

# Mark Scheme (Results)

January 2012

GCE Biology (6BI05) Paper 01  
Energy, Exercise and Coordination

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Question number	Answer	Mark
1(a)(i)	C	(1)

Question number	Answer	Mark
1(a)(ii)	A	(1)

Question number	Answer	Mark
1(a)(iii)	D	(1)

Question number	Answer	Mark
1(b)(i)	<ol style="list-style-type: none"> <li>1. Idea that lack of (visual) stimulation limits brain development ;</li> <li>2. Idea that this due to of lack of connections ;</li> <li>3. within the {visual cortex / eq} / eq ;</li> <li>4. Idea that the brain cannot interpret this visual information correctly / eq ;</li> <li>5. reference to critical {period / window} ;</li> <li>6. idea that mice are different from humans ;</li> </ol>	(3)

Question number	Answer	Mark
1(b)(ii)	<ol style="list-style-type: none"> <li>1. Idea that embryo supplies cells ;</li> <li>2. Idea that some people have {ethical / eq} objections to the use of embryonic cells/ eq ;</li> <li>3. Idea of objections to the use of animals ;</li> <li>4. Idea of risk of stem cells becoming cancerous ;</li> </ol>	(2)

Question number	Answer	Mark
1(c)(i)	<ol style="list-style-type: none"> <li>1. Idea that (cerebral hemisphere) is the site of vision perception ;</li> <li>2. reference to visual cortex / eq ;</li> <li>3. idea that stem cells differentiate ;</li> <li>4. this treatment will help to establish (neurone) connections / eq ;</li> <li>5. Idea that can not get stem cells to this location any other way (than injection) ;</li> </ol>	(2)

Question number	Answer	Mark
1(c)(ii)	<ol style="list-style-type: none"> <li>1. reduce number of variables / to keep all variables constant / eq ;</li> <li>2. so that only the effect of the {treatment / eq} is measured / eq ;</li> </ol>	(2)

Question number	Answer	Mark
2 (a)* QWC	<p>(QWC – Spelling of technical terms (<i>shown in italics</i>) must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> <li>1. idea that energy obtained from ATP ;</li> <li>2. idea that ATP already in muscle cells e.g. ATP store ;</li> <li>3. ATP from {<i>glycolysis</i>/ substrate level <i>phosphorylation</i>/ eq} ;</li> <li>4. idea that <i>glycolysis</i> produces ATP {rapidly / eq} ;</li> <li>5. idea that some {<i>aerobic respiration</i> / eq} due to some oxygen present ;</li> <li>6. <i>glycolysis</i> occurs in <i>cytoplasm</i> / eq ;</li> <li>7. idea of need to recycle NAD<sup>+</sup> ;</li> <li>8. idea that <i>pyruvate</i> is converted to <i>lactate</i> ;</li> <li>9. reference to <i>anaerobic respiration</i> ;</li> <li>10. idea of <i>lactate</i> tolerance ;</li> <li>11. reference to fast <i>twitch</i> {muscle / fibres} ;</li> <li>12. reference to {<i>creatine phosphate</i> / eq} ;</li> </ol>	(6)

Question number	Answer	Mark
2 (b)(i)	<ol style="list-style-type: none"> <li>1. (lactate build up) causes {drop in pH / more acidic / increase H<sup>+</sup> / eq} ;</li> <li>2. idea of this affects enzyme {activity / shape / eq} ;</li> <li>3. this slows down {<i>glycolysis</i> / ATP production / <i>anaerobic respiration</i> / eq} ;</li> <li>4. reference to muscle contractions being affected ;</li> </ol>	(2)

Question number	Answer	Mark
2 (b)(ii)	<ol style="list-style-type: none"> <li>1. reference to lactate in the blood / eq ;</li> <li>2. {transported to / broken down in / eq} liver ;</li> <li>3. lactate is {converted to pyruvate / eq} ;</li> <li>4. this involves {oxidation / production of reduced NAD / eq} ;</li> <li>5. pyruvate is then {oxidised / eq} ;</li> <li>6. reference to Krebs cycle ;</li> <li>7. {this requires extra oxygen / reference oxygen debt} / eq ;</li> <li>8. idea that carbon dioxide and water are produced ;</li> </ol>	(4)

Question number	Answer	Mark
3(a)(i)	<ol style="list-style-type: none"> <li>1. idea that sample size is enough ;</li> <li>2. comment on the accuracy of measurement / eq ;</li> <li>3. standard deviations are small / eq ;</li> </ol>	(2)

Question number	Answer	Mark
3(a)(ii)	<ol style="list-style-type: none"> <li>1. <math>(9.35 \div 10.22)</math> ;</li> <li>2. <math>(0.91487) \times 100 = 91.5</math> (%) ;</li> </ol>	(2)

Question number	Answer	Mark
3(a)(iii)	<ol style="list-style-type: none"> <li>1. men are faster than women / eq ;</li> </ol> <p>Any one from:</p> <ol style="list-style-type: none"> <li>2. idea of differences in body structure e.g. men have more muscle, longer legs, more fast twitch fibres ;</li> <li>3. idea of differences in physiology e.g. testosterone ;</li> </ol>	(2)

Question number	Answer	Mark
3(b)	<ol style="list-style-type: none"><li>1. marathon distance greater / eq ;</li><li>2. Idea that more aerobic respiration is needed ;</li><li>3. to {reduce / eq} production of lactate ;</li><li>4. anaerobic respiration not efficient enough / eq ;</li><li>5. {oxygen debt / lactate levels} cannot be sustained over this distance / eq ;</li><li>6. idea that marathon runners use slow twitch fibres ;</li></ol>	(3)



Question number	Answer	Mark
4(a)(i)	<ol style="list-style-type: none"> <li>1. idea that people are more likely to have obsessive compulsive disorder if they have a close relative with the condition ;</li> <li>2. credit manipulation of figures i.e. 100 times more likely ;</li> <li>3. therefore they may also have the {genes / alleles / genotype / eq} for this condition / eq ;</li> </ol>	(2)

Question number	Answer	Mark
4(a)(ii)	<ol style="list-style-type: none"> <li>1. idea that if they have a close relative with this illness, the risk {ought to be higher than / is only} 10%;</li> <li>2. therefore other factors must be involved as well / eq ;</li> <li>3. named example of environmental influence e.g. learnt behaviour ;</li> </ol>	(2)

Question number	Answer	Mark
4(a)(iii)	<ol style="list-style-type: none"> <li>1. neurotic depression ;</li> <li>2. {little / eq} difference between {population as a whole / females} and close relative data / eq ;</li> </ol>	(2)

Question number	Answer	Mark
5(a) (i)	<p>Any one from:</p> <ol style="list-style-type: none"> <li>1. reduces {volume / pressure of gas} / eq ;</li> <li>2. allows {measurement of oxygen used / movement of liquid / eq} ;</li> </ol>	(1)

Question number	Answer	Mark
5(a) (ii)	<ol style="list-style-type: none"> <li>1. returning the coloured liquid back to zero / eq ;</li> <li>2. idea of calibration ;</li> <li>3. repetition / eq ;</li> </ol>	(2)

Question number	Answer	Mark
5(b)* QWC	<p>(QWC – Spelling of technical terms (<i>shown in italics</i>) must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> <li>1. reference to constant temperature ;</li> <li>2. use of water bath / eq ;</li> <li>3. reference to {suitable / stated / fixed time / eq} ;</li> <li>4. Reference to measuring {volume / distance} ;</li> <li>5. description of how to obtain volume ;</li> <li>6. calculation of rate described / eq ;</li> <li>7. reference to replicates ;</li> <li>8. description of control e.g. no woodlice ;</li> <li>9. idea of welfare of animals important ;</li> <li>10. reference to {mass / eq} of woodlice ;</li> </ol>	(6)

Question number	Answer	Mark
6(a)(i)	D	(1)

Question number	Answer	Mark
6(a)(ii)	B	(1)

Question number	Answer	Mark
6(a)(iii)	B	(1)

Question number	Answer	Mark
6(a)(iv)	D	(1)

Question number	Answer	Mark
6(a)(v)	A	(1)

Question number	Answer	Mark
6(a)(vi)	C	(1)

Question number	Answer	Mark
7 (a)	<ol style="list-style-type: none"> <li>1. Idea that animals are being mistreated e.g. caused stress, pain ;</li> <li>2. idea that it is not ethical ;</li> <li>3. research topic might not be regarded as essential / eq ;</li> </ol>	(2)

Question number	Answer	Mark
7 (b)(i)	<ol style="list-style-type: none"> <li>1. effect on heart described e.g. increase heart rate / increased cardiac output ;</li> <li>2. idea of acts as neurotransmitter/ effect on sites of control e.g. increased SAN activity, excitatory centre, sympathetic nerves ;</li> <li>3. idea of vasodilation ;</li> <li>4. increase in blood pressure / eq ;</li> </ol>	(2)

Question number	Answer	Mark
7 (b)(ii)	<ol style="list-style-type: none"> <li>1. (increased blood flow) provides more {glucose / oxygen} / enables more {respiration/ energy release} ;</li> <li>2. for muscle used in "food hunt" / eq ;</li> </ol>	(2)

Question number	Answer	Mark
8 (a)	<ol style="list-style-type: none"> <li>1. {stiffness / rigidity} (of muscles) / eq ;</li> <li>2. tremor (of muscles) / eq ;</li> <li>3. slowness of movement / bradykinesia / eq ;</li> <li>4. poor balance / postural instability / eq ;</li> <li>5. walking problems / akinesia / eq ;</li> <li>6. depression / eq ;</li> <li>7. speech problems / eq ;</li> <li>8. swallowing difficulty / dysphagia / eq ;</li> </ol>	(2)

Question number	Answer	Mark
8 (b)	<ol style="list-style-type: none"> <li>1. dopamine agonists {mimic/ eq} dopamine / eq ;</li> <li>2. they bind to dopamine receptors at {synapses / eq} / eq ;</li> <li>3. they trigger action potentials / eq ;</li> </ol>	(2)

Question number	Answer	Mark
8 (c)	<ol style="list-style-type: none"> <li>1. L-Dopa can pass into the brain / eq ;</li> <li>2. L-Dopa is converted into dopamine / eq ;</li> <li>3. dopamine triggers action potentials at synapses / eq ;</li> <li>4. {alleviates / eq} symptoms / eq ;</li> </ol>	(3)

Question number	Answer	Mark
8 (d)	<ol style="list-style-type: none"> <li>1. can help to {reduce / manage / eq} symptoms / eq ;</li> <li>2. idea of no side effects ;</li> <li>3. prevention of {decline / eq} ;</li> <li>4. idea of effects immediate ;</li> <li>5. economic benefits qualified e.g. return to work ;</li> <li>6. social benefit qualified e.g. better quality of life ;</li> </ol>	(3)

Question number	Answer	Mark
8 (e)	<ol style="list-style-type: none"> <li>1. stereotactic frame allows {more accuracy / less damage / eq} / eq ;</li> <li>2. almost any area of the brain can now be {stimulated / eq} ;</li> <li>3. {more / stated} disorders can be treated e.g. cluster headaches, phantom pains ;</li> </ol>	(2)

Question number	Answer	Mark
8 (f)	<ol style="list-style-type: none"> <li>1. brain cells have a potential difference across their membrane / eq ;</li> <li>2. electrical stimulation above a threshold level / eq ;</li> <li>3. causes {depolarisation / action potentials} / eq ;</li> <li>4. the membrane is then repolarised / eq ;</li> </ol>	(3)

Question number	Answer	Mark
8 (g)	<ol style="list-style-type: none"> <li>1. brain has no pain receptors / eq ;</li> <li>2. {local anaesthetic / eq} used / pain receptors desensitised ;</li> <li>3. sense organs are elsewhere e.g. skin, scalp ;</li> </ol>	(2)

Question number	Answer	Mark
8 (h)	(Jamie) can give feedback during the operation / eq ;	(1)

Question number	Answer	Mark
8 (i)	<ol style="list-style-type: none"> <li>1. {neurotoxin / MPTP} destroys the dopaminergic cells / eq ;</li> <li>2. in the {basal ganglia / substantia nigra} ;</li> <li>3. creating Parkinsonian symptoms (in monkeys) / eq ;</li> </ol>	(2)

Question number	Answer	Mark
8 (j)	<ol style="list-style-type: none"> <li>1. connection means that {both / globus pallidus external segment} could be related to Parkinson's / eq ;</li> <li>2. stimulation of either could be beneficial / eq ;</li> <li>3. idea of larger target area ;</li> <li>4. greater chance of success of treatment / eq ;</li> </ol>	(2)

Question number	Answer	Mark
8 (k)	<ol style="list-style-type: none"> <li>1. haemoglobin (without oxygen) absorbs the signal / oxyhaemoglobin does not / eq ;</li> <li>2. fMRI measures oxygen {uptake / change / eq} ;</li> <li>3. More brain activity / eq ;</li> <li>4. lower signal means higher brain activity / eq ;</li> </ol>	(3)

Question number	Answer	Mark
8 (l)	<ol style="list-style-type: none"> <li>1. fMRI can only measure events every 0.25 seconds (250ms) ;</li> <li>2. DBS involves (transient) {events / effects / changes / neural activity / eq} that last a few milliseconds / eq ;</li> <li>3. idea that fMRI is not fast enough to pick up changes due to DBS ;</li> </ol>	

Question number	Answer	Mark
8 (m)	<ol style="list-style-type: none"> <li>1. person taking the placebo does respond / eq ;</li> <li>2. idea that placebo should produce no effect ;</li> </ol>	(2)

Question number	Answer	Mark
8 (n)	DBS produces an immediate observable effect / no other cause of the effect / eq ;	(1)



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