

APOLLO

Muscle and motility

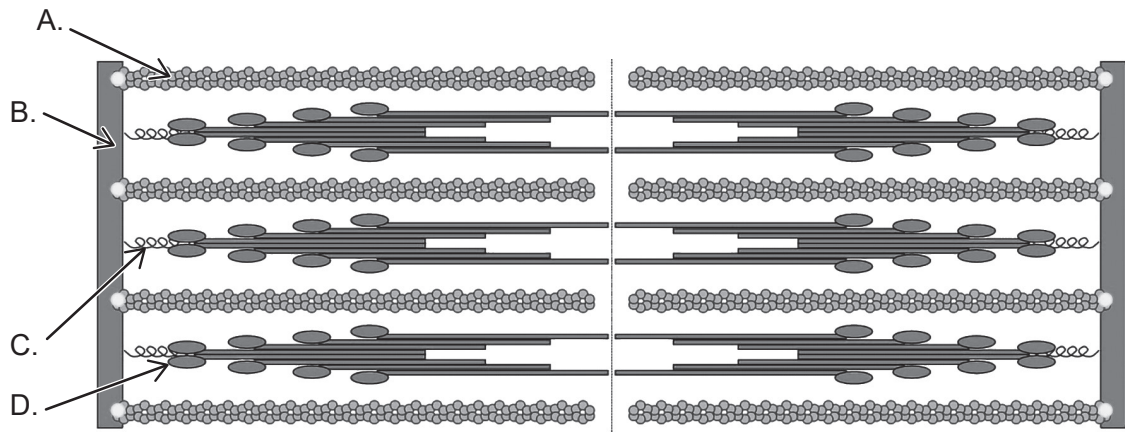
HL

Biology

First assessment 2025

7 questions | questions

25. The diagram shows a contracted sarcomere. Which part will vary in length in response to relaxation of a muscle?



15. Which features are found in both cardiac and striated muscle?

- A. Nuclei and branched myofibrils
- B. Sarcomeres and unbranched myofibrils
- C. Mitochondria and branched myofibrils
- D. Sarcomeres and mitochondria

23. What is a role of one of the structures at a synovial joint such as the hip?

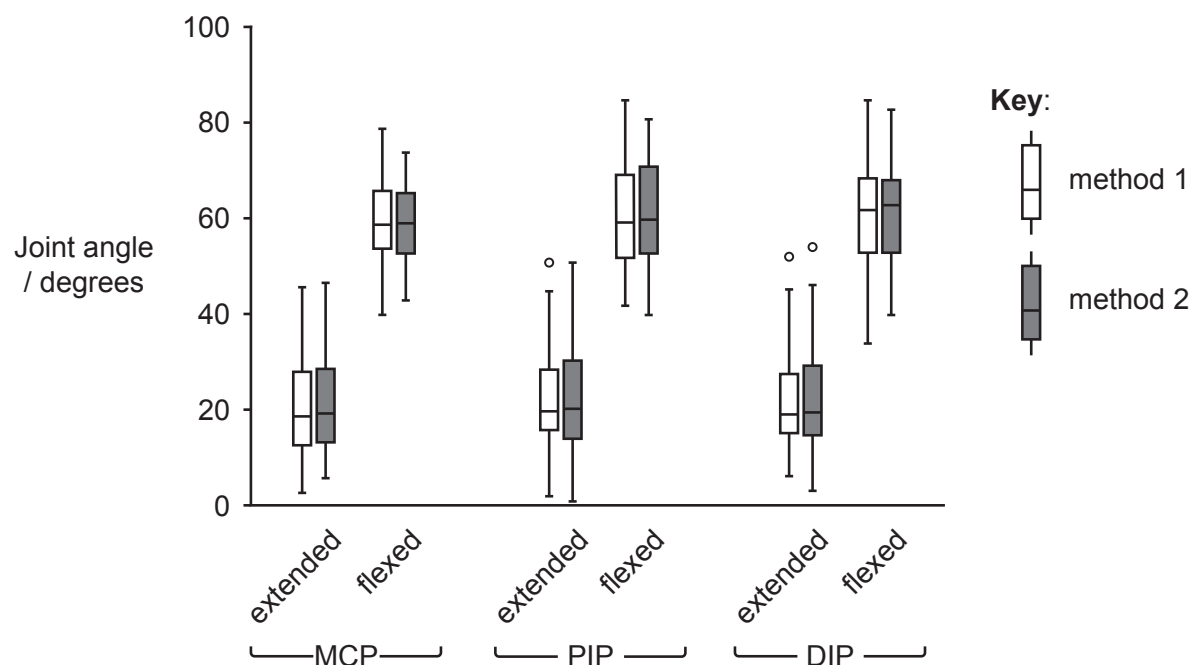
- A. Ligaments attach muscle to bone.
- B. Tendons transmit force of contraction to bone.
- C. Cartilage holds bones together at the joint.
- D. Muscles stretch and contract to move bones.

- 23.** A titinopathy is a muscle disorder caused by titin abnormalities. What could be a consequence of abnormal titin in muscles?
- A. Muscles would detach from tendons.
 - B. Muscles would stretch too much during relaxation.
 - C. Muscles would have less ATP for contraction.
 - D. Antagonistic muscles would contract at the same time.

Turn over

2. A student used two different methods to measure the left ring finger joint angles in 120 healthy people. The metacarpophalangeal (MCP), proximal interphalangeal (PIP) and distal interphalangeal (DIP) joint angles were measured while the finger was extended (straight) or flexed (bent).

The box-and-whisker plots show the angle measurements at the different joints obtained for both methods.



(This question continues on the following page)



(Question 2 continued)

- (a) (i) State the dependent variable in this experiment. [1]

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- (ii) Identify what is indicated by the circles in the plot. [1]

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- (b) Deduce whether method 2 is a good substitute for method 1. [1]

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- (c) Evaluate the experiment used to measure the joint angles of the ring finger. [2]

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- (d) Explain the reason that the angle measured by both methods is smaller in the extended than in the flexed position. [3]

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**Turn over**

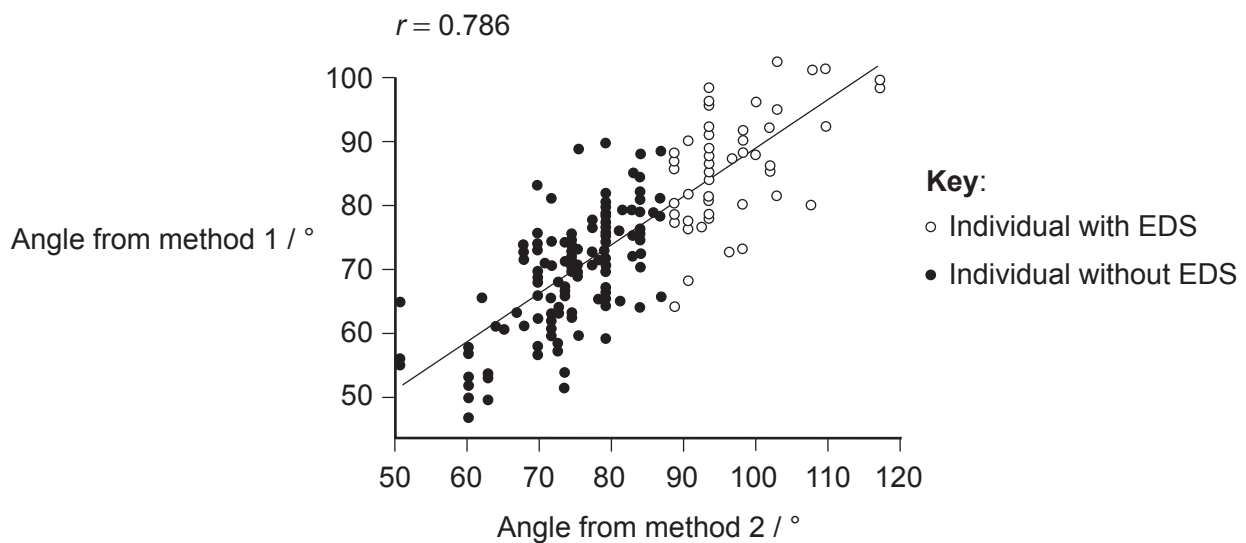
2. Ehlers–Danlos syndrome (EDS) causes joint hypermobility, where joint movement extends well beyond the normal range. Researchers used two different methods to measure angles of movement at a joint of the smallest (fifth) finger.

(a) Suggest in which direction the finger was moved to assess hypermobility.

[1]

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The graph shows all angles of movement of the finger, measured in degrees (°) using both methods.



(b) Suggest a method which could have been used to measure the angle of movement of the finger.

[1]

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(c) Estimate the threshold (minimum) angle for a diagnosis of EDS.

[1]

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(Question 2 continued)

(d) Suggest which structure at the finger joint is affected by EDS. [1]

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(e) Describe the level of correlation between the data from the two measurement methods. [1]

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(f) Joints are part of the musculoskeletal system of animals, which provides support and movement to the body. Xylem provides support in plants and also transports water and minerals. Explain the adaptations of xylem for its functions. [3]

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Turn over

Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

3. (a) Outline the function of mitochondria in muscle fibres. [2]

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(b) Explain the function of actin and myosin in the sarcomeres of muscle fibres. [3]

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(c) Explain the role of the protein titin in muscle relaxation. [2]

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Turn over