

# SKELETON, JOINTS AND MUSCLES

## 17.1 Skeleton

The frame of our body is made of bones and is known as the skeleton.

Figure 17.1 Imagine what would have happened if your body did not have a skeleton?

Bones of our body help in its movement, maintain its shape, and protect the soft organs such as brain, heart and lungs from injury.

Let us now identify the various bones found in our body. A large picture of the human skeleton has been given at the end of this book. By moving different parts of your body, and with the help of this picture, try to identify the different bones and colour them one-by-one.

### 17.1.1 Skull

The skull is made up of a number of bones which are attached to each other. The skull is hollow from the inside. The brain is protected in the cavity of the skull.



#### Activity - 1

Move your lower jaw. Do the bones of the upper jaw also move in a similar way? Feel the bones of your skull, nose, ear, forehead and jaw by touching them. (figure 17.2)

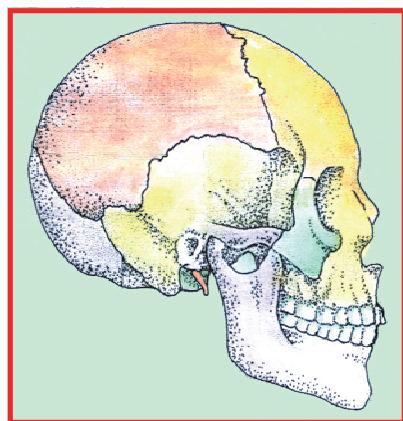


Fig. 17.2 : Humans Skull

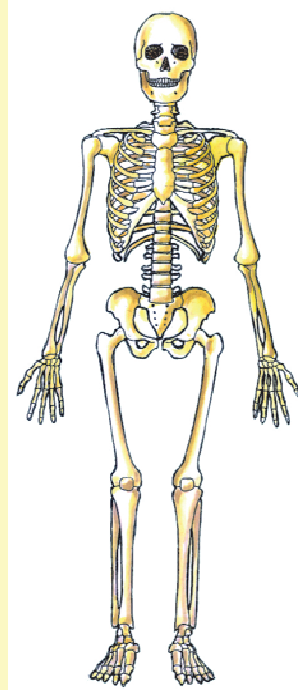


Fig. 17.1 : Human Skeleton

### 17.1.2 Backbone (Vertebral Column)



#### Activity - 2

Ask your friend to stand, then bend forward and try to touch the ground with both hands. Press a finger just behind his/her neck and move it backwards to feel the vertebral column. (Figure 17.3)

In man, the backbone is made up a number of small ring-like bones. Each of these rings is called a vertebra. Young children have 33 vertebrae. As they grow older, the 9 vertebrae in the lower part of the spine fuse together, to form a single triangular bone. The hollow spaces of the vertebrae form a canal in which the spinal cord lies protected. Imagine what would have happened if you had a single long back bone instead of separate vertebrae!

### 17.1.3 Ribs

You have already read that the lungs and heart are situated in the chest in a cage of bones that keeps them protected. Let us now find out which bones form this cage. The bone situated in the centre at the front of the chest is called the Sternum. Towards the back of the rib-cage there are bones connecting the sternum to the vertebrae. The ribs cover the chest on both right and left side (Fig. 17.1 ).

Ask your friend to draw in a deep breath and hold it for some time. You can now count his ribs. How many ribs could you count?

### 17.1.4 Shoulder Bones (Pectoral Girdle)



#### Activity - 3

Tell your friend to press against a wall as shown in the figure 17.4. Can you see two projecting bones below both the shoulders on doing so? Both these projecting bones are called the Scapular bones.

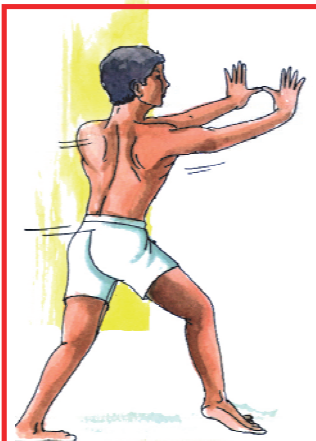


Fig. 17.4 : Feel the shoulder bones or pectoral girdle

### 17.1.5 Clavicles

The bone located in the upper part of the chest, which stretches from the neck to the shoulder is called the Clavicle. Try and find this projecting bone by moving your finger from below your throat towards the shoulder. Similarly, try to find the clavicle on the other side of the throat.

Scapula and clavicle together make up the pectoral girdle. Bones of the upper arms on both sides are joined to the pectoral girdle.

### 17.1.6 Hip Bone (Pelvic Girdle)



#### Activity - 4

Press your fingers just below your waist (Figure 17.5). Do you find two similar bones, one on each side? These bones are the ends of a much bigger girdle called the hip girdle bone or pelvic girdle. Each part of the pelvic bone is made up of three separate bones. The Pelvic Girdle is attached to the backbone and the thigh bone.

### 17.1.7 Bones of the Hand



#### Activity - 5

Move the different parts of your arm and hand in different ways and try to identify the various bones with the help of Fig. 17.1. There is a single bone from the shoulder to the elbow, two bones from the elbow to the wrist, and the hand is made up of many small and big bones.

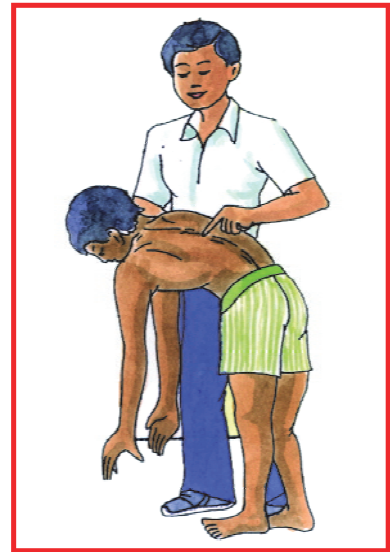


Fig. 17.3 : Feel the Vertebral column

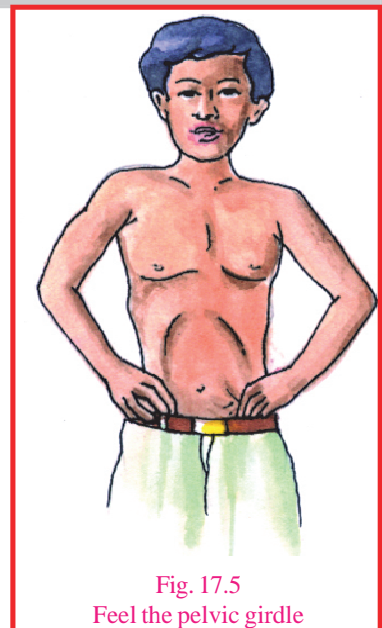


Fig. 17.5  
Feel the pelvic girdle

### 17.1.8 Bones of the Leg

Look at Figure 17.1. You will notice that like hands, the legs are also made up of many big and small bones. The uppermost is the thigh bone. This is the longest and the strongest bone of our body. There are two bones below the knee. Move the foot and toes and notice that they are also made up of many small bones.

### 17.1.9 The knee



#### Activity - 6

Straighten your leg, hold the knee with your fingers and move it. Can you feel a cap-shaped moving bone? Identify the bone in figure 17.1.

### 17.2 Flexible Bones (Cartilage)



#### Activity - 7

Feel the bone between your wrist and elbow by pressing it with your fingers. This is a hard bone. Now touch your ears and notice how some parts of your ear are soft and others are hard. The soft part of your ear is made up of a flexible bone known as cartilage. You can also now identify the cartilage in your nose. Cartilage is also found in other parts of the body including between the vertebrae, in the backbone and between the ribs and the chest bone.

By now you must have coloured the figure to show all the bones identified by you. Show this figure to your friends and find out which additional bones they have marked. If you have left out then find these bones in your body and show them in your figure too.

### 17.3 Joints

Our skeleton is made up of many small and large bones. The places where these bones are joined are called joints. Joints are very important because they enable us to move different parts of our body. Identify different joints in your hands, legs, neck, elbow and knee by bending these parts. Some of the important joints are –

#### 1. Ball and Socket Joints



#### Activity - 8

**Material required :-** a fused bulb, coconut shell

Let us perform an experiment to explore the joint between the shoulder and the bone of the upper arm..

Put the fused bulb into the coconut shell and move it around—notice how the round bulb gets supported while it moves in the shell surrounding it. This type of joint is called a ball and socket joint. This type of joint allows for movement in all directions. These joints are found in the thigh and Pelvic Girdle as well. Look at figure 17.6 and identify which bone acts like the bulbs and which acts like the coconut shell. Stretch your arm out straight ahead and rotate it to be able to feel the ball and socket joint in your shoulder.

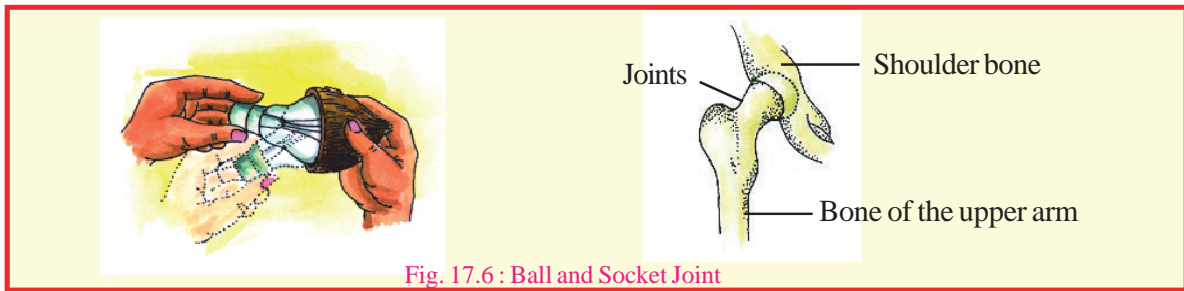


Fig. 17.6 : Ball and Socket Joint

## 2. Elbow Joint (Hinge joint)

Try to rotate your arm at the elbow. Are you able to rotate this joint in the same manner in which you could rotate your shoulder? There is a difference between the shoulder and the elbow joints. The elbow joint allows the arm to move only up and down, whereas the shoulder joint lets it rotate all round. The elbow joint is similar to the hinges of a door because the hinge allows the door movement in only one direction. Similar joints are found in the fingers.

The body has other kinds of joints in addition to the ball and socket and hinge joints. These include sliding joints in the backbone and wrist. It is because of these sliding joints that we can move our wrists and neck. A pivot joint is present between the first vertebra and the base of the skull. It is because of this joint that the neck can move forward and backwards as well as right and left.

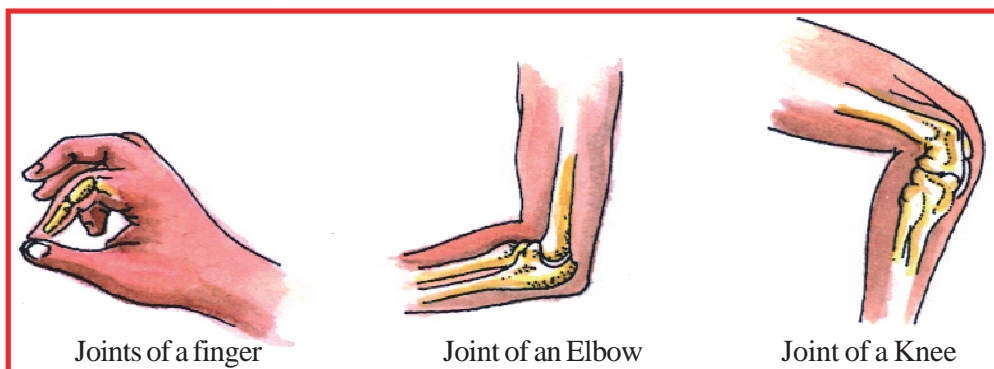


Fig. 17.7 : Hinge Joint

## 17.4 Muscles

You have so far read that getting up, sitting down, walking around, bending down and rotating the neck require the movement of bones. But bones cannot move on their own—for this there are some parts which can be seen moving just below the skin. These parts are known as muscles. You have already read about muscular tissue. Let us now understand how muscles help in the movement of our body.



### Activity - 9

Close the fist of your right hand and touch your shoulder with it. Observe the change in the upper part of your arm as you move your fist. With your left hand press the upper part of your right arm and notice how it becomes hard and bulges (figure 17.8). This hardness is due to the

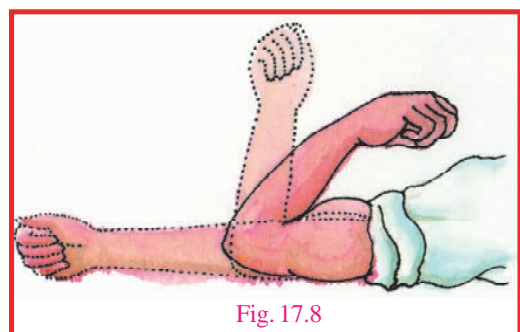


Fig. 17.8

contraction of muscles. Bring your right hand back to its original position. What change occurred in the muscles? The movement of the bones is made possible by the contraction and relaxation of muscles. In this manner, different body parts can move with the bones and muscles working together. Even the beating of the heart takes place due to the contraction and relaxation of muscles. Various muscles present in different parts of the body together make up the Muscular System.



### Activity - 10

Stretch your arm and then bend and straighten your fingers one by one. Observe the movement of the muscles. Could you see separate muscles moving different fingers? Stand up and hold tight your right thigh with both hands. Now lift your knee up, move your leg forwards and backwards and feel the muscles of your thigh. Try to move your leg without moving the muscles (figure 17.9). Could you do it?

Move other parts of your body like your knees, fingers, toes etc. and feel the movement of the muscles. Now fill the Table 17.1



Fig. 17.9

Feel the movement of muscles of the thigh



Table - 17.1

| S.No. | Activity                           | Muscle movement felt/not felt |
|-------|------------------------------------|-------------------------------|
| 1.    | Chewing food                       |                               |
| 2.    | Breathing in and out               |                               |
| 3.    | Lifting weight                     |                               |
| 4.    | Clenching and unclenching the fist |                               |
| 5.    | Moving the toes                    |                               |
| 6.    | Moving eyelids                     |                               |



### We have learnt

- Our body is made up of a frame of bones which is called the skeleton.
- The brain is protected by the skull.
- The backbone is made up of a series of bones called the vertebrae.
- The ribs in the chest make up a cage.
- The bones of arms are attached to the pectoral girdle and those of the legs to the pelvic girdle.
- Cartilage is soft and flexible. It is found in the ear, nose, between the vertebrae and between the ribs in the chest.
- The places where bones are joined together are called joints.
- The joint between the shoulder and the arm and that between the pelvic girdle and the thigh bones is called a ball and socket joint.
- Hinge joints are found in the elbows.

- The movement of bones is made possible by the contraction and relaxation of muscles.
- Various muscles present in different parts of the body together make up the Muscular System.



### Questions for practice

#### 1. Choose the correct answers.

##### 1. Ball and Socket joint is found in

- a) Shoulder and arm bone      b) Elbow
- c) Upper jaw                      d) Wrist

##### 2. Vertebrae are found in

- a) Skull                              b) Hands
- c) Backbone                      d) Fingers

##### 3. Cartilage is found in

- a) Hands                              b) Ear
- c) Foot                                d) Skull

##### 4. Hinge joint is found in

- a) Upper jaw                      b) Elbow
- c) Lower jaw                      d) Shoulder

#### 2. Correct and rewrite the following sentences

- a) Cartilage protects soft organs like brain and lungs from injury.
- b) Bones of the hand are connected to the Pelvic girdle
- c) The brain is protected by the rib cage
- d) Bones and muscles together form the muscular system.

#### 3. Answer the following questions

- a) In which part of the body is the longest bone located in your body found?
- b) What is the use of the backbone in the body ?
- c) Explain the joints found in the fingers and knee.
- d) Why can't earthworms stand up straight like human beings?
- e) Make a list of all the organs in the body by touching or moving which we can feel the muscles.
- f) What would happen if there were no joints in our fingers ?
- g) What is the difference between bone and Cartilage ?
- h) What do you think would have happened if there were threads instead of muscles in your body?



### Do these also

- 1. Try and obtain an X-Ray films of bones from a hospital or from persons who have such films. Try to identify the bones seen in the X-Ray by comparing them with the figure of the skeleton given in the book.

