

11.2 Movement

Question Paper

| | |
|------------|---------------------------------|
| Course | DP IB Biology |
| Section | 11. Animal Physiology (HL Only) |
| Topic | 11.2 Movement |
| Difficulty | Easy |

Time allowed: 60
Score: /47
Percentage: /100

Question 1a

a)
State the word which is used to describe a pair of muscles that act against each other to perform opposite actions.

[1 mark]

[1 mark]

Question 1b

b)
Classify the following alphabetical list of organisms into their skeleton type in the table below.

1. Amphibians
2. Arachnids
3. Birds
4. Centipedes
5. Crustaceans
6. Fish
7. Insects
8. Mammals
9. Molluscs
10. Reptiles

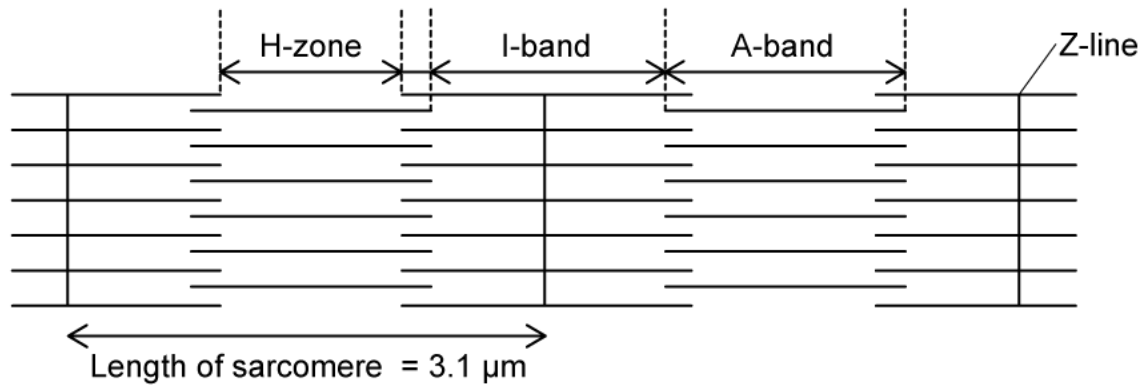
| Internal Skeletons | Exoskeletons |
|--------------------|--------------|
| | |
| | |
| | |
| | |
| | |

[3 marks]

[3 marks]

Question 1c

c)
The diagram shows a myofibril strand in a relaxed muscle fibre.



Describe the effect of muscle fibre contraction on the length of the A-band and the sarcomere.

[2 marks]

[2 marks]

Question 1d

d)
Explain the presence of a large number of mitochondria in the sarcoplasm of a muscle fibre.

[2 marks]

[2 marks]

Question 2a

a)
The smallest unit of organisation in most tissues is the cell. However, the term 'muscle fibre' is used to describe the smallest unit of skeletal muscle.

Explain why.

[2 marks]

[2 marks]

Question 2b

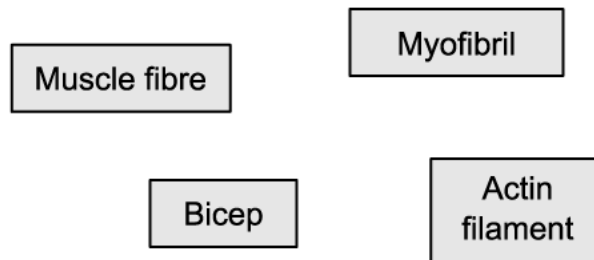
b)
Name the bundles of actin and myosin fibres.

[1 mark]

[1 mark]

Question 2c

c)



Place the four words above into descending order of size in the table below:

| | |
|-----------------|--|
| Largest | |
| ↓ | |
| ↓ | |
| Smallest | |

[2 marks]

[2 marks]

Question 2d

d)

Define the term, sarcolemma.

[1 mark]

[1 mark]

Question 3a

a)

Myosin is a protein that has two different kinds of protein structure, fibrous and globular, in its molecule.

State where these two types of structure are found within the myosin molecule.

[2 marks]

[2 marks]

Question 3b

b)

Explain how actin filaments are formed.

[2 marks]

[2 marks]

Question 3c

c)
Complete the table to identify the molecules that carry out the following functions of muscular contraction.

| Name of Molecule | Function |
|------------------|--|
| | Hydrolyses ATP |
| | Covers the binding site on the actin filament (when the muscle is relaxed) |
| | Required for recocking of the myosin head |

[3 marks]

[3 marks]

Question 3d

d)
State the role of calcium ions during muscle contraction.

[2 marks]

[2 marks]

Question 4a

a)
The power stroke of muscle contraction is a short, sharp movement as a myosin head flexes and slides over an actin filament.

Suggest why a muscle movement is a smooth process, rather than a series of short, jerky movements as this model might indicate.

[2 marks]

[2 marks]

Question 4b

b)

Identify the **two** successive events that cause a contracting muscle to stop contracting when the motor neurone stops sending impulses to the muscle fibre.

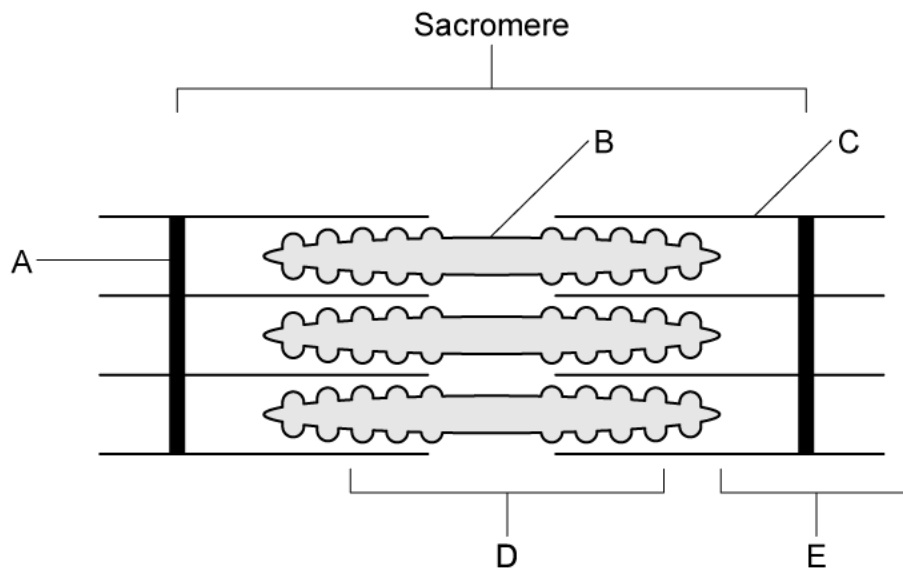
[2 marks]

[2 marks]

Question 4c

c)

Identify parts **A - E** on the diagram of a sarcomere below.



[5 marks]

[5 marks]

Question 5a

One mark is available for clarity of communication throughout this question.

a)

Whilst making a school poster of the human elbow, a student dropped his annotation cards. He gathered them up and randomly allocated an annotation to each part of the elbow but many got mixed up, as shown in the table below.

| Part of the elbow | Annotation |
|-------------------|---|
| Humerus | Anchorage point for biceps |
| Triceps | Lubricates the joint between cartilage and bone ends |
| Cartilage | Shock-absorbing tissue that reduces friction in the joint |
| Synovial fluid | Extends the joint |
| Biceps | Surrounds the joint and holds in synovial fluid |
| Radius | Flexes the joint |
| Ulna | Anchorage point for biceps and triceps |
| Joint Capsule | Anchorage point for triceps |

Re-sort the annotations to match the correct parts of the elbow joint below.

| Part of the elbow | Mixed-up Annotation | Correct Annotation |
|-------------------|---|--------------------|
| Humerus | Anchorage point for biceps | |
| Triceps | Lubricates the joint between cartilage and bone ends | |
| Cartilage | Shock-absorbing tissue that reduces friction in the joint | |
| Synovial fluid | Extends the joint | |
| Biceps | Surrounds the joint and holds in synovial fluid | |
| Radius | Flexes the joint | |
| Ulna | Anchorage point for biceps and triceps | |
| Joint Capsule | Anchorage point for triceps | |

[8 marks]

[8 marks]

Question 5b

b)

Explain the advantages of using an electron microscope to analyse muscle tissue.

[3 marks]

[3 marks]

Question 5c

c)

Distinguish between the following pairs of terms about joint movement:

- Abduction and adduction
- Flexion and extension

You may use examples to clarify your answers.

[4 marks]

[4 marks]