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Mark Scheme (Results)
June 2010

GCE

GCE Biology (6BI05/01)

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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.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.
Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

GENERAL INFORMATION

The following symbols are used in the mark schemes for all questions:

Symbol	Meaning of symbol
; semi colon	Indicates the end of a marking point
eq	Indicates that credit should be given for other correct alternatives to a word or statement, as discussed in the Standardisation meeting
/ oblique	Words or phrases separated by an oblique are alternatives to each other
{} curly brackets	Indicate the beginning and end of a list of alternatives (separated by obliques) where necessary to avoid confusion
() round brackets	Words inside round brackets are to aid understanding of the marking point but are not required to award the point
[] square brackets	Words inside square brackets are instructions or guidance for examiners
[CE] or [TE]	Consecutive error / transferred error

Crossed out work

If a candidate has crossed out an answer and written new text, the crossed out work can be ignored. If the candidate has crossed out work but written no new text, the crossed out work for that question or part question should be marked, as far as it is possible to do so.

Spelling and clarity

In general, an error made in an early part of a question is penalised when it occurs but not subsequently. The candidate is penalised once only and can gain credit in later parts of the question by correct reasoning from the earlier incorrect answer.

No marks are awarded specifically for quality of language in the written papers, except for the essays in the synoptic paper. Use of English is however taken into account as follows:

- the spelling of technical terms must be sufficiently correct for the answer to be unambiguous
  e.g. for amylase, 'ammalase' is acceptable whereas 'amylose' is not
  e.g. for glycogen, 'glicojen' is acceptable whereas 'glucagen' is not
  e.g. for ileum, 'illeum' is acceptable whereas 'ilium' is not
  e.g. for mitosis, 'mytosis' is acceptable whereas 'meitosis' is not

- candidates must make their meaning clear to the examiner to gain the mark.

- a correct statement that is contradicted by an incorrect statement in the same part of an answer gains no mark – irrelevant material should be ignored

Question Number	Correct Answer	Mark
1(a)	1. nature of abnormality e.g. bleeding, ref. to density ; 2. {location / eq} of abnormality ; 3. {extent / size/ eq} of abnormality ; 4. likely problems e.g. accessibility for surgery ;	**max (2)**

Question Number	Correct Answer	Mark
1(b)	1. (found in) different {regions / eq} of brain / eq ; 2. the right hand brain has {more / two/ eq} abnormalities ; 3. different areas of brain have different functions / eq ; 4. {symptoms / eq} depend on region of brain affected / eq ; 5. idea of different types of abnormality can cause different symptoms ;	**max (2)**

Question Number	Correct Answer	Mark
1(c)	1. detects level of oxygenation of the blood /measures changes in blood flow within brain / eq ; 2. {increased flow / more oxygen / eq} suggests increased activity / eq ; 3. study brain activity related to {stimuli / tasks / eq} ;	**max (2)**

Question Number	Correct Answer	Mark
1(d)		**(4)**

	W	X	Y	Z	
Regulating core temperature		☒			;
Climbing stairs				☒	;
Regulating carbon dioxide in the blood			☒		;
Choosing a gift	☒				;

Question Number	Correct Answer	Mark
2(a)	1. depolarisation of adjacent {membrane / eq} / eq ; 2. changes PD across membrane / eq ; 3. opens sodium {gates / eq} ; 4. sodium ions move into (the neurone) ;	**max (2)**

Question Number	Correct Answer	Mark
2(b)	**Position on diagram** / **Permeable to sodium ions** / **Permeable to potassium ions** A ☒ ; D ☒ ;	**(2)**

Question Number	Correct Answer	Mark
2(c)	1. correct {reference to / description of} diffusion gradient (of potassium ions) ; 2. correct {reference to / description of} electrochemical gradient ; 3. increased permeability (of membrane) to potassium ions / eq ; 4. reference to potassium {gates / eq} open / eq ; 5. reference to sodium {gates / eq} closed / eq ;	**max (3)**

Question Number	Correct Answer	Mark
2(d)	1. PD less negative / eq 2. idea that the membrane remains permeable to potassium ions ; 3. potassium ions {move because of charge difference / eq} ; 4. into {nerve cell / neurone / axon / eq} ; 5. idea that potassium ion is removing a positive charge (from the outside) ; 6. idea that equilibrium is established e.g. diffusion gradient balanced by potential difference ;	**max (3)**

Question Number	Correct Answer	Mark
3(a)	1. carbon dioxide produced in respiration / eq ; 2. affects {volume / pressure} of gas / eq ; 3. allows measurement of oxygen used / eq ;	**max (2)**

Question Number	Correct Answer	Mark
3(b)(i)	Two marks for correct answer 0.8 (mm min^{-1}) ;; if incorrect allow one mark for correct working 1. 48 ; OR 1. 12 ; 2. ÷ 60 to give answer ; OR 2. ÷ 15 to give answer	**(2)**

Question Number	Correct Answer	Mark
3(b)(ii)	1. no oxygen available/no oxygen uptake ; 2. reference to anaerobic respiration ; 3. carbon dioxide produced is absorbed / eq ; 4. no (net) change of {volume / pressure} of gas ;	**max (2)**

Question Number	Correct Answer	Mark
3(b)(iii)	1. {mass / eq} of organism may differ ; 2. use same mass / express results per unit mass / eq ; 3. temperature changes / eq ; 4. control temperature using a water bath / eq ; 5. pressure may affect volume of gas / eq ; 6. use of control with no organisms, at the same time / eq ;	**max (4)**

Question Number	Correct Answer	Mark
4(a)	1. {initiates / eq} heartbeat / eq ; 2. (starts) wave of excitation / depolarisation ; 3. {determines / eq} heart rate ;	**max (2)**

Question Number	Correct Answer	Mark
4(b)	1. {increased / eq} impulses to SAN / eq ; 2. (via) sympathetic {nervous system / eq } ; 3. stimulates more frequent depolarisation in SAN / eq ; 4. increases {heart rate / cardiac output} /eq ;	**max (2)**

Question Number	Correct Answer	Mark
***4(c)**	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) 1. changes {electrical activity / *depolarisation*} of heart / eq ; 2. peak is reversed / eq ; 3. idea that peak is earlier than expected ; 4. no change in pressure in *pulmonary artery* ; 5. (because) little blood in *ventricles* ; 6. missed normal wave after E / longer gap before next wave / eq ; 7. missed (effective) *contraction* after E ; 8. early *depolarisation* leaves *ventricle* insensitive ; 9. idea that the wave of *depolarisation* is prevented ; 10. reference to *refractory* period / eq ;	**max (5)**

Question Number	Correct Answer	Mark
4(d)	1. idea that (absolutists) say drugs should not be used at any time ; 2. should not allow athletes to be pressured into using drugs ; 3. risk to health / eq ; 4. gain unfair advantage / eq ; 5. other harmful substances banned / eq ; 6. burden on care services / eq ; 7. idea that (relativists) say that drugs could be used under some circumstances ; 8. idea that they could be used for medication ; 9. drugs (in the body) can be difficult to legislate for / eq ;	**max (2)**

Question Number	Correct Answer	Mark
5(a)	Mark for each correct row **Muscle** / **Muscle contracted when** (Holding steady / Lifting upwards) Extensor: X Flexor: X X ;;	**(2)**

Question Number	Correct Answer	Mark
5(b)	tendons ;	**(1)**

Question Number	Correct Answer	Mark
5(c)	1. idea that muscles cannot extend themselves ; 2. need opposing muscle to extend / eq ; 3. antagonistic muscle allows control (of movement) / eq ;	**max (2)**

Question Number	Correct Answer	Mark
5(d)	1. all fibres same length and width as original ; 2. Z lines closer together ; 3. more overlap of actin and myosin ;	**(3)**

Question Number	Correct Answer	Mark
***5(e) QWC**	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) 1. reference to {*vesicles* / *t-tubules* / *sarcoplasmic reticulum*} contain *calcium ions* ; 2. {binds / eq} to *troponin* ; 3. *tropomyosin* moves exposing binding sites / eq ; 4. for *myosin* /eq ; 5. needs ATP to remove *calcium ions* / eq ; 6. ATP provides energy for changing shape of *myosin* / eq ; 7. ATP is required to {break cross bridges / eq} ; 8. ATP for synthesis of *neurotransmitter* / eq ;	**max (5)**

Question Number	Correct Answer	Mark
6(a)	ATPase / ATP synthetase ;	**(1)**

Question Number	Correct Answer	Mark
6(b)	1. (H^+ ions) from reduced NAD / eq ; 2. H^+ ions pumped into inter membrane space / eq ; 3. reference to energy needed (for pump) / eq ; 4. reference to movement of electrons along ETC /eq; 5. (ETC on) inner membrane / cristae;	**max (3)**

Question Number	Correct Answer	Mark
6(c)	1. H^+ ions follow diffusion gradient / eq ; 2. idea that this causes an energy change or makes energy available ; 3. ATP is formed / eq ; 4. idea that this occurs on stalked particles ; 5. ATP is energy source for (biological processes) / eq ;	**max (2)**

Question Number	Correct Answer	Mark
7(a)	1. idea that enzymes are proteins ; 2. reference to transcription ; 3. gene / eq ; 4. reference to mRNA ; 5. reference to translation (of mRNA) ; 6. reference to genetic code / eq ; 7. reference to {ribosome / polysomes} ; 8. reference to tRNA ; 9. idea that amino acids bonded / polypeptide produced ;	**max (4)**

Question Number	Correct Answer	Mark
7(b)	1. adrenoceptors are {proteins / glycoproteins} ; 2. phospholipids can move in the membrane / eq ; 3. can be {added to / removed from / move around in} {phospholipid bilayer / membrane} ; 4. adrenroceptors can interact with phospholipids e.g. {hydrophobic / hydrophilic} interactions ;	**max (2)**

Question Number	Correct Answer	Mark
7(c)	1. {incomplete / insufficient} data / eq ; 2. different interpretations of data / eq ; 3. & 4. credit any two examples from the text e.g. evidence from noradrenaline, electrical stimulation, multifactorial problem, antidepressant drugs, pain killers, gender ;;	**max (3)**

Question Number	Correct Answer	Mark
***7(d)(i)**	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) **Drug therapy** 1. idea that it affects the whole brain ; 2. idea that it is difficult to get dose right ; **DBS (Deep Brain Stimulation)** 3. targets specific area of the brain / eq ; 4. relieves tremors /eq ; 5. has effects on {other areas of the brain / other cell types} ; 6. has short term side effects e.g. laughing, crying ; 7. has long term side effects e.g. depression, mood swings, suicidal tendencies ; 8. invasive procedure has risk / eq ; **Gene therapy** 9. corrects chemical imbalance / eq ; 10. precise group of cells affected / eq ; **Light therapy** 11. very precise effects / eq ; 12. requires genetic modification / eq ; 13. genes from different species / eq ; **General** (Gene or light therapy) 14. dangers of using virus as vector / eq ; 15. ethical issues of genetic modification / eq ;	**max (7)**

Question Number	Correct Answer	Mark
7(d)(ii)	1. both caused by {lack / eq} of neurotransmitter ; 2. Parkinson's {lack / eq} of dopamine ; 3. depression {lack / eq} of serotonin ;	**max (2)**

Question Number	Correct Answer	Mark
7(e)	1. light affects pigments / eq ; 2. rhodopsin / iodopsin (in mammals) ; 3. (changes in pigment) result in action potentials /nerve impulses / eq ; 4. pigments (in cones) respond to {specific / eq} wavelength / eq ;	**max (3)**

Question Number	Correct Answer	Mark
7(f)	1. virus acts as a vector ; 2. reference to human cold virus ; 3. virus has specific surface proteins / eq ; 4. match surface{proteins / receptors / eq} of target cell ; 5. binding to surface protein promotes entry to cell / eq ; 6. idea that genes can be incorporated into {host DNA / eq}	**max (3)**

Question Number	Correct Answer	Mark
7(g)	1. {causes / involved in / eq} inflammation / eq ; 2. vasodilation / eq ; 3. increased blood flow / eq ; 4. increased {permeability / leakage} of blood vessels ; 5. Oedema / swelling / eq ; 6. reference to temperature increase ; 7. reference to histamine / mast cells ; 8. idea that phagocytes / macrophages move to site ;	**max (2)**

Question Number	Correct Answer	Mark
7(h)	1. representative sample / eq ; 2. (sufficiently) large sample / eq ; 3. double blind testing ; 4. reference to placebo ; 5. objective measurement of effects / eq ; 6. (collecting / analysing) separate data sets for males and female / eq ; 7. other factors need to be {controlled / measured} e.g. hormone levels in females, socioeconomic, nutrition ; 8. reference to other models e.g. animals, tissue culture ; 9. appropriate comment on safety issues e.g. toxicity ; 10. consideration of time e.g. between dose and observation, long term data ;	**max (4)**

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