

## 8.2 FUNCTION OF SKELETAL SYSTEM, CLASSIFICATION OF BONES AND TYPES OF JOINTS

### Skeletal System

This system is a combination of various bones. There are 213 bones in children and 206 bones in adults. These bones differ in shape and size. These bones are joined together by ligaments. Bones provide support and protection to the delicate organs of our body. Some of the bones act as levers in our body. Bones also provide surface for the attachment of the skeletal muscles. In fact, this system is a structure of bones. Skeleton or skeletal system can be divided into two parts for better understanding.

1. Axial Skeleton
2. Appendicular Skeleton

1. **Axial Skeleton:** This skeleton consists of the following bones.

- (a) Skull — 28
- (b) Sternum — 1
- (c) Ribs — 24
- (d) Hyoid bone — 1
- (e) Vertebral column — 26 for adults and  
— 33 for children

2. **Appendicular Skeleton:** This skeleton consists of the following bones.

- (a) Upper limbs — 64
- (b) Lower limbs — 62

### Functions of Bones

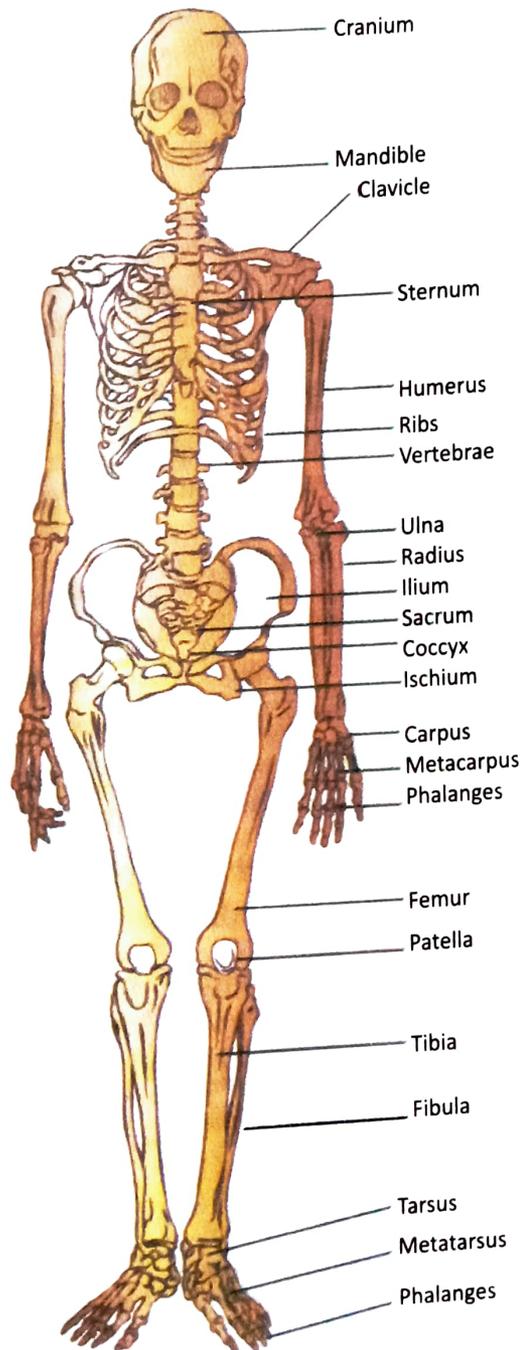
The important functions of bones are given below.

1. **Provide Support:** The bones are the principal organs of support. They support the whole body.
2. **Provide Protection:** Bones provide protection for some of the soft and delicate organs of the body such as skull and pelvis.
3. **Bony System Serves for the Attachment of Muscles:** Bony system provides surface for the attachment of the skeletal muscles. This bony framework affords attachment for the soft parts, maintains them in right position, covers them, helps to control and direct varying internal pressures and gives stability to the whole body.
4. **Bony System Gives Shape to the Body:** Bones play a vital role in shaping the body. It may be responsible for the long or short stature.
5. **Act as Levers:** Bones act as levers in our body. These help in doing work easily.
6. **Passive Instruments of Locomotion:** Bones are the passive instruments of locomotion or movements. In fact, these enable us to move.

### Classification of Bones

According to the shape and formation of bones, there are various types of bones, which are as follows.

1. **Long Bones:** Long bones are found mainly in the upper and lower limbs. These bones act as levers in our body and help in making



Front view of the human skeleton

movement possible. Long bones, such as humerus and femur, consist of a shaft and two extremities each. Only due to their length, these are called long bones.

2. **Short Bones:** These bones are short in length, hence these are called short bones. For example, carpus and tarsus are called short bones. These bones are light in weight but are strong. These bones are made of cancellous bone tissues. These bones are covered with compact tissues. They help in exerting force.
3. **Flat Bones:** Usually these bones are found where protection is required, such as the bones of skull, scapulae and ribs. There is always a large surface on flat bones for the attachment of muscles.
4. **Irregular Bones:** These bones have a peculiar shape. So, these bones cannot be grouped under any preceding heads. A vertebra is a good example of these bones. Some bones of face are also included under this head.
5. **Sesamoid Bones:** The word sesamoid is derived from Greek word 'sesamon', a 'seed of the sesamum', and 'eidos', 'form' or 'resemblance'. These bones are found in knee (patella), hand and foot.

## Joints of Bones

A joint or an articulation is the union of only two or more bones of the skeleton. The study of joints is called arthrology. In fact, articulating surfaces of the bones are sometimes separated by a thin membrane, sometimes by connective tissue, or fibrocartilage and, in the freely moving joints, these are completely separated.

### Classification of Joints

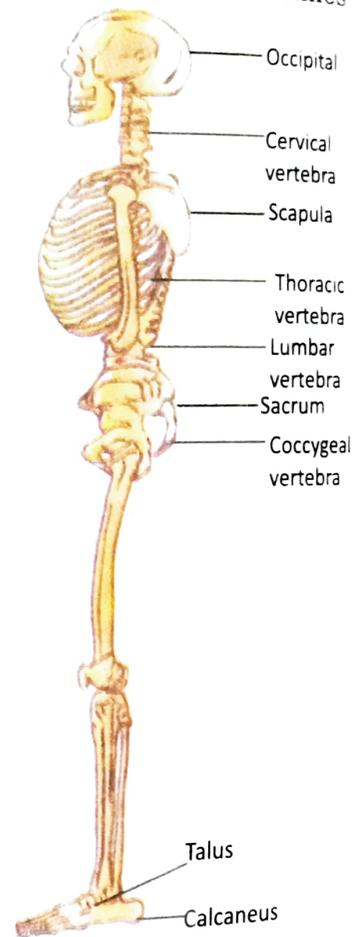
Joints are classified according to the amount of movement that they are capable of and their structural composition. So, according to the capability of movement, we can classify the joints in three categories.

1. Immovable Joints or Synarthroses Joints
2. Slightly Movable Joints or Ampharthroses Joints
3. Freely Movable Joints or Diarthroses Joints

1. **Immovable Joints:** These joints are also called fibrous joints, because the bones are connected by fibrous tissues. These joints are fixed and do not move. These joints are found in the bones of skull and face (with the exception of mandible). These joints are shown in figure given alongside.



Immovable joints of skull



Side view of the human skeleton

2. **Slightly Movable Joints:** In these joints, surfaces of bones are separated by some intervening substance and only slight movement is possible. This joint includes two types—(a) symphysis and (b) synchondrosis.

(a) **Symphysis:** It is a joint where two long bony surfaces are connected by a broad, flat disc of fibrocartilage, e.g., symphysis pubis and inter-vertebral joints.

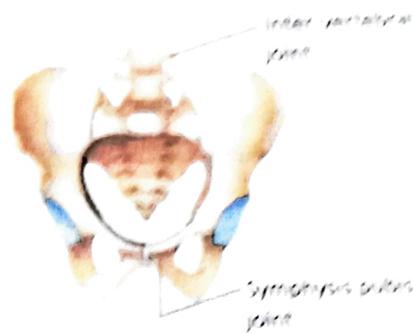
(b) **Synchondrosis:** It is a temporary form of joint. The cartilage is changed to bone before adulthood. These joints are found between the diaphysis and epiphyses of the long bones.

3. **Freely Movable Joints:** These joints are also called synovial joints. These joints include most of the joints of the body. The adjacent ends of the bones are covered with hyaline cartilage and are surrounded by a fibrous articular capsule, which is strengthened by ligaments. Tendons of muscles pass over these joints and play a vital role in stabilising the joint. The hyaline cartilage provides a smooth surface for the opposing bones, lubricated by synovial fluid. These freely movable joints are further classified into six categories.

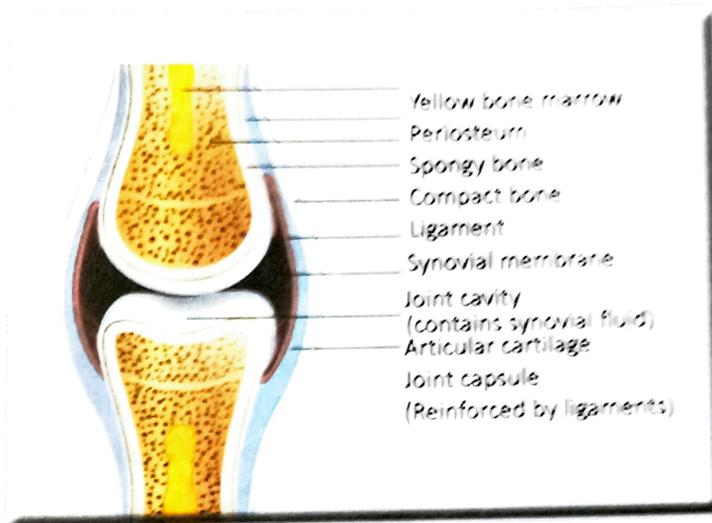
(a) **Gliding Joints:** These joints permit gliding movements only, as in the joints between carpal bones of the wrist and between tarsal bones of the ankle.

(b) **Hinge Joints:** These joints permit angular movement in one direction, like a door on its hinges. The movements of these joints are called flexion and extension, e.g., humerus and ulna (elbow), knee and ankle joints, and the joints of phalanges.

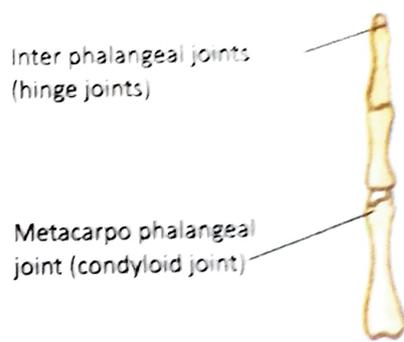
(c) **Condyloid Joints:** These joints allow an angular movement in two directions, e.g., wrist joint. Movements of this joint include flexion, extension, adduction, abduction and circumduction, but no rotation.



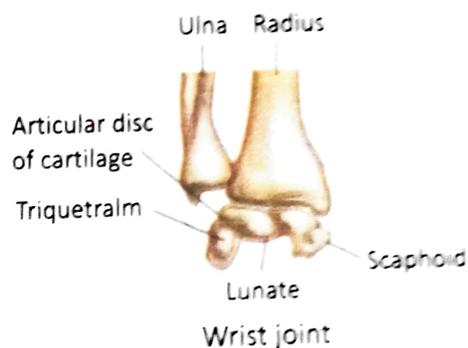
Slightly movable joints—symphysis pubis and inter-vertebral joints



Synovial Joint



Hinge joint and condyloid joint

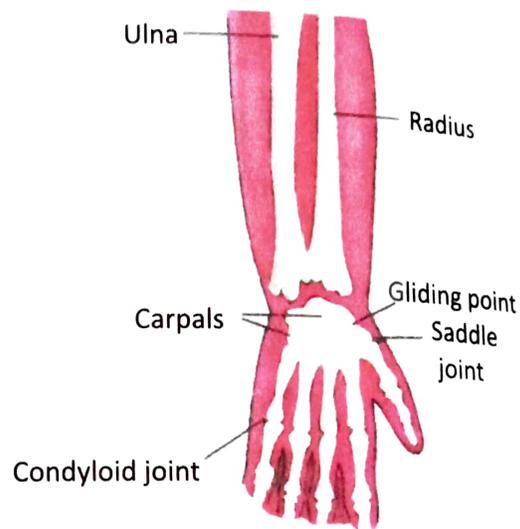


Wrist joint

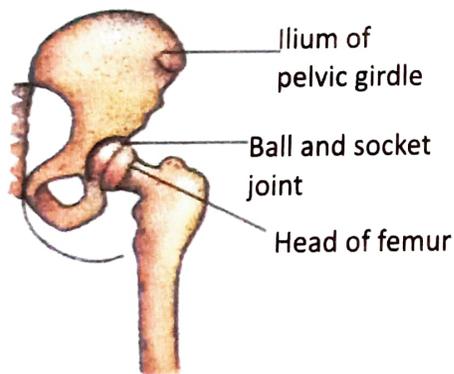
(d) **Saddle Joints:** These joints permit a great freedom of movements, e.g., joint of thumb. It enables the thumb to oppose the fingers.

(e) **Ball and Socket Joints.** These joints have an angular movement in all directions and a pivot movement. In this form of joint, a more or less rounded head lies in cup-like cavity. Shoulder joint and hip joints are the examples of ball and socket joints.

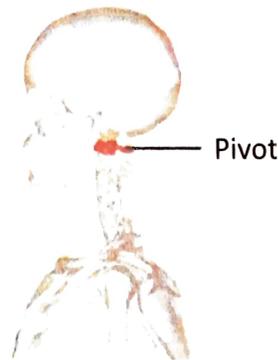
(f) **Pivot Joint:** These are the joints with a rotary movement in one axis. In this form, a ring rotates around a pivot or a pivot-like process rotates within a ring being formed of bone and cartilage, e.g., atlas and axis bones at the top of the neck.



Saddle joint and condyloid joint



Ball and socket joint



Pivot joint