

Answers to examination-style questions

Answers	Marks	Examiner's tips
1 a) W = myosin, X = actin	1	
b) myofibril is contracting in Figure 3 / relaxing in Figure 2; movement of actin fibres between myosin fibres;	2	You state precisely in which of the figures the muscle is contracting or relaxing.
c) calcium ions bind to / move tropomyosin; to reveal binding sites on actin; allowing myosin (heads) to bind to actin / actinmyosin formed; activates ATPase / energy released from ATP;	4	Although the specification only refers to tropomyosin, descriptions that include troponin are acceptable. You must refer to 'binding site' not 'active site'.
2 a) calcium ions bind to / move tropomyosin; reveal binding site on actin; myosin binds to exposed sites on actin / actomyosin formed / cross bridges form between actin and myosin; activates ATPase;	3 max.	Although the specification only refers to tropomyosin, descriptions that also include troponin are acceptable. You must refer to 'binding site' not 'active site'.
b) distance single actin filament moves divided by distance moved using 1 ATP; 15 ATP;	2	Correct answer = 2 marks. Always show your working, then if you make a mistake you may still obtain a method mark.
c) respiration stops; no ATP produced; ATP required for separation of actin and myosin / cross bridges;	2 max.	
3 a) i) A-band / dark band is mainly due to myosin filaments; H-zone only myosin filaments; darker band has both types of filament; light band has only actin filaments;	2 max.	This question is often allocated more than 2 marks so learn all the points on the mark scheme.
ii) H-zone narrows; light band narrows; outer darker regions of A-band / dark band widen;	2 max.	The length of the A-band / dark band remains the same as it is determined by the length of the myosin filaments which do not change.
b) i) breaks down ATP yielding energy; used to break actomyosin bridges;	2	Many candidates only provide the first marking point. You must refer to the role of ATPase during muscle contraction.

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<p>ii) A and B tropomyosin covers binding site on actin; no cross bridges formed / ATPase activity on myosin head reduced;</p> <p>B and C calcium ions remove tropomyosin; binding / calcium ions increase ATPase activity;</p>	<p>2</p> <p>2</p>	<p>Be precise in your answers. The difference between A and B is the presence of tropomyosin so refer to the role of this molecule in muscle. Similarly, the difference between B and C is the presence of calcium ions so you must outline the role of calcium ions in muscle contraction.</p>
<p>4 a) ATP allows myosin to detach from actin / 're-cocks' myosin cross bridge; phosphocreatine allows regeneration of ATP under anaerobic conditions; phosphocreatine releases P_i to join ADP;</p> <p>b) endurance athletes exercise for long periods of time; respire aerobically; so lactate does not accumulate; slow fibres adapted to aerobic respiration; as have many mitochondria; site of Krebs's cycle; and electron transport chain; producing large amount of ATP; also resistant to fatigue;</p>	<p>3</p> <p>6 max.</p>	<p>The phosphocreatine store is replenished using phosphate from ATP when the muscle is relaxed.</p> <p>Marathon runners have a high proportion of slow fibres. These contract more slowly and provide less powerful contractions over a longer period.</p>