

CBSE Class 11 Biology
Important Questions
Chapter 20
Locomotion and Movement

1 Marks Questions

1.Name the functional contractile unit of muscle.

Ans. Sarcomere.

2.What is arthritis?

Ans. Inflammation of the joints.

3.What is the total member of bones present in the left pectoral girdle and the left arm respectively in a normal human?

Ans. Left pectoral girdle – 2 ; Left arm – 30.

4.Name the tissue which connects muscles to the bone?

Ans. Tendon.

5.What is the function of myoglobin?

Ans. Myoglobin stores oxygen in the muscles.

6.What causes fatigue of muscle fibers?

Ans. Lactic acid.

7.What is a tendon?

Ans. The tough non – elastic connective tissue that joins muscle to a bone.

8.Which type of movable joint makes the hip joint?

Ans. Ball & socket joint.

9.Name the heaviest and longest bone in the human body?

Ans. Femur.

10.How many bones are present in each limb?

Ans. 30 bones.

11.Why do skeletal muscle show striation ?

Ans. Due to distribution pattern of actin and myosin protein.

12.Name last two pair of ribs.

Ans. Floating ribs.

13.Write the name of chemical that causes fatigue in the mussels.

Ans. Actin and myosin.

14.What lubricate the freely movable joints at the shoulder?

Ans. Synovial fluid

15.Name of longest bone of human body.

Ans. Femur

16.Give the first vertebra.

Ans. Atlas

17. Define a sarcomere.

Ans. A portion of myofibril between two successive 'Z' lines.

18. Name the cup shaped bone that constitutes the knee cap.

Ans. Knee cap

CBSE Class 12 Biology
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2 Marks Questions

1. List functions of skeleton in higher animals?

Ans.i) Skeletal system forms the framework for the body.

ii) The bone of skeletal system protects delicate internal organs of the body.

iii) Skeleton provides attachment surface for the body muscles, tendons and other similar things and thus helps in movement

iv) It gives shape and posture to the body.

2. Define a joint.

Ans. The place of articulation of two or more bones are called as joints. At the joints, the surface of the two bones is in opposite to each other. These joints facilitate the movement of bones in different ways.

3. What is osteoporosis? Name two factors which are responsible for osteoporosis.

Ans. Osteoporosis is an age – dependent systemic disorder, characterized by low bone–mass and micro–architectural deterioration of the bones.

Factors – **(1)** Deficiency of calcium & vitamin D.

(2) Imbalance of hormones like parathyroid hormone, thyrocalcitonin and sex hormones.

4. Which kinds of muscle fibers are richly found in the extensor muscles present on the back of human body? What characteristics enable those fibers to serve their purpose?

Ans. Red muscle fibers.

Characteristics:- They are rich in mitochondria, myoglobin, slow acting, no lactic acid. Aerobic respiration takes place.

5. Give differences between red and white muscle fibers, other than color.

Ans. Red muscles – Have more mitochondria.

- Can contract for longer period.

White muscles – Have less mitochondria.

- Can contract for short period.

6. What are floating ribs? How many of them are there?

Ans. Floating ribs – The last two pairs (11 and 12 pairs) ribs are called floating ribs.

They are dorsally attached to the respective thoracic vertebrae and are free ventrally.

7. Why can a red muscle fiber work for a prolonged period, while a white muscle fibre suffers from fatigue soon?

Ans. Red muscle fibers contain myoglobin that stores oxygen in the form of oxymyoglobin since there is a continuous supply of oxygen; for oxidation of good materials to release energy, the red muscle fibers energy, and the red muscles fibres do not become fatigued and work for long periods.

White muscle fibers lack myoglobin. They carry out anaerobic respiration and become fatigued.

8. What is the function of girdles?

Ans. There are two girdles in the body, pectoral girdle & pelvic girdle.

1) Pectoral girdle – It provides surface to the soft organs of the body of the pectoral region. It

also provides surface (glenoid cavity) for the articulation of forelimbs. In the glenoid cavity fits the head of the humerus bone.

2) Pelvic girdle – It protects the organs of pelvic region and provides surface (acetabulum) for the articulation of the hind limbs. (the femur bone of the thigh fits in the acetabulum)

9. What makes the synovial joints freely movable? List any four types of synovial joints.

Ans. Synovial Joints – In the synovial joints not only, a space called synovial cavity is present between articulating bones.

This cavity is filled with synovial fluid, that reduces the friction on the articulating surface of bones; so the synovial joints are freely movable.

Synovial joints are of the following types:

(i) Ball and socket joint **(ii)** Hinge joint **(iii)** Pivot joint.

CBSE Class 12 Biology
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Chapter 20
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3 Marks Questions

1.Explain the initiation of muscle contraction. What is the role of sarcoplasmic reticulum, Myosin head and F – actin during contraction in striated muscles?

Ans. Sarcoplasmic Reticulum – It releases calcium ions, that bind to the troponin and bring about conformational changes; so the active site on F – actin for myosin becomes exposed.

Myosin head – It provides the specific binding site for F – actin to form cross – bridges, it also shows ATP active site

F – actin – F – actin are specific to myosin head for cross bridge formation.

2.What are the three types of muscle tissue? Write two characteristic points about the structure of each of them?

Ans. Types of muscle tissue – It is of 3 types

(i)Striated / Skeletal muscles –

ØThe muscle fibers are cylindrical, unbranched and show prominent striations.

ØThey are innervated by voluntary nervous system.

ØThey are under the control of conscious mind and be moved at will.

ØAttached to skeletal system.

(ii)Smooth muscles –

ØThey are innervated by autonomic nervous system.

ØThey are not under voluntary control.

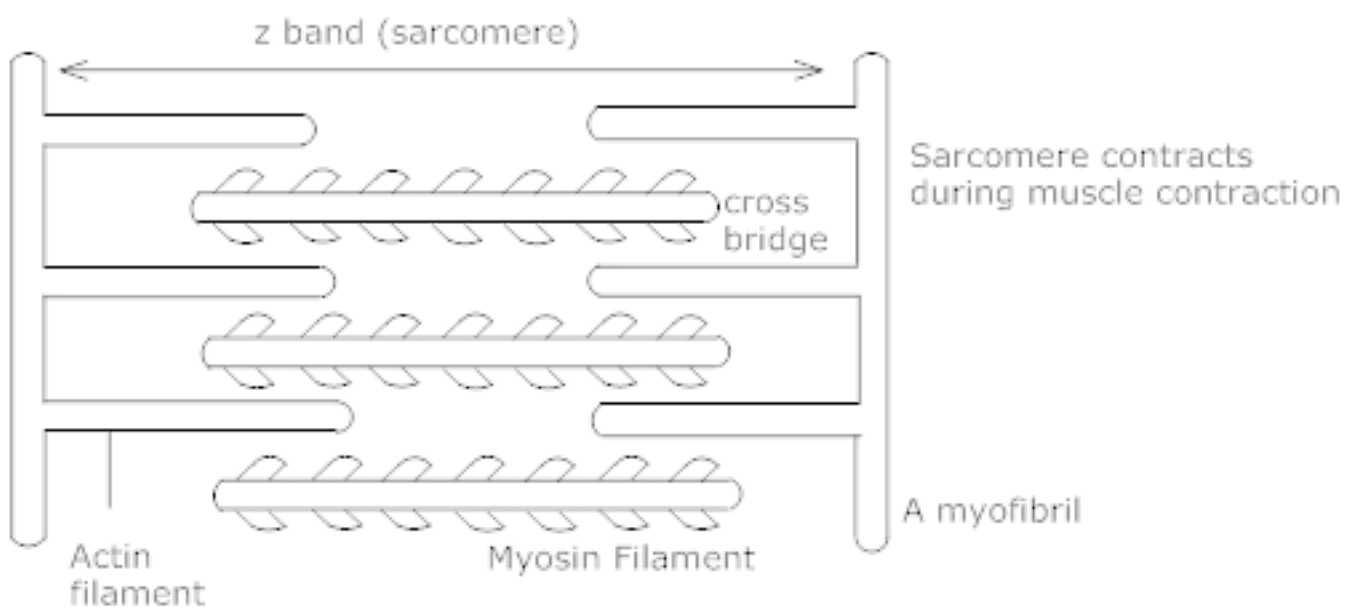
(iii) Cardiac muscles –

Ø These muscles are found exclusively in the heart.

Ø They are involuntary in function.

3. Represent diagrammatically a sarcomere and label its parts. Which of these parts shorten during muscle contraction?

Ans.



4. Describe any three disorders of the muscular system.

Ans. Disorders of muscular system

(i) Myasthenia gravis

It is an autoimmune disorder, that affects the neuron muscular junction, leading to progressive weakening and paralysis of skeletal muscles.

(ii) Muscular dystrophy – It is a genetic disorder resulting in progressive degeneration of skeletal muscles.

(iii) Tetany – It refers to the rapid spasm (wild contraction) or the continued state of

contraction due to low Ca^{+} in the body fluids.

5. Differentiate between Endoskeleton and Exoskeleton.

Ans.

	Exoskeleton	Endoskeleton
1.	Made up of hard parts on the surface of body.	Made up of hard parts found inside the body.
2.	Examples scales, feathers, hair, claws, hooves, nails and horns in vertebrates	Cartilage and bones form endoskeleton in vertebrates.
3.	Formed by ectoderm.	Formed by mesoderm.

6. Explain the following –

a) Antagonistic muscles

b) Tetanus

c) Threshold stimulus

Ans. a) Antagonistic muscles – Contraction of muscles which results in the opposite movements at the same joint are called antagonistic muscle e. g biceps is a flexor for the elbow joint and triceps is its antagonistic. And an extension for that point. During flexion at the elbow biceps contracts and triceps relaxes; during extension triceps contracts and biceps relaxes.

b) Tetanus – If a muscle fiber is stimulated by many nerve impulses or electric shocks it will remain in the state of contraction till the stimulation continued of contraction is known as tetanus.

c) Threshold stimulus – Each skeletal muscle is made of many muscle fibers and each muscle fiber is supplied by a nerve. These nerves send nerve impulse to the muscle fibers. As a result of this the muscle is stimulated and contraction of the muscle takes place. But for contraction muscle fibres require a minimum strength of the nerve impulse. This is called threshold stimulus.

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5 Marks Questions

1. What is the role of Ca^{++} and ATP in muscle contraction?

Ans. A nerve impulse arriving at neuromuscular junction stimulates contractile response. Due to the depolarization of the surface of sarcomeres it spreads quickly. Neurotransmitter is released at the enormous collar junction. It enters into the sarcomere through membrane channel. Na^+ moves inside the sarcomere. It is called inflow of Na^+ . Action potential is generated in the sarcomere. Action potential travels to the full length of muscle fiber.

The sarcoplasmic reticulum, then release the Ca^{2+} which is stored here. It binds to the specific sites found in the troponin of the thin filament. Their filaments are called actins, change faces in troponin active sites of F – actin are exposed then to myosin head. Myosin head shows Mg^{2+} dependent ATPase activity. During relaxation of muscle Ca^{2+} is pumped back into sarcoplasmic reticulum. Consequently the troponin component is freed to inhibit the active sites for myosin head. Cross bridges are broken. Their filaments assume their normal position. The muscle fiber is then in relaxed state.

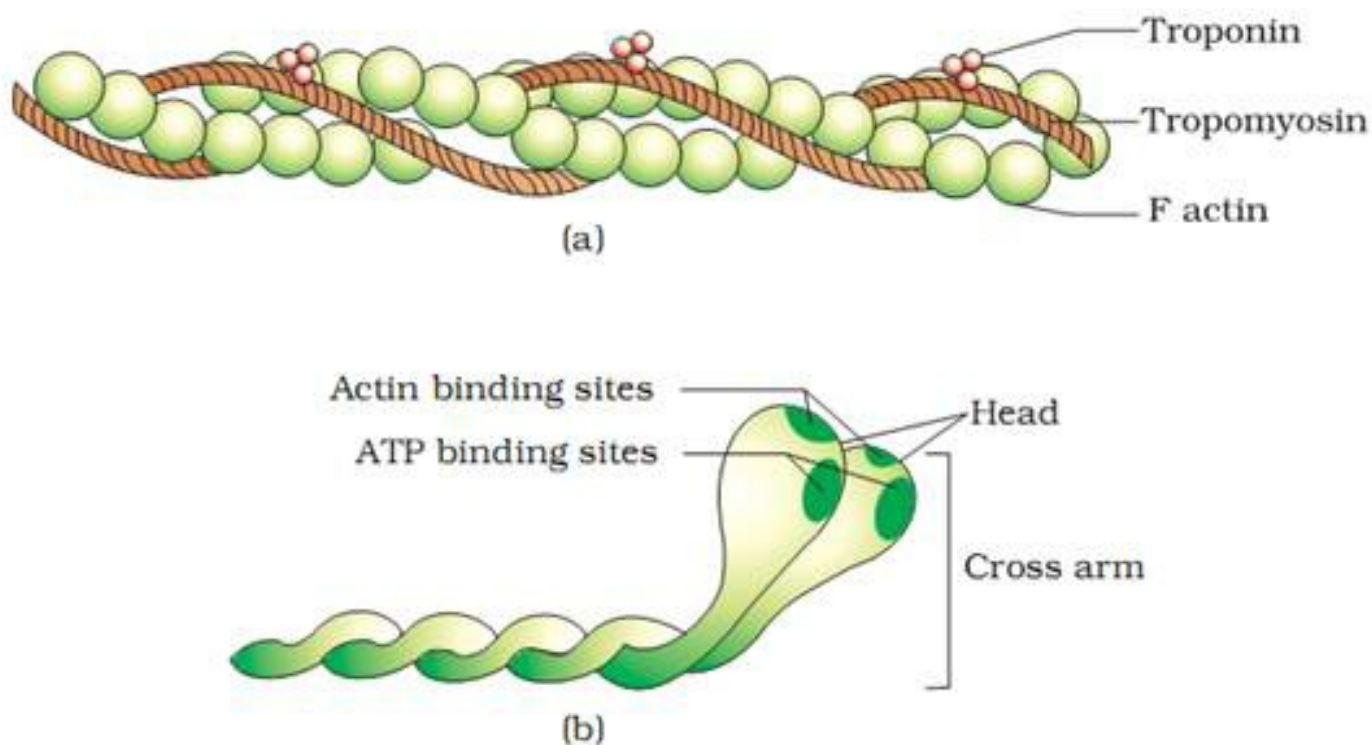


Figure 20.3 (a) An actin (thin) filament (b) Myosin monomer (Meromyosin)

2. Describe the various kinds of joint in human body. According to mobility giving one example of each.

Ans. Various types of joints – When two or more bones articular with each other at a particular point it forms a joint. The joints help in performing various types of movements. In the body of vertebrates three types of joints are found –

1) Perfect joints – The joints have synovial joints are capable of performing movements in more than one plane. These joints may be of the following categories-

(a) Ball and socket joints – As the name suggests in this type of joint one bone forms a cup like depression of socket in which ball like structure fits. The head or ball can move freely can the joint in any direction. Ex – shoulder and hip joints.

(b) Hinge joint – In this type of joint movement is performed only in one direction. Ex elbow, knee joint, joints of phalanges of fingers & toes.

(c) Gliding joints – such are the joints in which one surface glides over another such joints are found in the vertebral column.

(d) Pivot joint – One bone of the joint is always fixed and other is able to move freely over the former. Such joints can be seen in the skull of man which moves freely over the odontoid process of the 2nd neck vertebra.

(e) Saddle joints : It resembles ball & socket joint except that ball and socket are not fully developed.

2) Imperfect joint – the joints which do not possess synovial capsule or connecting ligaments are called imperfect joints. Ex – the joint between the ilium of pelvic girdle and transverse process of sacral vertebra.

3) Immovable joints:- Joints which are permanently fixed and cannot perform any movement are termed as immovable joints, these also do not possess synovial capsule or ligaments. Various bones of the skull are joined with such joints. These joints do not allow any kind of movements.

3. Explain sliding filament theory of muscle contraction.

Ans. Sarcomeres are small units of myofibrils: the sarcomere consists of A – band in the centre with halves of two I – bands on its two sides i. e. the distance between two Z – membranes. When stimulus is given to muscles, the thin (actin or I – band) filaments slide in the space between the thick (myosin or A – band) but neither of them change its length. Due to sliding of I filaments, there is breakage and rearrangement of the cross – linkage between actin and myosin filaments. The ATP is broken by the enzyme ATPase myosin which provides energy for interaction between actin and myosin filaments. Consequently, the thin actin filaments slide deeper into the A bands and Z – lines are drawn closer with each other by the disappearance of H – zone finally the sarcomeres become shortened due to shortening of its I–band.

By relaxation, the cross linkage between the filaments are rearranged. The cross-bridges disappear due to the pulling of the filaments by the active sites on the actin filaments. The actin filaments are slide out from the A – band. Consequently, this elongates I – band, pushing the Z – line away from each other. Thus contraction and relaxation of muscles occurs due to repetitive formation and breakage of cross bridges between thick filament of A – band and thin filament of I–band.

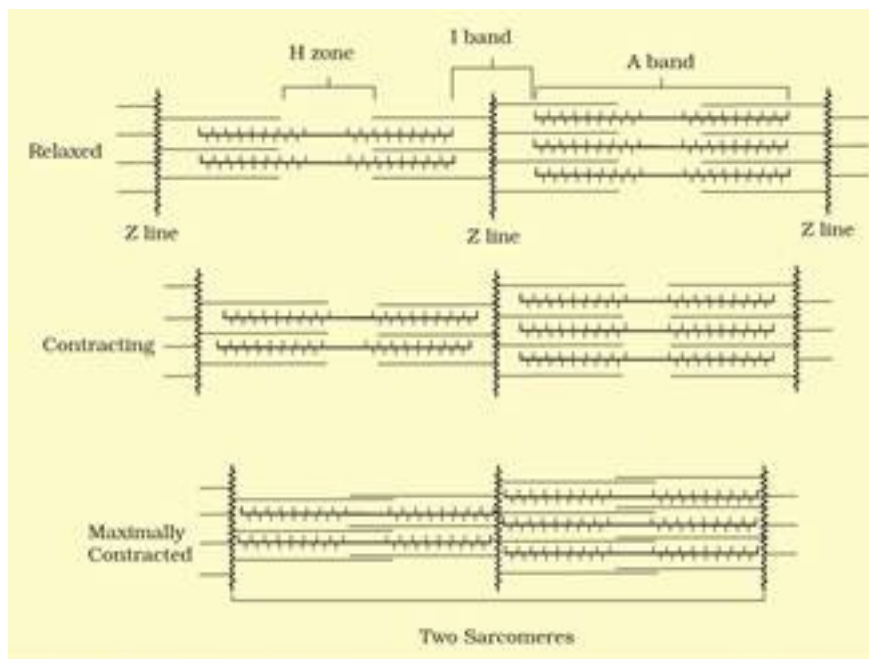


Figure 20.5 Sliding-filament theory of muscle contraction (movement of the thin filaments and the relative size of the I band and H zones)