



Locomotion and Movement Important Questions With Answers

NEET Biology 2023

1. Sliding filament theory can be best explained as _____ .
- a) Actin and Myosin filaments shorten and slide pass each other.
b) Actin and Myosin filaments do not shorten but rather slide pass each other.
c) When myofilaments slide pass each other, Myosin filaments shorten while Actin filaments do not shorten.
d) When myotilaments slide pass each other Actin filaments shorten while Myosin filament do not shorten.

Solution : -

Sliding filament theory can be best explained as actin and myosin filaments do not shorten but rather slice pass each other. Sliding filament theory states that muscle contraction takes place by the sliding of thin filaments over the thick filaments. During this process, the sarcomeres shortens, without changing the length of thin and thick filament.

2. Lower jaw is made up of
a) mandible b) Vomer c) Maxilla d) palatine
3. Which statement is correct for muscle contraction?
a) Length of two Z-lines increase b) Length of H-line decreases **c) Length of A-band remains constant**
d) Length of I-band increases

Solution : -

When Ca^+ ions combine with troponin contraction of muscle initiates. During contraction the Z-lines come closer together and the sarcomerre becomes shor⁺er. The length of A- band remains constant. I-bands shortens and H-band narrows.

4. Upon stimulation of skeletal muscles, calcium is immediately made available for binding to troponin from
a) blood b) lymph **c) sarcoplasmic reticulum** d) bone

5. Identify the incorrectly matched pair.

a)

Pair of skeletal parts	Category
Sternum and ribs	Axial skeleton

b)

Pair of skeletal parts	Category
Clavicle and glenoid cavity	Pelvic girdle

c)

Pair of skeletal parts	Category
Humerus and ulna	Appendicular skeleton

d)

Pair of skeletal parts	Category
Malleus and stapes	Ear ossicles

Solution : -

Clavicle and glenoid cavity are skeletal parts of pectoral girdle.

6. A cricket player is fast chasing a ball in the field. Which one of the following groups of bones are direct contributing in this movement?
a) Femur, malleus, tibia, metatarsals **b) Tarsals, femur, metatarsals, tibia**
c) Pelvis, ulna, patella, tarsals d) sternum, femur, tibia, fibula

7. Which of the following structures contract and relax rhythmically to produce movement?

- a) Flagella b) Cilia **c) Muscles** d) Pseudopodia

8. The joint of radio-ulna with the upper arm is

- a) hinge joint** b) socket joint c) pivot joint d) none of these

Solution : -

The joint of radio-ulna with the upper arm is a hinge joint. This joint allows the movement only in a single plane.

9. Which of the following statements is incorrect?

- a) Smooth muscles are found in urinary bladder alimentary canal and genital tract

b) A striated muscle is a syncytium i.e., a multinucleate structure

- c) The cytoplasm of striated muscle is called endoplasm

d)

The plasma membrane and ER of striated muscles are called sarcolemma and sarcoplasmic reticulum respectively

Solution : -

The cytoplasm of striated muscle is called sarcoplasm.

10. Which of the following correctly characterises a "fast oxidative" type of skeletal muscle fibre?

- a) Few mitochondria and high glycogen content b) Low myosin ATPase rate and few surrounding capillaries

- c) Low glycolytic enzyme activity and intermediate contraction velocity

d) High myoglobin content and intermediate glycolytic enzyme activity

Solution : -

Fast-oxidative-glycolytic fibres are an intermediate type that are designed to contract rapidly but to resist fatigue. They utilise both aerobic and anaerobic energy systems; thus, they are red fibers with high myoglobin (which facilitates production of ATP by oxidative phosphorylation), but they also have a moderate ability to generate ATP through glycolytic pathways.

11. **Assertion :** Visceral muscles are smooth in appearance.

Reason: Many muscle cells assemble in a branching pattern to form a visceral muscle.

- a) If both assertion and reason are true and reason is the correct explanation of assertion.

- b) If both assertion and reason are true but reason is not the correct explanation of assertion.

- c) If assertion is true but reason is false.** d) If both assertion and reason are false.

Solution : -

Visceral muscles are located in the inner walls of hollow visceral organs of the body like the alimentary canal, reproductive tract, etc. They do not exhibit any striation and are smooth in appearance. Hence, they are called smooth muscles (nonstriated muscle). Many cardiac muscle cells assemble in a branching pattern to form a cardiac muscle.

12. Which of the following contractile proteins contributes 55% of muscle protein by weight?

- a) Tropomyosin** b) Troponin **c) Myosin** d) Actin

Solution : -

Myosin constitutes 55% of muscle protein by weight. The thick filaments consist mainly of myosin protein. A myosin molecule consists of six polypeptide chains, two identical heavy chains and four light chains.

13. A human body contains how many muscles?

- a) 640 **b) 639** c) 600 d) 700

14. Which of the following movements in mammalian skeleton represent the leverage of the third order (force applied at a point between fulcrum and the point of resistance)?

- a) **Biceps muscle flexing arm at elbow.** b) Triceps muscle extending arm at elbow.
- c) Gastrocnemius muscle raising weight of body on toes.
- d) Movement of the head of femur in the acetabulum of pelvic girdle.

15. Read the given statements and select the correct option.

Statement 1: Inflammation of a skeletal joint may immobilise the movements of the joint.

Statement 2: This may be caused due to uric acid

crystals in the joint cavity and ossification of articular cartilage

- a) **Both statements 1 and 2 are correct** b) Statement 1 is correct but statement 2 is incorrect
- c) Statement 1 is incorrect but statement 2 is correct d) Both statements 1 and 2 are incorrect

Solution : -

Excess of uric acid and its salts (urates) accumulate in the joint resulting in gouty arthritis. Inflammation of joint may immobilise its movements.

16. Which of the following components is a part of the pectoral girdle?

- a) Sternum b) Acetabulum c) **Glenoid cavity** d) Ilium

17. Number of floating ribs are

- a) **2 pairs** b) 12 pairs c) 7 pairs d) 3 pairs

18. The protein whose removal enables myosin to bind actin in smooth muscle is

- a) **tropomyosin** b) caldesmon c) **myosin light chain kinase** d) calmodulin

19. In human body, which one of the following is anatomically correct?

- a) Collar bones - 3 pairs b) Salivary glands - 1 pair c) Cranial nerves - 10 pairs d) **Floating ribs - 2 pairs**

Solution : -

Floating ribs are 2-pairs (11th. And 12th Pair) which are not attached to sternum

20. Which one of the following statements is true?

- a) Head of humerus bone articulates with acetabulum of pectoral girdle.
- b) **Head of humerus bone articulates with glenoid cavity of pectoral girdle.**
- c) Head of humerus bone articulates with a cavity called acetabulum of pelvic girdle.
- d) Head of humerus bone articulates with a glenoid cavity of pelvic girdle.

Solution : -

Each pectoral girdle consists of two bones: 1 clavicle and 1 scapula. At the point where the superior and lateral borders of the scapula meet, there is a lateral angle which presents a shallow articular surface termed as glenoid cavity into which the head of the humerus is articulated.

21. One of the following is called hip bone

- a) **Innominate** b) Scapula c) Manubrium d) Coracoid

22. Elbow joint is an example of_____

- a) **hinge joint** b) gliding joint c) ball and socket joint d) pivot joint

Solution : -

Elbow joint is an example of hinge joint. In hinge joint concave surface of one bone make a joint with convex surface of other bone. E. g. Knee, elbow and interphalangeal joints. In pivot joint, one bone is fix and other is articulated with that. Joint between atlas and axis cervical vertebra.

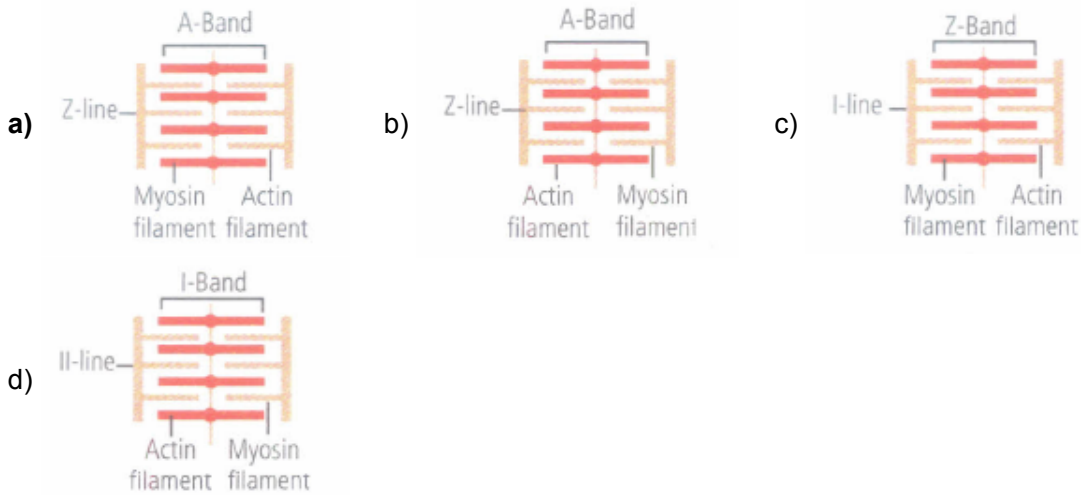
23. Which one of the following options is incorrect?

- a) **Hinge joint - between humerus and pectoral girdle**
- b) Pivot joint - between atlas, axis and occipital condyle c) Gliding joint - between the carpals
- d) Saddle joint - between carpal and metacarpals of thumb

Solution :-

Joint between humerus and pectoral girdle is an example of ball and socket joint.

24. Which of the following sarcomeres is labelled correctly?



25. Match column I with column II and select the correct option from the codes given below.

Column I	Column II
A. Structural and functional unit of a myofibril	(i) H-zone
B. Protein of thin filament	(ii) Myosin
C. Protein of thick filament	(iii) Sarcomere
D. The central part of thick filament not overlapped by thin filament.	(iv) Actin

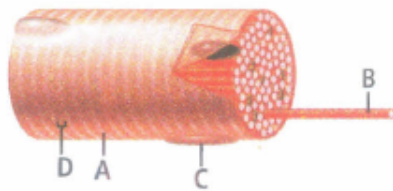
a) A-(i), B-(ii), C-(iii), D-(iv) b) A-(i), B-(iii), C-(ii), D-(iv) c) A-(i), B-(iv), C-(iii), D-(ii)

d) A-(iii), B-(iv), C-(ii), D-(i)

26. A bundle of muscle fibre is called

a) Fascia b) Glenoid cavity c) Myocyte **d) Fasciculus**

27. The given figure represents the histology of a striated muscle. Identify the parts labelled as A, B, C and D, and select the correct option.



a)

A	B	C	D
Sarcoplasm	Sarcolemma	Dark band	Light band

b)

A	B	C	D
Dark band	Myofibril	Nucleus	Light band

c)

A	B	C	D
Light band	Myofibril	Nucleus	Dark band

d)

A	B	C	D
Nucleus	Dark band	Light band	Myofibril

28. Which of the following statements are correct regarding muscle proteins?

- (i) Actin is a thin filament and is made up of two F-actins.
- (ii) The complex protein, tropomyosin is distributed at regular intervals on the troponin.
- (iii) Myosin is a thick filament which is also a polymerised protein.
- (iv) The globular head of meromyosin consists of light meromyosin (LMM).

a) (i), (ii) and (iii) b) (i), (ii) and (iv) **c) (i) and (iii)** d) (ii) and (iv)

Solution : -

Each actin (thin) filament is made of two T (filamentous) actins helically wound to each other. Each F actin is a polymer of monomeric 'G' (globular) actins. Myosin (thick) filament is a polymerised protein. Many monomeric proteins called meromyosins constitute one thick filament. Tropomyosin is a fibrous molecule that attaches to F actin in the groove between its filament. The globular head of meromyosin consists of heavy meromyosin.

29. Dark bands are

- a) **A-band** b) B-band c) I-band d) Z-line

Solution : -

A myofibril has dark and light bands. The dark bands are called A bands (Anisotropic bands). Light bands are called I bands (isotropic bands).

30. In an adult human, how many bones are present as ear ossicles?

- a) 4 b) 6 c) **3** d) None of these

Solution : -

Six ear ossicles are present, three in each ear. They are malleus, incus and stapes.

31. Knee joint and elbow joints are examples of

- a) saddle joint b) ball and socket joint c) pivot joint d) **hinge joint.**

32. Name the ion responsible for unmasking of active sites for myosin for cross-bridge activity during muscle contraction

- a) **Calcium** b) Magnesium c) Sodium d) Potassium

Solution : -

Increase in Ca^{++} level leads to the binding of calcium with a subunit of troponin on actin filaments and thereby remove the masking of active sites for myosin

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

- a) **Pivot** b) Saddle c) Hinge d) Gliding

Solution : -

Pivot joint allows only a rotatory movement of one bone on the other, which remains stationary. A rounded end of one bone fits into a shallow pit of another bone. e.g., joint between atlas and axis vertebrae which enables the head to turn from side to side.

34. Which of the following is a bone of skull?

- a) Atlas b) Patella c) **Ethmoid** d) Phalanges

Solution : -

Ethmoid is a bone of skull Atlas is a bone of vertebral column. Patella is a bone of hind limb and phalanges are the bones of limbs.

35. Acromion process is characteristically found in _____ the of mammals.

- a) **pectoral girdle** b) sperm c) pelvic girdle d) skull

Solution : -

Each pectoral girdle consists of two bones - 1 clavicle and 1 scapula. The scapula consists of a sharp ridge, the spine and a triangular body. The end of the spine projects as a flattened and expanded process called acromion. This process articulates with the clavicle.

36. Lack of relaxation between successive stimuli in sustained muscle contraction is known as _____

- a) Spasm b) Fatigue c) **Tetanus** d) Tonus

Solution : -

Sustained contraction with no relaxation phase is known as muscle tetanus.

37. In which category of muscle fibres, contraction can be regulated by acetylcholine neurotransmitter?

a) Skeletal muscle fibre b) Cardiac muscle fibre c) Smooth muscle fibres **d) All of these**

38. Smallest bone in human system is

a) stapes b) patella c) malleus d) incus

Solution : -

Stapes, one of the ear ossicles, is the smallest bone in human body.

39. Which of the following is not a function of the skeletal system?

a) Storage of minerals **b) Production of body heat** c) Locomotion d) Production of erythrocytes

Solution : -

Production of body heat is not a function of the skeletal system. It is the function of muscles. When muscle contracts, heat is produced which keeps the body warm during the winters.

40. How many bones form the skeleton of the face?

a) 22 b) 8 c) 10 **d) 14**

41. The sheath covering the bundle of muscle fibres is

a) Epimysium b) Endomysium **c) Perimysium** d) Mesoderm

42. **Assertion:** The portion of the myofibril between two successive Z-lines is considered as the functional unit of contraction called sarcomere.

Reason: During contraction, I-bands get reduced whereas A-bands retain the length, thereby causing shortening of the sarcomere.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

Solution : -

Each myofibril contains actin and myosin filaments which give it striated appearance due to dark and light bands. The light bands are made of actin and are called I-bands or isotropic band, whereas the dark bands are called 'A' or anisotropic bands and contain myosin. Both the proteins are arranged as rod-like structures, parallel to each other and also to the longitudinal axis of the myofibrils. In the centre of each I-band is an elastic fibre called Z-line which bisects it. The portion of the myofibril between two successive Z-lines is considered as the functional unit of contraction and is called a sarcomere. During contraction, the Z-lines attached to the actins are pulled inwards thereby causing a shortening of the sarcomere, i.e., contraction. Hence, during shortening of the muscle, i.e., contraction, the I-bands get reduced, whereas the A-bands retain the length.

43. The vertebral column is connected to the pelvic girdle in the

a) coccygeal region **b) sacral region** c) lumbar region d) cervical region.

44. Imbalances of certain hormones, deficiencies of calcium and vitamin D are the major causative factors of

a) rheumatoid arthritis b) osteoporosis c) osteoarthritis d) gouty arthritis

Solution : -

Osteoporosis is a disease of bone in which bone mineral density (BMD) is reduced, structure of bone gets disrupted, the amount and variety of non-collagenous proteins in bone is changed and the chances of fracture increases. It is caused by deficiency of calcium, vitamin D, estrogen and androgen and increased level of glucocorticoid, thyroid, parathyroid hormones.

45. Which of the following statements about the molecular arrangement of actin and myosin in myofibrils is/are incorrect?

(i) Each actin (thin filament) is made of 2F(filamentous) actins.

(ii) F-actin is the polymer of G (globular) actin.

(iii) 2F-actins are twisted into a helix.

- (iv) Two strands of tropomyosin (protein) lie in the grooves of F-actin.
 - (v) Troponin molecules (complex proteins) are distributed at regular intervals on the tropomyosin.
 - (vi) Troponin forms the head of the myosin molecule.
 - (vii) The myosin is a polymerised protein.
- a) (i), (iii) and (vii) b) (ii), (iv) and (v) **c) Only (vi)** d) Only (iii)

Solution : -

A complex troponin protein of three globular peptides (Troponin T - Binding to tropomyosin as well as to the other two troponin components; Troponin I - inhibiting the F-actin - myosin interaction, also binding to other components of troponin; Troponin C - calcium binding polypeptide) is distributed at regular intervals on the tropomyosin. In the resting stage of muscle fibre, a sub - unit of troponin masks the active sites for myosin on the actin filaments.

46. Hinge joint is present between
a) Humerus and Radio-ulna b) Femur and Pelvic girdle c) Femur and Acetabulum
 d) Humerus and Pectoral girdle
47. The scapula is a large triangular flat bone situated in the dorsal part of the thorax between
a) second and seventh rib b) third and fourth rib c) fifth and sixth rib d) second and fifth rib
48. Actin binding sites are located on:
 a) troponin b) tropomyosin **c) meromyosin** d) both (b) and (c).

Solution : -

Heavy meromyosin consists of two globular sub-fragment (S-1) and one rod shaped fibrous sub-fragment (S-2). Each S-1 segment contains an ATPase site and a binding site for actin.

49. Long distance, competitive runners are usually small and wiry and run more slowly than sprinters, who run much shorter distances and generally have a large bulk of muscles. Which of the following best explains the differences between the two types of runners?
 a)
 Long distance runners run more slowly because lactic acid quickly builds up in their muscles and causes fatigue. Sprinters do not run for a long enough for lactic acid to build up in their muscles.
 b)
 The large muscles of sprinters increase the oxygen supply to each muscle, preventing lactic acid from forming.
c)
Sprinters do not run for long enough for sufficient lactic acid to build up in their muscles therefore they can have large muscles for more power. By being lighter and running more slowly long distance runners ensure that their muscles receive enough oxygen for aerobic respiration.
 d)
 Sprinters run faster because their large muscles have more blood running through them to stop anaerobic respiration from taking place. Long istance runners run more slowly because they are using the energy from anaerobic respiration, which does not produce as much ATP as aerobic respiration.

50. Match column I with column II and select the correct option from the codes given below.

Column I	Column II
A. Smooth muscle	(i) Myoglobin
B. Tropomyosin	(ii) Thin filament
C. Red muscle	(iii) Sutures
D. Skull	(iv) Involuntary

- a) A-(iv), B-(ii), C-(i), D-(iii)** b) A-(ii), B-(iv), C-(iii), D-(i) c) A-(iii), B-(i), C-(iv), D-(ii)
 d) A-(i), B-(iv), C-(ii), D-(iii)