

SHORT QUESTIONS

1. Differentiate between cartilage and bone.

Ans. Difference between Bone and Cartilage:

	Bone	Cartilage
Types:	Bones are classified into long, short, flat irregular sesamoid and sutural bones	Types of cartilage include hyaline cartilage, fibrocartilage and elastic cartilage
Function:	Bones protect the body against mechanical damage assisting in the movement of the body providing a framework and shape for the body, storing minerals and producing red blood and white blood cells	The main functions of cartilage tissue include reducing friction at the joints supporting tracheal and bronchial tubes, acting as shock absorbers Between vertebrae and maintaining the shape and flexibility of ear nose and so on.
Structure:	Bone or osseous tissue is made up of osteoblasts (progenitor cells).	Cartilage comprises of chondroblasts which are precursor cells,

	osteocytes (mature bone cells), (large cells that breakdown bone tissue for growth and repair) and bone lining cells (that regulate the movement of calcium)	chondrocytes and osteoclasts and dense matrix comprising of collagen and elastic fibres in which the mature chondrocyte cells are embedded
Diseases/Disorders	Disorders of the bone consist of osteoporosis) osteosarcoma osteomyelitis and osteogenesis imperfecta which is a genetic disorder and other disorders	Diseases of the cartilage include osteoarthritis, achondroplasia costochondritis and other chondrodystrophies
Where found in the body:	Bones make up the endoskeleton of vertebrates	Cartilage is a much softer more pliable component that is mostly found in between vertebrates joints of bones
Membrane:	periosteum	penicondrium

OR (Second Answer)**Cartilage:**

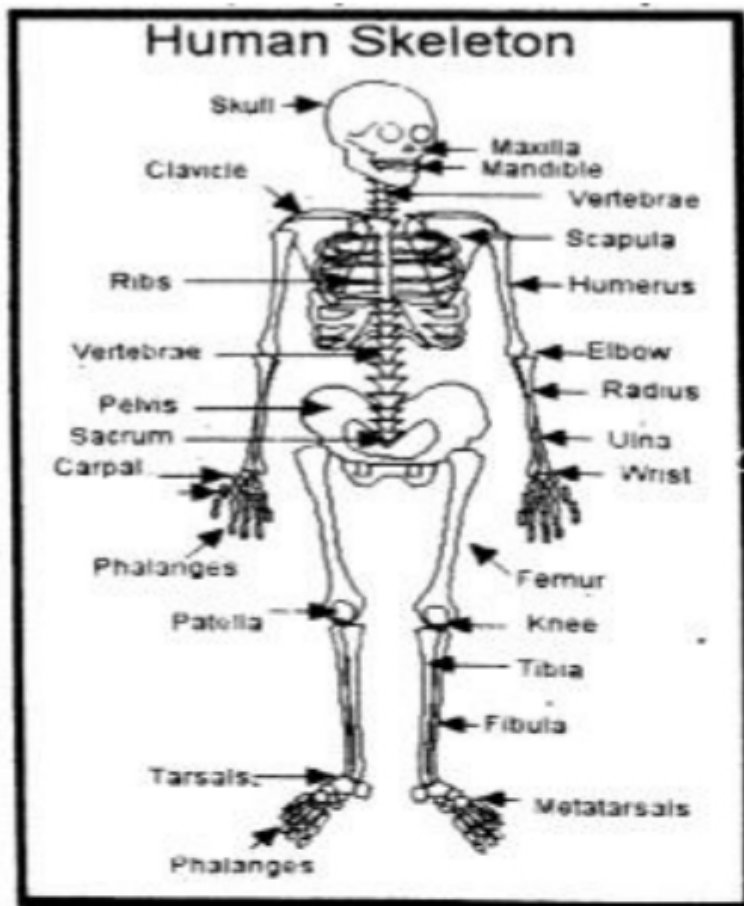
1. The cellular elements of the cartilages are chondrocytes
2. The matrix contains a protein called chondrin
3. It is soft except calcified cartilage.
4. It is avascular (not supplied with blood vessels)
5. Marrow cavity is absent.
6. Canaliculi are absent
7. Cartilage is covered by perichondrium.

Bone:

- i. The cellular elements of the bone are osteocytes.
- ii. The matrix contains a protein called ossein.
- iii. It is hard due to the deposition of phosphates and carbonates of calcium in the matrix.
- iv. It is vascular (supplied with blood vessels).
- v. Marrow cavity is present.
- vi. Osteocytes interconnected canaliculi.
- vii. Bone is covered by periosteum.

2. What is the role of skeleton in support and movement?**Ans. Role of Skeletal System:**

The big functions of skeletal system are protection, support and movements. In our body skeleton works very closely with the muscular system to help us move



Similarly, skeleton provides protection to many internal organs e.g. skull protects brain, vertebral column protects spinal cord and ribs protect most of our other internal organs. Vertebral column also provides the main support to our body mass.

3. How would you differentiate between osteoporosis and arthritis?

Ans. Both arthritis and osteoporosis can affect seniors, Osteoporosis affects the bones while arthritis affects the joints and surrounding tissue.

Osteoporosis is a condition in which the bones become fragile and brittle, leading to a higher risk of fractures (breaks or cracks) than in normal bone.

Arthritis is an auto immune disease that leads to the destruction of the soft tissue in joints eventually leading to the joints becoming immobilized and deformed.

These two are entirely different conditions.

4. Label the biceps and triceps in the following diagrams and also mention their contracted or relaxed states.



Ans:

Figure(A)	Figure(B)
Biceps (Contracted state)	Biceps (Relaxed state)
Triceps (Relaxed state)	Triceps (Contracted state)

UNDERSTANDING THE CONCEPT

1. What are the main components of the axial skeleton and the appendicular skeleton of human?

Ans. The adult human skeleton has 206 bones which are organized into two main components

- i. Axial skeleton
- ii. Appendicular skeleton

i. Axial skeleton:

Axial skeleton consists of the 80 bones in the head and trunk of body it is composed of five parts

Skull bones:

Skull contains 22 bones out of which 8 are cranial bones (enclosing the brain) and 14 are facial bones

Middle ear ossicles:

There are 6 middle ear ossicles (3 in each ear)

Hyoid bone:

There is also a hyoid bone in neck

Vertebral column:

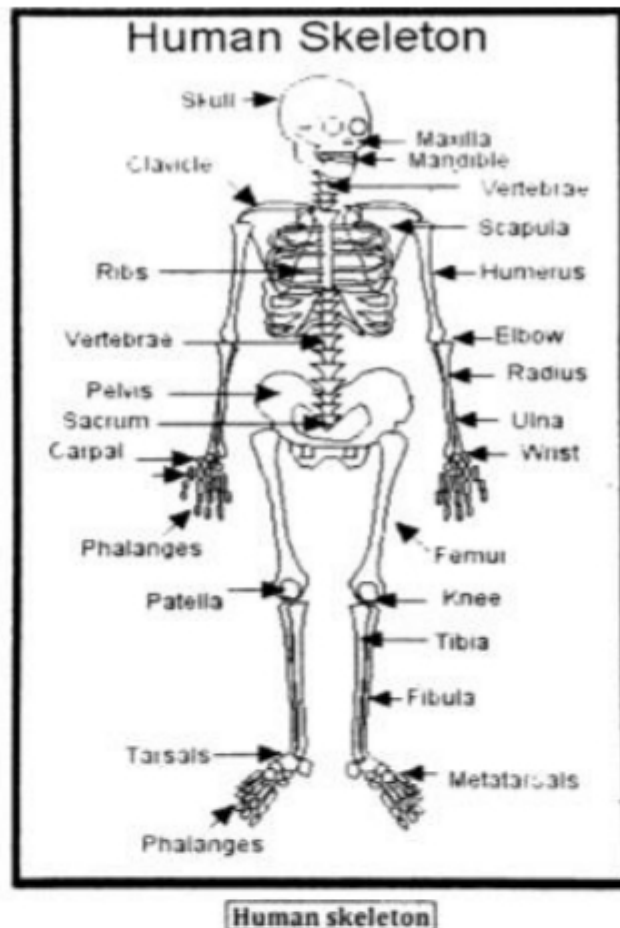
Vertebral column contains 33 bones (vertebrae)

Chest:

The chest is made of a chest bone called sternum and 24(12 pairs) ribs

ii. Appendicular Skeleton:

Appendicular skeleton is composed of 126 bones Pectoral (shoulder) girdle is made of 4 bones Arms have 6 bones. Both hands have 56 bones Pelvic girdle (hips) has 2 bones Legs have 8 bones. Both feet have 56 bones.



2. Describe the types of joints and give examples.

Ans. Joint:

A joint is the location at which two or more bones make contact. They allow movement and provide mechanical support.

Types of joints:

Joints can be classified on the basis of the degree of movement they allow.

i. Immoveable (Fixed) joints:

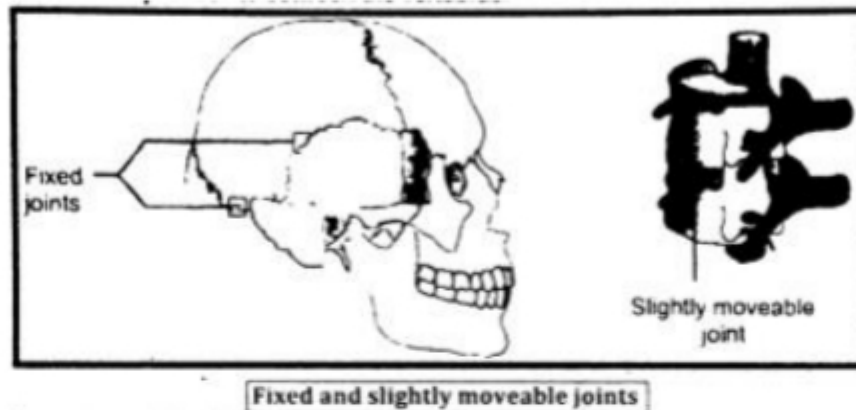
Such joints allow no movement.

Example: The joints between the skull bones.

ii. Slightly moveable joints:

Such joints allow slight movements

Example: Joints between the vertebrae

**iii. Moveable joints:**

They allow a variety of movements

Example: Shoulder joint, hip joint, elbow joint, knee joint etc

Types of Moveable joints:

There are many types of moveable joints in body. The main types are hinge joints and ball-and-socket joints a.

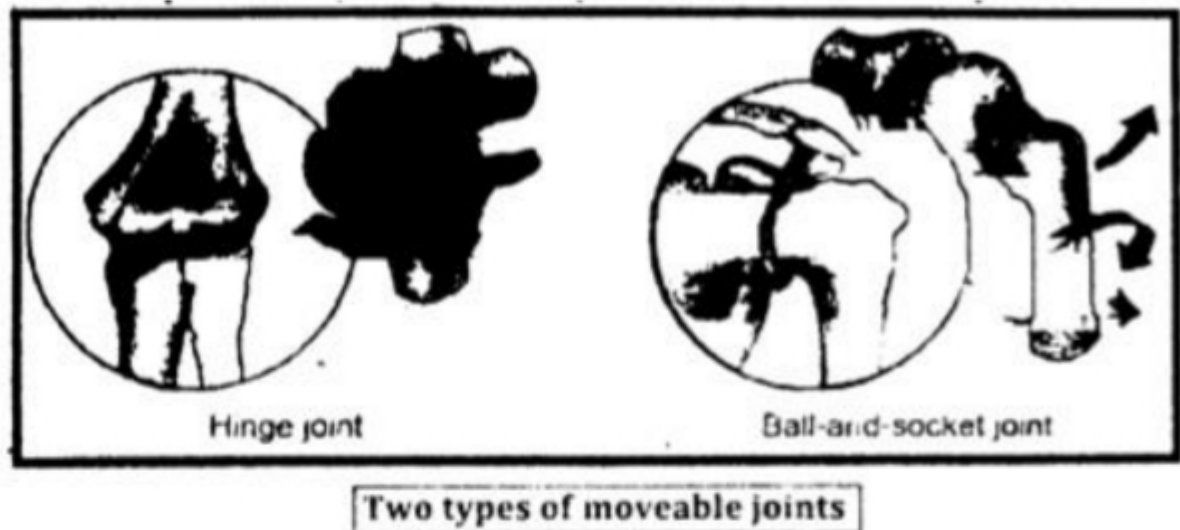
a. Hinge joints:

Hinge joints move back and forth like the hinge on a door and allow movements in one plane only

Example: The knee and elbow are hinge joints

b. Ball-and-socket:

Ball-and-socket joints allow movement in all directions Example: The hip and shoulder joints are ball-and-socket joints



3. What are ligaments and tendons? What function do they perform?

Ans. Ligaments and Tendons:

Tendons and ligaments are bands of connective tissue (made of collagen).

Ligaments:

Ligaments are strong but flexible bands and join one bone to another at joints

Function of ligaments:

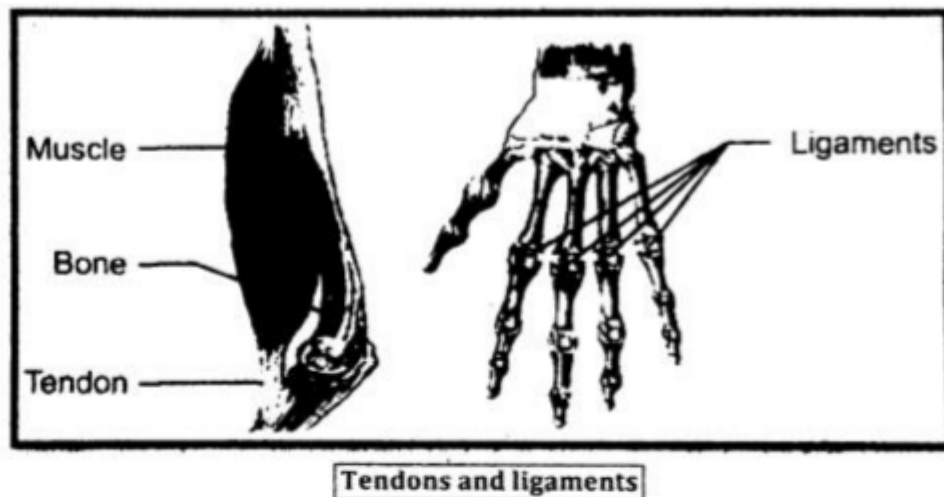
Ligaments prevent dislocation of bones at joints

Tendons:

Tendons are tough bands and attach muscles to bones

Function of Tendons:

When a muscle contracts tendon exerts a pulling force on the attached bone which moves as a result.



4. Explain antagonism in muscle action selecting biceps and triceps as example.

Ans. Antagonism:

Skeletal muscles are usually in pairs of antagonists. In an antagonistic pair, both muscles do opposite jobs. When one muscle contracts the other relaxes and this phenomenon is known as antagonism (antagonistic action)

Flexor:

When a muscle contracts and bends the joint, it is known as flexor muscle and the movement is called flexion.

Extensor:

When a muscle contracts and straightens the joint, it is known as extensor muscle and the movement is called extension. Following is an example of the antagonistic action of a pair of skeletal muscles

Biceps:

Biceps is a flexor muscle on the front of the upper arm bone

Triceps:

Triceps is an extensor muscle on the back of arm.

Both these muscles have their origin at pectoral girdle and insertion at one of the two bones of forearm

Action of Antagonistic muscle (Biceps and Triceps):

Action of Flexion:

When biceps contract the forearm insertion end is pulled upward It is the flexion of elbow joint. During this flexion, triceps muscle relaxes

Action of Triceps:

When triceps muscle contracts forearm is pulled down it is the xtension at elbow joint. During it, biceps muscle relaxes

In this way, biceps and triceps make up an antagonistic pair of muscles Similar pairs, working antagonistically across other joints provide for almost all the movements of skeleton

