Chapter 9

INTERNAL ORGANS OF THE BODY

PART 1

Cars, tractors, motorcycles and scooters are made of many different parts. Each part performs a different function, but they all work together in harmony to move the vehicle forward.

Have you ridden a bicycle? It has handlebars, front and rear wheels, a chain, brakes and many other parts. If these do not work in harmony, what would happen? Try and imagine such a situation. If the handlebars turned the front wheel in one direction and the rear wheel in another direction, could anyone ride a bicycle?

Our bodies too have many parts that work together in harmony. If they did not, what do you think would happen?

We can see some parts of our body, like our hair, skin, eyes, nose, ears, etc. These parts are called our external organs. We can easily observe and study them. But most of our organs are situated inside our body. These are our internal organs. We cannot see them. How can we study them and understand how they work? Students of medicine study internal organs by the **dissection** of dead bodies, but it is not possible for us to do this. We must find other ways of studying them.

Many animals, big and small, have organs that are similar to ours. The rat is one such animal. Rats are commonly available and are small enough to be easily **dissected**. We can dissect a rat and study its internal organs. This is one way in which we can learn about our own internal organs.

Thus, there are at least three different ways in which we can go about studying the internal structure of the human body:

1. By observing the internal organs of a dissected rat and comparing them with our own internal organs.
2. By examining those internal organs that we can see or sense from outside.
3. By collecting information about specific diseases that affect our internal organs and understanding the functions of these organs.

We will continue the study of our internal organs in Class 8.

Section 1

Organs that help the body to move: Our muscles and muscular system

You may have sometimes climbed a tree to pluck its fruit on your way to school. In school, you sit down, get up, write with your pen and do experiments. Every day you move your hands and legs, turn your neck, bend your waist, and so on. All this movement is carried out with the help of organs that lie beneath our skin. We cannot see them, but we can sense them and see the way they move beneath our skin. In much the same way, we cannot see a person hidden beneath a blanket, yet we can tell that the person is under the blanket from his form and shape, particularly when he moves. If you observe a cow, bull or horse walking or running, you will see some **fleshy** structures moving beneath the skin around their shoulders and hips. These structures are called muscles.

We shall carry out a few experiments to find out how these muscles help us to move. We shall also see which activities of the body these muscles are connected with.

Experiment 1

Hold your right hand straight out in front of you at shoulder level, with the palm facing upwards. Clench your fist.

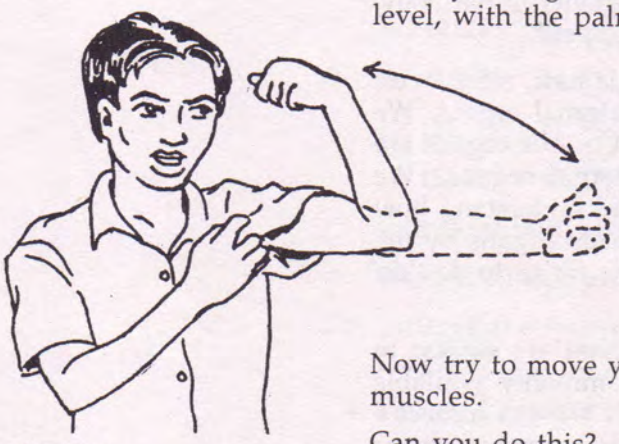


Figure 1

Fold your forearm in the way shown in Figure 1, moving your palm towards your shoulders. When your palm touches your shoulder, straighten your arm again. While doing so, press the muscles (biceps) of this arm with the finger of your other hand. Repeat this exercise several times and try to see and feel how the muscles of your arm move.

Now try to move your arm up and down without moving your muscles.

Can you do this?

Experiment 2

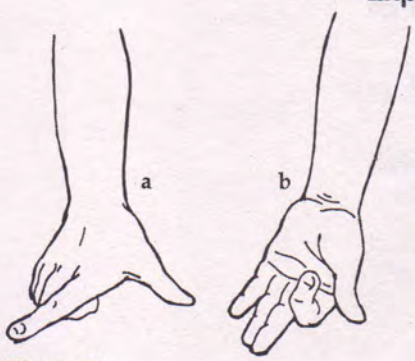


Figure 2

Hold one of your hands in front of you as shown in Figure 2 (a), with the palm facing downwards. Fold and unfold the fingers of this hand, one by one. Observe the back of your palm between the fingers and the wrist and study the movement of the muscles.

Can you identify the different muscles that move as you open and close each finger?

Now hold your hand with the palm facing upwards, as shown in Figure 2 (b), and fold and unfold your fingers one by one. Study the muscles that move.

Can you identify the different muscles?

Try to open and fold your fingers without moving these muscles. Is it possible to do so?

Experiment 3

Squat on the floor and bend one leg at the knee. Grasp the calf of that leg tightly with both hands and lift the leg slightly off the ground (Figure 3). Now move your foot rapidly up and down.

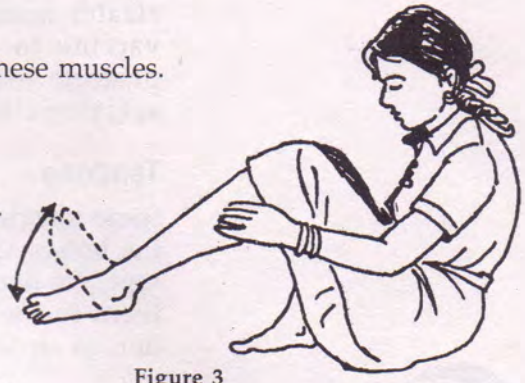


Figure 3

Do you feel the muscles in your calf moving?

Can you move your foot up and down without moving these muscles?

Experiment 4

Stand up straight, grasp one of your thighs tightly with both hands, lift your knee up and then swing your leg backwards and forwards (Figure 4).

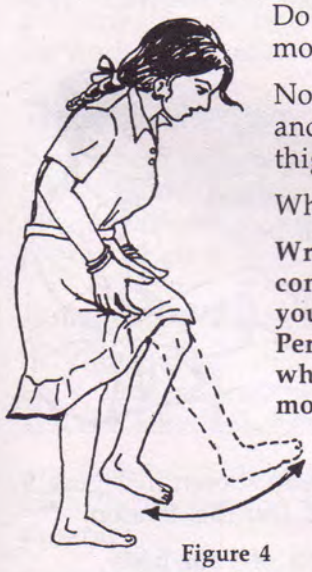


Figure 4

Do you feel the muscles of your thigh moving?

Now try and swing your leg, forward and backward, without moving your thigh muscles.

What happened?

Write in your own words, the connection between moving parts of your body and your muscles. (1)
Perform the following actions and say whether you were able to feel the movement of any muscles:

1. **Fluttering your eyelashes.**
2. **Chewing.**
3. **Breathing in and out.**
4. **Lifting a weight.**
5. **Moving your toes. (2)**

If you wish to move any part of your body you have to move some muscle or the other. In other words, it is only by the movement of muscles that we are able to move parts of our body. The muscles found in different parts of the body together constitute the muscular system. The muscular system of human beings is shown in Figure 5.

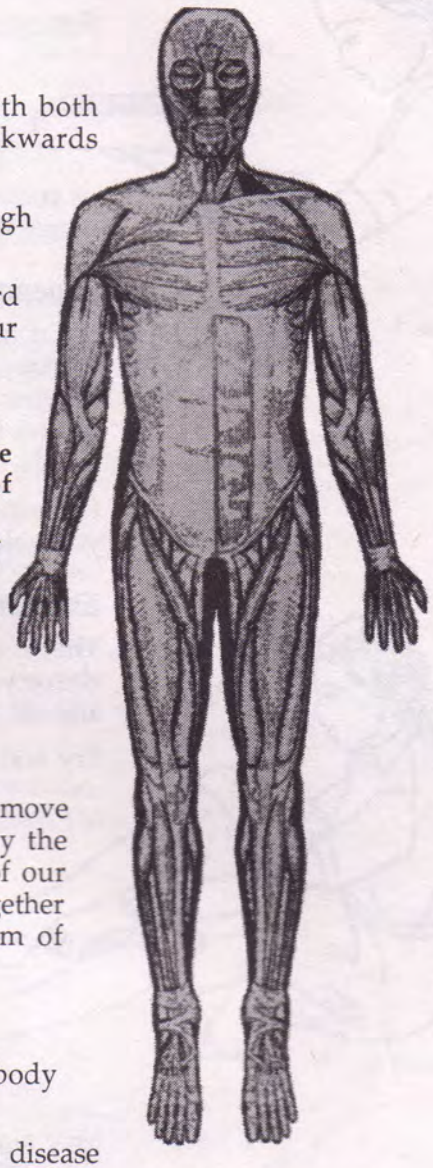


Figure 5: The muscular system of human beings covers the whole body.

Polio - A disease of the muscles

What would happen if the muscles of any part of our body stop functioning? Can that part move?

You may have seen children whose legs are wasted by a disease called **polio**. These children crawl with the help of their elbows or walk upright with great difficulty.

Health workers administer the polio vaccine to children. This medicine protects - or vaccinates - the child against polio.

Tendons

Some muscles are connected directly to the bones. Others have round, white, rope-like fibres at the ends that connect them to the bones (Figure 6). These fibrous structures are called tendons.

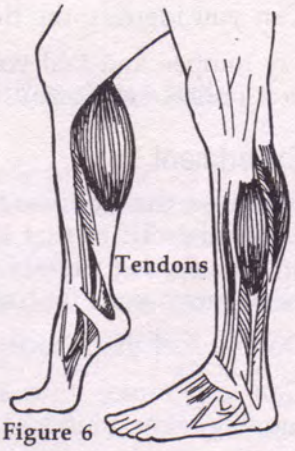


Figure 6

Experiment 5

Recognise your tendons

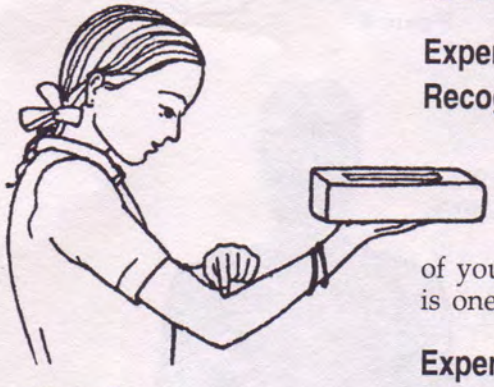


Figure 7

You can feel the tendons in several parts of your body. Place a brick or any other heavy object on your palm as shown in Figure 7. Bend that arm from the elbow. While doing so, press the inner part of your elbow with a finger of your other hand. Do you feel a hard rope-like structure? That is one of your tendons.

Experiment 6

Squat on the floor with your feet straight in front of you. Bend one knee as shown in Figure 8 and lift your leg a little off the ground. Feel the tendons on the inner part of your knee joint with both hands.

How many tendons were you able to identify?

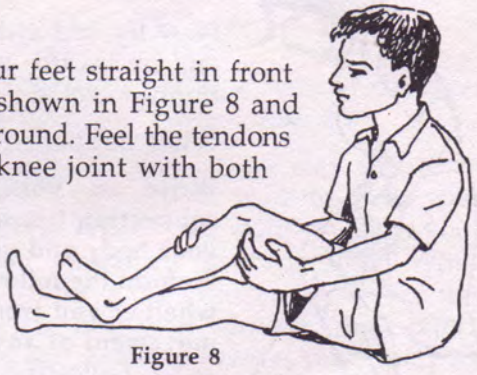


Figure 8

Experiment 7

There is a tendon just above your heel. Bend your knee in the way shown in Figure 9 and lift your heel off the ground. Try and feel this tendon.

Try and identify the tendons in other parts of your body.

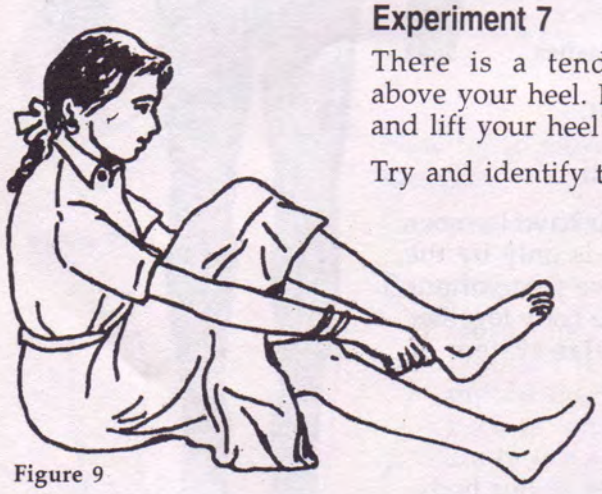


Figure 9

New words

Dissection	Dissected	Muscular system	Polio
Muscle	Tendon	Campaign	

Section 2

You learned some things about the muscular system earlier in this chapter. Now you will learn some things about your bones. You will do this by moving different parts of your body, like you did earlier.

When a person is injured, the doctor often takes an **x-ray** of the injured bone. The shape and structure of bones are clearly seen in x-ray photographs. In this way, a doctor can find out whether a bone is cracked, broken or dislocated.

Try and bring some x-ray films of broken bones to the class so that everyone can have a look at them.

Can you identify the broken bones in the x-rays? Is there an x-ray which shows a broken bone that has not been joined properly? If you break a bone in your hand and it does not join properly, how would it affect the functioning of your hand? Try and imagine such a situation.

If you know of any person whose broken bones have not healed properly, try and find out how the injured part of the body and its work has been affected.

The skeletal system

Bones help maintain the shape and structure of the body and protect some tender organs from injury. They also help us in our movements. All the different bones in our body are said to form a single structure known as the **skeleton**.

A diagram of a skeleton

Cut out the two diagrams of the human skeleton in your kit copy. One diagram shows the skeleton as seen from the front and the other as seen from the back.

Try to feel and identify the different bones in your body. As you identify each bone, colour the corresponding bone in the diagram.

Press one of your elbows with the fingers of your other hand. Bend and straighten the elbow as shown in Figure 10(a). Do this four or five times.

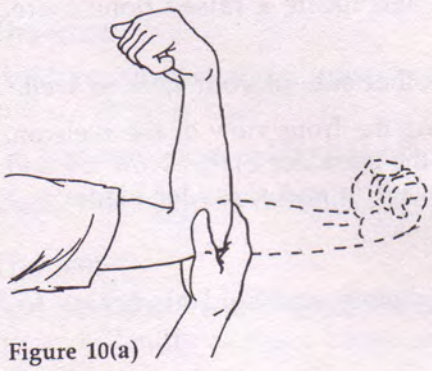


Figure 10(a)

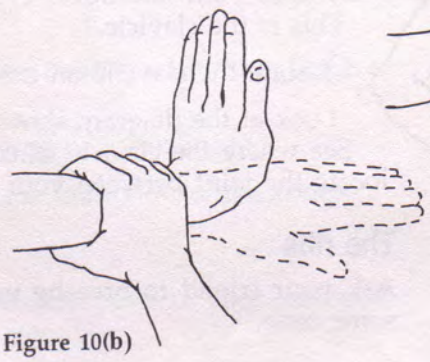


Figure 10(b)

Figure 10(c)

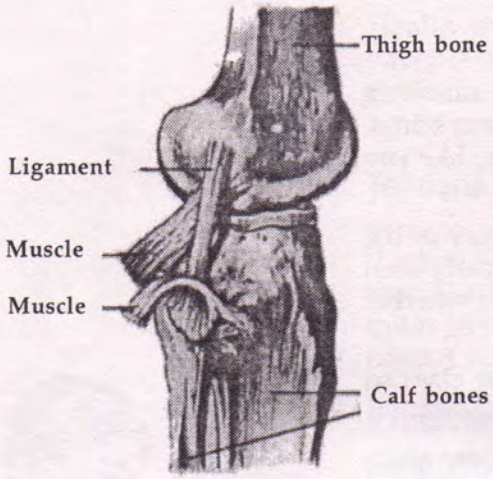


Figure 11 The ligaments of the knee

In the same way, hold your wrist and rotate your palm (Figure 10(b)).

Hold the joint of one finger between the thumb and forefinger of your other hand. Bend and unbend the finger at the joint (Figure 10(c)).

Is there only one single bone stretching from your shoulder to your fingertip? Move or rotate different parts of your arm and try to see how many different bones you can identify.

You saw earlier that muscles are joined to the bones to help them move. In the same way, two bones are joined together in a special way by fibres. These fibres are called ligaments (Figure 11).

The jawbone

Ask your friend to open his mouth and move his lower jaw up, down and sideways.

Observe his face carefully.

Did you notice any joint in the bones near his ear?

This is the place where the lower jawbone is joined to the skull.

Now try and locate these joints in your own lower jaw.

Press your fingers on both sides of your face at the spots where you have identified these joints. Open your mouth and move your lower jaw in the same way your friend did (Figure 12).

Figure 12

Can you feel the joints between your lower jawbone and your skull?

The clavicle

Fold one arm and rest it on your waist. Now slowly lift your arm and shoulder together (Figure 13).

Run a finger of your other hand from just below your neck towards your shoulder. Try and locate a raised bone there. This is the clavicle.

Locate the clavicle on the other side of your neck as well.

Look at the diagram showing the front view of the skeleton. See where the clavicle joins the shoulder blade. Now try and locate the joint between your clavicle and shoulder blade.

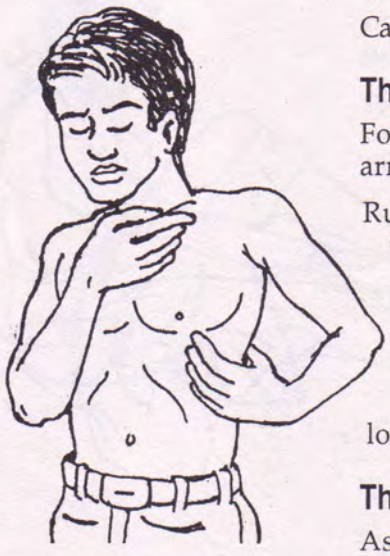


Figure 13

The ribs

Ask your friend to breathe in deeply and hold his breath for some time.

Run your finger over his ribs and try to count as many of his ribs as you can.

How many of the ribs shown in the diagram were you able to locate?

Run your finger along one of your friend's ribs and trace where it goes behind his back. Find out where the other ribs join at the back. The diagram of the skeleton shows that all the ribs join the **spinal column** at the back. In the front, all the ribs, barring the two lowest ribs, join a long flat bone in the chest. This bone is called the sternum. In this way, the ribs form a cage. Observe the rib cage carefully in the front and rear views of the skeleton.

Now take a look at the picture of the rat labelled A in your kit and see which important organs are protected by the rib cage.

Make a list of these organs in your exercise book. (3)

Figure 14

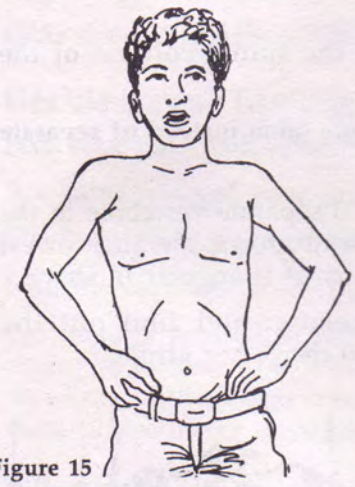


Figure 15

The pelvic girdle

Press the area just below your waist with the fingers of both hands as shown in Figure 15.

Can you feel similarly shaped bones on both sides of your body?

What appear to be two separate bones are the two ends of a single large bone. This large bone is the hip bone or pelvic girdle. Identify the pelvic girdle in both diagrams of the skeleton.

The bones of the legs

How many different joints can you identify by moving your legs?

Locate the bones in your leg and compare them with those shown in the front view of the skeleton. Find the joint between the hip and leg bones in your diagram.

The knee

Hold your leg straight, grasp your kneecap with your fingers and move your knee.

Do you feel a saucer-like bone moving on your knee?

Identify this bone in the diagram of the front view of the skeleton.

The feet

Feel, press, move and shake the different parts of your feet and try and identify as many bones as possible.

Indicate the bones you located in the front view of the skeleton.

Why couldn't you feel the other bones in your feet? (4)

The spinal column

Look at the rear view of the skeleton.

Ask your friend to stand up, bend forward at the waist and try and touch his toes with his palms (Figure 16).

Figure 16

While he is in this position, run a finger along the centre of his back from below the neck.

Is the long structure running down the middle of his back a single bone or is it made up of many small bones joined together?

Look at this structure carefully in the rear view of the skeleton.

This structure is called the spinal column. The small bones it is made up of are called **vertebrae**.

Count the number of vertebrae in the spinal column of the skeleton in your diagram.

What would happen if you had a single bone instead of separate vertebrae? (5)

Scientists have found that there are 33 separate vertebrae in the spinal column of an infant. As the infant grows, the nine lowest vertebrae fuse into a single bone which is triangular in shape.

Look at both diagrams of the skeleton and find out the relationship of this triangular bone to the pelvic girdle.

Press your lower back with your fingers and feel how hard and strong the bone is there. This strong bone is formed by joining the fused vertebrae with the pelvic girdle. Figure 17 shows how the spinal column, pelvic girdle and thigh bones are joined.

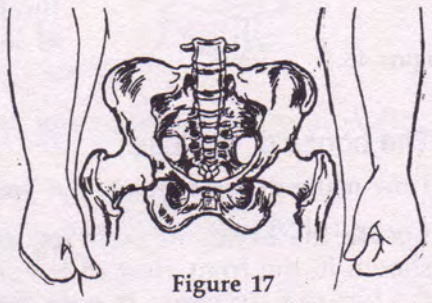


Figure 17

Now explain the different ways the pelvic girdle is used in the body. (6)

Ask your friend to stand and press his hands against a wall, as shown in Figure 18.

Figure 18

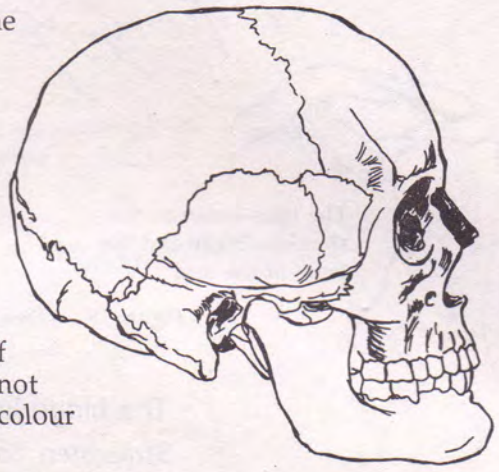
Look at his back while he is doing this. Do his two shoulder blades become clearly visible just below his shoulders?

Look at both diagrams of the skeleton and see the connection between the shoulder blades and the arms.(7)

What is the relationship between the shoulder blades and the clavicle? Look at the diagrams and explain. (8)

The skull

Examine the skull carefully in both diagrams of the skeleton.



Can you see the joints of the bones which make up the skull?

What is the major difference between the joints in the bones of the skull and the joints in the bones of the leg? (9)

Have you coloured all the bones you have identified so far in the diagrams of the skeleton? Have your friends also done the same? Find out if they have identified some bones which you were not able to. Try and locate these bones in your body and colour them in your diagrams.

Glue these diagrams of the skeleton in your exercise book. (10)

Flexible bones - Cartilage

Feel your ears with your fingers. Press them and bend them.

Are some parts of your ear soft and some other parts hard?

The hard parts are made of a substance called cartilage.

Find the cartilage in your nose.

Cartilage is present in other parts of the skeleton as well, for example, between the ribs and the sternum and between the vertebrae of the spinal column. Try and identify the cartilage in these places in the front view of the skeleton.

Different kinds of joints in the skeletal system

You have seen that the human skeleton is made up of many bones and that these bones have joints between them. We can move the various parts of our body because of these joints.

You may have seen different kinds of joints in things around you. Does the human skeleton also have different kinds of joints? Let us find out.

Ball and socket joint

You will have to make a model to understand how the joint between the shoulder blades and the bones of your arms works. Place a fused bulb inside the half shell of a coconut and rotate it in the way shown in Figure 19.

A joint made by fitting a ball into a socket is called a ball and socket joint. In this joint the bone can rotate easily in all directions.

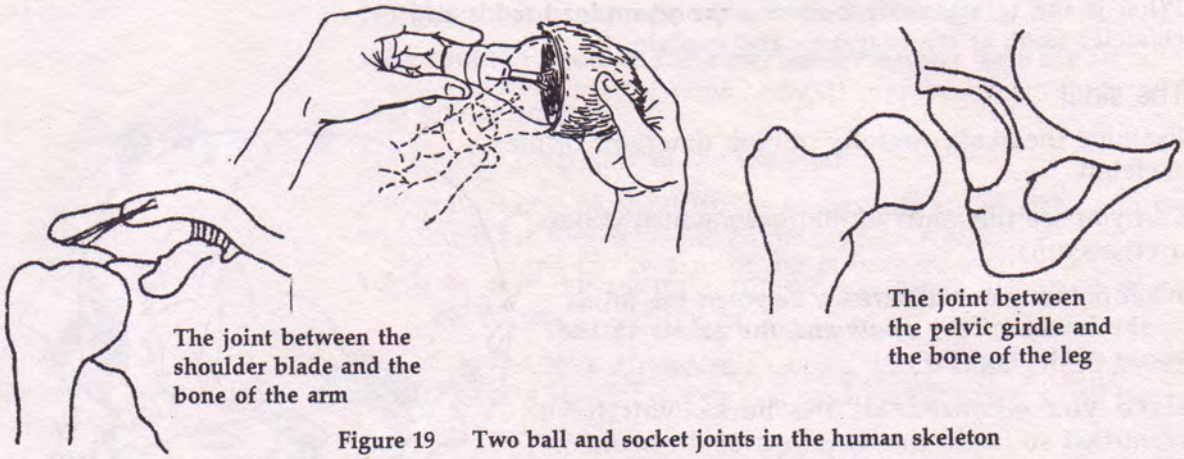


Figure 19 Two ball and socket joints in the human skeleton

The hinge joint

Straighten your arm and hold your elbow in the palm of your other hand. Try and rotate your forearm in all directions at the elbow joint.

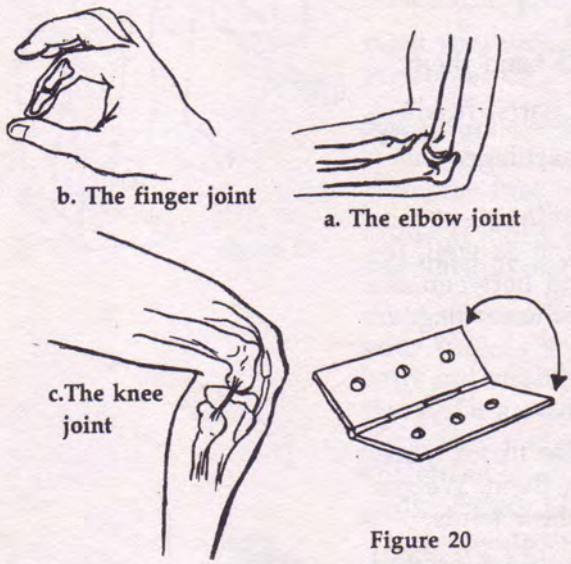


Figure 20

Were you able to rotate your forearm at the elbow joint in the same way you rotated your arm at shoulder joint?

If you couldn't, what could be the reason for not being able to do so?

Is it possible that there is a difference between the shoulder joint and the elbow joint?

Straighten your arm and bend your forearm up and down at the elbow as shown in Figure 20a.

Could you bend your forearm beyond 180^0?

To understand how the elbow joint works, open and close the lid of a box or attaché case. Is there some similarity between opening and closing the lid and the movement of the forearm?

Look at Figure 20 and then look for other joints, similar to a door hinge, in your body. Make a list of these hinge joints. (11)

Another property of the elbow joint

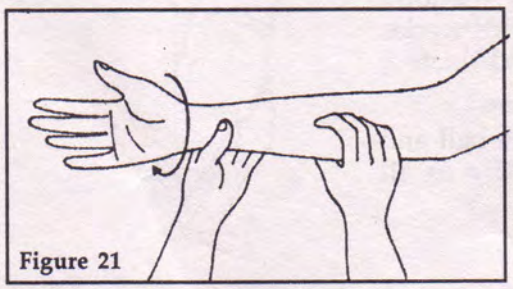


Figure 21

You studied the bones of your arms. How many bones were you able to locate between your elbow and wrist? Identify the outer and inner bones below the elbow in the two diagrams of the skeleton. These are some of the bones you cannot easily feel from the outside.

Let us do an experiment to understand how these two joints move. Ask your friend to straighten her

arm, with the palm facing upwards. Hold her forearm with both your hands. Press the inner bones of the forearm with the fingers of one hand, as shown in Figure 21. Ask your friend to rotate her forearm. Can you feel the difference in the movement of the two inner bones as she rotates her forearm?

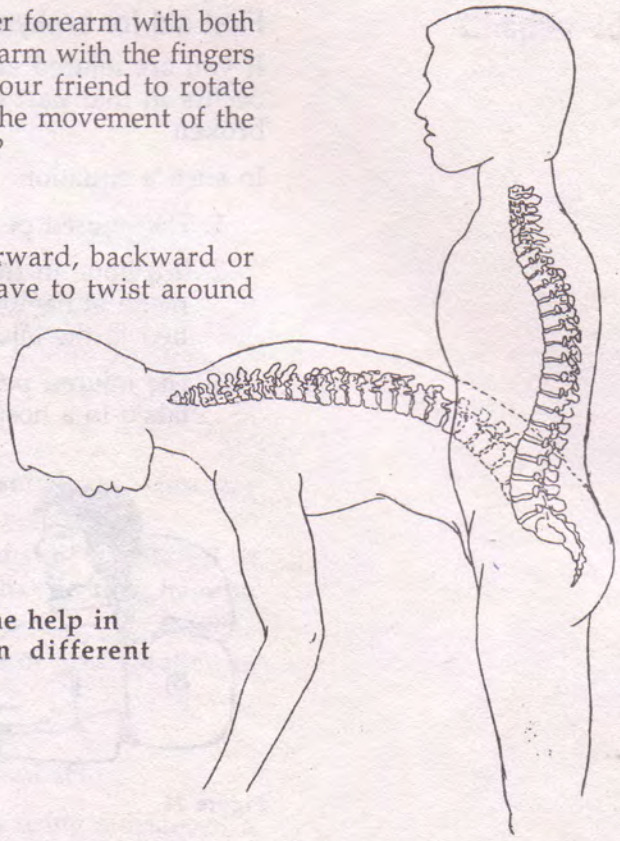
Your spinal column is a spring

Very often you have to bend your body forward, backward or sideways from the waist. You sometimes have to twist around as well.

Could you explain what property of the spinal column enables you to make such movements? (12)

You have seen in both diagrams of the skeleton that there is a tender and flexible cartilage between the vertebrae of the spinal column.

How does the cartilage between the vertebrae help in allowing the spinal column to rotate in different directions? (13)



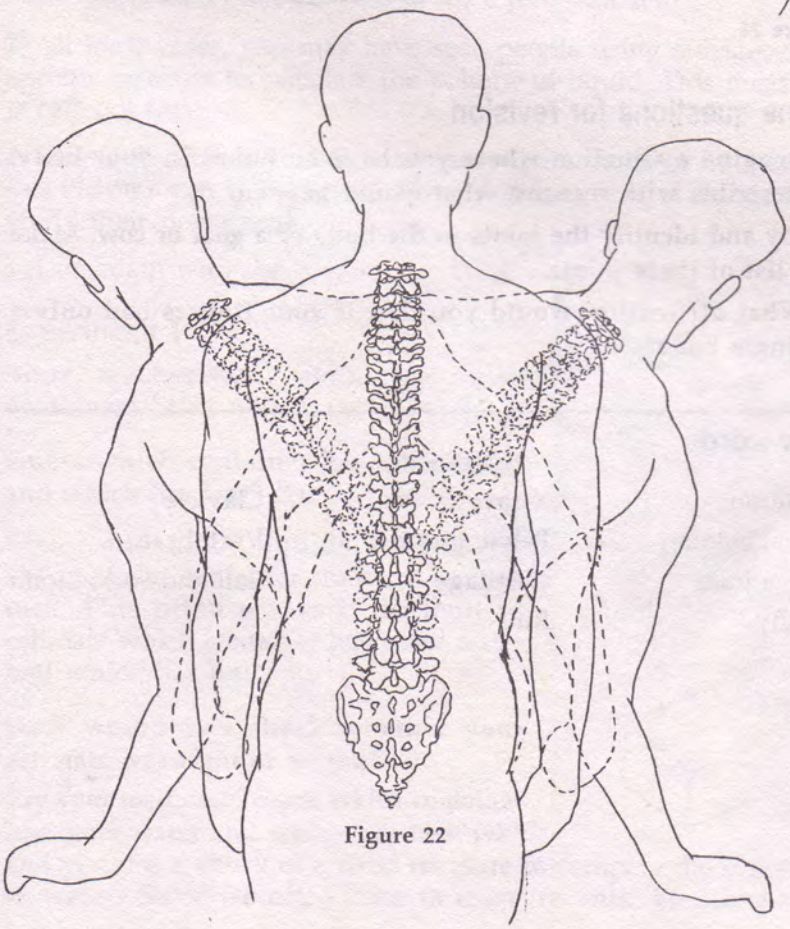


Figure 22

First aid for broken bones

If you are injured and the pain is unbearable and if a swelling occurs in that part of your body, it may be because a bone is broken.

In such a situation:

1. The injured person should not move at all.
2. If a bone in the arm or leg is broken, a splint should be made of bamboo or wood, or any other stiff material, and tied to the injured limb as shown in Figure 24.
3. The injured person should be covered with a blanket and taken to a hospital as soon as possible.

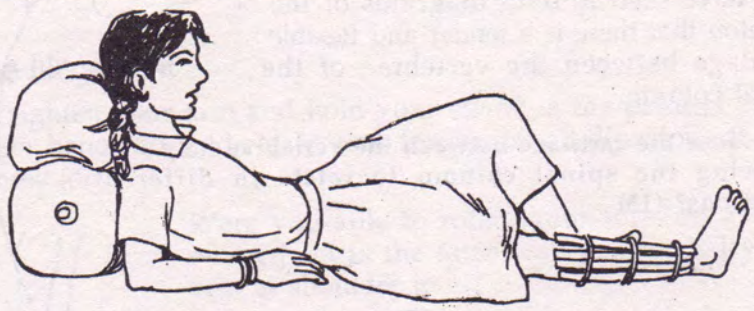


Figure 24

Some questions for revision

1. **Imagine a situation where you have no bones in your body. Describe, with reasons, what would happen.**
2. **Try and identify the joints in the body of a goat or cow. Make a list of these joints.**
3. **What difficulties would you face if your fingers had only a single bone?**

New words

Skeleton	X-ray	Clavicle
Spinal column	Pelvic girdle	Vertebrae
Hinge joint	Cartilage	Ball-and-socket joint
Fleshy	Ribs	