

1. Fig. 2.1 below is an electron micrograph showing the ultrastructure of skeletal muscle.

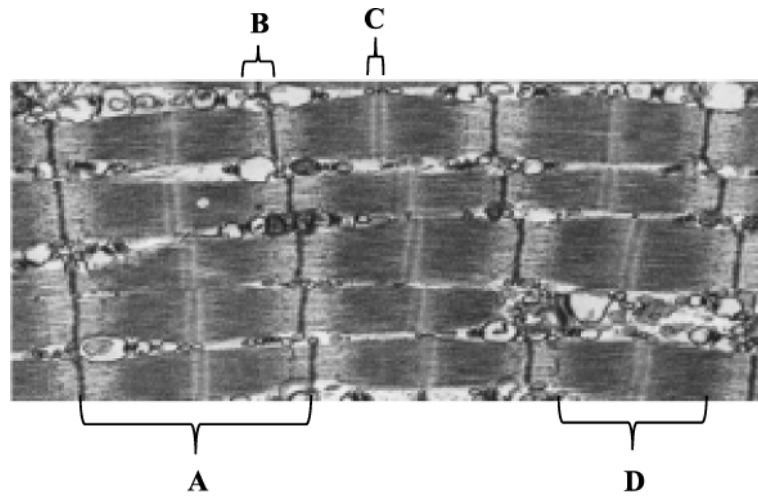


Fig. 2.1

Which of the areas labelled A–D represents the A-band?

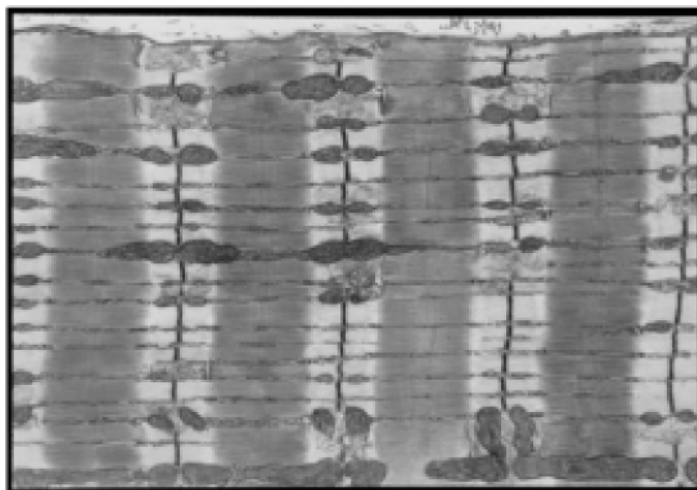
Your answer

[1]

2. Sections of muscle tissue can be prepared and studied under a microscope.

A magnified section of muscle tissue is shown below in Fig. 17.1.

What is the approximate length of a sarcomere?



**Fig. 17.1**

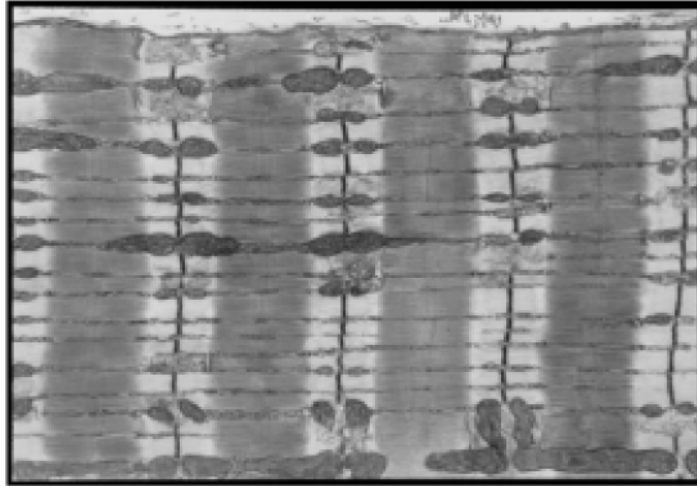
Magnification =  $\times 16800$

- A  $1.5 \times 10^{-5}$  m
- B  $1.5 \times 10^{-6}$  m
- C  $1.25 \times 10^{-5}$  m
- D  $1.25 \times 10^{-6}$  m

Your answer

[1]

3. Students prepared a section of muscle tissue and added drops of ATP solution to the tissue.



**Fig. 17.1**

Magnification =  $\times 16800$

The students observed changes in the muscle tissue.

What would happen to the length of the sarcomere?

- A no change
- B shortens
- C lengthens
- D disappears

Your answer

[1]

4. Some chemicals bind directly to haemoglobin.

Which of the options, **A** to **D**, correctly identifies two of these chemicals?

- A  $\text{CO}_2$  and  $\text{H}^+$
- B  $\text{H}^+$  and  $\text{HCO}_3^-$
- C  $\text{HCO}_3^-$  and  $\text{CO}_2$
- D  $\text{H}_2\text{CO}_3$  and  $\text{H}^+$

Your answer

[1]

5. ATP is required for the contraction of skeletal muscle.

Which of the options, **A** to **D**, is the result of ATP binding to the myosin head?

- A attachment of the myosin head to actin
- B detachment of the myosin head from actin
- C return of the myosin head to the original (cocked) position
- D tilting of the myosin head

Your answer

[1]

6. Which of the options, **A** to **D**, is the long-term effect of aerobic training on  $VO_2$  max and excess post-exercise oxygen consumption (EPOC)?

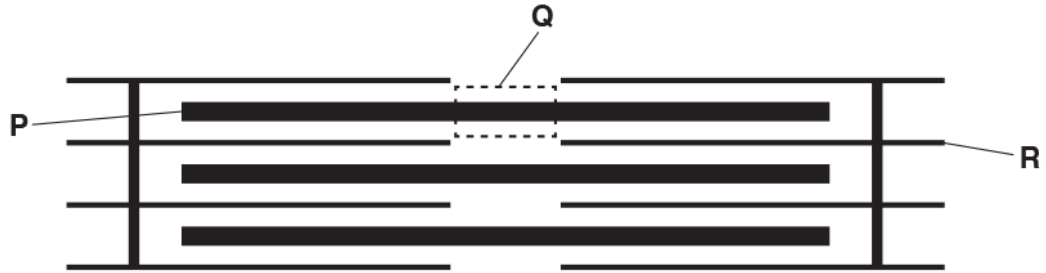
- A decreased  $VO_2$  max and decreased EPOC
- B decreased  $VO_2$  max and increased EPOC
- C increased  $VO_2$  max and decreased EPOC
- D increased  $VO_2$  max and increased EPOC

Your answer

[1]

7. The diagram below represents the ultrastructure of a single sarcomere in skeletal muscle.

Three features of the sarcomere are labelled P, Q and R.



Here are three statements about the diagram:

- 1 During muscle contraction, R slides along P.
- 2 P is responsive to calcium ions.
- 3 Q is responsive to ATP molecules.

Which of the statements is/are correct?

- A 1, 2 and 3 are correct
- B Only 1 and 2 are correct
- C Only 2 and 3 are correct
- D Only 1 is correct

Your answer

[1]

**END OF QUESTION PAPER**

### Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
1			D	1	
			Total	1	
2			D	1	
			Total	1	
3			B	1	
			Total	1	
4			A ✓	1	<p><b>Examiner's Comments</b> This question was straightforward recall but less than half of all candidates remembered the chemicals that bind to haemoglobin.</p>
			Total	1	
5			B ✓	1	<p><b>Examiner's Comments</b> A disappointing number of candidates failed to recall this straightforward fact about the role of ATP in muscle contraction.</p>
			Total	1	
6			C	1	
			Total	1	
7			A	1	<p><b>Examiner's Comments</b> This proved to be a challenging question with a small proportion of candidates selecting the correct answer. The most common response was option B suggesting that candidates didn't recognise Q as an area where there would be overlap between actin and myosin during muscle contraction. It would therefore need to be responsive to ATP molecules.</p>
			Total	1	