Class: 10th

subject: Biology

Chapter 13: Support and Movement

Important MCQs:

1. What is the human skeleton also known as?

(a) Exoskeleton

(**b**) Endoskeleton ✅

(c) Hydrostatic skeleton

(d) Cartilage system

2. Which of the following is NOT a function of the skeletal system?

(a) Support

(b) Movement

(**c**) Digestion ✅

(d) Protection

3. Which part of the skeleton protects the brain?

(a) Ribs

(b) Skull ✅

(c) Vertebral column

(d) Sternum

4. What type of tissue is cartilage?

(a) Muscular tissue

(b) Connective tissue ✅

(c) Epithelial tissue

(d) Nervous tissue

5. Which cells are found in cartilage?

(a) Osteocytes

(b) Chondrocytes ✅

(c) Neurons

(d) Myocytes

6. Which cartilage is strong but flexible and found at the ends of long bones?

(a) Elastic cartilage

(b) Hyaline cartilage ✅

(c) Fibrous cartilage

(d) Compact cartilage

7. Which cartilage is found in intervertebral discs?

(a) Hyaline cartilage

(b) Elastic cartilage

(c) Fibrous cartilage ✅

(d) Spongy cartilage

8. What is the hardest connective tissue in the human body?

(a) Cartilage

(b) Ligament

(c) Bone ✅

(d) Tendon

9. What is the soft and porous part inside a bone called?

(a) Compact bone

(b) Spongy bone ✅

(c) Lacuna

(d) Marrow layer

10. How many bones are present in the axial skeleton of a human?

(a) 126

(b) 206

(c) 80 ✅

(d) 54

11. Which type of joint allows no movement?

(a) Hinge joint

(b) Ball-and-socket joint

(c) Slightly moveable joint

(d) Immoveable joint ✅

12. Which joint is found between the vertebrae and allows limited movement?

(a) Hinge joint

(b) Slightly moveable joint ✅

(c) Ball-and-socket joint

(d) Fixed joint

13. Which of the following is a hinge joint?

(a) Shoulder joint

(b) Hip joint

(c) Knee joint ✅

(d) Neck joint

14.Ball-and-socket joints allow movement in:

(a) Only one direction

(b) Two directions

(c) Circular motion only

(d) All directions ✅

15. What is the role of ligaments in the human body?

(a) Connect bone to muscle

(b) Produce red blood cells

(c) Join bone to bone at joints ✅

(d) Make bones flexible

16. Which structure connects skeletal muscles to

bones?

(a) Ligaments

(b) Tendons ✅

(c) Cartilage

(d) Fibres

17. The fixed end of a skeletal muscle is known as:

(a) Insertion

(b) Origin ✅

(c) Anchor

(d) Joint

18. When biceps contract, the movement at elbow joint is called:

(a) Extension

(b) Flexion ✅

(c) Rotation

(d) Dislocation

19. Which of the following muscles causes extension at the elbow joint?

(a) Biceps

(b) Triceps ✅

(c) Deltoid

(d) Hamstring

20. Antagonistic muscles:

(a) Always work together

(b) Have the same action

(c) Perform opposite actions ✅

(d) Are attached to the same bone

21. Which disease is caused by loss of bone minerals like calcium and phosphorus?

(a) Arthritis

(b) Gout

(c) Osteoporosis ✅

(d) Rickets

22. In which disorder do uric acid crystals accumulate in joints?

(a) Osteoarthritis

(b) Rheumatoid arthritis

(c) Gout ✅

(d) Osteoporosis

23. Which hormone is responsible for mineral deposition in bones?

(a) Estrogen ✅

(b) Progesterone

(c) Insulin

(d) Adrenaline

24. Which form of arthritis is due to cartilage degeneration or decreased joint lubricant?

(a) Gout

(b) Osteoarthritis ✅

(c) Rheumatoid arthritis

(d) Fibrosis

25. What is the function of ligaments in joints?

(a) Connect muscle to bone

(b) Connect bone to bone ✅

(c) Produce calcium

(d) Join skin to bone

Exercise Short Questions:

Q1. Differentiate between cartilage and bone.

Answer:

- Cartilage is a flexible connective tissue without blood vessels.
- Bone is a hard connective tissue with blood vessels and mineral deposits (calcium, phosphate).
- Cartilage contains chondrocytes, while bone contains osteocytes.

Q2. What is the role of skeleton in support and movement?

Answer:

- Skeleton provides support to body and maintains shape.

- It protects internal organs like brain and lungs.
- It helps in movement by providing attachment to muscles through tendons.

Q3. How would you differentiate between osteoporosis and arthritis?

Answer:

- Osteoporosis is the loss of bone density, mostly in old women, due to calcium deficiency.
- Arthritis is the inflammation of joints, causing pain and stiffness, especially in weight-bearing joints.

Q4. Label the biceps and triceps in the following diagrams and also mention their contracted or relaxed states.

Answer:

- Biceps are located on the front of the upper arm – they are contracted when the forearm is lifted.
- Triceps are at the back of the upper arm – they are relaxed when the biceps are contracted.

- When the arm straightens, triceps contract and biceps relax.

Important Short Questions:

1. Define the skeletal system.

Answer:

The skeletal system is the framework of hard, articulated structures that provides support, protection, and movement to the body.

2. What is meant by endoskeleton?

Answer:

The endoskeleton is the internal skeleton found inside the body, like in humans and other vertebrates.

3. Write any two functions of the skeletal system.

Answer:

1. It provides protection to internal organs.

2. It helps in body movement by working with

muscles.

4. Which bones protect the brain, spinal cord, and lungs?

Answer:

- Skull protects the brain.
- Vertebral column protects the spinal cord.
- Ribs protect the lungs.

5. What is cartilage?

Answer:

Cartilage is a flexible connective tissue made of chondrocytes. It lacks blood vessels and provides support in various body parts.

6. Name three types of cartilage.

Answer:

1. Hyaline cartilage
2. Elastic cartilage
3. Fibrous cartilage

7. What is bone made of?

Answer:

Bone is made of collagen fibers and minerals like calcium and phosphate. It also contains living cells called osteocytes.

8. What is the difference between compact bone and spongy bone?

Answer:

- Compact bone is the hard outer layer.
- Spongy bone is soft and porous and contains bone marrow.

9. How many bones are present in the axial skeleton?

Answer:

There are 80 bones in the axial skeleton.

10. What are the major components of the appendicular skeleton?

Answer:

It includes pectoral girdle, pelvic girdle, arms, hands, legs, and feet — totaling 126 bones.

11. What is a joint?

Answer:

A joint is a location where two or more bones meet. It allows movement and provides mechanical support.

12. Name the three types of joints based on movement.

Answer:

1. Immoveable (fixed) joints
2. Slightly moveable joints
3. Moveable joints

13. What is the function of hinge joints? Give two examples.

Answer:

Hinge joints allow movement in one plane only.

Examples: Knee joint and elbow joint.

14. Which joints allow movement in all directions?

Answer:

Ball-and-socket joints allow movement in all directions.

Examples: Hip joint and shoulder joint.

15. Differentiate between tendons and ligaments.

Answer:

- Tendons connect muscles to bones.
- Ligaments connect bones to other bones and prevent dislocation.

16. What is meant by origin and insertion of a muscle?

Answer:

- The fixed end of a muscle is called origin.
- The movable end of a muscle is called insertion.

17. What is an antagonistic pair of muscles?

Answer:

A pair of muscles that perform opposite actions (one contracts, the other relaxes) is called antagonistic pair.

18. Give an example of antagonistic muscles.

Answer:

- Biceps and triceps are an example.
- Biceps cause flexion.
- Triceps cause extension at elbow joint.

19. What is the function of tendons?

Answer:

Tendons attach muscles to bones and help in movement when muscles contract.

20. Differentiate between flexor and extensor muscles.

Answer:

- Flexor muscles bend a joint (e.g. biceps).
- Extensor muscles straighten a joint (e.g. triceps).

21. What is osteoporosis?

Answer:

Osteoporosis is a bone disease in which bone

density decreases, making bones weak and brittle.

22. Mention two causes of osteoporosis.

Answer:

1. Calcium and phosphorus deficiency
2. Lack of estrogen hormone in old age

23. What is arthritis?

Answer:

Arthritis is inflammation in joints causing pain, swelling, and stiffness.

24. What is gout?

Answer:

Gout is a form of arthritis caused by accumulation of uric acid crystals in joints, especially in the toes.

25. What is the main difference between osteoarthritis and rheumatoid arthritis?

Answer:

- Osteoarthritis is due to cartilage degeneration.
- Rheumatoid arthritis is due to inflammation of

joint membranes.

Important Long Questions:

🌟 **Q1: Define the skeletal system. Explain the major functions of the human skeletal system.**

❖ **Definition of Skeletal System:**

The skeletal system is the framework of hard, articulated structures (bones and cartilages) that provides support, protection, and movement to the human body. It also acts as an attachment site for muscles.

🔹 **Endoskeleton in Humans:**

The human skeleton is located inside the body, so it is called an endoskeleton. Unlike external skeletons in insects, the endoskeleton supports the internal organs and works with muscles to produce movement.

🔹 **Major Functions of Human Skeletal System:**

1. Support:

- The skeleton provides a rigid structure that supports the body shape and holds organs in place.
- The vertebral column supports the entire body's weight and maintains posture.

2. Protection:

- Skull protects the brain.
- Vertebral column protects the spinal cord.
- Ribs protect the heart, lungs, and other vital organs.

3. Movement:

- Skeleton works with muscles to produce movement.
- Joints allow flexibility while bones act as levers.
- Tendons attach muscles to bones; when muscles contract, bones move.

4. Attachment for Muscles:

- Bones provide attachment sites for skeletal muscles via tendons.

- This connection is necessary for movement and body coordination.

5. Works with Muscular System:

- Skeletal and muscular systems work together to allow movement.
- Muscles contract, pull on bones, and create motion through joints.

✅ **Examples:**

Skull ⇒ protects brain

Ribs ⇒ protect chest organs

Vertebral column ⇒ supports posture and protects spinal cord

✏️ **Summary:**

The skeletal system is vital for maintaining body structure, protecting internal organs, and enabling movement in coordination with muscles.

🌟 **Q2: Describe the structure and types of cartilage.**

❖ **Definition of Cartilage:**

Cartilage is a dense, firm but flexible connective tissue found in many parts of the body. It is less hard than bone and plays a role in cushioning joints and supporting soft structures.

- **Structure and Characteristics of Cartilage:**
  - Cartilage contains living cells called chondrocytes.
  - Each chondrocyte lies in a fluid-filled space called a lacuna.
  - The matrix is made of collagen fibers.
  - No blood vessels are present in cartilage (it is avascular).
  - It is bluish-white in appearance and semi-transparent.

➤ **Types of Cartilage:**

1. Hyaline Cartilage:

Structure: Strong yet flexible. Contains fine collagen fibers.

Location: Ends of long bones, nose, larynx, trachea,

and bronchial tubes.

Function: Reduces friction at joints, supports respiratory passages.

2. Elastic Cartilage:

Structure: Similar to hyaline but has elastic fibers in addition to collagen.

Location: Epiglottis, external ear (pinna).

Function: Provides strength with elasticity; can bend and return to shape.

3. Fibrous Cartilage:

Structure: Very tough, contains thick collagen fibers in a dense network.

Location: Intervertebral discs, knee meniscus.

Function: Provides shock absorption and resists compression.

🌟 Q5. Explain the Major Components of Human Skeleton

❖ **Introduction:**

The human skeleton is a strong, internal framework

made up of 206 bones in an adult body. It provides support, shape, movement, and protection to internal organs. It is divided into two main parts:

1. Axial Skeleton
2. Appendicular Skeleton

1. Axial Skeleton (80 bones):

The axial skeleton forms the central axis of the body. It supports and protects the organs of the head, neck, and trunk.

(a) Skull (22 bones):

Protects the brain.

Composed of:

- 8 cranial bones – surround the brain
- 14 facial bones – form the structure of the face

(b) Middle Ear Ossicles (6 bones):

- Smallest bones in the body
- 3 bones in each ear: malleus, incus, stapes
- Help in hearing by transmitting sound vibration

(c) Hyoid Bone (1 bone):

- Located in the neck
- Supports the tongue and muscles involved in swallowing and speech

(d) Vertebral Column (26 bones):

- Also called the spine or backbone
- Composed of 26 vertebrae arranged in a vertical column
- Protects the spinal cord and supports body weight

(e) Sternum and Ribs (25 bones):

Sternum (1 bone): Also called breastbone

Ribs (24 bones or 12 pairs):

- Protect organs in the chest cavity like heart and lungs
- Attached to thoracic vertebrae and sternum

🟢 2. Appendicular Skeleton (126 bones):

The appendicular skeleton includes the limbs and the girdles that attach them to the axial skeleton. It

helps in movement and locomotion.

(a) Pectoral (Shoulder) Girdle (4 bones):

- Connects arms to the body
- 2 clavicles (collar bones)
- 2 scapulae (shoulder blades)

(b) Arms (6 bones):

3 bones in each arm:

- Humerus (upper arm)
- Radius and Ulna (forearm)

(c) Hands (54 bones):

27 bones in each hand:

- 8 carpals (wrist bones)
- 5 metacarpals (palm bones)
- 14 phalanges (finger bones)

(d) Pelvic Girdle (2 bones):

- Also called hip bones
- Supports the weight of the upper body
- Connects the legs to the axial skeleton

(e) Legs (6 bones):

3 bones in each leg:

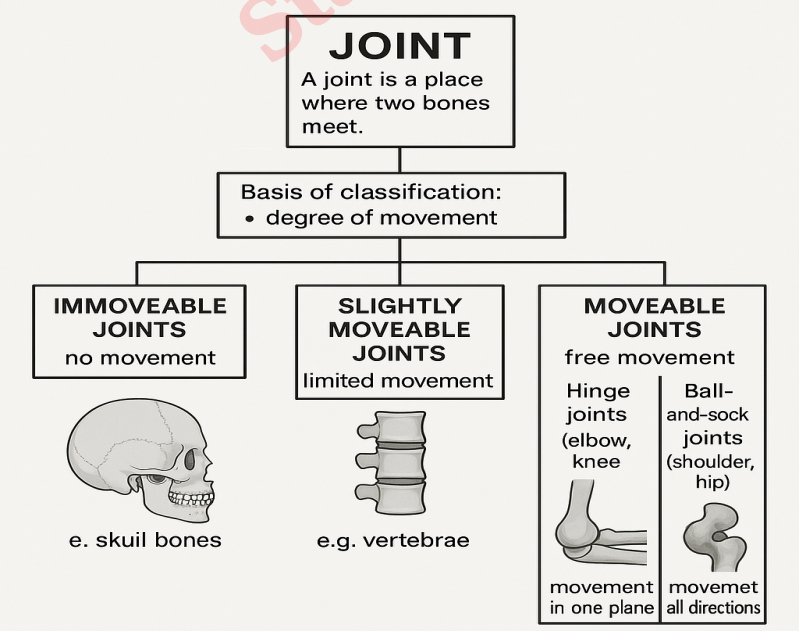
- Femur (thigh bone – longest bone in the body)
- Tibia and Fibula (lower leg bones)

(f) Feet (54 bones):

27 bones in each foot:

- 7 tarsals (ankle bones)
- 5 metatarsals (middle of foot)
- 14 phalanges (toe bones)

🌟 **Q6: Define Joint. Describe Different Types of Joints with Examples.**



❖ Definition of Joint:

A joint is the location where two or more bones meet or make contact.

🔸 Joints allow movement and provide mechanical support to the body.

🔹 Classification of Joints:

Joints are classified on the basis of degree of movement they allow. There are three main types:

🟠 1. Immoveable Joints (Fixed Joints):

- These joints do not allow any movement.
- The bones are tightly joined together.
- Also called fibrous joints.

✅ **Example**: Joints between skull bones

🟡 2. Slightly Moveable Joints:

- These joints allow limited or slight movement.
- Bones are held together by cartilage.
- Also called cartilaginous joints.

✅ **Example**: Joints between vertebrae of the

backbone

🟡 3. Freely Moveable Joints (Synovial Joints):

- These joints allow free and wide range of movements.
- They are filled with synovial fluid to reduce friction.

There are two main types of moveable joints:

(a) Hinge Joints:

Allow movement in one plane only (like a door hinge).

✅ **Examples**: Elbow joint, knee joint

(b) Ball-and-Socket Joints:

- Allow movement in all directions.
- A ball-like end of one bone fits into a cup-like socket of another.

✅ **Examples**: Shoulder joint, hip joint

🌟 Q7: Explain the Role of Skeletal Muscles in Movement.

❖ **Introduction:**

The skeletal muscles are responsible for the movement of bones at joints. They are voluntary muscles and work in coordination with the skeletal system to produce movement.

Attachment of Muscles to Bones

- Skeletal muscles are attached to bones by strong connective tissues called tendons.
- Tendons transmit force from the muscle to the bone during contraction.

Origin and Insertion of Muscles

- One end of the skeletal muscle is fixed to a non-moveable bone (called the origin).
- The other end is attached to a moveable bone (called the insertion).

Muscle Contraction and Movement

- When a muscle receives a nerve impulse, it contracts (becomes shorter and thicker).
- This contraction pulls the moveable bone at the insertion point and causes movement.

Role of Nerve Impulse

- The motor neuron sends a signal to the muscle fiber.
- Upon stimulation, calcium ions are released, triggering contraction.

Flexor and Extensor Muscles

Flexor muscles: Contract to bend a joint (flexion).

Extensor muscles: Contract to straighten a joint (extension).

- **Example**: Biceps and Triceps (Antagonistic Pair)
  - Biceps (front of upper arm) is a flexor.
  - When biceps contracts, it pulls the forearm upward (flexion at elbow).
  - At this time, triceps relaxes.
  - Triceps (back of arm) is an extensor.
  - When triceps contracts, it pulls the forearm downward (extension).
  - Biceps then relaxes.

🌟 Q8: Describe the Antagonistic Action of Skeletal Muscles.

❖ Definition of Antagonism

Antagonistic muscles are those that work in pairs, where one muscle contracts while the other relaxes, performing opposite actions on the same joint.

1. Mechanism of Antagonistic Action

- One muscle contracts to move a bone, while its antagonist relaxes.
- The contracting muscle is either a flexor (bends the joint) or an extensor (straightens the joint).

2. Flexion and Extension

- **Flexion**: Bending of a joint (angle decreases).
- Performed by flexor muscle.
- **Extension**: Straightening of a joint (angle increases).
- Performed by extensor muscle.

🔹 **Example**: Biceps and Triceps

- **Biceps (Flexor):** Contracts ⇒ elbow bends ⇒ forearm moves up
- **Triceps (Extensor):** Contracts ⇒ elbow straightens ⇒ forearm moves down
- While one contracts, the other relaxes – this is antagonistic action.

Note:

This chapter is designed to provide a solid foundation of knowledge, with the goal of deepening understanding and encouraging further exploration of the subject. The content has been carefully selected to support effective learning and inspire students to engage with the topic more deeply.

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Purpose: To contribute to education by offering insightful, valuable content that enhances learning

and understanding.

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