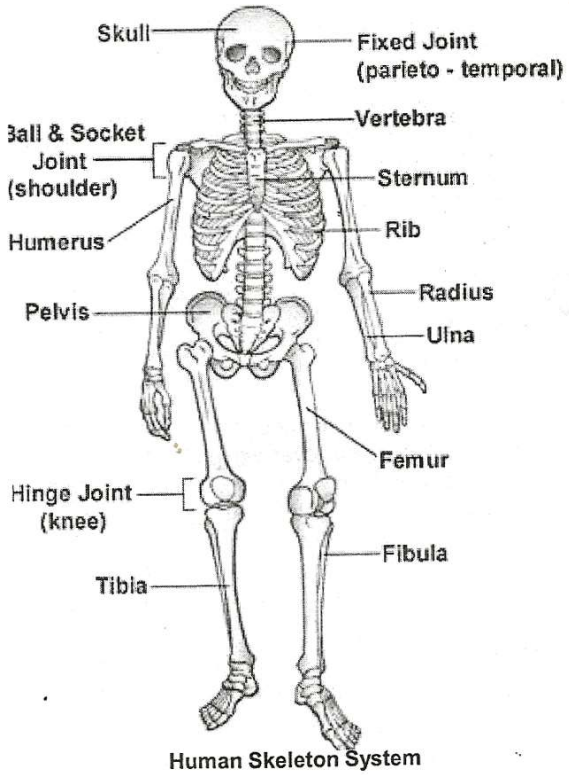
BODY MOVEMENTS

INTERODUCTION

The hard parts of an animal body present inside or outside the body collectively form the skeletal system.

- Skeleton serves as the reservoir of many minerals, like calcium and phosphate.
- The marrow of the long bones is the site for the haemopoiesis, i.e., for mation of blood cells (RBC, WBC).
- The skeleton plays a vital role in movement and locomotion.
- Human skeleton consists of 206 pieces of bones.
- In infants 306 bones are present. The act of moving from place to place is known as locomotion. It involves the movement of the whole body, as in walking, running, swimming or flying. Movement is the change in position of only a part of the body, as movement of stem towards light in plants.



Human Skeleton System

- **Why animals need locomotion :**

1. Locomotion enables animals to move from an unfavourable place or environment to a safe place.

2. It helps them to escape from their enemies and predators.

3. It hepls animals to find their partners for reproduction, and to move to safe place for laying eggs or rearing of the young ones.

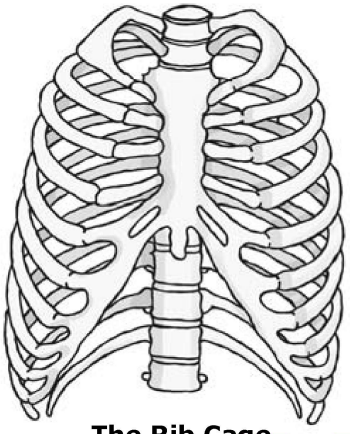
DID YOU KNOW ?
When we are born we have more than 306 bones in our bodies. By the time we are grown up, theyare about 206. Many of the infant's bones get joined together or fused.

HUMAN SKELETION

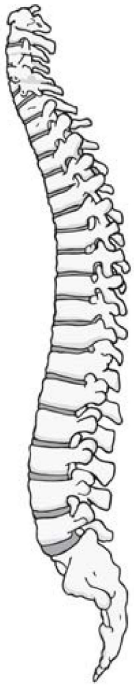
↓

2 Parts

Axlal Skeleton (Along longltudlna axis)	Appendicular Skeleton (Along transverse axis of body)
4 Parts	2. Parts
a. Skull	e. Girdles
b. Vertebral column	f. Limb bones
c. Stemum	
d. Ribs	



The Rib Cage

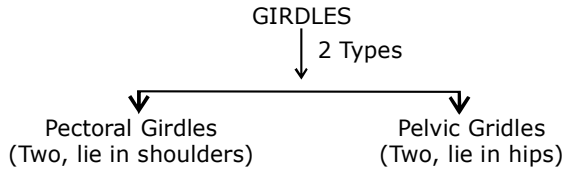


Backbone

Axial Skeleton	
1. Skull	29
2. Vertebral column	26
3. Sternum	1
4. Ribs	24 (12 pairs)
Total Number of Bones	80
Appendicular Skeleton	
1. Fore limb bones	60 (30 in each)
2. Hind limb bones	60 (30 in each)
3. Girdle bones	
• Pectoral girdle	4 (2 in each)
• Pelvic girdle	2
Total Number of Bones	126
Total Number of Bones in Skeletal system	**206**

Table : Number of bones in different parts of Human Skeleton

- **Girdle bones :** These provide a connection between the axial skeleton and limbs. The two girdles are named as pectoral and pelvic girdles, respectively.



JOINTS

Joints are the place of articulation between two or more bones or between a bone and a cartilage. Due to the presence of a number of joints, the movement of the different body parts and the whole body is possible.

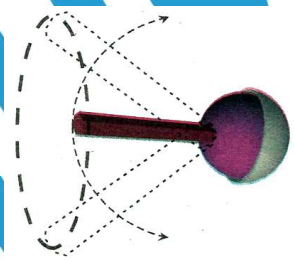
Types of Joints :

(i) Fixed or immovable or fibrous joint : There is no space between the bones. The attached bones are tightly held with the help of while fibrous connective tissure e.g. Between bones of vertebrae and pelvic girdle.

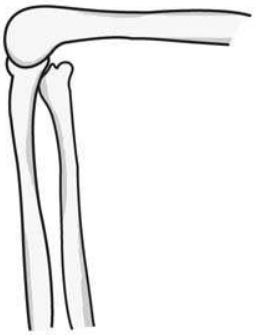
(ii) Slightly movable or cartilaginous joint : It is an articulation between the bones that allows very little movement e.g. Between bones of vertebrae and pelvic girdle.

(iii) Movable joint or synovial joint : It is a joint which allows the movement of articulating bones such that they can move extensively upon each other. The space between bones is called synovial cavity. This cavity remains filled with a viscous and slippery synovial fluid. These are of following types :

(A) **Ball & socket joint :** One bone forms a ball like head that fits into a socket formed in the other bone. The bone with head can move nearly in all the directions. e.g. Shoulder joint, hip joint.

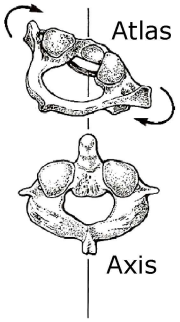


(B) **Hinge joint :** This joint allows movements in one plane only. e.g. Elbow joint & knee joint.



Knee Joint

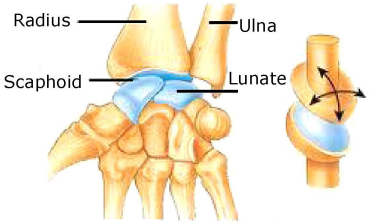
(C) **Pivot joint :** This joint allows only a rotatory movement of one bone on the other stationary bone. e.g. Atlas and axis vertebrae.



Pivot Joint

(D) **Angular joint / Ellipsoid / condyloid joint :** This allows movement in two directions - side to side and back & forth. e.g. Wrist joint.

(E) **Gliding joint :** This joint permits sliding movement of two bones over each other, e.g. Carpal in wrist and tarsals in ankle.



Gliding Joint

S.No.	Joint	Where found in body	Type of movement
1	Fixed	Skull and peivis	
2	Slightly movable	Backbone	
3	Movable (i) Ball-and-socket (ii) Hinge (iii) Pivot	Hip and shoulder Elbow, knee, finger Neck	In all directions In only one plane - like the hinge on a door Nodding or turning

MOVEMENT IN DIFFERENT ANIMALS

(a) **Movement in Amoeba :**

Amoeba is an unicellular organism which can move with pseudopodia (false feet).

(b) **Movement in Earthworm :**

- Earthworm doesn't have bones. It has muscle which help in locomotion with setae (hook like chitinous structure.)
- During movement it first extends the front part of the body keeping the rear portion fixed to the ground with the help of setae.
- Then it fixes the front end and release the rear end.

  It then shortens the body and pulls the rear end forward.
- By repeating such expansions and contraction it can move through soil.

(c) Movement in Snail :

- Snail is a molluscan which doesn't has bones but has muscles.
- A shell is present as outer skeleton During movement a thick muscular foot comes out of the shell's opening.
- By the contraction & expansion of the foot muscle it can do slow movement at a substratum.

(d) Movement in Cockroach :

- Cockroach is an arthropod which has jointed appendages. It has three pair of legs and two pairs of wings attached to the thorax.
- The cockroaches have distinct muscles.

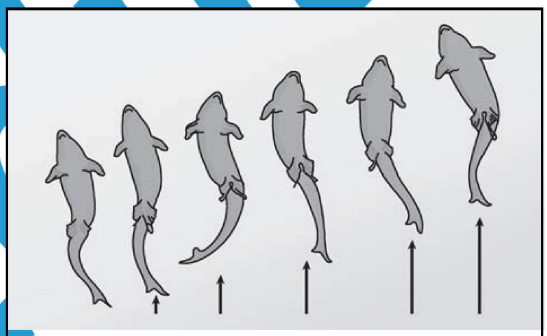
  (i) walking muscles - muscle attach to legs.

  (ii) flying muscles - thorax muscle attach to wings.

(e) Movement in Fish :

- Fishes are aquatic animals. Head and tail of the fish are smaller than the middle portion of the body. This body shape is called stream lined which is helpful to reduce friction during movement. It has caudal, dorsal (impaired), pectoral, pelvic (paired) fins.
- Fishes have skeletal & muscular system both. During swimming, muscles make the front part of the body curve to one side and the tail part swings towards the opposite side. Then quickly the body and tail curve to the other side.
- This makes a jerk and pushes the body forward. A series of jerks make the fish swim ahead. This is helped by fins of the tail.
- Thus paired fins help in the maintaining balance of body during swimming while impaired provide jerk.

Fish lacking bones : In sharks, skeleton is made entirely of cartilage.



Movement in Fish

DID YOU KNOW ?
How many bones does the giraffe have in its long neck ? Only seven, justlike yours.

MUSCLE BONE RELATION

Movement of organs and different parts of the body are brought about by the contraction of skeletal muscles inserted into the articulating bones.

- **Ligaments :** flexible connective tissue bands called ligaments stabilize the joints by holding the articulating bones together.
- **Tendons (Insertion of skeletal muscles) :** The skeletal muscles are attached to the bones by tendons. Tendons are formed of white fibrous connective tissue.
- **Muscle movement :** Muscle are made up of two kind of contractile proteins - Actin & Myosin, which are helpful in locomotion. Muscle work in pairs when one of them contracts the other muscle of the pair relaxes. To move the bone in the opposite direction, the relaxed muscle contracts to pull the bone towards its original position while the first relaxes. A muscle can only pull. It can't push. Thus, two muscles have to work together to move a bone.

DID YOU KNOW ?
There are 22 joints in our body.
There are more than 350 muscles in our body.
Muscles constitute about 40 to 50 per cent of total body weight.
Tendons attach muscles to the bones.

(f) Movement in Snake :

- Snakes are reptiles which can do creeping movement with the help of skeletal and muscular system. Muscles are interconnected to long backbone, ribs and skin.
- The snakes body curve into many loops. Each loop gives it a forward push by pressing against the ground. These movements occur rapidly in its body that show a very fast movement.

(g) Movement in Birds :

- Birds (Aves) can fly in the air and walk on the ground and some birds like duck can swim in water also.
- In birds skeletal (with hollow bones) and muscular system are present. Forelimbs are modified into wings. Shoulder bones are strong and breast bones are modified to hold muscles of flight which are used to move the wings up and down.
- While bones of hind limbs are typical for walking and perching.