



BODY

Movements

Key Points

"Bones in our body form the framework that supports the whole body."

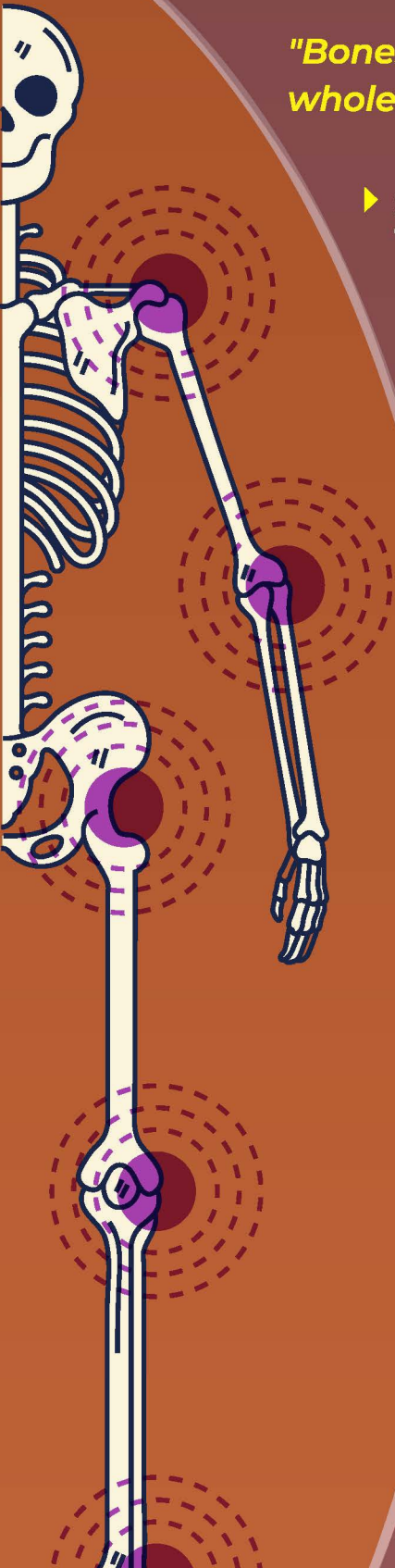
- ▶ Skeleton is the term used to describe the framework of the body formed by the bones & cartilages
- ▶ All living organisms show some type of movement like animals move more freely but at the same time it is not true for a tree.

Movement and locomotion

- ▶ **Movement** is the change in position of only a part of the body.
e.g.- stem towards light in plants.
- ▶ **locomotion** The act of moving from place to place.
- ▶ It involves the movement of the whole body as in walking, running, swimming or flying.

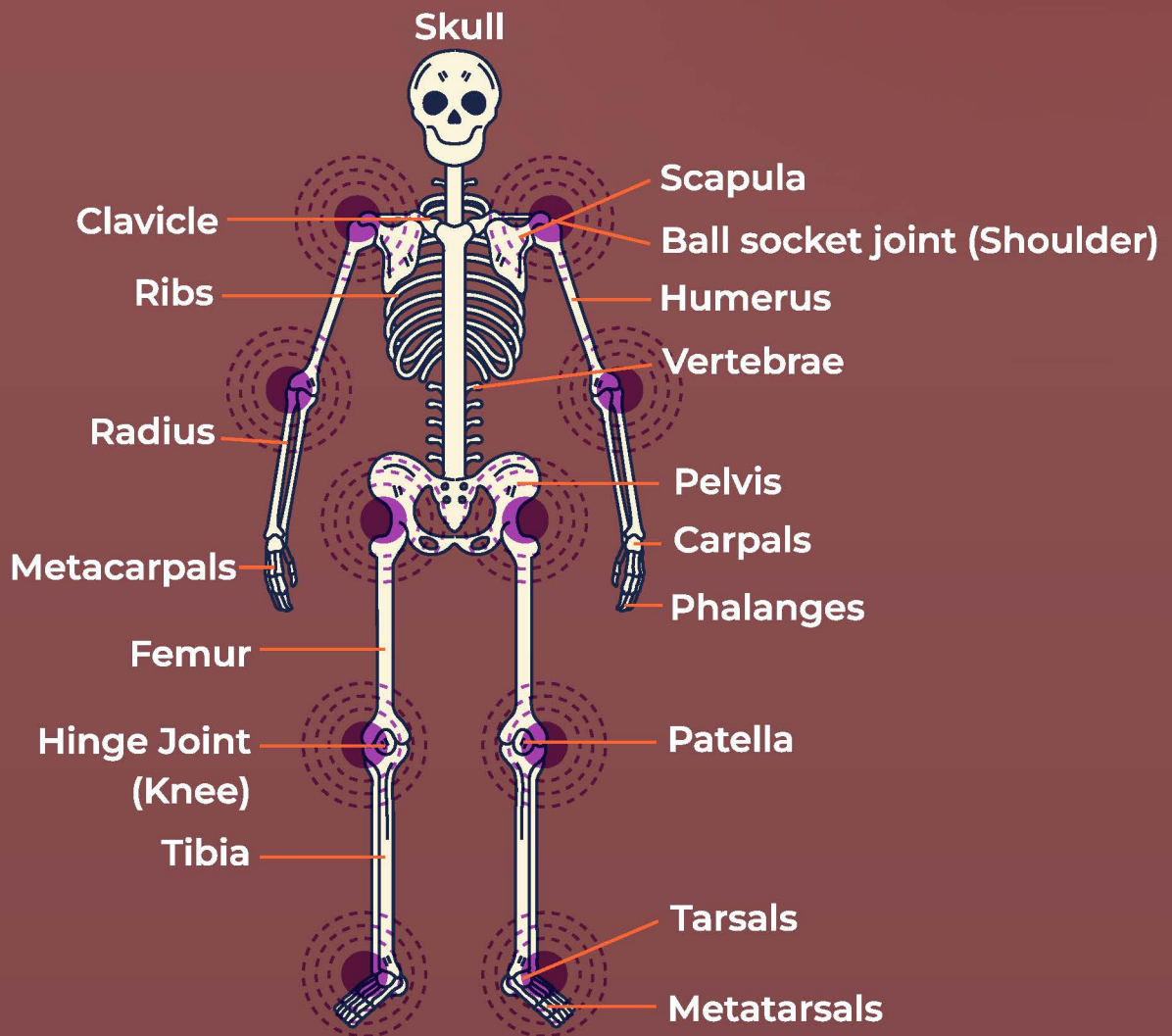
Note

- ▶ Movements in animals help them to move towards safety and to places where food and water are available.



Human body and its movement

- **Skeletal system:** The skeleton consists of Skull, Backbone, Ribs, Breastbone, Shoulder bones, Hip bone, Arm bones and Leg bones.



Skull :

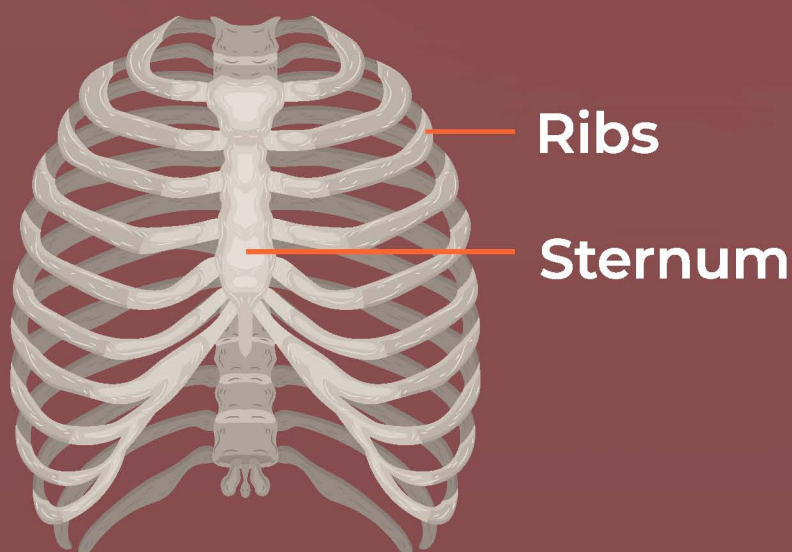
- The bones of skull form a strong case around the brain.
- Protects the main sense organs like eyes, ears and nose.
- The eyes are contained in two large cavities called 'eye sockets' in front of the skull.



Backbone:

- ▶ A long, hollow, rod-like structure running from the neck to the hips, inside our body .
- ▶ The scientific name of backbone is **vertebral column**.
- ▶ Backbone forms the main supporting structure of the body.
- ▶ **Top 7 vertebrae** of backbone form our neck.

Rib cage:



- ▶ The chest bones are called **ribs** which are the curved bones in our chest.
- ▶ Ribs exist in pairs and there are **12 pairs** of ribs in the chest of our body.
- ▶ The hollow, bony structure formed by the ribs is called '**rib cage**'.
- ▶ Ribs are attached in front to **breast bone** or **sternum** and at the back they are attached to backbone.

Note

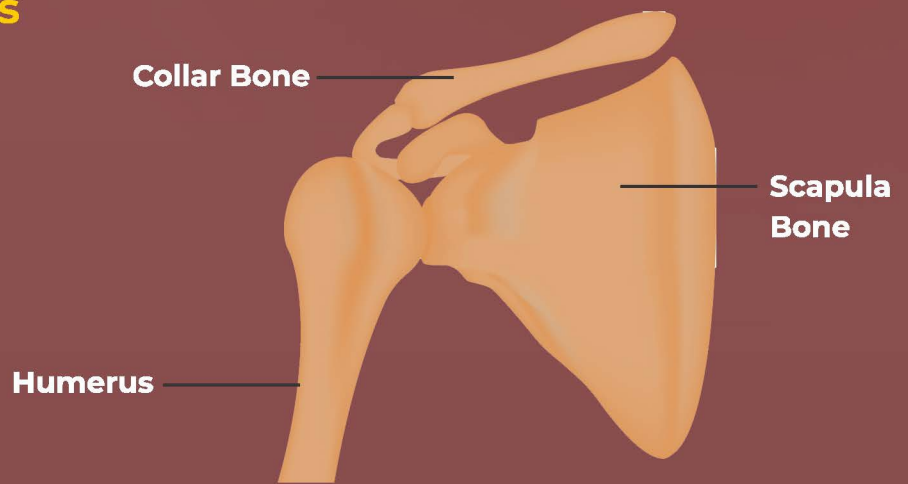
- ▶ Calcium is essential for strong healthy bones. 99% of calcium in our body is in our bones and teeth.

Shoulder bones , Hip bone

- ▶ Shoulders are the part of the body to which our arms are attached.
- ▶ The human body has two shoulders, one on each side of the neck.

Two shoulder bones are there:

1. Collar bone
2. Shoulder blade



Hip bone :

- ▶ The thigh bones of our legs are joined to the hip bone by the ball and socket joints.
- ▶ Hip bone forms the link between upper part of our body (called trunk) and the legs.

Note

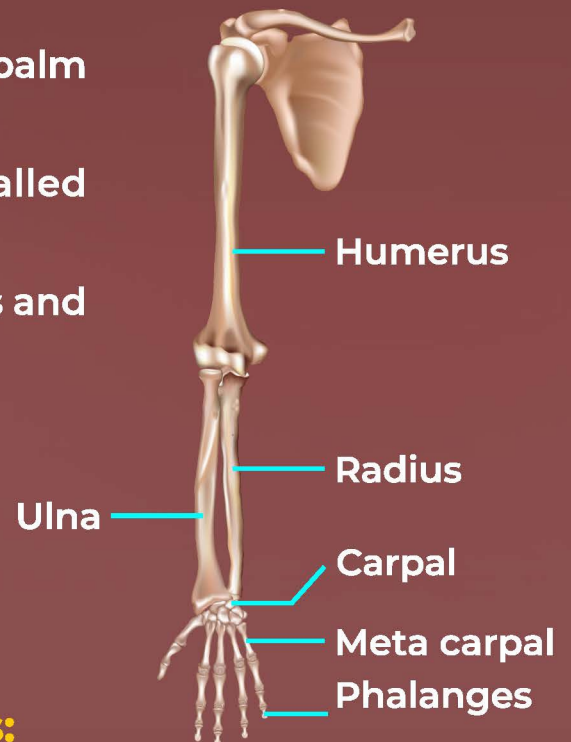
- ▶ The hip bone is also known as pelvic bone (or pelvis).

Bones of the hand and Bones of leg

Bones of the hand:

- ▶ Each arm consists of three parts – upper arm, lower arm, and hand.
- ▶ The hand consists of various small bones which form wrist, palm and fingers.

- ▶ Our hand is made up of three parts : wrist, palm and fingers.
- ▶ Upper arm consists of a single bone called 'humerus'.
- ▶ Lower arm is made up of two bones – radius and ulna.
- ▶ Wrist bones - carpals (8)
- ▶ Bones of palm - metacarpals. (5)
- ▶ Bones of fingers -phalanges (14)

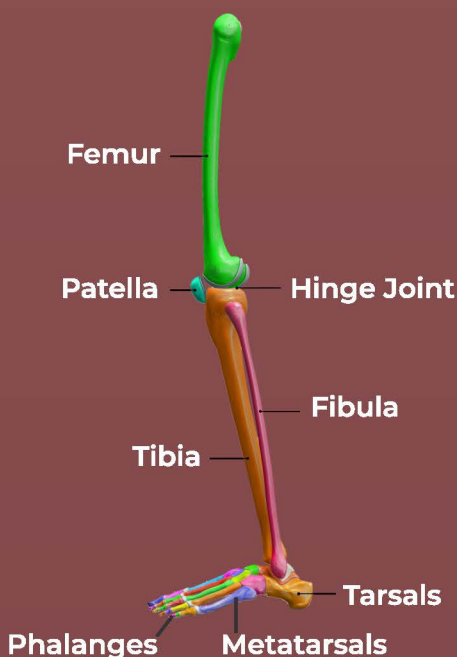


Bones of the legs:

- ▶ Each leg consists of three parts – upper leg, lower leg and foot.
- ▶ Bone of upper leg - femur (Longest bone).
- ▶ Bone of knee cap - patella.
- ▶ Bones of lower leg - tibia and fibula.

Bones of foot -

- ▶ Bones of ankle - tarsals (7)
- ▶ Bone of middle part of foot - metatarsals (5)
- ▶ Bone of fingers - phalanges (14)



Note

- ▶ Milk contains several important nutrients. A glass of milk will give us calcium, protein, iodine, potassium, phosphorus, vitamin B2 and B12 etc.

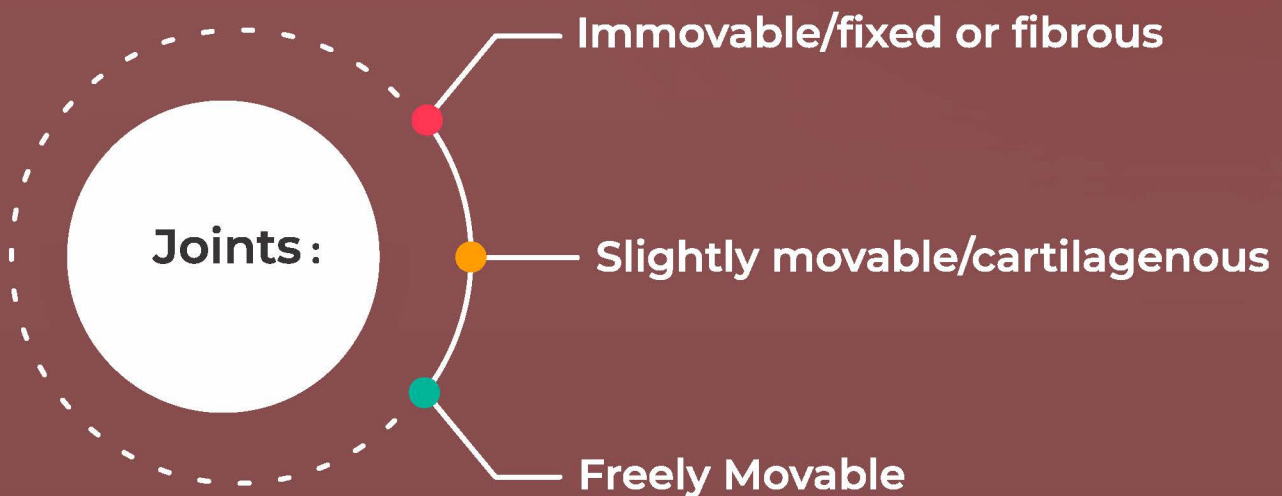
Note

- ▶ Potassium is the most abundant mineral element in muscles.

Joints

- ▶ The structural arrangements of tissues by which bones are joined together are called joints.

According to mobility, joints are classified as

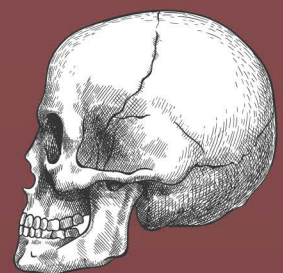


Immovable joints/fixed joints:

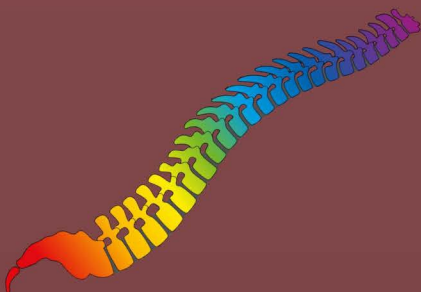
- ▶ In some joints, the bones are held so tightly together that they cannot move at all. Such joints are called fixed joints.
- ▶ These joints allow no movement.

E.g. ▶ The bones of skull are interlocked with each other by their serrated margins called sutures.

- ▶ Joints in tooth sockets.
- ▶ Upper jaw.



Slightly movable joints:



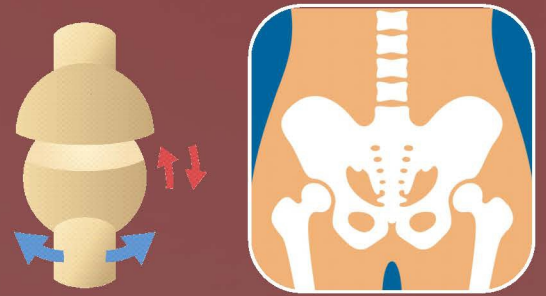
- ▶ In these joints, a pad of flexible cartilage is present between the bones which make slight movement possible.
- ▶ Present between adjacent vertebrae in the backbone.

Freely movable joints:

- ▶ These joints allow free movement of bones in various directions. These are also known as synovial joints.

(a) Ball and socket joint

- ▶ The rounded head (like a ball) of one bone fits into a cup-shaped cavity formed by the other bone.
- ▶ This allows movement in all directions.



E.g. Joints at the hip and the shoulder.

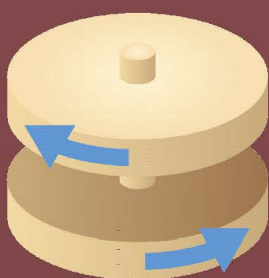
(b) Hinge joint

- ▶ The hinge joints allow the movement only in one direction (back and forth movement) like those of a door or the lid of a box.

E.g. Elbow joint (between the upper and lower arm).
Knee joint (between the thigh and lower leg).

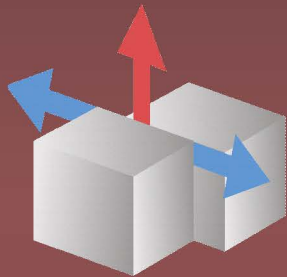


(c) Pivot joint



- ▶ Such joints allow rotation only.
- ▶ Pivot joint occurs where our neck joins the head which allows the head to move backward and forward and turn the head to our right or left.
- ▶ The head rotates over a cylindrical bone of the neck.

(d) Gliding joint



- ▶ Also known as plane joint which allows bones to glide past one another providing little movement .
- ▶ E.g: Joints at the ankle and the carpals in wrist.

Cartilage and Muscles

Cartilage

- ▶ Cartilage is soft, smooth and elastic tissue.
- ▶ Some additional parts of the skeleton that are not as hard as the bones and which can be bent. These are cartilage.

Muscular system

- ▶ Muscular system consists of muscles which helps in locomotion and movement.
- ▶ Locomotion is the result of co-ordinated action of muscles of the limb bones.
- ▶ The contraction and relaxation of muscles move the bones.

Muscles

- ▶ The muscle is a fibrous tissue which possess the property of contraction and relaxation which is responsible for the movement of bones and joints.
- ▶ Muscles work in pairs. When one of them contracts, the bone is pulled in that direction. The other muscles 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 cannot push. Thus, two muscles have to move together to move a bone.
- ▶ The muscle becomes shorter, stiffer and thicker when it contracted and it pulls the bone.

Gaits in animals

Earthworm :

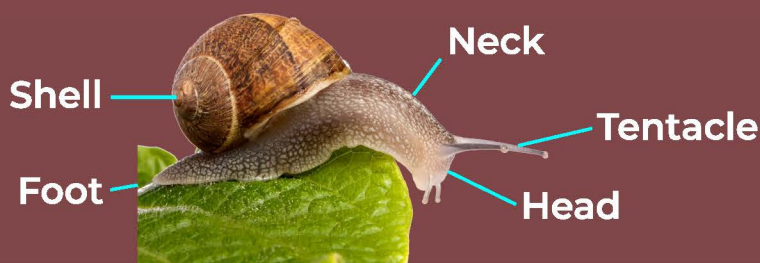
- ▶ The body of an earthworm is made up of many rings joined end to end.
- ▶ An earthworm **does not have bones** only has muscles which help to extend and shorten the body.
- ▶ During movement, the earthworm first extends the front part of the body, keeping the rear portion fixed to the ground. Then it fixes the front end and releases the rear end. It then shortens the body and pulls the rear end forward.
- ▶ Repeating such muscle expansions and contractions, the earthworm can move through soil.
- ▶ Earthworm body secretes a slimy substance to help the movement and has a large number of tiny bristles (hair like structures) projecting out. under the body.
- ▶ The bristles are connected with muscles which help to get a good grip on the ground.
- ▶ The earthworm, actually, eats its way through the soil. Its body then throws away the undigested part of the material that it eats. This activity of an earthworm makes the soil more useful for plants.



Note

- ▶ Gait means manner of movement.

Snail :



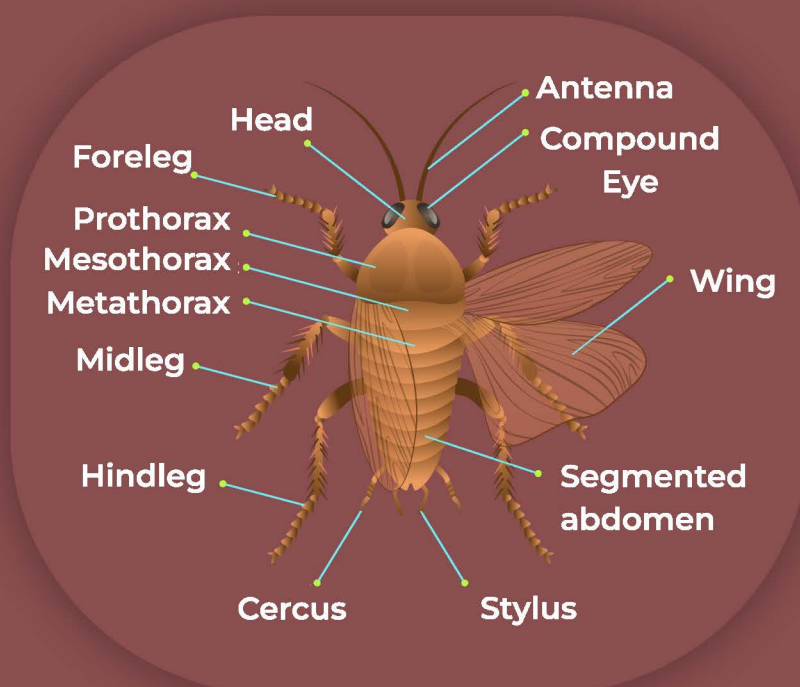
- ▶ A snail can slide over a razor blade without getting hurt.
- ▶ The slimy mucous enables it to slide over sharp objects without being injured.
- ▶ The snail moves with the help of a large, disc shaped muscular foot.
- ▶ It deposits a little fluid, at its front end and walks smoothly over this fluid.
- ▶ The shell is dragged along with the foot, as the shell cannot move by itself.
- ▶ There are two sets of muscles in the foot of snail which contracts and expand alternately, producing a kind of wave effect.
- ▶ A series of waves in the muscles of foot make the snail move forward.

Note

A snail can slide over a razor blade without getting hurt! The slimy mucous enables it to slide over sharp objects without being injured!

Cockroach :

Cockroaches are insects which come out at night to feed which can walk, climb as well as fly in the air. .

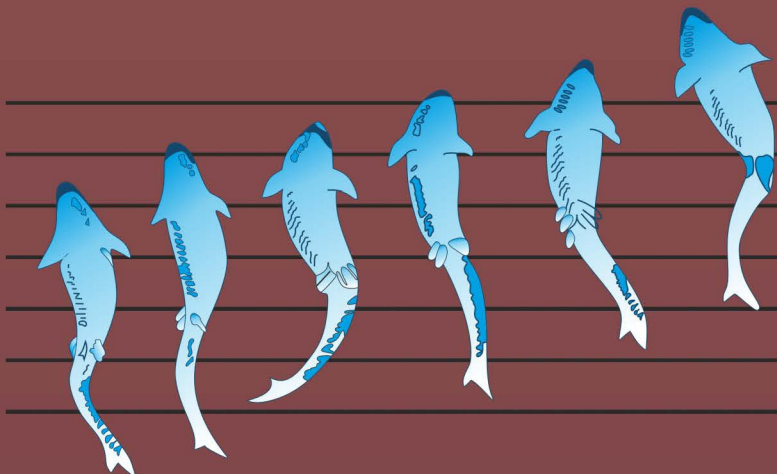


- ▶ Cockroaches are insects which come out at night to feed. They can walk, climb as well as fly in the air.
- ▶ Two pairs of wings and three pairs of legs are also present which help in walking.
- ▶ Bones are not present.
- ▶ The body is covered with a hard outer skeleton which is made of different units joined together and this permits movement.
- ▶ Muscles present near the legs help in walking while the breast muscles attached to the wings help in flying.

Note

- ▶ The skeleton of a cockroach is covered with hard and tough outer covering called exoskeleton because it is present outside the body.

Fish:



- ▶ Various adaptations are found in fish which help in movement.

The fish has flexible backbone.

- ▶ Due to flexible backbone, the fish can bend its body easily from side to side to move through water.

The fish has fins.

- ▶ The thin and flat projections on the body of fish are called fins that help in steering, balancing and stopping in water.
- ▶ The tail fin also helps in moving the fish forward in water

The fish has powerful body muscles.

- ▶ The powerful body muscles of fish on both sides help in moving its tail on both sides. During swimming, muscles make the front part of the body curve to one side and the tail part swings towards the opposite side.
- ▶ The fish forms a curve. Then, quickly, the body and tail curve to the other side.
- ▶ This makes a jerk and pushes the body forward. A series of such jerks make the fish swim ahead.
- ▶ This is helped by the fins of the tail. Fish also have other fins on their body which mainly help to keep the balance of the body and to keep direction, while swimming.

Snake



Note

- ▶ The special name of the wave like motion of a snake is “slither”.

- ▶ Snake has a long backbone and a large number of thin muscles which are connected to each other.
- ▶ Backbone, ribs and skin are also connected to the muscles.

- ▶ Movement takes place by crawling.
- ▶ A snake contracts and relaxes the muscles on the two sides of its body alternately to form many loops in which different parts of the snake's body are moving to the left side and right side at the same time.
- ▶ Each sideways moving loop of snake pushes back against the ground and gives the snake a forward push. The resultant push of all the loops of snake's body make it move forward very fast.

Birds



- ▶ Birds are adapted to fly in the air and walk on the ground.
- ▶ Birds like duck and swans swim in water.
- ▶ Birds walk on the ground by using their hind limbs.
- ▶ Those birds which swim in water do so by pushing against water with their hind limbs which have webbed feet that helps in swimming.

- ▶ Birds have following adaptations which enable them to fly:
 - Their forelimbs are modified to form wings for flying.
 - Their flight feathers provide a large flat surface which is light but strong.
 - Their bones are hollow and light.
 - Their bodies are streamlined and extremely light.
 - They have powerful flight muscles.
 - Their breastbone is extended for the attachment of large flight muscles.