

Muscles and Muscle Movement - Mark Scheme

Q1.

Question Number	Acceptable Answer	Additional Guidance	Mark
(a)	antagonistic (muscles)		(1)

Question Number	Acceptable Answer	Additional Guidance	Mark
(b)(i)	contraction (of F) {flexes / bends } the arm		(1)

Question Number	Acceptable Answer	Additional Guidance	Mark
(b)(ii)	A description that makes reference to the following: <ul style="list-style-type: none"> • G (tendon) attaches E to the bone (1) • as G does not stretch, the contraction of E moves the bone (1) 		(2)

Q2.

Question Number	Acceptable Answer	Additional Guidance	Mark
(a)	D		(1)

Question Number	Acceptable Answer	Additional Guidance	Mark
(b)	An explanation that makes reference to: <ul style="list-style-type: none"> • muscles can only work in one direction (1) Plus one from: <ul style="list-style-type: none"> • therefore a need to create opposite forces (1) • so must have extensors and flexors (1) 		(2)

Q3.

Question number	Answer	Additional guidance	Mark
(i)	<p>A description that makes reference to the following points:</p> <ul style="list-style-type: none"> tropomyosin is moved (by troponin) (1) myosin binding sites (on actin) are exposed (1) 	<p>ALLOW tropomyosin moves</p> <p>ALLOW actin-myosin binding site</p>	(2)

Question number	Answer	Additional guidance	Mark
(ii)	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> myosin heads can bind to binding sites (1) (bound) myosin changes shape (1) actin filaments { slide / pulled } over the myosin (1) (therefore) { muscle fibres / myofibril / sarcomeres } shorten (1) ATP hydrolysed / ADP and { inorganic phosphate / Pi } released (1) 	<p>ALLOW actin – myosin bridges form</p> <p>ALLOW description of head 'nodding' or 'dipping' forward</p> <p>ALLOW actin moves towards the M line</p> <p>ALLOW Ca²⁺ activates ATPase</p>	(4)

Q4.

Question Number	Answer	Mark						
(a)	<table border="1"> <thead> <tr> <th>Region of the brain</th> <th>One role while she is on the beam</th> </tr> </thead> <tbody> <tr> <td>Cerebellum</td> <td>maintaining balance / coordination of movement / muscle control / eq ;</td> </tr> <tr> <td>Medulla oblongata</td> <td>regulation of {breathing / heart beat} / eq ;</td> </tr> </tbody> </table>	Region of the brain	One role while she is on the beam	Cerebellum	maintaining balance / coordination of movement / muscle control / eq ;	Medulla oblongata	regulation of {breathing / heart beat} / eq ;	(2)
	Region of the brain	One role while she is on the beam						
	Cerebellum	maintaining balance / coordination of movement / muscle control / eq ;						
Medulla oblongata	regulation of {breathing / heart beat} / eq ;							

Question Number	Answer	Mark
(b)	<ol style="list-style-type: none"> 1. idea more blood flows near the skin surface / eq ; 2. due to {vasodilation / dilation of arterioles / eq} ; 3. {vasoconstriction / eq} of shunt vessels / eq ; 4. more blood to capillaries / eq ; 5. idea of more heat lost ; 6. via radiation ; 	(4)

Question Number	Answer	Mark
(c)(i)	<ol style="list-style-type: none"> 1. {in the knee / behind the knee cap} / {cross- shaped / two ligaments} ; 2. (connective tissue that) connects bone to bone / eq ; 	(2)

Question Number	Answer	Mark
(c)(ii)	<ol style="list-style-type: none"> 1. idea of smaller incision reduces chance of infection / eq ; 2. idea of smaller incision reduces recovery time ; 3. idea of smaller incision reduces likelihood of osteoarthritis / knee joint replacement later / eq ; 4. idea of smaller incision so less scar tissue / eq ; 5. idea of smaller incision so less blood loss / eq ; 6. idea of smaller incision so less pain / eq ; 7. use of local anaesthetic means less (associated) risk / eq ; 8. idea of cheaper related to fewer staff needed ; 	(2)

Q5.

Question Number	Acceptable Answer	Additional Guidance	Mark
	<p>An answer that makes reference to four of the following:</p> <ul style="list-style-type: none"> • For high risk, an increase in exercise reduces incidence of type II diabetes (1) • For low risk, an increase in exercise has no effect on incidence of type II diabetes (1) • Reference to correlation in correct context (1) • A causal relationship is {shown by the high risk group and level of exercise / not shown by the low risk group and level of exercise} (1) • Other factors may cause type II diabetes, e.g. obesity, diet, age, ethnicity (1) 	<p>Accept high risk = family history low risk = no family history</p>	(4)

Q6.

Question Number	Answer	Additional guidance	Mark
(a)	<ol style="list-style-type: none"> 1. mean time for group A much longer (compared with B) / eq ; 2. no overlap of data / eq ; 3. idea that means for {B and C / eq} very close together ; 4. range of data both overlap (for B and C) ; 5. manipulated data used e.g. lowest time for group A is 154 sec and still higher than longest time for group B (@ 134 sec) or C (@ 133 sec) ; 		(4)

Question Number	Answer	Additional guidance	Mark
(b)(i)	<p>4. increases / eq ;</p> <p>5. by {50% / 0.6 / 1.5x} ;</p>		(2)

Question Number	Answer	Additional guidance	Mark
* (b)(ii)	<p>(QWC – spelling of technical terms must be correct and the answer must be organised in a logical sequence)</p> <p>1. idea that fatigue maybe due to less ATP ;</p> <p>2. more <i>capillaries</i> supplies more <i>blood</i> / eq ;</p> <p>3. idea of more <i>capillaries</i> gives greater surface area for exchange ;</p> <p>4. this supplies {<i>oxygen</i> / <i>glucose</i> / eq} ;</p> <p>5. for <i>aerobic</i> respiration / eq ;</p> <p>6. detail of aerobic respiration ;</p> <p>7. (so) more ATP <i>made</i> / eq ;</p>	<p>QWC emphasis is spelling</p> <p>1. ACCEPT running out /running short</p> <p>6. ACCEPT a description e.g. of oxidative phosphorylation</p> <p>7. ACCEPT idea that more ATP present / available</p>	

	<p>8. (so) delays onset of fatigue / eq ;</p> <p>9. by 34 seconds in {group A / those fed on epicatechin} ;</p>	<p>8. ACCEPT reference to muscles can contract for longer</p>	(5)
--	---	---	-----

Q7.

Question Number	Answer	Additional Comments	Mark
(a)(i)	Actin = 14 (%); Myosin = 10 (%);	For Actin Accept 28 (%)	(2)

Question Number	Answer	Additional Comments	Mark
(a)(ii)	1. $\{Ca^{2+} / eq\}$ bind to troponin ; 2. troponin molecules $\{changes\ shape / moves / eq\}$; 3. idea that this displaces tropomyosin ;	3. Ignore comments on exposing myosin binding sites	(2)

Question Number	Answer	Additional Comments	Mark
(a)(iii)	$\{right / R\}$ atrium ;		(1)

Question Number	Answer	Additional Comments	Mark
(b)(i)	The higher the concentration of troponin T in the blood, the higher the mean number of days in hospital / eq ;	Accept the longer the stay in hospital Accept the higher the concentration of troponin T in the blood, the more severe the CVD is T1 (1)	

Question Number	Answer	Additional Comments	Mark
(b)(ii)	1. idea that the conclusion is valid ; 2. as there is no overlap between the range of data for each concentration of troponin T / eq ; 3. the validity (of the conclusion) becomes less the higher the concentration of troponin T / eq ; 4. (because) the data becomes less reliable at higher concentrations of troponin T / eq ; 5. idea that the range of data becomes greater ;	Accept comments relating to spread of data or standard deviations	(2)

Q8.

Question Number	Answer	Additional Guidance	Mark
	1. idea of not being fair ; 2. idea of being a poor role model for youngsters ; 3. health risk to athletes / eq ; 4. cost to $\{NHS / medical\ services / eq\}$ of health implications / eq ;	3. ACCEPT raised blood clotting risk, harmful side effects	(2)