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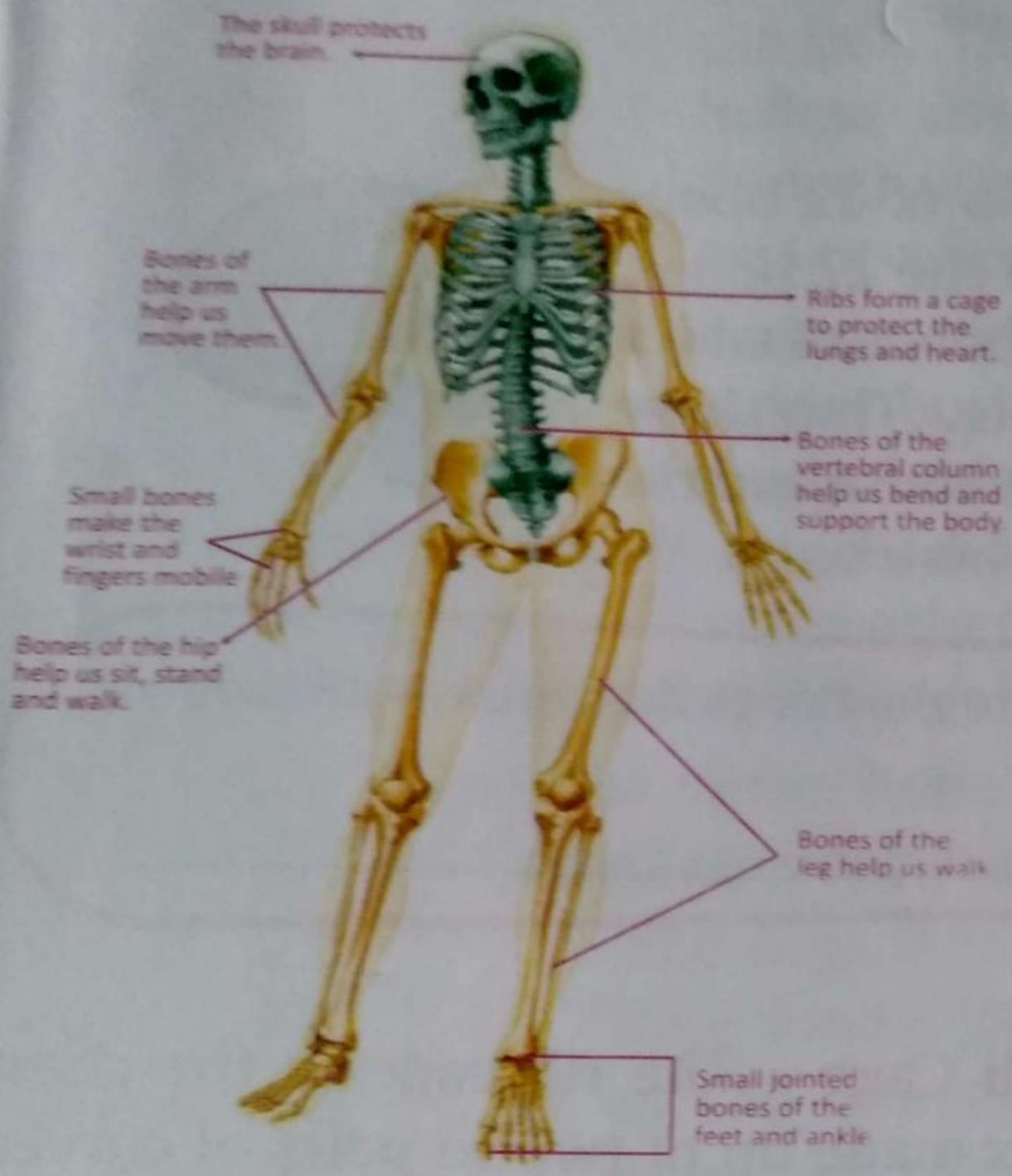
Unit I : The World Of The Living

The Human Skeleton



Skeletal system

Have you ever seen a house being built? The first thing to be built is the frame of the house. The frame is what gives the house the shape and support. The human skeleton is the frame of the human body that gives it the shape and support. Our skeleton performs an added function of providing protection to the delicate internal organs like the brain, the heart, the kidneys, lungs etc. The human skeletal system consists of the bones and the muscles. The bones are held together at the joints. The joints make the movement of the bones easy and flexible.

Bones

A baby is born with 300 bones but with age some of these bones fuse together and grow in size. Thus an adult is left with only 206 bones.

Bone Structure

The bones are made up of the bone cells, proteins and the minerals like calcium. The hard structure of the bone can be attributed

The skeleton forms the basic framework for all animals. The shape of the skeleton almost decides the shape of the animal.

Snake

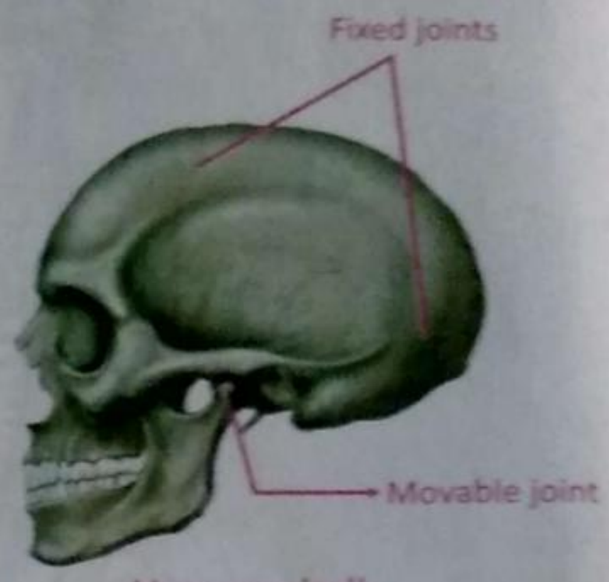
Snake skeleton

to calcium. In the centre the bone is soft and spongy and contains a substance called the bone marrow. The bones have blood vessels and nerves running through them which provide a sensation in the bones. We can feel the pain when we are hurt on a bone.

- Bone marrow – The soft and spongy substance inside the bone.

Bones In The Human Body

The Skull – The skull is made up of 22 bones and it encases the soft brain. Of the 22 bones, the facial region constitutes 14 bones of which only the lower jaw is movable. They have sockets for the eyes, the ears, the nose and the mouth. The teeth fit into the jaw bones.



Human skull

Lock your jaws together. Now think of the things that you would have to certainly move your jaws for.

The Rib Cage – The rib cage in the chest cavity is made up of twelve pairs of curved bones. These are strong and flexible and join the backbone to the breast bone or the sternum. The rib cage begins with the shoulder bones and a pair of collar bones. The lowest two ribs are called floating ribs as they are joined only to the spine. The ribs encase the heart and the lungs. They allow the expansion and contraction of the lungs while breathing.

- Sternum – The breast bone.
- Collar bones – A pair of bones joining the two shoulder bones.

The Backbone – The skull is attached to the backbone or the spine. Thirty-three small bones called the vertebrae make up the backbone; hence it is also called the vertebral column. The vertebrae are a hollow structure like a ring through which run the bunch of nerves called the spinal cord.

Insects like the mosquito, housefly, bees and spiders are called invertebrates. They do not have a back bone.

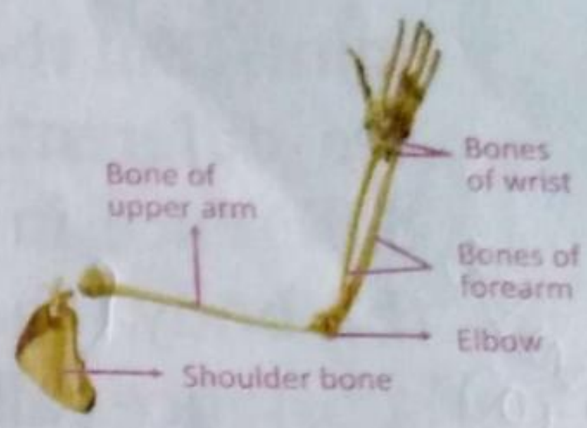
98% of animal species are invertebrates.

Animals like the horse, deer, tiger, giraffe etc., have a backbone and are called vertebrates.

2% of animal species are vertebrates.

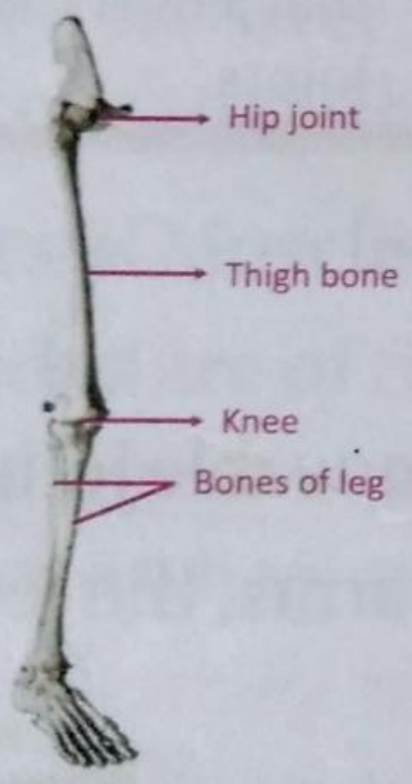
Ans D3

The Arms – The arms are our forelimbs. They are joined to the shoulder bone. The bone in the upper arm is a single bone while that of the forearm are two, attached at the elbow at one end and the wrist at the other end. From the wrist bone arise the palm bone and the finger bones.



Arms

Each finger has three bones and the thumb has two bones. The difference is evident when we try to fold our fingers and the thumb.



Leg

The Legs – The legs are our hind limbs. The thigh bone or the femur is the longest bone of the body and is attached to the hip bone. The two bones of the lower leg are attached to the femur at the knee and to the foot at the ankle. Like the thumb, our big toe has two bones while the other four toes have three bones each.

Vertebrae – The small hollow bones of the vertebral column that hold the spinal cord.

Quick Revision:

Fill in the blanks:

1. The Human Skeleton provides the framework for the body.
2. The bones are hard due to the presence of the mineral Calcium.

3. The only movable area of the skull is the lower jaw.
4. The ribs join the backbone (Spine) to the breastbone (Sternum)
5. The hollow ring like structure which holds the spinal cord is called Vertebrae.
6. Elbow and Wrist hold the two bones of the lower arm.
7. Femur is the longest bone of the body.

Joints

The bones are attached to each other at the joints. But the kind of joints at different areas are different. This is also a reason for the difference in flexibility at different areas of the body. (The joints are covered by a thick substance called the cartilage.) It is elastic and acts as a lubricant on the bones. Without the cartilage, the bones would rub against each other and wear out. The function of the cartilage can be compared to that of lubricating oil used to ease the movement of nuts in a machine.

Oiling in machine

Cartilage - The thick substance that covers the joints.

Types of Joints

- Immovable Joints – The joints in the skull are immovable joints.
- Movable Joints – The joints in the lower jaw, the arms, the legs and the spine are movable joints.

Movable Joints

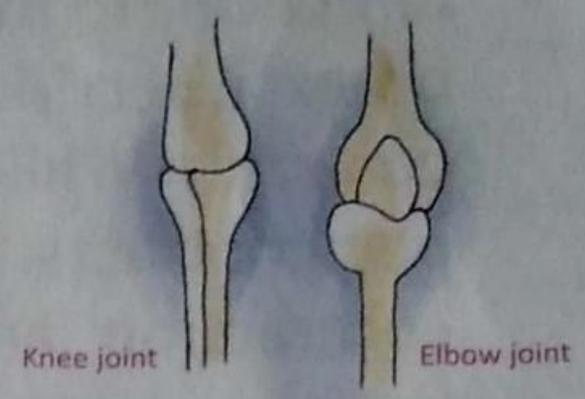
- Ball and socket Joint – This type of joint allows movement in many directions. The shoulder and hip joints are ball and socket joints.

Hip joint

Shoulder joint

Ball and socket joint

- Hinge Joint – The hinge joints resemble the movement of the hinges of a door. They can move only back and forth. Bones in knees, fingers, toes and elbows are examples of hinge joints.

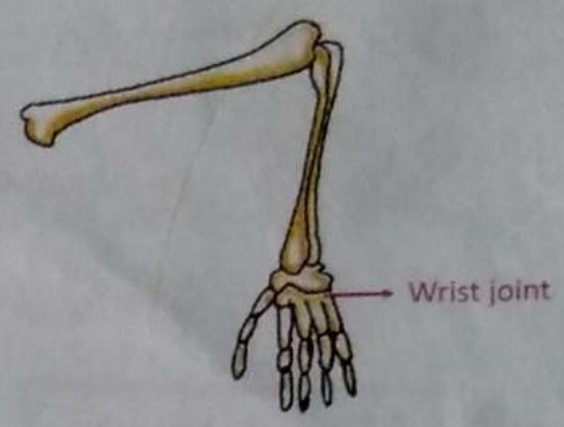


Hinge joint

- Pivot Joint – This joint allows upward, downward and circular movement. This type of joint is found between the first two vertebrae of the backbone.)

Ex –

- Gliding Joint – As the name suggests, it allows the bones to glide against each other as found in the wrist and the ankle.



Bone of wrist gliding joint

Muscles, Ligaments and Tendons

Ans D5 (d)

(The bones are held together at the joints by the ligament.) The ligaments restrict the movement of bones at the joints. The movements of the bones are made possible by the muscles.

Ans D5 (c)

(A muscle is a tissue that contracts to allow movement in the bones.) There are over 500 muscles in the body. (The tendons connect the muscles to the bones.)

Ans D5 (b)

Types of Muscles

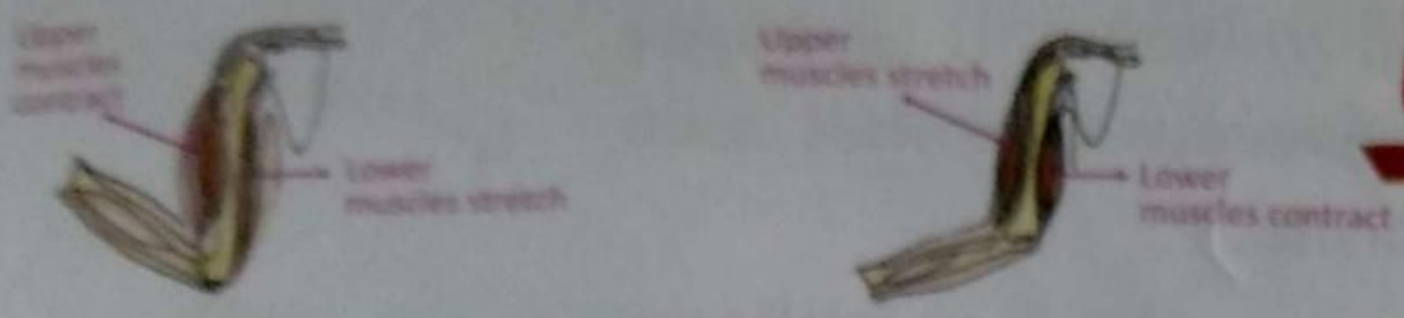
Muscles are of two types:

- Voluntary muscles like those of the arms and the legs that we can move when we want.
- Involuntary muscles like those that cause the heart beat or the contraction of the food pipe, so that the food moves down the gut, are not in our control. They are involuntary muscles.

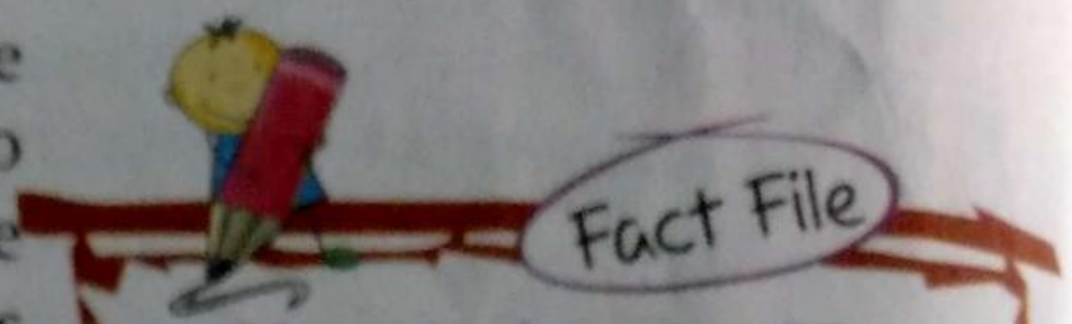
How the Muscles Work

All the muscles in our body work in pairs. They contract to pull the bone and make it move. But one muscle can contract only in one

direction. To move the muscle in the other direction, its partner has to contract. While one muscle of the pair contracts, the other relaxes. This contraction and relaxation of the muscles causes movement.



Muscles change shape to pull on bones



New Words

Rib Cage – A set of twelve curved bones in the chest cavity.
Spine – The strong and flexible set of thirty three small bones.
Floating Ribs – The lowest two ribs that are joined only to the backbone.
Forelimbs – The arms are our forelimbs.
Hindlimbs – The legs are our hindlimbs.

Let's Revise

1. The bone is made up of bone cells, proteins and calcium.
2. The centre of bone is soft and spongy and filled with bone marrow.
3. The skull is made of 22 bones and the facial region constitutes 14 bones.
4. The bone is also called the spine or the vertebral column.
5. The two bones of the forearm are joints at the elbow and at the wrist.
6. The fingers have three bones each while the thumb has two bones.
7. Ball and socket joints allow movement in many directions.
8. Hinge joint can move back and forth.
9. Tendons connect the muscles to the bones.

Let's Answer

A. Write True or False against the following statements:

1. Skeleton provides protection to the internal organs of the body. T
2. The bone is soft and spongy. F

3. The rib cage joins the sternum and spinal cord. F
4. The vertebrae are hollow ring like structures. T
5. Ligaments provide lubrication to joints. F
6. Pivot joint allows movement in all the directions. F
7. Muscles of the food pipe are involuntary. T

B. Name them:

1. Types of joints on the basis of our control. Movable Joints
2. Longest bone of the body. Femur
3. Ribs attached only to the backbone. Floating ribs
4. Organs protected by the ribcage. Heart and Lungs
5. Joints that allow back and forth movement. Hinge Joint

C. Fill in the blanks:

1. The muscles in the arms and legs are examples of Voluntary muscles.
2. There are 22 bones in the skull.
3. The big toe of our foot has Two bones while the other four toes have Three bones each.
4. Without the Cartilage cover, the bones would rub against each other and wear out.
5. The rib cage protects the Heart and Lungs.
6. The Brain is protected by the skull.
7. Ball and Socket joints in the shoulder bone allow movement of Arms in all directions.
8. Heart beat and Contraction of food pipe are examples of involuntary muscles.

D. Answer these:

1. Explain any three types of joints with examples. Pg no - 8 and 9
2. Explain the structure of the rib cage with diagram. Pg. no-6
3. Discuss the structure and number of bones in our limbs. Pg. no-7
4. Why do we feel the pain when our bones break? Pg. no.-6
5. Define:
   a. Cartilage Pg no-8
   b. Tendon Pg no-9
   c. Muscle Pg no-9
   d. Ligament Pg no-9
6. What would you mean by a ligament rupture?