge to learning depending on self-learning in an atmosphere of joy and amusement.
 - Exploring information and gain much experiences through developing the essential thinking skills such as observation, analysis, concluding and reasoning.
 - Providing opportunities to students for practicing citizenship through the methods of self-learning and the team work spirit, negotiating and confessing, accepting others and rejecting extremists.
 - Enriching students with various life skills, and the practical capabilities through increasing all interests in the practical and scientific domain.
- Science and You contains three integrated units, each one contains a set of integrated lessons achieving the concerned objectives.

We hope that this book may benefit our sons for the favour of our country Egypt.

Preparation Team

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Unit (1)

Friction

Lesson One:

Friction

Lesson Two:

Applications of Friction



When you drop a sheet of paper and a coin at the same time from a high point above the ground, which of them reaches the ground first? You may say that the coin would reach the ground first. That is correct!

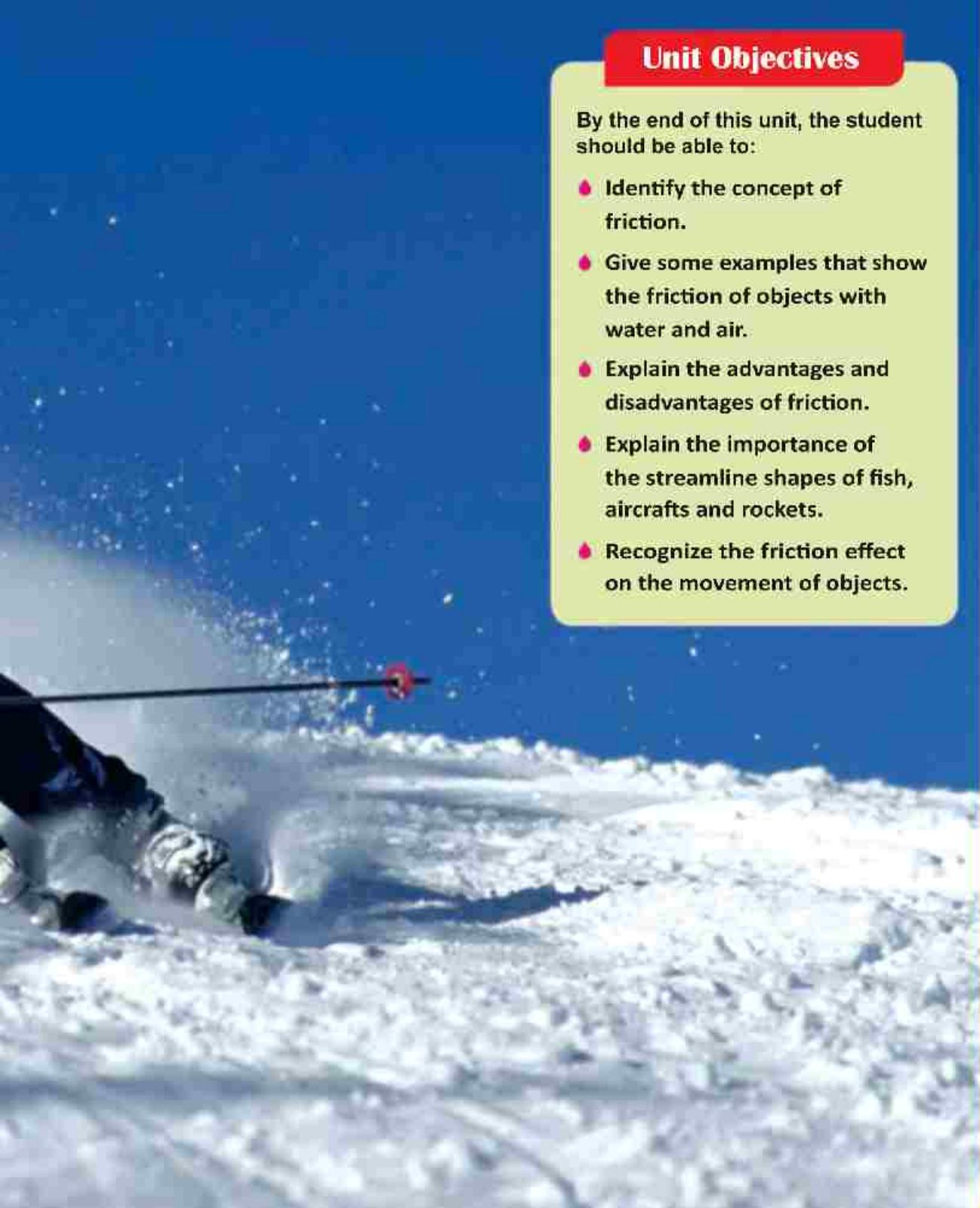
Try to think about the force that caused the sheet of paper and the coin to reach the ground at different times. It is the friction force! As an object moves through air, a force acts opposite to this motion and depends on the area of the object facing the air. That is the reason! The coin has reached the ground first due to the smaller surface area facing the air.

Friction does not only affect objects moving through air, but also objects moving through water and the solid surfaces moving in contact to each other. In this unit you will learn that friction has a lot of benefits and applications and disadvantages, as well.

Unit Objectives

By the end of this unit, the student should be able to:

- ❖ Identify the concept of friction.
- ❖ Give some examples that show the friction of objects with water and air.
- ❖ Explain the advantages and disadvantages of friction.
- ❖ Explain the importance of the streamline shapes of fish, aircrafts and rockets.
- ❖ Recognize the friction effect on the movement of objects.



Lesson (1 - 1)

Friction

Objectives

By the end of this lesson, the student should be able to:

- ◆ Identify the concept of friction.
- ◆ Conclude that friction depends on the material of the two surfaces in contact.
- ◆ Recognize the effect of friction on the motion of objects through air and water.
- ◆ Recognize the effect of increasing the surface area of an object on its motion through air and water.
- ◆ Explain the idea of streamlined shape of some moving objects.



Figure (1)
Friction against marble movement

What have you learnt?

The marble slows down gradually and then it stops as a result of the action of a force resisting its motion known as the friction force.

When a ball is kicked to roll along the ground, it moves a distance then it stops after a while at a certain point.

The ball has stopped by the effect of a force.

What is this force? Discover this yourself through the following activities.

Activity (1) Motion of Marbles

- ◆ Tools: A number of marbles.

Procedure:

- Throw the marbles along the ground.
- Watch the movement of the marbles,

Answer the following questions.

- 1- When the marbles are thrown on the ground, why do their movement decrease gradually?

.....

.....

.....

- 2- What is the force affecting the movement of the marbles?

.....

.....

.....

Activity (2) Motion of a Bicycle

Tools: A bicycle

Procedure:

- When you ride a bike and push against the pedal, the bike moves forwards (figure 2).
- What happens then if you stop pedaling while the bike is moving?
- Was the bike still moving in the same direction ?

Yes No

- Was the bike still moving in the same speed ?

Yes No

- Did the bike speed decrease, When pedaling had stopped?

Yes No

- Think and discuss with your classmates :

- Why does the bike speed decrease ?
.....

- What is the direction of the force that makes the bike speed decrease ?
.....



Figure (2): Friction between the rubber surface of the bike Wheel and the ground

Terms

Friction force:

The force between two surfaces in contact that acts in a direction opposite to the direction of motion and causes the object to slow down and stop.

What have you learnt?

- The bike is moving forward by a force on pushing the pedals called the driving force.
- When pedaling stops, the bike speed decreases and then it stops due to a force known as the friction force between the rubber surface of the bike wheel and the ground.
- The friction force acts in a direction opposite to the direction of motion that causes the bike to slow down and stop.

Friction

Activity (3) Friction and Surface Material

(Mug motion)

Tools: mug - spring balance - pieces of cardboard, carpet and silk - sticky tape - table.

Procedure:

- Cut the pieces of cardboard, carpet and silk to fit the diameter of the mug base.
- Fix the piece of carpet at the mug base using the sticky tape.
- Fix the hook of the spring balance to the mug handle.
- Try to pull the mug by the spring balance along the surface of the table at constant speed (figure 3).
- Notice the reading of the balance.

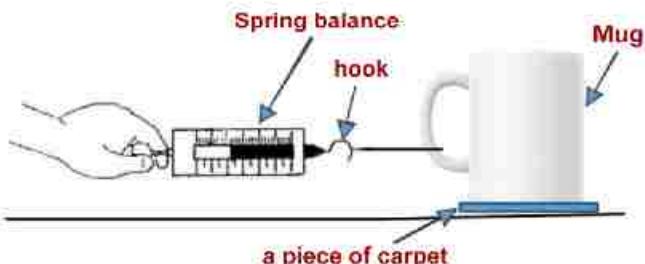


Figure (3)

- Replace the material at the mug base by another material and repeat the previous steps.
- Notice the reading of the balance each time.

- Does the balance pointer stand at the same reading in each case?

Yes No

- Discuss the answer with your classmate.

- Does friction change according to the type of the surface in contact ?

What have you learnt?

The friction force depends on the type of the material of the surfaces in contact

Movement of Objects through Air and Water

Fricition due to movement of objects through air and water :

Friction is not restricted to solid surfaces when sliding or tending to slide over one another, but also when objects are moving through air or water.

Thus, the resistance of air to the object motion through it (figure 4) and the resistance of water to the object motion through it (figure 5) are types of frictional forces.



Figure (4): What is the effect of the air resistance on the bird motion?



Figure (5): What is the effect of water resistance on the boat motion?

In the following section, we are going to discuss the effect of friction due to air resistance and water resistance on objects motion.

- Air resistance to object motion :

The air resistance acts on the moving object in a direction opposite to the direction of its motion. The air resistance is considered as a type of friction that hinders the motion of that object. The air resistance to the motion of objects becomes more obvious when they move at a higher speed.



Examples:

1- As you run in the open. (Figure 6)

- Do you feel the air resistance while running?

Yes

No

- Describe that effect.

Figure (6): The effect of the air resistance on your motion

Friction

2- Ride a bicycle at a high speed. (figure 7)

- Do you notice the air resistance while riding the bike at a high speed?

Yes No

- Describe that effect.



Figure (7): The effect of the air resistance on the bike motion

3- The effect of the air resistance becomes obvious and high when the car moves at a high speed. (figure 8)

The air resistance to the car motion decreases when the car moves at a low speed.

It means that the air resistance to the car motion increases as the speed of the car increases.



Figure (8): The effect of the air resistance on the car motion

What is the effect of the air resistance on moving car ?

1- The car moves at higher speeds

2- The car moves at lower speeds

The effect of the surface area exposed to air or water on friction

Have you noticed the design of rockets, planes and fast trains?

These vehicles are designed to have streamlined shapes to reduce friction caused by the air resistance to their motion.

The streamlined shape decreases the surface area exposed to air and hence friction with air.



Figure (9): streamlined shape of rockets, planes and fast trains reduces air resistance

It is found that as the surface area exposed to air increases, the amount of air resistance increases. It means that friction between the moving object and the air increases.

Having a clear example here, as a bat is landing to the ground, it extends its wings to increase the surface area exposed to air. This increases the air resistance to its motion and slows down its landing. (Figure 10)

That is also true when talking about a parachutist. When he opens his parachute to increase the surface area exposed to air (Figure 11), this increases the air resistance to its motion (friction) and hence slows down his landing to reach the ground safe.

Terms

Air Resistance:

It is a type of Friction force as an object moves through air.



Figure (10): The bat increases the surface area exposed to air on landing

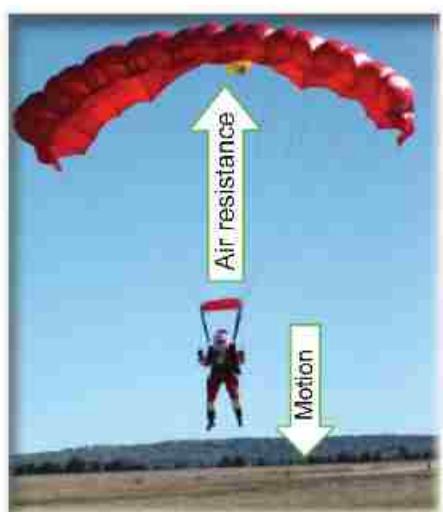


Figure (11): A parachutist on landing

Water resistance to objects motion:

As an object such as a ship, a fish or a dolphin, moves through water at a high speed, there is a friction force between these bodies and water.



Figure (12): Direction of the friction force is opposite to the direction of the dolphin motion

Friction

The streamlined shape of ships, fish or dolphins helps to reduce water resistance (friction) to their motion since the streamlined shape decreases the surface area exposed to water.

The friction force always acts in a direction opposite to the direction of the object motion. (Figure 12)

Terms

Water Resistance:

It is a type of Friction force as an object moves through water.

Lesson (1 - 1) Exercises**1- write the scientific terms that expresses the following sentence**

A force that slows down the moving object and has its effect in the opposite direction of the object's movement.

2 - put (✓) or (✗) in front of each of the following sentences and correct the wrong sentences :

- The friction force is always in the same direction of the object's movement.
- The friction force between two surfaces greater, on moving than stopping.
- The moving car is affected by air resistance in the same direction of its movement.
- The air resistance decreases when the car moves so fast.
- When the area of the object surface exposed to the air increased the air resistance of its movement decreased.
- When the parachutist opens his parachute, the friction force decreases.

3- Give reason for the following sentences

- The fish has streamlined shape.
- Parachutist opens his parachut on landing.
- Bats extend its wings during landing on.

4- Complete the following sentences

- Friction force has its effect on the.....direction of the object's movement.
 - The force that slows down the objects motion is called.....
- 5- What happens if we drop two similar sheets of paper, One of them is folded and the other is unfolded? Which one reaches the ground first? Give reason.

Lesson (1 - 2)

Applications of Friction

Objectives

By the end of this lesson, the student should be able to:

- Explain some benefits of friction.
- Explain some disadvantages of friction.

A lot of technological applications are based on friction between two surfaces that are in contact.

The friction force causes those surfaces that are in contact to each other to slow down or even stop motion. Also, the friction force always acts in a direction opposite to the direction of motion.



Friction appears in the following cases:

- 1- Friction between two surfaces in contact, one of them tends to move over the other.
- 2- Friction between two surfaces in contact, one of them is moving over the other.
- 3- Friction due to the motion of objects through air or water.
- Give one example of the previous cases ?

Benefits of Friction :

Most of us think about the friction force as a force that hinders the motion of objects. As a matter of fact, friction has many advantages such as:

- 1- Friction between the tires and the ground helps the car to move forwards. Also, friction is needed to increase the speed of the car and change its direction. (Figure 13)



Figure (13): friction enables us to control the car movement

- 2- The car brakes that are used to slow down or stop the car depends on friction.
- 3- Friction between yours shoes and the ground helps you to walk. If there is no enough friction between your feet and the floor, you will slip. (Figure 14)



Figure (14): you cannot walk without friction between your shoes and the ground

- 4- Catching things need friction. Without friction, things slide down through hands.
- 5- Lighting up a match needs friction to generate heat. (Figure 15)

What have you learnt?

Friction is essential for everyday life.



Figure (15): friction is necessary to lit a match stick

Disadvantages of Friction:

Although friction forces have a great importance so that life becomes almost impossible at its absence, friction can cause many damages. Some of them are quite serious at the long run. In most cases, the internal parts of machines are often damaged as a result of friction between their moving parts.



Figure (16): friction can damage the machine parts

This friction leads to a rise in temperature of these parts. Continuous cooling is needed because overheating can damage the machine. Also, friction causes the machine parts to wear out and waste a lot of money (Figure 16). Engineers design machines to minimize friction between their moving parts to increase their efficiency.

Lesson (1 - 2) Exercises

1 - Give reason for the following sentences :-

- a - Mechanical machines must be cooled when they are in operation for along time.
- b - Rockets and aircraft have a streamline shap.
- c - Car movement needs friction.

2 - Complete the following sentences :-

- a - All car bodies are designed in streamlined shape to reduce
- b - The force between two surfaces in contact called

3 - put (✓) or (✗) in front of each of the following sentences and correct the wrong sentences :-

- a - Rockets and air craft have a rectangle shape. ().
- b - Friction is necessary for walking. ().

Unit 1 Test

1 Complete the following sentences:

- (a) The value of between two surfaces depends on the type of material of both surfaces.
- (b) Friction force has its effect in the opposite direction of
- (c) The friction force between the air and the object that moves through is called
- (d) The friction force between water and the object that moves through is called
- (e) increases by the increase of the surface area of a moving object.
- (f) The force of acts in the opposite direction of an object's motion.

2 Answer the following questions:

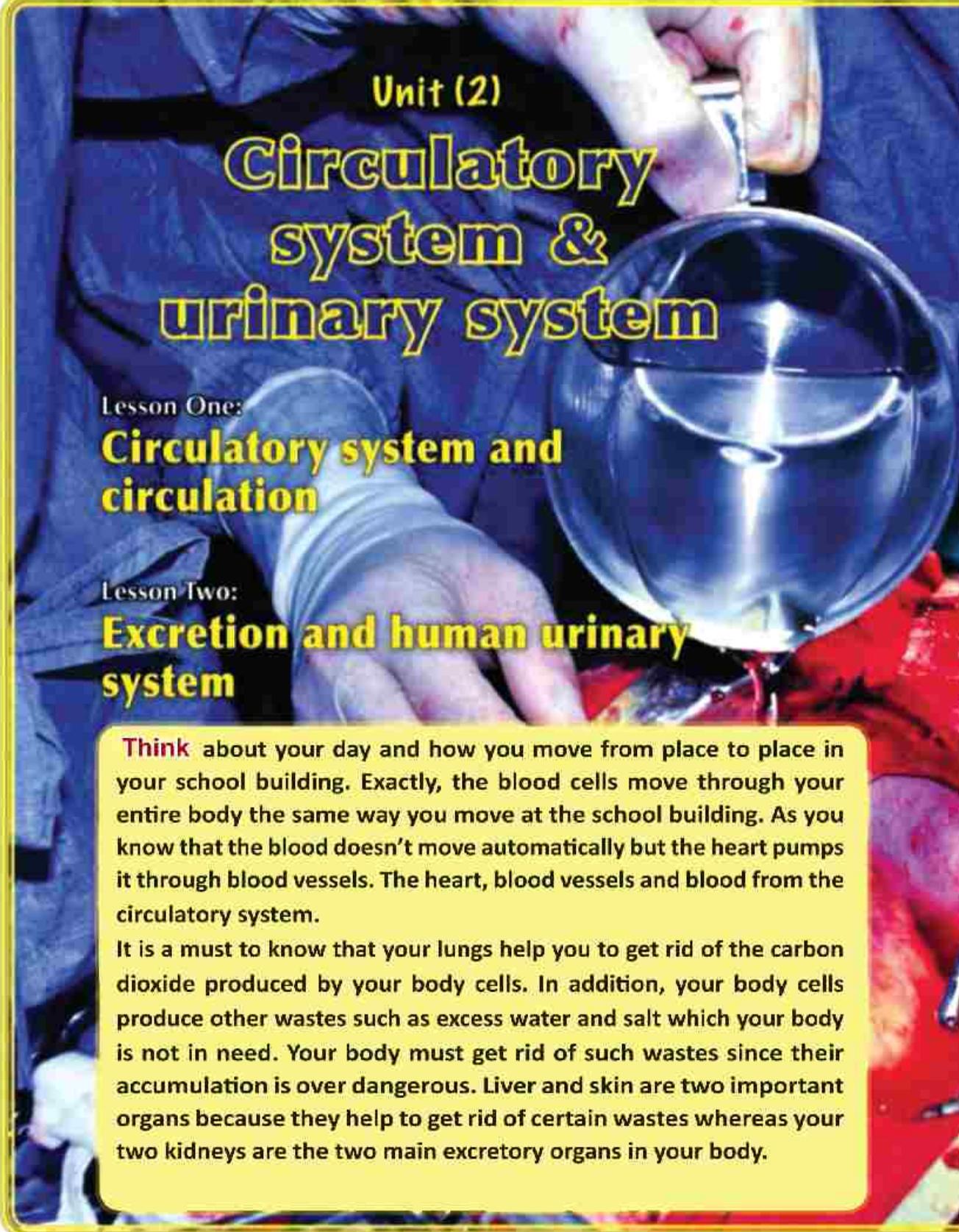
- (a) The following table clarifies the values of friction force between some surfaces. Study this table and answer the following questions:

| The two surfaces | The friction force |
|-----------------------|--------------------|
| Glass and glass | 3 |
| Rubber and wet cement | 4 |
| Glass and metal | 5 |
| Rubber and dry cement | 6 |

If you push a marble on a glass surface and another similar one on a metal surface, which one will move for a longer distance? Why?

1 Put (✓) or (✗) in front of each of the following sentences and correct the wrong sentences :

- (a) The friction force affects in an opposite direction to the direction of motion.
- (b) The friction force depends on the shape of the surface of two touching objects.
- (c) The pushing of an object forward is opposed by a friction force at the same direction.



Unit (2)

Circulatory system & urinary system

Lesson One:

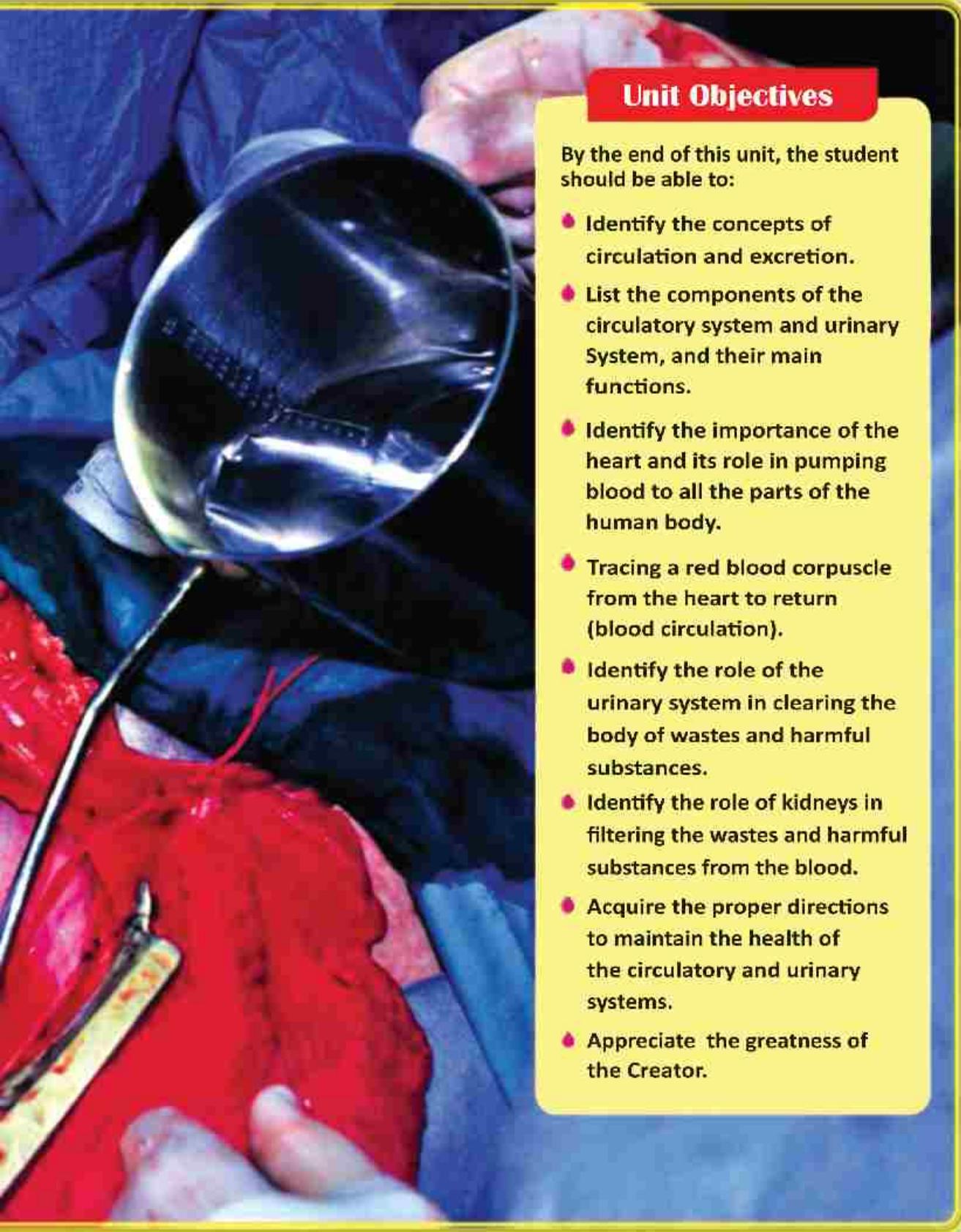
Circulatory system and circulation

Lesson Two:

Excretion and human urinary system

Think about your day and how you move from place to place in your school building. Exactly, the blood cells move through your entire body the same way you move at the school building. As you know that the blood doesn't move automatically but the heart pumps it through blood vessels. The heart, blood vessels and blood from the circulatory system.

It is a must to know that your lungs help you to get rid of the carbon dioxide produced by your body cells. In addition, your body cells produce other wastes such as excess water and salt which your body is not in need. Your body must get rid of such wastes since their accumulation is over dangerous. Liver and skin are two important organs because they help to get rid of certain wastes whereas your two kidneys are the two main excretory organs in your body.



Unit Objectives

By the end of this unit, the student should be able to:

- Identify the concepts of circulation and excretion.
- List the components of the circulatory system and urinary System, and their main functions.
- Identify the importance of the heart and its role in pumping blood to all the parts of the human body.
- Tracing a red blood corpuscle from the heart to return (blood circulation).
- Identify the role of the urinary system in clearing the body of wastes and harmful substances.
- Identify the role of kidneys in filtering the wastes and harmful substances from the blood.
- Acquire the proper directions to maintain the health of the circulatory and urinary systems.
- Appreciate the greatness of the Creator.

Lesson (2 - 1)

Circulatory system and circulation

Objectives

By the end of this lesson, the student should be able to:

- ◆ Define the components of circulatory system.
- ◆ Identify the structure and function of the heart.
- ◆ Define the blood composition and its functions.
- ◆ Know how he can maintain the health of circulatory system.

The human heart and blood vessels:

- Put your hand on your chest, what do you observe?
- Count the beats you may feel in a minute. Record their number.
- If you are wounded, what is the fluid which you observe flow out from your body?
- What is its Color?
- What is its source?
- What is its name?



Fig. (17)
The human heart and blood vessels.

Your circulatory system consists of the heart, blood vessels and blood (Fig. 17). This system transports the digested food, oxygen and water to all your body cells.

It also transports what is formed inside your cells from food combustion products to special organs in your body to get ride of it.

In addition, your circulatory system helps to maintain your body healthy.

First**The heart**

Heart is a muscular pump, about your fist in size. It is located within the chest cavity between the lungs slightly inclined to the left.

Heart consists of four rooms (chambers) which are always full of blood and connected with blood vessels (Fig. 18).

Heart has two sides, namely the right-hand side and left-hand side, and a muscular wall separating them to prevent mixing the blood found in both sides.

The right side consists of a room called the right atrium at the top and the right ventricle at the bottom whereas the left side consists of the left atrium and the left ventricle.

There is a valve, between the atrium and ventricle of each side, allows blood to pass from the atrium to the ventricle and prevents it from returning back.

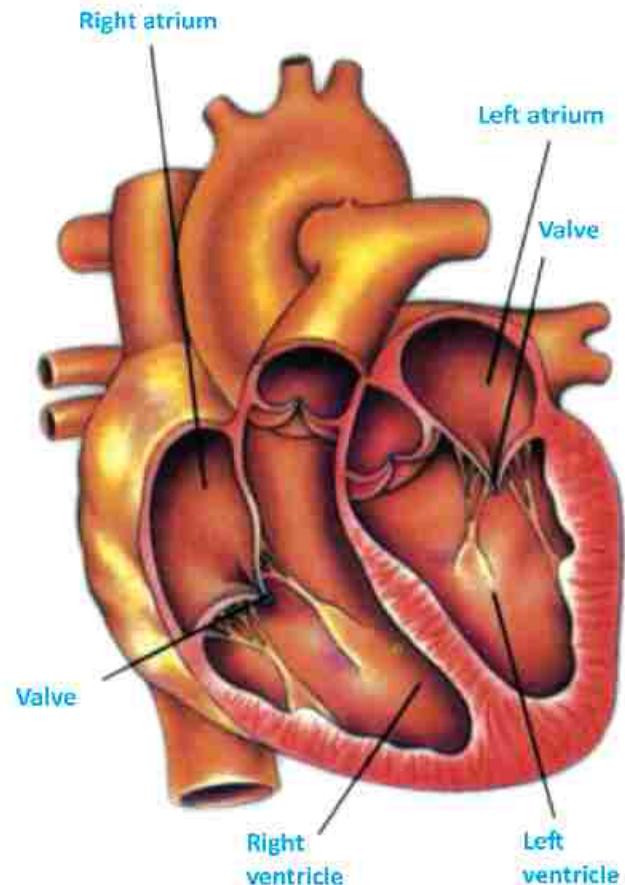


Fig. (18)
The human heart

Circulatory system and circulation

Second:

Blood vessels

Blood flows inside your body through a network of blood vessels. There are three types of blood vessels (Fig. 19). Each type has a special function.

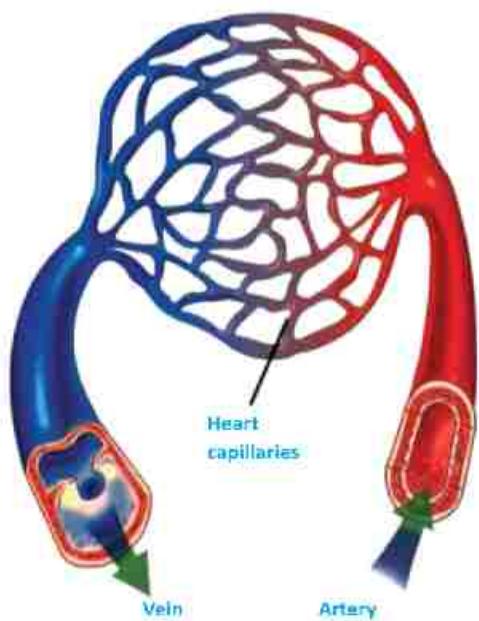


Fig. (19)
The 3 types of blood
vessels.

a) The arteries:

Arteries are blood vessels which emerge from the heart (from the 2 ventricles) and transport blood to all parts of the body. Arteries are large and wide at the beginning, but become smaller and end in a network of blood capillaries near the cells.

All the arteries carry oxygen - rich blood except the pulmonary artery which carries blood containing plenty of carbon dioxide.

b) Veins:

Veins are blood vessels that carry blood from different body parts to the heart. They open in the 2 atria. Veins begin in the form of capillaries at the cells, and collect together to become larger and larger until reaching the heart.

c) Blood capillaries:

Blood capillaries are a network of thin-walled vessels located within the tissues and around the cells. Their thin wall allows blood to deliver food and oxygen to the cells, and then carries carbon dioxide and waste products to excretory organs.

Third:

The Blood:

- The human blood (Fig. 20) consists of:
 - ① **Red blood cells (RBC's):** These are red cells without nuclei. They function to carry oxygen from the lungs to all body cells, and carry carbon dioxide from the cells to the lungs to get rid of it.
 - ② **White blood cells (WBC's):** These are white cells with nuclei of different forms. They function to defend the body against microbes.

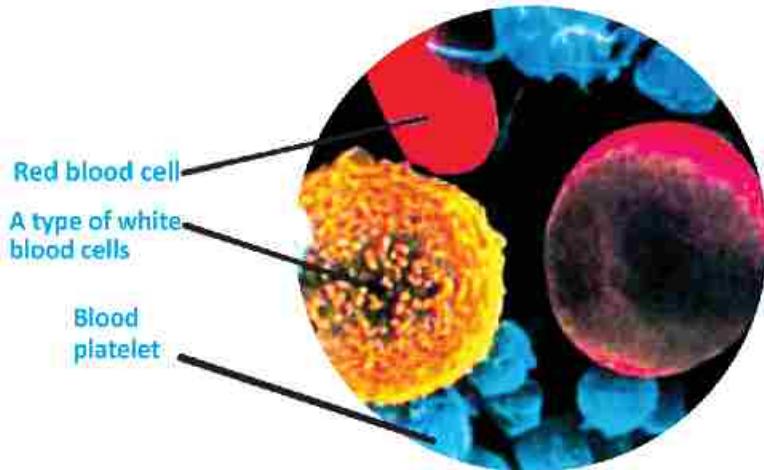


Fig. (20)

Human blood composition.

③ **Blood platelets:** They are small-sized cell fragments. They function to coagulate blood (forming blood clot). When the body is wounded and the blood is exposed to the air, this prevents bleeding and infection of the human body.

- **Plasma:** A yellow watery fluid containing the food that cells need, as well as the harmful waste products formed in the cells. The red blood cells, white blood cells and blood platelets float in blood plasma.

Functions of blood:

- Human blood has two general functions, which are:
 - ④ The transfer and delivery of materials to the cells of all body parts.
 - The red blood cells carry oxygen and carbon dioxide.
 - The plasma transports food, vitamins, salts and harmful waste products formed in the cells.
 - Blood distributes and keeps the temperature of the body constant.
 - ⑤ The defence and protection of the body.
 - The white blood cells attack the microbes that cause diseases to human.
 - The blood platelets help to heal the wounds.

The path of blood through the heart (Fig. 21)

Your heart is a hollow, muscular organ that pumps blood continuously. The heart from inside is divided into four chambers. Each atrium receives blood out of the veins. Each ventricle pumps blood out of the heart through arteries. Try to trace the path of blood in the figure below.

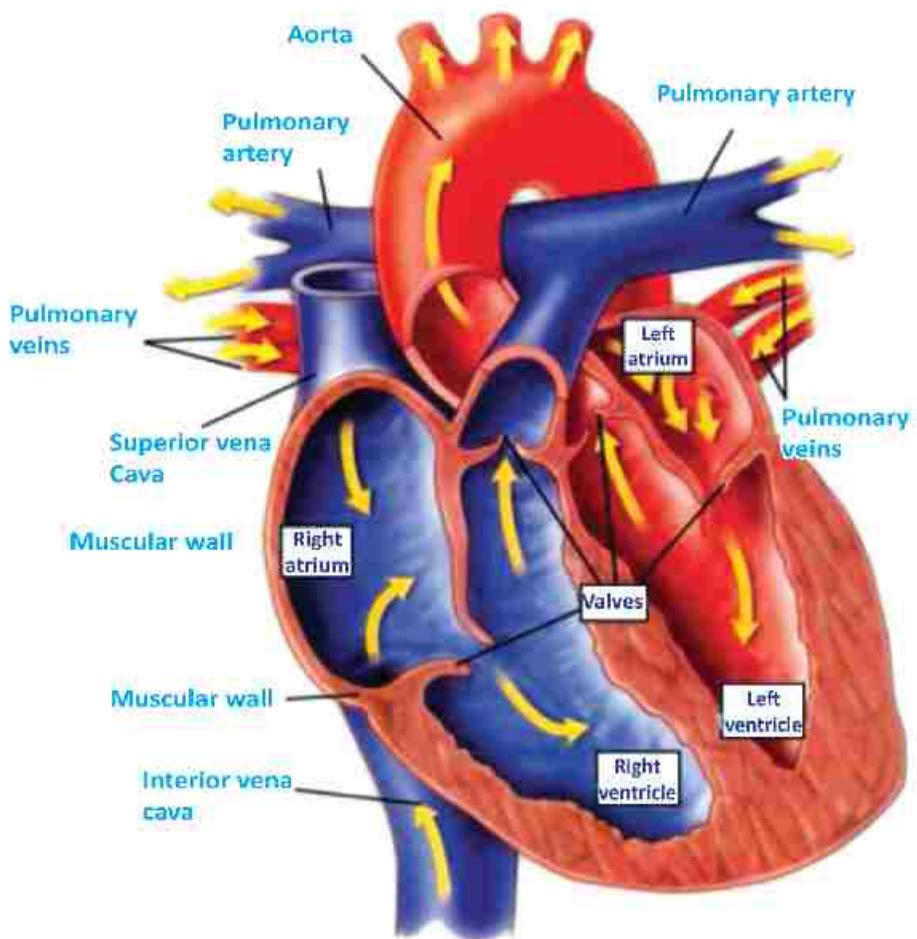


Fig. (21)
The path of the blood through
the heart.

Circulatory system and circulation

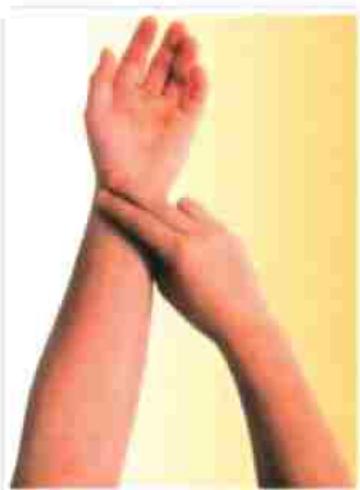


Fig. (22)
How to measure your pulse?

Activity Heart beats

Materials: stopwatch

Steps :

- Place your arm on a desk, palm up. Place the first two fingers of the other hand against the wrist near the base of your thumb (Fig. 22).
- Do you feel the pulse in your wrist? Do you know its reason? Do you know its source?
- Watching the clock, count your pulse for 10 seconds. Write the number down, then multiply it by 6. This measurement is your heart rate in a minute at rest.

Activity The rate of heart beats

Materials: stopwatch

Steps :

- (Cooperate with one of your classmates in doing this activity).
- Sit comfortably and put your hand on your chest. Ask your classmate to observe the time.
- Count your heart beats during a minute.
How many beats?



- Run around several minutes. Count your heart beats for a minute. How many beats?
- Do you observe an increasing or decreasing in the rate of your heart beats?
- Explain what happens.

How to maintain the circulatory system healthy?



Fig. (23)
Practising exercise keeps your body healthy.



Fig. (24)
Having balanced meals keep your body healthy.

- ➊ Keep exercising, this strengthens the heart muscle and activates blood circulation (Fig. 23).
- ➋ Eat healthy and balanced food, low in fats and salts (Fig. 24).
- ➌ Eat more fruits and vegetables, that should be fresh and clean.
- ➍ Drink an appropriate amount of clean water every day, especially in the summer.
- ➎ Avoid exposure to infections and accidents. When wounded try your best to stop bleeding. Clean the wound and get appropriate treatment.
- ➏ Avoid smoking and cigarette smokers; smoking harms the heart and weakens blood circulation.

Enrichment

Science, Technology, and Society

The electronic pace maker

Recently, patients of heart diseases which are subjected to heart attack use an electronic pace maker which is implanted beneath the skin and connected to heart muscle by wires.

Both natural and electronic pace makers work together by sending signals to heart muscle to work in a regular fashion. And, when the natural pace maker stops after the occurrence of heart attack, the electronic pace maker works alone in order to keep the heart pulsing.



Lesson (2 - 1) Exercises

1 Complete the following sentences:

- a Heart is located within the chest cavity between the..... .
- b Heart beats cause to all body parts.
- c Heart consists of 4 chambers filled with and connected with
- d Blood flows inside a network of pipelines called
- e The blood vessels that emerge from the heart are called
- f blood cells attack the microbes that cause diseases to human.
- g blood cells carry oxygen and carbon dioxide inside the body.
- h keeps body's temperature constant.
- i Blood platelets form which help in healing wounds.

2 Give reasons:

- a The two sides of heart are separated.
- b Heart contains valves.
- c Blood flows in one direction only inside the heart.
- d Blood capillaries have a thin wall.
- e It is necessary to keep exercising.
- f Smoking must be avoided.
- g It is necessary to avoid exposure to infection and accidents.

Lesson (2 - 1)

- ① Write the scientific term which expresses each of the following sentences:
- a A muscular organ, about the fist in size and located within the chest.
 - b The two lower chambers of the heart.
 - c The network of pipelines that extend all over the human body.
 - d The blood vessels that collect blood from all body parts and pour it into the heart.
 - e The small bodies that play a role in blood coagulation when the body is wounded.
 - f A yellow watery fluid in which blood cells float.

Lesson (2 - 2)

Excretion and human urinary system

Objectives

By the end of this lesson, the student should be able to:

- ◆ Identify the excretory products of human body.
- ◆ Describe the structure of human urinary system.
- ◆ Identify the role of human urinary system in eliminating body wastes.
- ◆ Know the proper methods of keeping the urinary system healthy.

The waste materials

The body cells get energy from the digested food in the presence of oxygen. This process gives up some waste products such as carbon dioxide and water vapor.

Also, cells produce other wastes which are known as the nitrogen wastes (such as urea and uric acid) when they break down proteins which body uses for growth and repair of damaged cells. In addition the body gets rid of excess salts.

These wastes which body cells produce are known as the excretory materials. Some of these materials are harmless, but your body cannot use them, while others are more dangerous or poisonous to the body, so the body must get rid of such materials.

- Define the excretory materials.

Terms

Excretory system:
group of organs that help the body to get rid from wastes that produced from the breaking down the food stuff inside the cells.

Cell wastes are different from solid wastes (Faeces) which are materials from food that your body cannot digest. Solid wastes are stored in your large intestine before passing out of your body. So, faeces does not consider as excretory products.

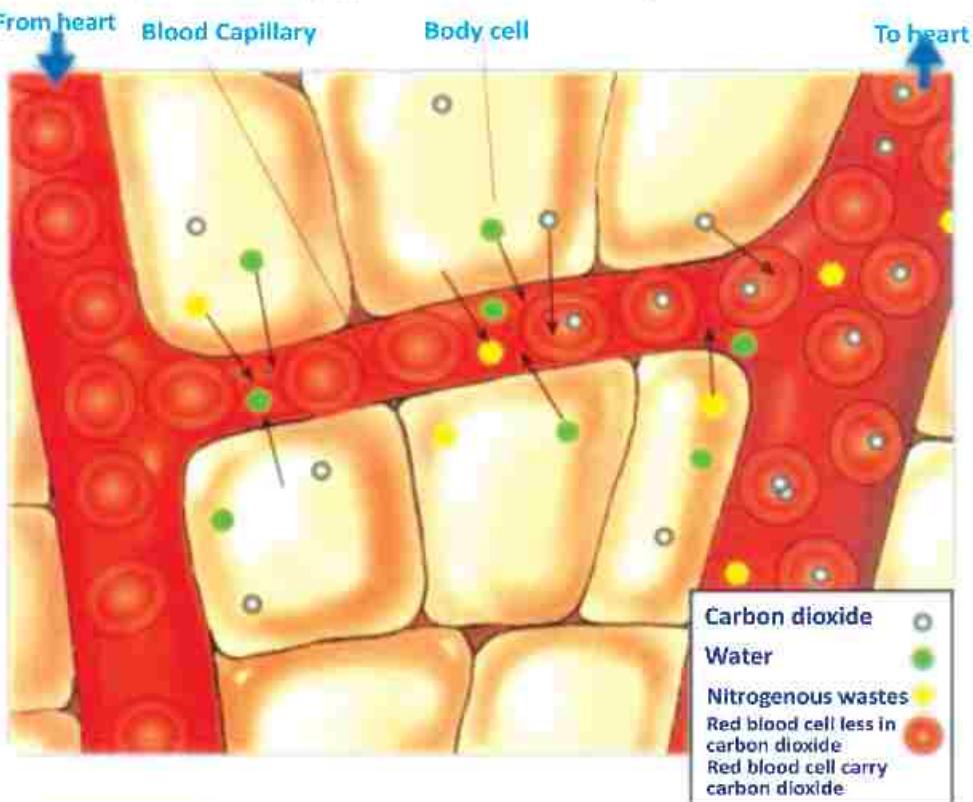
Lesson (2 - 2)

- How do your cells get rid of excretory materials?
- The wastes your body cells release move through the thin walls of nearby capillaries (Fig. 25) and enter the blood. The figure below shows this process.

Body cells produce wastes and release them into the capillaries. The blood carries cell wastes to the organs that get rid of the wastes, where:

- Carbon dioxide is exhaled from the lungs.
- Excess salts are expelled out in sweat from the skin.
- Nitrogenous wastes (such as urea and uric acid) are removed by the urinary system but of the body with urine.

Fig. (25)
How the body cells get rid of their excretions.



Urinary System and removing wastes from blood:

The urinary system functions to filter the blood of excess salts, urea, uric acid and other waste materials and expels them out in the form of urine.

What are the components of the urinary system, and where does it lie in the body?

Human urinary system is located in the cavity of the abdomen near the backbone. It consists of three parts:

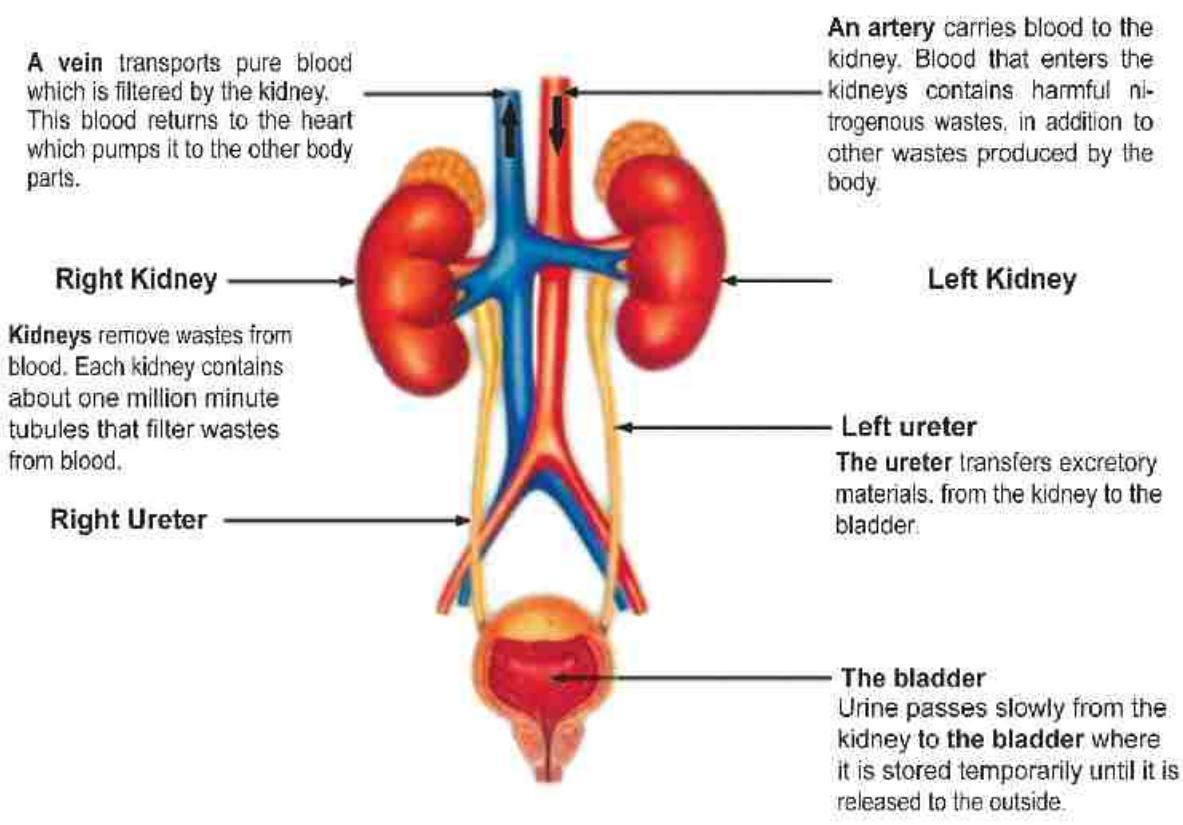


Fig. (26)
The structure of human urinary system

① The kidneys:

The kidneys are the most important organs of the urinary system. They are bean-shaped organs located on either sides of the backbone. Blood enters the kidneys through arteries and leaves through veins that carry blood to the heart.

The main function of the kidneys is filtering the blood from urea, uric acid, excess salts and other waste materials, and get rid of them dissolved in water in the form of urine.

② The ureters:

Ureters are two narrow tubes that carry urine from the kidneys to the urinary bladder.

③ The urinary bladder:

A balloon like sac that receives urine from the ureters. It temporarily stores urine until it is released from the body to the outside through the urethra.

Did you know?

Man needs to drink 2 liters of water a day, and excrete about 1.5 litre of urine per day.

A doctor can diagnose many diseases by examining a report of urine analysis.

Artery, which enters the kidney, carries blood with much waste materials, while the vein, which leaves the kidney carries clean blood to the heart.

Bloody urine indicates infection of urinary tract with disease.

Diseased or injured kidneys (renal failure) may cause poisoning.

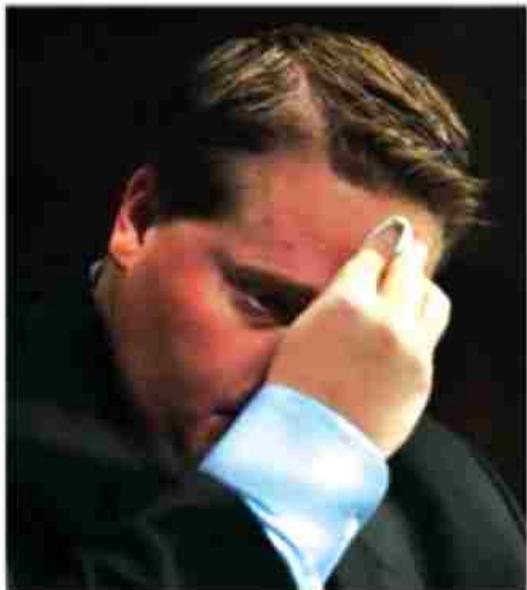


Fig. (27)
The body gets rid of excess water and salts through sweating, as shown in the picture of the wrestler.

Getting rid of the excess salts

The body gets rid of excess salts and some other excretory products by secreting sweat (Fig. 27) from special glands in the skin which known as sweat gland.

How to maintain the urinary system healthy?

To maintain the integrity of your urinary system, you must follow the following instructions:

- 1 Drink appropriate quantities of clean water daily, especially in the summer.
- 2 Eat healthy and balanced food, low in salts.
- 3 Avoid schistosomiasis disease (bloody urine) by keeping away and not urinating in irrigation canals.
- 4 Don't keep urine for long periods. This will affect the function of the kidney.

Lesson (2 - 2) Exercises

1 Choose the correct answer:

a The kidneys are the main organs in the system.

- 1- digestive
- 2- circulatory
- 3- urinary
- 4- nervous

b The kidney has a (an) shape.

- 1- bean
- 2- pea
- 3- banana
- 4- orange

c is the narrow tube that allows urine to reach the urinary bladder.

- 1- Urinary bladder
- 2- Ureter
- 3- Urethra
- 4- Liver

2 Complete the following sentences:

- (a) are the main organs of the urinary system.
- (b) The kidney excretes the wastes dissolved in water in the form of
.....
- (c) is connected with the kidney and carries the urine into
.....

3 Write the scientific term that expresses the following:

- (a) The group of organs that clarifies the body from the wastes and harmful substances.
- (b) The system that clarifies blood from excess salts, urea and uric acid.
- (c) The fluid which the kidneys produce and contains harmful substances.
- (d) The narrow tube which connects with the kidney and urine passes through it.

4 Give reasons:

- (a) Skin is one of the excretory organs.
- (b) If the 2 kidneys are damaged, the person will die.
- (c) Sweat has a salty taste.
- (d) Man urinates less in summer than winter.

5 State the function of the following:

the kidney - urinary bladder - ureter

Unit 2 Test

1 Complete the following sentences by using the following words:

(plasma - valve - veins - left ventricle - clot - pulmonary artery - blood platelets - urea - urinary bladder - urethra - uric acid)

- a Vessels that carry blood to the heart are called
- b There is a between atrium and ventricle on each side of the heart.
- c The tube, which extends from the bladder and opens outside the body is called.....
- d Blood consists of red blood cells, white blood cells, and
- e Urine consists of water containing excess salt, and
- f When the blood is exposed to the air, a bloody is formed.

2 Put (✓) or (✗) in front of each of the following sentences and correct the wrong sentences:

- a There are valves within the heart cavity.
- b The aorta delivers blood to the lungs.
- c White blood cells defend the body against microbes.
- d Eating meals rich in fats and salts activate the circulatory system.
- e Keeping the urine and delaying getting rid of it benefits urinary bladder.
- f The kidney filters excess water and salts from the human's food.
- g Ureter is a tube that extends from the bladder to open outside of the body.

③ Choose the correct answer:

- a) The heart is a muscular pump in a size of your
 - 1- fingers
 - 2- foot
 - 3- fist

- b) Blood vessels which carry blood from the heart are the
 - 1- arteies
 - 2- veins
 - 3- blood capillaries

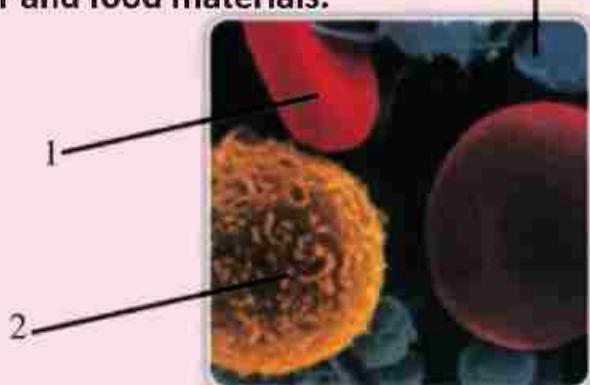
- c) Blood components which are responsible for attacking the microbe causing diseases to man are the
 - 1-red blood cells
 - 2-white blood cells
 - 3-blood platelets

- d) Carbon dioxide and water vapour are released by the
 - 1- Kidneys
 - 2- lungs
 - 3- heart

- e) Urea is expelled by the
 - 1- heart
 - 2- kidneys
 - 3- lungs

④ The figure you see illustrates the human blood composition. Answer the following questions:

- a) Write the names of the numbered parts.
- b) What is the function of the 2 components No 1 and 2?
- c) Which component carries water and food materials.





Unit (3)

The Soil

Lesson One:

Soil Components

Lesson Two:

Types and properties of soil

When you dig a deep whole in an agricultural or desert region or even at your school yard, you may find different colored layers of soil.

Further to that, when you take long drives, you may observe that the soil is not the same along the sides of the route. When you stop your car and have a deep look at the grains of soil, you will see them in different-colored sizes.

In this unit, you will learn about the surface layer of soil and the necessity of it for growing plants, trees and some other living organisms. As you know, plants absorb water from the soil to grow, man and animals feed on these plants, besides there are some animals live inside it.



Unit Objectives

By the end of this unit, the student should be able to:

- Identify the soil as a part of Earth's crust.
- Differentiate between the soil components.
- Identify some types of soil (clay, sand and silt soils).
- Perform experiments to compare between soil types in view of their color, particles size, compactness, aeration, water absorption, fertility and drainage of water.
- Name plant kinds that suit each type of soil.
- Identify the ways of protecting the soil from pollution.

Lesson (3 - 1)

Soil components

Objectives

By the end of this lesson, the student should be able to:

- Identify the soil as a part of Earth's crust.
- Differentiate between the soil components.

Have you ever planted seedling or dug a trench in the ground. If so, you might have observed that soil has different colors. These different colors help scientists to identify the characteristics of metals inside. Furthermore there are different types of soil such as: color and texture. Some soil textures are sometimes smooth, granular and rocky rough. Types of soil vary since it is made up of various types of rocks and metals. Dead animals remains affect the color and texture of soil.



Fig. (28)
Different plants grow well in different types of soil.

What soil is made of?

Soil is made of more than pieces of rocks. It also has water, air and materials that once was alive. When organisms die, they decay. (To decay means to break down or rot) . The decayed material also becomes part of the soil. The decayed remains of plants and animals in soil is called humus. Humus is usually dark brown or black. Humus adds nutrients to soil.

- Now, can you define the concept of soil?
- **Soil:** is a thin non compacted superficial layer which covers the Earth's crust.

What is the importance of soil as one of environment main components?

Soil is important to plant, animal and human life as well because without soil, land plants couldn't have grown (Fig. 29). Without plants there would be no food for animals and humans that feed on them. In addition, many organisms take the soil as a home for living. Finally, all land organisms depend on the soil. So, soil is a main component of the environment.



Fig. (29)
Soil is the thin non compacted superficial layer which covers the Earth's crust.

Soil erosion

The stages of soil erosion are:-

- 1- water flow breaks down rocks into smaller pieces.
- 2- wind breaks down the rocks.
- 3- Rocks break down into very small pieces over the time and change of the temperature.



Fig. (30)
Stages of soil erosion

The Soil

It is the loose superficial layer of Earth's crust. It is composed of minerals that resulted from breaking down of rocks, mixed with the decayed material of dead organisms. It also contains different micro-organisms.

Soil Components

Soil and living organisms?

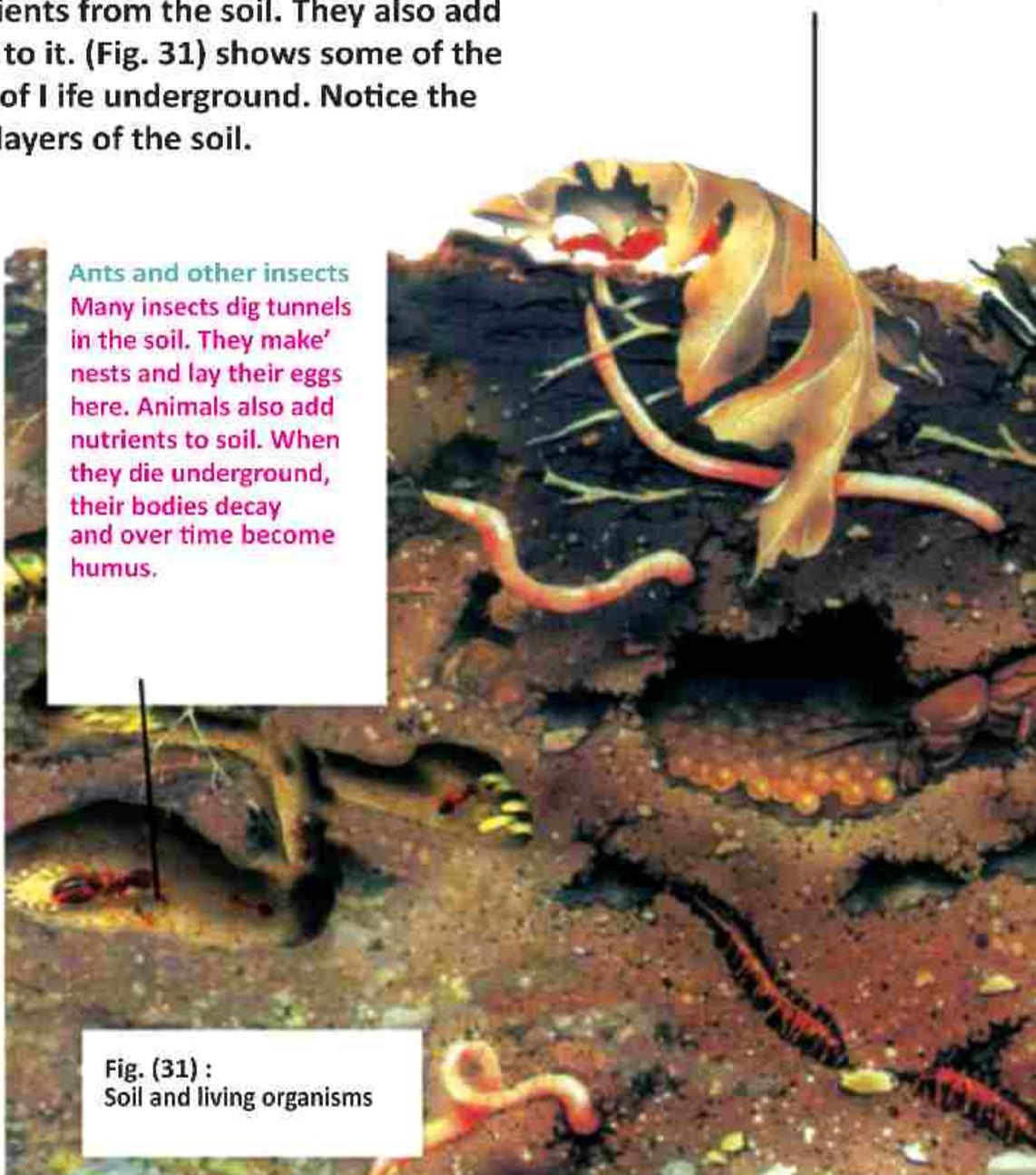
All living organisms need the Earth's soil. Plants need the minerals and other nutrients in soil to live and grow. The animals that eat plants depend on soil. Some animals make their homes in soil. Plants and animals take nutrients from the soil. They also add nutrients to it. (Fig. 31) shows some of the activities of life underground. Notice the different layers of the soil.

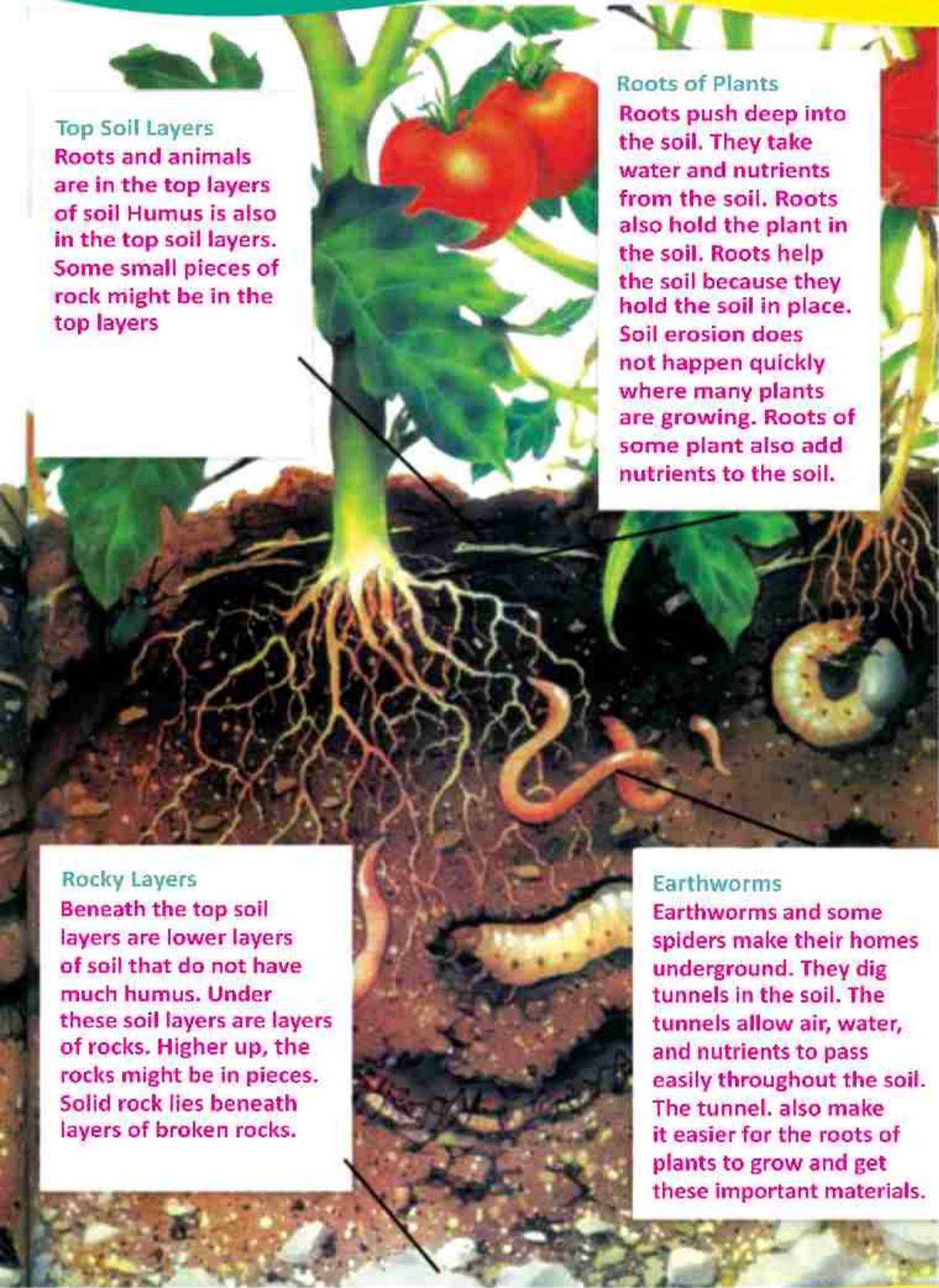
Leaves

Leaves and other plant parts fall off the soil. They decay there and help to form humus

Ants and other insects
Many insects dig tunnels in the soil. They make nests and lay their eggs here. Animals also add nutrients to soil. When they die underground, their bodies decay and over time become humus.

Fig. (31) :
Soil and living organisms





Soil Components

Activity What is the composition of soil?

Materials : Graduated Cylinder - Sample of soil-water

Steps:

- Take a graduated cylinder (or it jar) with a wide mouth. Fill it up to the middle with a sample of your school garden soil.
- Fill the cylinder with water and cover it tightly.
- Shake the cylinder strongly, then put it on a table and left it to stand for 15 minutes (Fig.33).

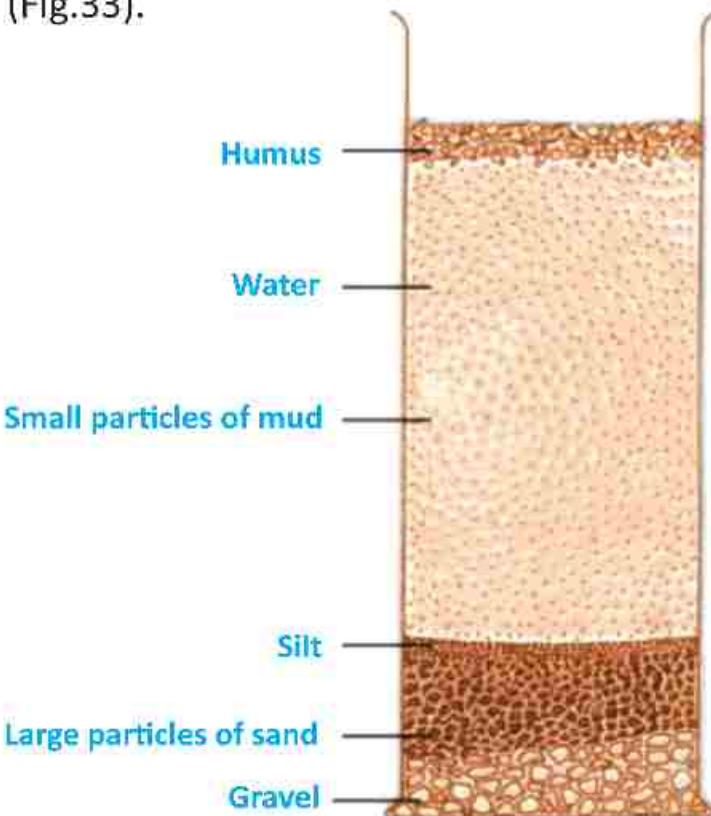


Fig. (33)
What are the soil components?

• Observations.

record your observation

.....
.....

Lesson (3 - 1) Exercises

1 Complete the following statements:

- a** The soil contains gravels produced from breaking down of.....
- b** The main soil components are.....,,
- c** Water and break down rocks into small pieces.
- d** Humus add nutrients to

2 Write the scientific term for each of the following statements:

- a** A thin non-compacted layer which covers the Earth's crust.
- b** The decayed organisms mixed in soil component and add nutrients to soil.

3 Give reasons for each of the following:

- a** The soil is the main component of the environment.
- b** Roots are important for the soil.

4 What are the soil different components?

5 How do plants and animals affect in soil composition?

6 What is the importance of soil as a main component of the environment ?

Lesson (3 - 2)

Types and properties of soil

Objectives

By the end of this lesson, the student should be able to:

- Identify the types of soil.
- Perform experiments to compare between soil types in view of their color, particles size, components, compactness, aeration, water absorption, fertility and drainage of water.
- Name plant kinds that suit each type of soil.

Activity

What soil is made of?

Materials : 3 Samples of soils (clay - sand - silt) - hand lens .

Steps:

- Cooperate with your classmates to get 3 different colored samples of soils (yellow, dark and gray) from different locations.
- With a hand lens, try to identify different particles each sample is made up of (Fig. 34).
- Compare the shape and color of these particles with that present in the figure.
- Which particles are mainly found in each type of soil.



Fig. (34)
The three types of soil

Types of soil

Soil can be classified into three different types according to the kind of particles as follows:

① Clay soil

is composed mainly of clay and silt particles and a small amount of sand particles and humus.



② Sand soil

Is composed mainly of sand particles, a small amount of clay and silt particles and rarely contains humus.

Do not keep nutrients So it is not the most suitable for crop growth or human life.



③ Silt soil

is composed of a mixture of gravel, sand, clay, silt and more humus.



Fig. (35)
Different types of soil

Types and properties of soil

Comparing the properties of different types of soil

Cooperate with your classmates to conduct the following activities to compare between the distinguishing properties of the different types of soil

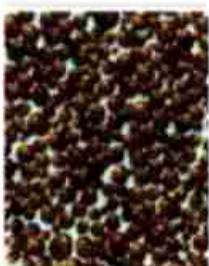
Activity

The soil color

Work with your classmates in examining of three samples of sand, clay and silt soils.

- Observe each sample, what is its characteristic color?
 - Sand soil:
 - Clay soil:
 - Silt soil:

Clay soil



Sand soil



Silt soil



Fig. (36)
Soil particles

Activity

Particles size

Take small equal samples of the three different types of soil.

- Spread out each soil sample on a piece of white paper.
- Examine the particles size (Fig. 36) for each of the soil types by a magnifying lens.
- Observe each of the following:
 - Which soil type has the largest size of particles?
 - Which soil type has the smallest size of particles?
 - What is the soil type that contains a mixture of large and small particles?

Activity Compactness of soil particles

Put three equal samples of sand, clay and silt soils (Fig. 37), separately, in three similar dishes.

Add to each soil sample an equal amount of water to cover it and leave them exposed to the sun and air till they get completely dry.

Try to crush each sample of them by your fingers.



Fig. (37)
Three equal samples of sand, clay and silt soils.

• **Observe:**

- Which soil type has a great compactness?
- Which soil type has a little compactness?
- Which soil type has a medium compactness?

Activity Rising of water in the soil

Get 3 similar glass tubes opened from both ends.

- Tightly cover one end of each tube with a piece of cloth as shown in the figure.
- Put in the three tubes equal amounts of sand, silt and clay soils, separately.
- Immerse the 3 covered ends of the three tubes at equal depths in a basin containing water as in Fig. (38).
- **Observe:** Does the water level rise through the soil inside the three tubes? (yes - no)
- **Explain:** If your answer is «yes», Does the water rising result from the presence of air spaces within the soil? (Yes - No).



Fig. (38)
An experiment showing aeration and water absorption of different types of soil.

Types and properties of soil

Aeration

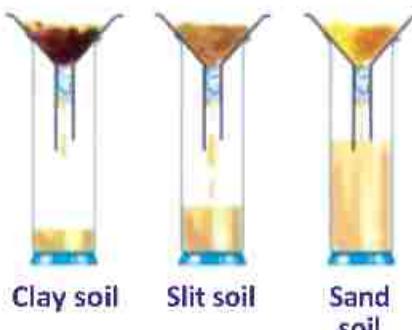


Fig. (39)
Soil draining of water
differs according to soil
particles size and the
spaces between these
particles (aeration).

Activity

Drainage of water through the soil

- Bring three similar funnels and put a small piece of cotton in each to close their internal holes.
- Put three equal samples of sand, clay and silt soils, separately, in the three funnels. Put a graduated cylinder under each funnel.
- Pour three equal amounts of water in each of the three funnels (Fig. 39).
- **Observe:**
 - Which soil type drains water fastest?
 - Which soil type drains water slowest?
 - Which soil type retains little water?
 - What is the relation between draining water through soil and the aeration of soil?

Activity

The fertility



Fig. (40)
The different samples
for each of the three
types of soil separately

- Soil fertility is related to what it contains of humus.
- Repeat the «What is the composition of soil» activity in the previous lesson using the three types of soil, separately. Compare the amount of humus in each type
- **Observe:**
 - Which soil type contains more humus (more fertile)?
 - Which contains the least?
 - The more fertile soil is.....
 - The least fertile soil is.....

From the activities above, you can conclude the following:

- Color:** sand soil has a yellow color, clay soil is dark and silt soil is grey.
- Particles size:** sand soil particles are large, particles of clay soil are small, while that of silt soil are a mixture of large and small particles.
- Compactness:** sand soil is non - compacted (loose or weak), clay soil is highly compacted (hard), whereas silt soil is medium.
- Drainage of water:** sand soil has the greatest draining of water, clay soil is the lowest, while silt soil is medium. So, clay soil retains more water than the silt soil which, in turn, retains more water than sand one.

- Aeration:** sand soil is well aerated; clay soil is poorly aerated, while the silt soil is medium.
- Fertility:** according to the amount of humus, the soil is fertile. So, sand soil is low fertile (poor in humus), clay soil is fertile and silt soil is highly fertile.

A comparison between different types of soil

Relation of soil with living organisms

- Helps in fixing plants.
- Provides plants with nutrients and water.
- It is a suitable medium for the activities of some living organisms.

| Properties | Sand Soil | Clay Soil | Silt soil |
|-------------------|----------------|-----------------------|---|
| Composition | sand particles | Clay & silt particles | Mixture of gravel, clay, sand, silt and humus |
| Color | Yellow | Dark | Grey |
| Size of particles | Large | Small | Medium |
| Aeration | Good | Poor | Medium |
| Compactness | Weak | Hard | Medium |
| Water absorption | Low | High | Medium |
| Drainage of water | Fast | Slow | Medium |
| Holding of water | Less | More | Medium |
| Fertility | Less fertile | Fertile | Highly fertile |

Types and properties of soil

The soil and plants?

Plants are affected by the type of soil in which they grow. So, each type of soil suits certain kinds of plants.

- **Sand soil:** is suitable for cultivation of plants that produce tubers such as potato and sweet potato, and the plants which give fruits beneath soil surface such as peanut plants.
- **Clay soil:** suits the cultivation of cotton, rice, sugar cane, wheat and many vegetable plants.
- **Silt soil:** Many plants grow efficiently in this soil such as strawberry, lemon, pomegranate and oranges.



• Rice.



• Cactus.



• Strawberry.



• Cotton.



• Potato.



• Lemon.

Fig. (41)
Each type of soil suits the cultivation of certain kinds of plants

Protection the Soil from pollution

- There are many reasons for pollution of agricultural soil such as: pesticides - chemical fertilizers - industrial wastes and other polluants.
- Researches about the soil pollution and the ways of its protection in Egyptian knowledge bank and discuss that for your teacher and your classmates.

Lesson (3 - 2) Exercises

1 Complete the following statements:

- (a) The main types of soil are , and
- (b) The colour of soil is dark, while that of soil is yellow.
- (c) soil is highly fertile because it contains large amount of
- (d) Clay soil holds water and soil holds less water.
- (e) The compactness of soil is very weak, while that of soil is highly compact.

2 Choose the correct answer:

- (a) The particles size of clay soil is
(large - small - medium)
- (b) The aeration of sand soil is
(good - bad - medium)
- (c) The most suitable soil for cultivation is soil.
(sand - clay - silt)
- (d) The sand soil water more than the other two types of soil.
(drains - holds - retains)

3 Put (✓) or (✗) in front of each of the following sentences and correct the wrong sentences :

- (a) Wheat plant grows in sand soil.
- (b) The spaces between the particles of clay soil are large.
- (c) Cactus plants are seen in sand soil.
- (d) Silt soil contains gravel, clay, sand, silt and humus.
- (e) Sand soil is more compacted than silt one.

4 Describe an experiment that you have performed to compare water absorption and draining in different types of soil.

5 Mention three examples of plants that grow in the following types of soil: clay - silt - sand.

Unit 3 Test

1 Complete the following statements:

- a The soil types are , and
- b Sand soil aeration is , clay soil compactness is and the silt soil fertility is
- c The origin of the agricultural soil in Egypt is the rocks from the plateau.

2 Put (✓) or (✗) in front of each of the following sentences and correct the wrong sentences :

- a The sand soil is strongly compact, has poor ventilation and fertile.
- b The clay soil has poor ventilation.
- c Humus is the remains of fragmented small rocks and was deposited on the Earth's surface.
- d Cactus plant grows in clay soil.

3 Choose the correct answer:

- a The silt soil compactness is
1- strong 2- weak 3-medium
- b The particles of the clay soil is
1- tiny 2- medium 3- large

(c) The water drain easily in the soil.

- 1-silt 2- sand 3-clay

(d) Rice grows efficiently in soil.

- 1- clay 2- silt 3- sand

(e) Write the scientific term for each of the following:

- a A thin loose layer covering the Earth's crust .
b The remains of the decayed organisms.
c A highly fertile soil because it contains suitable dissolved salts and humus .
d A soil is mainly composed of clay and silt particles.
e A soil rarely contains humus.

(f) Give reasons for each of the following:

- a The sand soil has good aeration.
b The water level in the clay soil is higher than the water level in both the sand and silt soils.
c The silt soil fertility is the highest .
d The clay soil has poor aeration.
e Soils differ in compactness depending on their types.
f The micro organisms that live inside the soil have a great importance.

(g) Mention three plants that grow in the following soil types:

Sand - Clay - Silt

قائمة نهائية بالروابط الخاصة بمواضيعات العلوم للصف الخامس الابتدائى الفصل الدراسي الثاني

| | Unit | Video title | QR |
|---|---|-------------------------------|-----------|
| 1 | <u>One</u> Friction | Moving slower | |
| 2 | <u>Two</u> Circulatory system and urinary system | Heart and circulatory system | |
| | | Urinary system | |
| 3 | <u>Three</u> The soil | How is soil made? | |
| | | Soil Differences | |
| | | Investigating Soil | |
| | | Soil pollution and protection | |

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| رقم الكتاب | التجليد | طباعة الغلاف | طباعة المتن | ورق الغلاف | ورق المتن | عدد الصفحات بالغلاف | المقاس |
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شركة أخبار اليوم للاستثمار