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Mark Scheme (Results)
Summer 2010

GCE

GCE Biology (6BI01/01)

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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.

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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	Answer	Mark
1(a)	A ;	**(1)**

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

Question Number	Answer	Mark
1(c)	C ;	**(1)**

Question Number	Answer	Mark
1(d)	D ;	**(1)**

Question Number	Answer	Mark
1(e)	D ;	**(1)**

Question Number	Answer	Mark
1(f)	C ;	**(1)**

Question Number	Answer	Mark
1(g)	A ;	**(1)**

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Question Number	Answer	Mark
2(a)	1. atria / atrium; 2. aorta ; 3. left ; 4. artery ; 5. vena cava ;	**(5)**

Question Number	Answer	Mark
2 (b)	1. diastole / atrial systole ; 2. the {atrioventricular / bicuspid / tricuspid} valves are open / semi-lunar valves are closed ;	**(2)**

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Question Number	Answer	Mark
3(a)(i)	1. phospholipids ; 2. phosphate (head) ; 3. (two) fatty acid (tails) ; 4. reference to location of glycerol ; 5. correct reference to ester bonds ;	**max (3)**

Question Number	Answer	Mark
3(a)(ii)	1. reference to {hydrophilic / polar / charged} part ; 2. reference to {hydrophobic / non polar / uncharged} part ; 3. reference to orientation of molecule in relation to water; 4. idea that aqueous environment is {on two sides / cytoplasm and {environment / tissue fluid / eq}} ;	**max (3)**

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Question Number	Answer	Mark
3(b)	**Active transport:** 1. idea that molecule {binds / fits into} {protein / carriers} ; 2. idea that {protein / carrier} changes shape ; 3. (molecules move) against a concentration gradient / eq ; 4. reference to use of {ATP / energy} ; [Submax 2 marks] **Facilitated diffusion:** 5. reference to proteins as {channels / gates / pores / carriers} ; 6. idea that {channels can open or close / carriers change shape} ; 7. for {large / polar / charged} molecules (to pass through membrane) ; 8. (molecules move) down a concentration gradient / eq ; [Submax 2 marks]	**max (3)**

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Question Number	Answer	Mark
3(c)(i)	1. idea that both types of protein in fused cell in correct context ; 2. idea that the proteins are {intermingled / mixed / eq} ; 3. same original number of protein / eq ;	**max (2)**

Question Number	Answer	Mark
3(c)(ii)	1. idea that {phospholipids / molecule A} allow {fluidity / movement/ eq} ; 2. idea that {fluidity / movement / eq} allow membranes to fuse; 3. idea that {fluidity / movement / eq} allows protein to {move / intermingle / eq} ;	**max (2)**

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Question Number	Answer	Mark
4(a)(i)	1. idea that frequent cocaine use results in {higher / an increase in / eq } levels in both blood components (compared to occasional use) ; 2. correct manipulation of figures to approximate the increase in levels of one of the blood components ; 3. frequent use increases fibrinogen beyond normal range / eq ; 4. idea that the levels of both the blood components are within the range for normal levels in occasional users ;	**max (3)**

Question Number	Answer	Mark
4(a)(ii)	**Any one of the following ideas** 1. the levels are given as a {range / not one level / blood components within normal level range} 2. no indication of data analysis e.g. spread of data, statistics 3. no indication of number in {samples / study / eq} 4. no indication of other variables / named variable / eq ;	**max (1)**

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Question Number	Answer	Mark
4(b)	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) 1. idea that *von Willebrand* factor results in *platelets* sticking to {the endothelium /each other} ; 2. reference to release of *thromboplastin* (from *platelets*) ; 3. (as a result) the blood clotting process is triggered / eq ; 4. credit one correct detail of clotting process ; 5. reference to more *fibrinogen* resulting in the clot {being larger / growing faster } ; 6. reference to *von Willebrand* factor making the *platelets* stickier ; 7. as a result of {*platelet* stickiness /platelets sticking together} the {clot grows faster / blood flow is decreased / eq} ; 8. If the blood is flowing slower then there is an increased chance of blood clotting / eq ;	**max (4)**

Question Number	Answer	Mark
4(c)	1. idea that a correlation is {a relationship between two factors / when one factor changes another factor changes} ; 2. fibrinogen increases with (cocaine) use / eq ; 3. heart attacks increase with cocaine use / eq ; 4. idea that increased fibrinogen levels have not been shown to result in the increase in heart disease ;	**max (2)**

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Question Number	Answer	Mark
***5(a) 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 CFTR {protein / channel} eq ; 2. reference to a different {amino acid / sequence of amino acids / eq} (on defective CFTR protein) ; 3. reference to change in protein ; 4. reference to role of protein in transporting chloride ions ; 5. reference to (chloride) ions not {moving out of cells / going into mucus} ; 6. reference to sodium ions moving in ; 7. water does not move out (of cells) / water moves in (to cells) /eq ; 8. by osmosis / eq ; 9. mucus (on cell surface) {is not diluted / becomes thicker / becomes stickier} / eq ; 10. (thickened mucus) cannot be moved by {cilia / coughing} ;	**max (5)**

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Question Number	Answer	Mark
5(b)(i)	1. idea that mucus {traps / eq} {bacteria / pathogens} ; 2. idea that {bacteria / mucus containing the bacteria} cannot be removed (by cilia); 3. idea that mucus provides conditions for bacteria to {live / grow / develop / eq} ; 4. reference to antibodies not being effective ; 5. reference to trauma caused by coughing ; 6. idea that resident {phagocytes / macrophages} cannot destroy bacteria ;	**max (2)**

Question Number	Answer	Mark
5(b)(ii)	1. {increase / eq} with age ; 2. (increases) {from 0 to 25 / up to 25} ; 3. {constant /eq} 25 to 35 ; 4. {decreases / eq} 35 to 45 ; 5. credit correct manipulation of figures ;	**max (3)**

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Question Number	Answer	Mark
5(b)(iii)	1. Overall increase in P and decrease in S ; 2. At 0 more S than P / between 0 and 7 years S is greater than P ; 3. After 7 years P is greater than S ; 4. S starts to decrease at year 15 but P {decreases at 35 years / continues to increase} ; 5. Maximum P is greater than maximum S ; 6. S {stays constant / is at its highest} between 10 and 15 years but P {stays constant / is at its highest} between 25 and 35 years ;	**max (2)**

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Question Number	Answer	Mark
6(a)	1. reference to {enzymes / biological catalysts} reducing activation energy / eq ; **Biological catalyst** 2. produced by {organisms /cells}; 3. speeds up (rate of) {reactions / processes} / eq ; **Activation energy** 4. energy needed for a reaction to occur / eq ; 5. By causing bonds to {break / weaken / form} / by increasing the number of collisions / eq ;	**max (4)**

Question Number	Answer	Mark
6(b)	1. idea that there should be enough substrate molecules to saturate the enzyme ; 2. (to ensure that) substrate is not a limiting factor/ eq ; 3. {fastest / highest} rate / decreases after initial rate / eq ; 4. as reaction proceeds substrate concentration decreases / eq ; 5. as substrate gets used up {by enzyme / in reaction / eq } ; 6. substrate concentration should be constant (in each test) / eq ;	**max (2)**

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Question Number	Answer	Mark
6(c)	**Any two pairs** pH ; buffer ; temperature ; water bath ; not room temperature time of reaction ; stopwatch ; volume of {enzyme / substrate} ; not amount measuring cylinder / pipette ; type of enzyme ; same batch of enzyme ;	**(4)**

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Question Number	Answer	Mark
7(a)(i)	Any **two** from: genetic, diet qualified, increasing age, male, high blood pressure, smoking, {inactivity / lack of exercise / eq} ;	**(1)**

Question Number	Answer	Mark
7(a)(ii)	1. idea that it makes the {results / data / study} {representative / reliable} ; 2. idea that there are {many potential risk factors / large variation between individuals}; 3. idea that side effects more likely to show up ;	**max (2)**

Question Number	Answer	Mark
7(b)	same treatment method as for drug S e.g. solvent used for drug S / saline / water / sugar tablet / empty capsule / eq ;	**(1)**

Question Number	Answer	Mark
7(c)	idea that {CVD is not an immediate disease / side effects may take time to become apparent / need to see if drug works over a long time} ;	**(1)**

Question Number	Answer	Mark
7(d)	1. the number of {deaths / all events / eq} is {similar to / no higher than / less than} placebo group ; 2. Credit correct manipulation of figures ;	**(2)**

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Question Number	Answer	Mark
7(e)(i)	1. correct values selected (8.7 and 11.8) ; 2. correct subtraction (11.8 – 8.7 = 3.1); 3. correct multiplication by 10 000 ÷ 100 ; [Consequential errors apply]	**(3)**

Question Number	Answer	Mark
7(e)(ii)	it has been shown to reduce {CVD / stroke} / eq ;	**(1)**

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Question Number	Answer	Mark
8(a)	1. tumour has {decreased in size / grown less / eq} ; 2. decrease in size quantified ; 3. rats survive longer / eq ; 4. idea that {more rats survive / higher survival rate / lower death rate} ; 5. 80% ;	**max (3)**

Question Number	Answer	Mark
8(b)(i)	1. reference to (virus acting as a) vector ; 2. idea that virus is used to get the {gene / DNA} into the cells ;	**(2)**

Question Number	Answer	Mark
8(b)(ii)	reference to {neurones in spinal cord / endorphins being made in spinal cord / spinal cord connects to brain / eq} ;	**(1)**

Question Number	Answer	Mark
8(b)(iii)	idea that endorphins have pain-reducing properties / more {endorphins / endorphins secreting cells} produced ;	**(1)**

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Question Number	Answer	Mark
8(b)(iv)	1. {little change / eq} in control but treated rats {rise and fall / eq} ; 2. in first {2 weeks / ½ month} level of tolerance is {(almost) the same in both groups slightly higher in control group} / eq ; 3. after the first 2 weeks the level of tolerance is higher in the rats given gene therapy / eq ; 4. between 2 weeks and 2 months there is an increase in tolerance in rats given gene therapy but control group {remains the same / drops (slightly)} / eq ; 5. ref to decrease in tolerance in group given gene therapy {in last month / after two months} and (slight) increase in control group ; 6. credit correct comparative manipulation of figures ;	**max (3)**

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