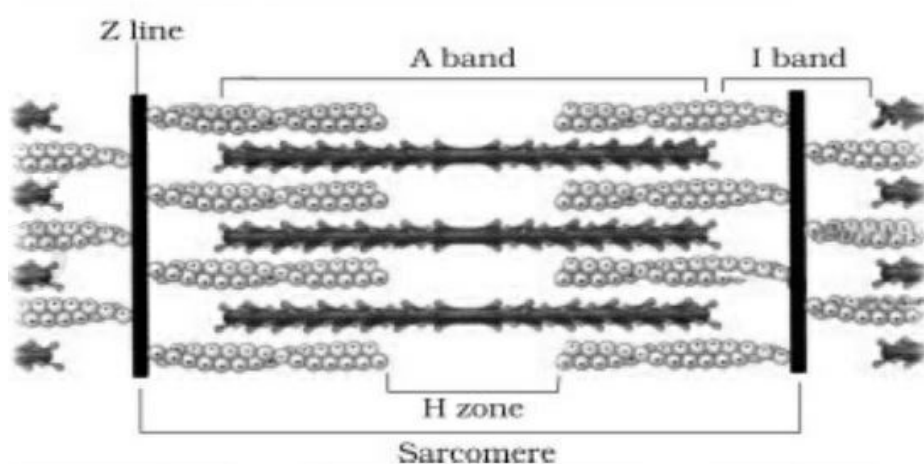


CBSE Class 11 Biology
NCERT Solutions
Chapter 20
Locomotion and movement

1. Draw the diagram of a sarcomere of skeletal muscle showing different regions.

Ans.



2. Define sliding filament theory of muscle contraction.

Ans. Sliding filament theory of muscle contraction states that contraction of a muscle fibre takes place by the sliding of the thin filaments over the thick filaments.

3. Describe the important steps in muscle contraction.

Ans. The important steps in muscle contraction: Muscle contraction is initiated by a signal sent by the central nervous system (CNS) via a motor neuron and reach the neuromuscular junction. As a result, neurotransmitter (Acetyl choline) which generates an action potential in the sarcolemma. This spreads through the muscle fibre and causes the release of calcium ions into the sarcoplasm. Increase in Calcium 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. Utilising the energy from ATP hydrolysis, the myosin head now binds to the exposed active sites on actin to form a cross bridge. The actin filaments are pulled. As a result, the H-

zone reduces. It is at this stage that the contraction of the muscle occurs. After muscle contraction, the myosin head pulls the actin filament and releases ADP along with inorganic phosphate. ATP molecules bind and detach myosin and the cross bridges are broken and decreases the calcium ions contraction. As a result, masking the actin filaments and leading to muscle relaxation.

4. Write true or false. If false change the statement so that it is true

- (a) Actin is present in thin filament**
- (b) H-zone of striated muscle fibre represents both thick and thin filaments.**
- (c) Human skeleton has 206 bones.**
- (d) There are 11 pairs of ribs in man.**
- (e) Sternum is present on the ventral side of the body.**

Ans. (a) True

(b) False

(c) True

(d) False

(e) True

5. Write the difference between:

- (a) Actin and Myosin**
- (b) Red and White muscles**
- (c) Pectoral and Pelvic girdle**

Ans. (a) Actin and Myosin

Actin	Myosin
Actin is a thin contractile protein.	Myosin is a thick contractile protein.
The light bands called I-band or Isotropic band contain actin.	The dark band called 'A' or Anisotropic band contains myosin.

(b) Red and White muscles

Red Muscles	White Muscles
Red muscle fibres are thin and smaller in size.	White muscle fibres are thick and larger in size.
They are red in colour as they contain large amounts of myoglobin.	They are white in colour as they contain small amounts of myoglobin.
They contain plenty of mitochondria.	They contain less number of mitochondria.
They provide energy by aerobic respiration.	They provide energy by anaerobic respiration.

(c) Pectoral and Pelvic girdle

Pectoral	Pelvic girdle
Pectoral girdle is situated in the pectoral region of the body.	Pelvic girdle is situated in the pelvic region of the body.
It is composed of two bones namely, clavicle or collar bones and scapula or shoulder bone.	It is composed of three bones, upper ileum, inner pubic, and ischium.
It has no articulation with the vertebral column.	It has articulation with the vertebral column.
These perform functions like holding, lifting etc.	These perform functions like running, standing, jumping etc.

6. Match Column I with Column II:

	Column I		Column II
(a)	Smooth muscle	(i)	Myoglobin
(b)	Tropomyosin	(ii)	Thin filament
(c)	Red muscle	(iii)	Sutures
(d)	Skull	(iv)	Involuntary

Ans.

	Column I		Column II
(a)	Smooth muscle	(iv)	Involuntary
(b)	Tropomyosin	(ii)	Thin filament
(c)	Red muscle	(i)	Myoglobin
(d)	Skull	(iii)	Sutures

7. What are the different types of movements exhibited by the cells of human body?

Ans. The different types of movements exhibited by the cells of human body are:

Amoeboid movement: Some specialised cells in our body like macrophages and leucocytes in blood exhibit amoeboid movement. It is effected by pseudopodia formed by the streaming of protoplasm (as in Amoeba). Cytoskeletal elements like microfilaments are also involved in amoeboid movement.

Ciliary Movement: It occurs in most of our internal tubular organs which are lined by ciliated epithelium. The coordinated movements of cilia in the trachea help us in removing dust particles and some of the foreign substances inhaled alongwith the atmospheric air. Passage of ova through the female reproductive tract is also facilitated by the ciliary movement.

Muscular movement: Muscle cells show muscular movement such as limbs, jaws, tongue, etc,

8. How do you distinguish between a skeletal muscle and a cardiac muscle?

Ans.

Skeletal Muscle	Cardiac Muscle
The cells of skeletal muscles are unbranched.	The cells of cardiac muscles are branched.
Intercalated disks are absent.	The cells are joined with one another by intercalated disks that help in coordination or synchronization of the heart beat.
Alternate light and dark bands are present.	Faint bands are present.
They are voluntary in nature.	They are involuntary in nature.
They contract rapidly and get fatigued in a short span of time.	They contract rapidly but do not get fatigued easily.
They are present in body parts such as the legs, tongue, hands, etc.	These muscles are present in the heart and control the contraction and relaxation of the heart.

9. Name the type of joint between the following:-

- (a) atlas/axis**
- (b) carpal/metacarpal of thumb**
- (c) between phalanges**
- (d) femur/acetabulum**
- (e) between cranial bones**
- (f) between pubic bones in the pelvic girdle**

Ans. (a) Pivotal joint

(b) Saddle joint

(c) Hinge joint

(d) Ball and Socket joint

(e) Fibrous

(f) Cartilaginous joint

10. Fill in the blank spaces:

(a) All mammals (except a few) have _____ cervical vertebra.

(b) The number of phalanges in each limb of human is _____

(c) Thin filament of myofibril contains 2 'F' actins and two other proteins namely _____ and _____.

(d) In a muscle fibre Ca^{++} is stored in _____

(e) _____ and _____ pairs of ribs are called floating ribs.

(f) The human cranium is made of _____ bones.

Ans. (a) Seven

(b) 14

(c) troponin, tropomyosin

(d) sarcoplasmic reticulum

(e) 11th and 12th

(f) eight
