Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCE In Biology (6BI05) Paper 01

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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)	1(a). The only correct answer is A *B is not correct because the spikes on the graph do not become further apart with time* *C is not correct because the spikes on the graph do not become smaller with time* *D is not correct because the spikes on the graph do not become smaller and further apart with time*	(1)

Question Number	Answer	Mark
1(b)	1(b). The only correct answer is B *A is not correct because the value is too small* *C is not correct because the value is too large* *D is not correct because the value is too large*	(1)

Question Number	Answer	Mark
1(c)	1(c). The only correct answer is B *A is not correct because the value is too small* *C is not correct because the value is too large* *D is not correct because the value is too large*	(1)

Question Number	Answer	Mark
1(d)	1(d). The only correct answer is A *B is not correct because the value is too large* *C is not correct because the value is too large* *D is not correct because the value is too large*	(1)

Question Number	Answer	Additional Guidance	Mark
1(e)	1. oxygen is {H^+ / electron} acceptor / eq ; 2. (at end of) electron transport chain ; 3. oxygen is used to form water / eq ; 4. reference to oxidative phosphorylation ; 5. production of ATP ;	1. ACCEPT final electron acceptor	(4)

Total for Question 1 = 8 MARKS

Question Number	Answer	Additional Guidance	Mark
2(a)(i)	1. generate heat (energy) / maintain core temperature / eq 2. moving about looking for food / eq 3. the birds are heavier so they will need more energy to move / eq ;	IGNORE to keep warm 1. ACCEPT to store (excess energy as) fat / insulation	(1)

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	1. less active / less food available / already have insulating fat layer/ eq ;	IGNORE hibernate	(1)

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	1. energy consumption per bird will be affected by mass of the bird / eq ; 2. (need to adjust values to per kg) to make a valid comparison / eq ;	1. ACCEPT 'birds might have different masses' 2. ACCEPT to remove body mass as a variable	(2)

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Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	1. winter energy consumption is lower than in summer / eq ; 2. consumption increases with running speed (for both seasons) / eq ; 3. same { difference between seasons / eq } at each speed ; 4. calculated difference supporting MP1, MP2 or MP3 ;	1. ACCEPT converse 2. ACCEPT positive correlation 4. ACCEPT 3.5 ($Jkg^{-1}s^{-1}$) greater in summer / correct calculated % increase for a specified running speed	(3)

Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	1. ptarmigan can run for longer distances / increased endurance / eq ; 2. reduced running speeds / eq ;	1. ACCEPT tires slowly	(1)

Question Number	Answer	Additional Guidance	Mark
2(b)(iv)	ligaments ;	ACCEPT tendons, cartilage	(1)

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Question Number	Answer	Additional Guidance	Mark
2(c)	1. lactate { moves into / transported in } the blood / eq ; 2. carried to the liver / eq ; 3. lactate is converted to { pyruvate / glucose } ; 4. glucose is { respired / stored / eq } / pyruvate is respired / eq ;	1. ACCEPT lactic acid { moves into / transported in } the blood 4. ACCEPT pyruvate enters link reaction / pyruvate reacts with CoA DO NOT ~~A~~C~~CEPT~~ ACCEPT pyruvate enters Krebs cycle	(3)

Total for Question 2 = 13 MARKS

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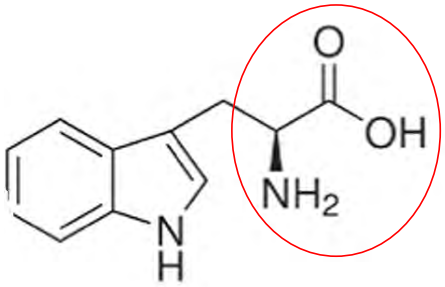
Question Number	Answer	Additional Guidance	Mark
3(a)(i)	NH_2 and COOH groups are circled ;	ACCEPT one or more circles Only NH_2 and COOH groups should be circled 	(1)

Question Number	Answer	Mark
3(a)(ii)	3(a)(ii). The only correct answer is B *A is not correct because proteins do not contain ester bonds* *C is not correct because proteins do not contain glycosidic bonds* *D is not correct because proteins do not contain phosphodiester bonds*	(1)

Question Number	Answer	Additional Guidance	Mark
3(b)	1. idea that substrate binds to (complementary) active site ; 2. idea that bonds are broken in intermediate Or idea that ketone group is removed ;	1. ACCEPT ES Complex formed 2. ACCEPT (C)=O or =O or C=O or CO for ketone group	(2)

Question Number	Answer	Mark
3(c)(i)	The only correct answer is D *A is not correct because the light dependent reaction is one of the stages of photosynthesis* *B is not correct because photolysis is the splitting of a molecule using energy from light* *C is not correct because photophosphorylation is the addition of a phosphate group to a molecule using energy from light*	(1)

Question Number	Answer	Additional Guidance	Mark
3(c)(ii)	1. IAA moves away from light / there is more IAA on the darker side of the stem / eq ; 2. (H) bonds between cellulose molecules weakened / broken / eq ; 3. the cells elongate due to {uptake of water / turgor pressure / eq} / eq ; 4. IAA causes (more) cell elongation (on the dark side of the stem) / eq ;	2. ACCEPT cell walls become {less rigid / more stretchy} / eq	(4)

Total for Question 3 = 9 MARKS

Question Number	Answer	Mark
4(a)(i)	4(a)(i). The only correct answer is C *A is not correct because motor neurones transmit impulses away from the CNS* *B is not correct because relay and sensory neurones have a cell body* *D is not correct because relay neurones have very short axons*	(1)

Question Number	Answer	Mark
4(a)(ii)	4(a)(ii). The only correct answer is B *A is not correct because amylose is a polysaccharide* *C is not correct because myosin is a protein found in muscle filaments* *D is not correct because a thylakoid is a structure found in chloroplasts*	(1)

Question Number	Answer	Mark
4(a)(iii)	4(a)(iii). The only correct answer is A *B is not correct because the resting potential of all neurones is -70 mV* *C is not correct because in a diagram an inhibitory synapse would be shown as a junction between two neurones* *D is not correct because the thickness of the cell membrane is not reduced at nodes of Ranvier*	(1)

Question Number	Answer	Additional Guidance	Mark
4(a)(iv)	1. {action potential / impulse / eq }causes influx of Ca^{2+} / eq ; 2. vesicles fuse with pre-synaptic membrane / eq Or reference to exocytosis ; 3. idea that a neurotransmitter released and attaches to receptors (on cell T) ;	1. ACCEPT Ca^{2+} channels open 3. ACCEPT causes an action potential (in cell T)	(3)

Question Number	Answer	Additional Guidance	Mark
4(b)(i)	1. (4.7 - 2.3) ÷ 4.7 or / 2.4 ÷ 4.7 ; 2. multiplied by 100 = 51(%) ;	Correct answer with no working gains full marks ACCEPT: 51 , 51.06, 51.1(%) and correct ecf answers	(2)

Question Number	Answer	Additional Guidance	Mark
4(b)(ii)	1. pupil size is smaller in older people (in low light conditions) / eq ; 2. the radial fibres in the iris contract less in older people (compared with younger people) ;	1. ACCEPT reverse argument 2. ACCEPT increased contraction of circular fibres in older people	(2)

Total for Question 4 = 10 MARKS

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Commented [SB1]: The forward slash is potentially confusing in the context of calculations, should the word 'OR' be used instead?

Question Number	Answer	Additional Guidance	Mark
5(a)	1. panting causes heat loss / eq ; 2. because water evaporates from { mouth / tongue } / eq ; 3. idea of using heat energy from blood ; 4. panting increases air movement (over the tongue / through the mouth) / eq ; 5. increased air movement increases the rate of evaporation / eq ;	2. ACCEPT saliva evaporates 3. ACCEPT heat energy lost through radiation from blood (capillaries in tongue)	~~(~~4~~)~~ (4)

Question Number	Answer	Additional Guidance	Mark
5(b)(i)	hypothalamus ;		(1)

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Commented [SB2]: The sense of this mp has been changed – the focus on evaporation using energy has been lost.

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Question Number	Answer	Additional Guidance	Mark
*5(b)(ii)	(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence) 1. idea that there is a normal temperature for the blood ; 2. thermoreceptors detect change in temperature ; 3. (thermoreceptors send) nerve impulses to TC / eq ; 4. (if the blood temperature increases the TC) sends out nerve impulses to increase panting / eq ; 5. blood temperature falls (due to panting) / eq ; 6. once normal blood temperature is reached, the impulses (from the TC) cease / eq ; 7. panting stops / eq ; 8. reference to homeostasis ;	QWC emphasis is clarity of expression 3. ACCEPT hypothalamus 4. ACCEPT impulses to ventilation centre	(5)

Question Number	Answer	Additional Guidance	Mark
5(c)	1. panting involves muscle contraction / eq ; 2. muscle contraction requires respiration / eq ; 3. {muscle contraction / respiration} releases heat energy / eq ;		~~(~~2~~)~~ (2)

Total for Question 5 = 12 MARKS

Question Number	Answer	Additional Guidance	Mark
6(a)(i)	1. opsin ; 2. retinal / eq ;	 2. DO NOT ACCEPT retinol	(2)

Question Number	Answer	Additional Guidance	Mark
6(a)(ii)	1. increasing day length reduces the amount of rhodopsin per eye / eq ; 2. idea of linear relationship ;	1. ACCEPT negative correlation 2. IGNORE manipulation of figures	(2)

Question Number	Answer	Additional Guidance	Mark
6(b)	the rats choose to avoid light areas (when the day length is long) Or (when the days are long) the rats { have their eyes shut / are asleep } for part of the daylight hours / eq ;	ACCEPT rats are nocturnal	(1)

Question Number	Answer	Additional Guidance	Mark
6(c)	1. the rat will have {more hours of darkness / longer nights} / eq ; 2. rod cells work well in low light levels / eq ; 3. rats need to be able to see (in dark) to {find food / avoid predators} / eq ;	2. ACCEPT better vision in dark / dim light	(3)

Total for Question 6 = 8 MARKS

Question Number	Answer	Additional Guidance	Mark
7(a)	1. idea of comparison ; 2. idea of seeing if {aerobic / exercise } nature of activity affects cognitive skills ;	2. ACCEPT difference is due to one activity being {aerobic / mental} / both involved in an activity 2. ACCEPT idea that this eliminates activity as a variable	(2)

Question Number	Answer	Additional Guidance	Mark
7(b)	1. idea that the confounding factors could affect whether dementia develops ; 2. they are factors that { are likely to / will } vary between individuals ;	1. ACCEPT named variable e.g. drinking 2. ACCEPT the idea that confounding variables cannot be controlled / taken out of the study	(2)

Question Number	Answer	Additional Guidance	Mark
7(c)	1. axes labelled {(change in) fitness / cardiovascular performance } and { ~~(physical education) grades /~~ cognitive abilities / intelligence} ; 2. line must slope to show a positive correlation ;	2. all parts of the line must show a positive correlation	(2)

Commented [SB3]: Inaccurate answer!

Question Number	Answer	Additional Guidance	Mark
7(d)(i)	cerebrum / cerebral cortex / cerebral hemispheres	ACCEPT hippocampus / frontal lobe / parietal lobe / occipital lobe / temporal lobe	(1)

Question Number	Answer	Additional Guidance	Mark
7(d)(ii)	*(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence) 1. damage occurs to the endothelium (of arteries) ; 2. artery wall { thickens / accumulates material / eq} ; 3. idea that the {artery / lumen} becomes narrower ; 4. reduced blood flow (to the brain) / eq ; 5. brain receives less { oxygen / glucose } ; 6. reduced respiration in brain cells / eq ; 7. increase risk of stroke / eq ;	(QWC emphasis on logical sequencing) 2. ACCEPT {atheroma / plaque / blood clots} develop in artery 3.ACCEPT idea that some (but not all) arteries are completely blocked 7. ACCEPT brain cells die	(5)

Question Number	Answer	Additional Guidance	Mark
7(e)	1. both increase the level of dopamine / eq ; 2. exercise stimulates the release of dopamine ; 3. Ritalin decreases the re-uptake of dopamine from the synaptic cleft / eq ;	3. ACCEPT Ritalin cause dopamine to stay in the synapse	(3)

Question Number	Answer	Additional Guidance	Mark
7(f)	1. the experiment showed that the mice that were bred to be more athletic also had larger brains / eq ; 2. this shows correlation / doesn't show causation eq ; 3. the effect could be correlation if the same genes that caused increased athleticism also cause increase brain growth / eq ; 4. the results for mice might not apply to humans / eq; 5. idea that mice can be used as models as they are mammals / eq ;	1. ACCEPT increased cell production in brain 2. IGNORE references to 'definite evidence' 4. ACCEPT they are genetically different 5. ACCEPT mice have {similar brains / brain structure} to humans	(3)

Question Number	Answer	Additional Guidance	Mark
7(g)	1. BNDF is released during exercise / eq ; 2. BNDF engages with receptors on cells (in the brain) / eq ; 3. Transcription (initiation) complex formed / eq ; 4. on the DNA / {mRNA / proteins produced } / eq ; 5. has an effect on the cell cycle / stimulates { cell division / mitosis} eq ;	1. ACCEPT transcription factors released during exercise 3. ACCEPT binds to promotor / operon 4. DO NOT ACCEPT BNDF produced 4. e.g. switching on genes	(4)

Question Number	Answer	Additional Guidance	Mark
7(h)	1. idea that genes (in the new cells) are { activated / transcribed } ; 2. detail of transcription ; 3. detail of translation ; 4. idea that proteins determine function / structure of cells ; 5. idea that cell processes form ; 6. the new neurones are relay neurones ;	1. ACCEPT switched on 3. ACCEPT correct reference to the role of mRNA / ribosomes/ tRNA 4. ACCEPT 'makes enzymes that the cells need' 5. ACCEPT axons or dendrites as an alternative	(4)

Commented [SB4]: Not sure what mp this is referring to.

Question Number	Answer	Additional Guidance	Mark
7(i)	more synapses / increased production of neurotransmitters / increased number of (post synaptic) receptors on cell membrane / increased numbers of dendrites ;		(1)

Question Number	Answer	Additional Guidance	Mark
7(j)	1. conduct an fMRI scan while someone is engaged in a cognitive activity / eq ; 2. indicates areas with increased { blood flow / oxygen use / eq } eq ; 3. (the lit up areas) indicate higher levels of brain activity / eq ; 4. idea of comparing the scans (from the two groups);	Mp1: accept 'while sorting cards' / during {attention / cognitive} test	(3)

Total for Question 7 = 30 MARKS

TOTAL FOR PAPER = 90 MARKS

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