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Mark Scheme (Results)

Summer 2015

Pearson Edexcel International Advanced Level in Biology (WBI05) Paper 01 Energy, Exercise and Coordination

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1(a)	**C** ; the extensor muscle is relaxed and the flexor muscle is contracted	**(1)**

Question Number	Answer	Mark
1(b)(i)	**D** ; pyruvate	**(1)**

Question Number	Answer	Mark
1(b)(ii)	**D** ; ATP, reduced NAD and reduced FAD	**(1)**

Question Number	Answer	Mark
1(b)(iii)	**C** ; NAD	**(1)**

Question Number	Answer	Mark
1(b)(iv)	**A** ;	**(1)**

Question Number	Answer	Mark
1(b)(v)	**C** ; four	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(c)(i)	1. reference to active transport ; 2. using { pump / carrier protein } ;	2. **ALLOW** sodium pump / sodium potassium pump **IGNORE** channel protein	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	1. idea that rate falls ; 2. idea of less ATP production ; 3. idea that sodium pump inhibited ;	2. **ACCEPT** less phosphorylation of ADP	**(3)**

Question Number	Answer	Mark
2(a)(i)	**D** ; sinoatrial node	**(1)**

Question Number	Answer	Mark
2(a)(ii)	**C** ; electrical activity	**(1)**

Question Number	Answer	Additional Guidance	Mark
2(a)(iii)	medulla (oblongata) / cardiovascular centre ;		**(1)**

Question Number	Answer	Additional Guidance	Mark
2(b)	1. receptors in the { skin / hypothalamus } ; 2. idea of (nerve) impulses to { hypothalamus / heat gain centre / thermoregulatory centre } ; 3. arterioles { constrict / vasoconstriction } so less blood to { skin / superficial capillaries } **OR** shunt vessels { dilate / widen / eq } so less blood to { skin / superficial capillaries } ; 4. idea that hair erector muscles contract to { trap air / insulate } ; 5. idea of less heat loss by { radiation / convection } ; 6. idea that heat generated by { shivering / muscle contraction / increase in metabolic rate / increase in respiration } ; 7. idea of { less sweating / inhibition of sweat glands } ; 8. idea of less heat loss by evaporation ;	2. **ALLOW** wave of depolarisation / action potentials 4. **IGNORE** trap heat	**(6)**

Question Number	Answer	Additional Guidance	Mark
*3 (a)	**(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence)** – ***applied once mark has been decided.***	**Emphasis is on logical sequence** **ACCEPT** Ca^{2+} / Na^{+} **ACCEPT** named neurotransmitter in MP4, MP5 and MP6	
	1. impulse / action potential / wave of depolarisation arrives ;		
	2. calcium ion channels open / calcium ions enter (neurone / knob) ;	2. **IGNORE** into membrane **ALLOW** through membrane	
	3. vesicles { fuse / bind / eq } with presynaptic membrane ;		
	4. neurotransmitter released { into synaptic cleft / by exocytosis } ;	4. **ALLOW** synapse	
	5. reference to diffusion of neurotransmitter ;		
	6. neurotransmitter binds to receptors in post synaptic membrane ;		
	7. sodium ion channels open / sodium ions enter ;	7. **IGNORE** sodium channels	
	8. post synaptic membrane is depolarised / action potential initiated / impulse initiated / wave of depolarisation initiated;		**(6)**

Question Number	Answer	Additional Guidance	Mark
3 (b)	1. idea that cocaine { binds / attaches / eq } to the { re-uptake channel / re-uptake protein / protein channel } ; 2. idea that dopamine { remains / accumulates / stays / not reabsorbed / eq } in synaptic cleft ; 3. dopamine { binds / attaches / eq } to receptors in postsynaptic membrane ; 4. idea of { depolarisation / action potentials / impulses } in { postsynaptic neurone / in the pleasure centre } ;	2. **ALLOW** synapse 4. **ALLOW** postsynaptic membrane	**(3)**

Question Number	Answer	Additional Guidance	Mark
4 (a)(i)	correct answer gains TWO marks 1. 2.48 ÷ 7.33 ; 2. (x 100 =) 33.8 (%) ;	**IGNORE** more than 2 decimal places **ALLOW** 33.83 / 34	**(2)**

Question Number	Answer	Additional Guidance	Mark
4 (a)(ii)	1. more reliable for 20 to 29 years ; 2. larger sample size / comparison of numbers to indicate difference in sample size ;	1. **ALLOW** converse for 80 to 89 years 2. **IGNORE** references to standard deviation / range	**(2)**

Question Number	Answer	Additional Guidance	Mark
4 (a)(iii)	1. idea that SD provides information of the { spread / range / variance / variation } of data ; 2. idea that small SD increases confidence in the mean / large SD decreases confidence in the mean ; 3. idea that small SD can indicate reliability / large SD can indicate less reliability ; 4. idea that overlap allows comparison of samples for significant difference ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
4 (b)(i)	1. acetylcholine cannot bind to receptors ; 2. circular muscles do not contract / circular muscles relax ; 3. radial muscles contract ;	1. **IGNORE** location of receptors	**(3)**

Question Number	Answer	Additional Guidance	Mark
4 (b)(ii)	1. to find out if it worked ; 2. to find out if it was safe / check for side effects / make sure it is not toxic / establish toxic level / eq ; 3. to find out the best concentration / dose to use ;	2. **IGNORE** similar nervous systems / similar genes / similar organs	**(2)**

Question Number	Answer	Additional Guidance	Mark
5 (a)(i)	**D** ; the carbon dioxide produced is absorbed		**(1)**

Question Number	Answer	Additional Guidance	Mark
5 (a)(ii)	1. { reset / move / eq } the coloured oil ; 2. allows collection of { several measurements / repeated results / reliable results / valid results } / eq ; 3. measure volume of oxygen consumed ;	1. **IGNORE** references to calibration 3. **NOT** amount	**(2)**

Question Number	Answer	Additional Guidance	Mark
5 (b)(i)	correct answer gains TWO marks 1. 6.75 ; 2. 15 (^{o}C) ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
5 (b)(ii)	idea of { intervals less than 5 ^{o}C / smaller intervals } between 25 ^{o}C and 35 ^{o}C ;	**ALLOW** appropriate list of temperatures e.g. 25 ^{o}C, 27 ^{o}C, 29 ^{o}C, 31 ^{o}C, 33 ^{o}C, 35 ^{o}C	**(1)**

Question Number	Answer	Additional Guidance	Mark
5 (c)	1. idea that less ATP produced ; 2. reference to denaturation ; 3. idea that { ATPase / proton channel / stalked particles } involved ; 4. idea of less { hydrogen ion / H^+ / proton } transport ;		**(3)**

Question Number	Answer	Additional Guidance	Mark
6 (a)	1. reference to habituation ; 2. idea that both show decrease in time siphon withdrawn (with repeated trials) ; 3. idea that sea slug from rough water withdrawal time is lower ; 4. idea that decrease in time siphon withdrawn is {greater / steeper / faster / eq} in sea slug from calm water 5. correct use of figures for decrease as {21.5 to 3 / 18.5 for slug from calm water / 2.5 to 1.0 / 1.5 for slug from rough water / 17.0 }	**ACCEPT** converse for MP3 and MP4	**(4)**

Question Number	Answer	Additional Guidance	Mark
6 (b)	1. idea that {stimulus / squirt of water / rough water} is {harmless / ignored / eq} ; 2. idea that less withdrawal of siphon saves energy / less waste of energy / has more energy for another activity ; 3. allows gas exchange ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
6 (c)	1. idea that fMRI involves brain activity in real time ; 2. idea that fMRI measures oxygen uptake ; 3. idea that active area of brain { gets more blood / oxygenated blood / uses oxygen } ; 4. {oxyhaemoglobin / deoxyhaemoglobin } involved ; 5. idea that fMRI uses {radio waves / signal / energy} ; 6. active brain emits less energy ; 7. more active area appears lighter / less active area appears darker ; 8. idea that brain activity falls with {habituation / repeated stimulus} ;	**ACCEPT** converse for Mp3 and Mp6	**(5)**

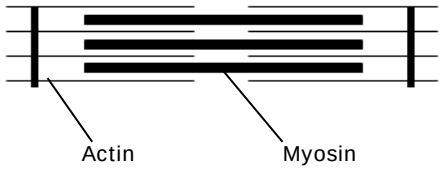
Question Number	Answer	Additional Guidance	Mark
7 (a)	1. idea that { heart rate decreased / blood pressure reduced } ; 2. idea of less {glucose / oxygen} transport ; 3. idea of reduced aerobic respiration **OR** increased anaerobic respiration / lactate build up ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
7 (b)	1. idea of reduced joint stability / more likely to dislocate / loosen / insecure / lack of support ; 2. ligaments attach bone to bone / hold bones together ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
7 (c)	1. makes drugs difficult to detect ; 2. idea that weight loss gives a described advantage ;	2. eg. different weight category / weightlifting / boxing / judo / horse racing	**(2)**

Question Number	Answer	Additional Guidance	Mark
7 (d)	1. avoid { immune response / foreign antigens / rejection / agglutination / transfusion reaction} ; 2. avoid transmission of { disease / infection / HIV / virus / pathogens / eq } ;	1. **IGNORE** different blood type / histocompatibility / clotting / coagulation 2. **IGNORE** microorganisms / bacteria	**(2)**

Question Number	Answer	Additional Guidance	Mark
7 (e)(i)	1. troponin ; 2. tropomyosin ; 3. ATPase ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
7 (e)(ii)	1. drawing correct ; 2. actin and myosin correctly labelled ;	 **Ignore** M line in drawing	**(2)**

Question Number	Answer	Additional Guidance	Mark
7(f)	produced within the body ;		**(1)**

Question Number	Answer	Additional Guidance	Mark
***7(g)**	**(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence)** ***– applied once mark has been decided.*** 1. more slow twitch fibres ; Four from: 2. reference to (more) *aerobic respiration* / (less) *anaerobic respiration* ; 3. idea of (more) *myoglobin* ; 4. reference to (more) *mitochondria* ; 5. idea of (less) *lactate* produced ; 6. idea of (more) *capillaries* ; 7. idea of (less) *fatigue* / athlete can run longer ;	**QWC emphasis is on spelling** **ALLOW** converse for fast twitch fibres	**(5)**

Question Number	Answer	Additional Guidance	Mark
7 (h)	1. idea that process involves a {gene / DNA / allele} ; 2. use of restriction enzymes and ligase ; 3. reference to plasmid ; 4. reference to vector ; 5. use of { *Agrobacterium* / (GM) bacteria / gene gun / virus / liposome / electric shock / protoplast fusion / microinjection } to infect plant ;	2. **ACCEPT** endonuclease / named restriction enzyme	**(4)**

Question Number	Answer	Additional Guidance	Mark
7 (i)	1. (EPO causes) { increased viscosity / blood thickening / increased blood volume / increased number of RBCs / blood clotting / thrombosis / coagulation } ; 2. (and) increases risk of { heart attack / stroke / hypertension / high blood pressure / atherosclerosis } ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
7 (j)	1. idea that (variations in) { haemoglobin / RBC / EPO } content is { natural / inherited / genetic / endogenous } ; 2. idea that other (legal) methods boost { RBC / haemoglobin } levels ;	1. **IGNORE** ideas about doctors helping cheats 2. e.g. oxygen tents / altitude training	**(2)**

Question Number	Answer	Additional Guidance	Mark
7 (k)	1. idea of pre-treatment DNA with restriction enzyme / endonuclease ; 2. idea of { DNA / fragments } placed in wells in { agar / gel } ; 3. idea of use of { electricity / current / potential difference } ; 4. idea of movement of DNA towards { positive electrode / anode } ; 5. idea that separation involves size ; 6. method of detecting DNA described ; 7. reference to comparing with known DNA sample ;	6. e.g. UV light / Southern blotting / probe / autoradiography / X-rays	**(4)**

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