

**NCERT Exemplar Solutions of Class 11 Biology – Chapter 20: Locomotion and Movement**

**MULTIPLE CHOICE QUESTIONS**

**1. Match the following and mark the correct option**

**Column I**

**Column II**

- |                       |                       |
|-----------------------|-----------------------|
| A. Fast muscle fibres | i. Myoglobin          |
| B. Slow muscle fibres | ii. Lactic acid       |
| C. Actin filament     | iii. Contractile unit |
| D. Sarcomere          | iv. I-band            |

**Options:**

- a. A-i, B-ii, C-iv, D-iii
- b. A-ii, B-i, C-iii, D-iv
- c. A-ii, B-i, C-iv, D-iii ✓
- d. A-iii, B-ii, C-iv, D-i

**Enhanced Solution:** The correct answer is **(c) A-ii, B-i, C-iv, D-iii**

**Explanation:**

- **Fast muscle fibres (A) → Lactic acid (ii):** Fast-twitch muscle fibres rely on anaerobic metabolism, producing lactic acid as a byproduct during intense activity
- **Slow muscle fibres (B) → Myoglobin (i):** Slow-twitch fibres are rich in myoglobin, which stores oxygen for sustained aerobic activity
- **Actin filament (C) → I-band (iv):** I-bands are light bands composed primarily of thin actin filaments
- **Sarcomere (D) → Contractile unit (iii):** The sarcomere is the basic functional and contractile unit of skeletal muscle

**2. Ribs are attached to**

- a. Scapula
- b. Sternum ✓
- c. Clavicle
- d. Ilium

**Enhanced Solution:** The correct answer is **(b) Sternum**

**Explanation:** Ribs are attached to the sternum (breastbone) through costal cartilages. The first seven pairs of ribs (true ribs) are directly attached to the sternum, while ribs 8-10 (false ribs) are indirectly attached through the cartilage of the 7th rib. Ribs 11-12 are floating ribs with no sternal attachment.

**3. What is the type of movable joint present between the atlas and axis?**

- a. Pivot ✓
- b. Saddle

- c. Hinge
- d. Gliding

**Enhanced Solution:** The correct answer is **(a) Pivot**

**Explanation:** The atlantoaxial joint between the atlas (C1) and axis (C2) vertebrae is a pivot joint. The odontoid process (dens) of the axis acts as a pivot around which the atlas rotates, allowing for rotational movement of the head (like shaking your head "no").

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**4. ATPase of the muscle is located in**

- a. Actinin
- b. Troponin
- c. Myosin ✓
- d. Actin

**Enhanced Solution:** The correct answer is **(c) Myosin**

**Explanation:** Myosin ATPase is located in the globular head of the myosin molecule. This enzyme hydrolyzes ATP to ADP + Pi + energy, which is essential for the power stroke during muscle contraction. The ATPase activity is activated by Ca<sup>2+</sup> ions and is crucial for cross-bridge cycling.

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**5. Intervertebral disc is found in the vertebral column of**

- a. Birds
- b. Reptiles
- c. Mammals ✓
- d. Amphibians

**Enhanced Solution:** The correct answer is **(c) Mammals**

**Explanation:** Intervertebral discs are fibrocartilaginous structures found between vertebrae in mammals. They act as shock absorbers and allow flexibility in the vertebral column. Other vertebrate groups have different mechanisms for vertebral articulation.

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**6. Which one of the following is showing the correct sequential order of vertebrae in the vertebral column of human beings?**

- a. Cervical — lumbar — thoracic — sacral — coccygeal
- b. Cervical — thoracic — sacral — lumbar — coccygeal
- c. Cervical — sacral — thoracic — lumbar — coccygeal
- d. Cervical — thoracic — lumbar — sacral — coccygeal ✓

**Enhanced Solution:** The correct answer is **(d) Cervical — thoracic — lumbar — sacral — coccygeal**

**Explanation:** The human vertebral column consists of 33 vertebrae arranged in five regions from top to bottom:

- **Cervical (7):** Neck region, C1-C7

- **Thoracic (12):** Chest region, T1-T12 (articulate with ribs)
- **Lumbar (5):** Lower back, L1-L5 (largest and strongest)
- **Sacral (5):** Fused to form sacrum
- **Coccygeal (4):** Fused to form coccyx (tailbone)

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**7. Which one of the following pairs is incorrect?**

- a. Hinge joint: between Humerus and Pectoral girdle ✓
- b. Pivot joint: between the atlas and axis
- c. Gliding joint: between the carpals
- d. Saddle joint: between carpals and metacarpals of thumb

**Enhanced Solution:** The correct answer is **(a) Hinge joint: between Humerus and Pectoral girdle**

**Explanation:** This pairing is incorrect because the joint between the humerus and pectoral girdle (specifically the glenoid cavity of the scapula) is a **ball and socket joint**, not a hinge joint. This joint allows movement in multiple planes including flexion, extension, abduction, adduction, and rotation.

The other pairs are correct:

- Pivot joint between atlas and axis allows rotation
- Gliding joints between carpals allow sliding movements
- Saddle joint at the thumb allows opposition movement

**8. Knee joint and elbow joint are examples of**

- a. Saddle joint
- b. Ball and socket joint
- c. Pivot joint
- d. Hinge joint ✓

**Enhanced Solution:** The correct answer is **(d) Hinge joint**

**Explanation:** Both knee and elbow joints are hinge joints that allow movement in only one plane:

- **Elbow joint:** Between humerus and radius/ulna, allows flexion and extension of the forearm
- **Knee joint:** Between femur and tibia/fibula, allows flexion and extension of the leg

Hinge joints are characterized by their door-like movement with restricted motion to one axis.

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**9. Macrophages and leucocytes exhibit**

- a. Ciliary movement
- b. Flagellar movement
- c. Amoeboid movement ✓

- d. Gliding movement

**Enhanced Solution:** The correct answer is **(c) Amoeboid movement**

**Explanation:** Macrophages and leucocytes (white blood cells) exhibit amoeboid movement, which involves:

- Formation of pseudopodia (false feet)
- Cytoplasmic streaming
- Movement by extending and retracting cell projections
- This type of movement allows them to migrate through tissues, engulf pathogens, and perform phagocytosis

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**10. Which one of the following is not a disorder of bone?**

- a. Arthritis
- b. Osteoporosis
- c. Rickets
- d. Atherosclerosis ✓

**Enhanced Solution:** The correct answer is **(d) Atherosclerosis**

**Explanation:** Atherosclerosis is a cardiovascular disorder involving the buildup of plaque in arteries, not a bone disorder.

The bone disorders listed are:

- **Arthritis:** Inflammation of joints
- **Osteoporosis:** Decreased bone density and increased fracture risk
- **Rickets:** Defective mineralization of bones due to vitamin D deficiency

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**11. Which one of the following statement is incorrect?**

- a. Heart muscles are striated and involuntary
- b. The muscles of the hands and legs are striated and voluntary
- c. The muscles located in the inner walls of the alimentary canal are striated and involuntary ✓
- d. Muscles located in the reproductive tracts are unstriated and involuntary

**Enhanced Solution:** The correct answer is **(c) The muscles located in the inner walls of the alimentary canal are striated and involuntary**

**Explanation:** This statement is incorrect because the muscles in the alimentary canal are **smooth muscles**, which are **unstriated and involuntary**, not striated.

Correct classifications:

- **Cardiac muscle:** Striated and involuntary (heart)
- **Skeletal muscle:** Striated and voluntary (hands, legs)
- **Smooth muscle:** Unstriated and involuntary (alimentary canal, reproductive tract)

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**12. Which one of the following statements is true?**

- a. Head of humerus bone articulates with the acetabulum of the pectoral girdle
- b. Head of humerus bone articulates with the glenoid cavity of the pectoral girdle ✓
- c. Head of humerus bone articulates with the acetabulum of the pelvic girdle
- d. Head of humerus bone articulates with a glenoid cavity of the pelvic girdle

**Enhanced Solution:** The correct answer is **(b) Head of humerus bone articulates with the glenoid cavity of the pectoral girdle**

**Explanation:** The head of the humerus forms a ball and socket joint with the glenoid cavity of the scapula (part of the pectoral girdle). This creates the shoulder joint, which allows for a wide range of movement.

Note: The acetabulum is part of the pelvic girdle and articulates with the femur, not the humerus.

### 13. Muscles with characteristic striations and involuntary are

- a. Muscles in the wall of alimentary canal
- b. Muscles of the heart ✓
- c. Muscles assisting locomotion
- d. Muscles of the eyelids

**Enhanced Solution:** The correct answer is **(b) Muscles of the heart**

**Explanation:** Cardiac muscles are the only muscles that are both striated and involuntary. They have:

- **Striations:** Due to organized arrangement of actin and myosin filaments
- **Involuntary control:** Controlled by the autonomic nervous system
- **Intercalated discs:** Special junctions between cardiac muscle cells
- **Rhythmic contractions:** Self-excitatory property

### 14. Match the followings and mark the correct option

#### Column I

A. Sternum

B. Glenoid Cavity

C. Freely movable joint

D. Cartilaginous joints

#### Column II

i. Synovial fluid

ii. Vertebrae

iii. Pectoral girdle

iv. Flat bones

#### Options:

- a. A-ii, B-i, C-iii, D-iv
- b. A-iv, B-iii, C-i, D-ii ✓
- c. A-ii, B-i, C-iv, D-iii
- d. A-iv, B-i, C-ii, D-iv

**Enhanced Solution:** The correct answer is **(b) A-iv, B-iii, C-i, D-ii**

**Explanation:**

- **Sternum (A) → Flat bones (iv):** The sternum is a flat bone that protects internal organs
- **Glenoid Cavity (B) → Pectoral girdle (iii):** The glenoid cavity is part of the scapula in the pectoral girdle
- **Freely movable joint (C) → Synovial fluid (i):** Synovial joints are freely movable and contain synovial fluid
- **Cartilaginous joints (D) → Vertebrae (ii):** Vertebrae are connected by cartilaginous joints (intervertebral discs)

