Locomotion and Movement

Assertion Reason Questions

Given below are two statements labelled as Assertion (A) and Reason (R). Select the most appropriate answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false. true.
(d) A is false but R is

1. Assertion (A): Skeletal muscles are inextricably linked to the skeletal components of the body. These have a striped look under the microscope and are hence referred to as striated muscles, they are also referred to as voluntary muscles.
Reason (R): Their functions are controlled by the nervous system.

Ans. (a) Both A and R are true and R is the correct explanation of A.
Explanation: The skeletal muscles are able to work be under voluntary control due to the involvement of the nervous system.

2. Assertion (A): There is a temporary stiffening of muscles after death.
Reason (R): There is a depletion of ATP that occurs with the stopping of cellular respiration.

Ans. (a) Both A and R are true and R is the correct explanation of A.
Explanation: This phenomenon is called "rigour mortis". There is a depletion of ATP that occurs with the stopping of cellular respiration that causes a stiffening of muscles.

3. Assertion (A): The Ca2+ ions play a crucial role in muscle contraction.
Reason (R): The Ca2+ ions bind troponin causing the displacement of tropomyosin, allowing the myosin head to bind actin.

Ans. (a) Both A and R are true and R is the correct explanation of A.
Explanation: Muscle contraction is determined by the calcium ion level. The sliding of filaments is initiated by an increase in calcium ion levels in the sarcoplasm. The sarcoplasmic reticulum stores calcium ions. Calcium ions are released from the sarcoplasmic reticulum into the sarcoplasm around the thick and thin filaments when an

action potential arrives. The calcium ions then bind to troponin, causing the troponin molecule's shape to change. Because troponin is bound to tropomyosin, the position of tropomyosin shifts. As a result, the tropomyosin-covered myosin-binding sites on actin are now exposed. Myosin head can now bind actin, causing the filaments to slide and contract the muscle.

4. Staying active is vital for overall health, and it is also the best way to build skeletal muscle. People are best able to improve their muscle mass by performing the right exercises and eating particular foods.

Assertion (A): Muscular tissues have several unique properties. Examples are contraction, extension, excitation, elasticity, etc.
Reason (R): Muscles originate from the ectodermal germinal layer.

Ans. (c) A is true but R is false.
Explanation: Muscles originate from the mesodermal layer. The reason provided is incorrect.

5. Assertion (A): The upper end of radius and ulna articulate with each other by the pivot joint.
Reason (R): The primary movement at the pivot joint is rotational.

Ans. (a) Both A and R are true and R is the correct explanation of A.
Explanation: In the pivot joint, it allows only rotary movement of one bone on another which remains stationary. A round end of one bone fits into a shallow pit of another bone. The joint between radius and ulna is an example of a pivot joint.

6. Assertion (A): Synovial joints are immov- able.
Reason (R): Presence of synovial fluid makes them freely movable.

Ans. (d) A is false but R is true.
Explanation: Synovial joints are freely movable because it contains synovial fluid which acts as a lubricant and enables their free movement by avoiding the friction. The examples are hinge joint, ball and socket joint.

7. Assertion (A): Acetabulum bone is found in the pelvic girdle.
Reason (R): Acetabulum is made up of one clavicle and one scapula.

Ans. (c) A is true but R is false.
Explanation: Acetabulum is found in the pelvic girdle and it is formed by the fusion of three bones- ilium, ischium and pubis which allow us to move freely and walk.

8. Assertion (A): Last two pairs of ribs are floating ribs.
Reason (R): Their sternal parts are not attached anywhere.

Ans. (a) Both A and R are true and R is the correct explanation of A.
Explanation: The last two pairs of ribs are floating because their anterior ends are not attached to either the sternum or the cartilage of another rib.

9. Assertion (A): Inflammation of a skeletal joint may immobilise the movement of joints.
Reason (B): Uric acid crystals in the joint cavity and ossification of articular cartilage leads to this condition.

Ans. (a) Both A and R are true and R is the correct explanation of A