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Mark Scheme (Results)
January 2010

GCE

GCE Biology (6BI01/01)

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GENERAL INTRODUCTION

Mark schemes are prepared by the Principal Examiners and revised, together with the relevant questions, by a panel of senior examiners and subject teachers. The schemes are further amended at the Standardisation meetings attended by all examiners. The Standardisation meeting ensures as far as possible that the mark scheme covers the candidates' actual responses to questions and that every examiner understands and applies it in the same way.

The schemes in this document are the final mark schemes used by the examiners in this examination and include the amendments made at the meeting. They do not include any details of the discussions that took place in the meeting, nor do they include all of the possible alternative answers or equivalent statements that were considered to be worthy of credit.

It is emphasised that these mark schemes are working documents that apply to these papers in this examination. Every effort is made to ensure a consistent approach to marking from one examination to another but each marking point has to be judged in the context of the candidates' responses and in relation to the other questions in the paper. It should not be assumed that future mark schemes will adopt exactly the same marking points as this one.

Edexcel cannot under any circumstances discuss or comment informally on the marking of individual scripts. Any enquiries about the marks awarded to individual candidates can be dealt with only through the official Enquiry about Results procedure.

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)	D ;	**(1)**

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

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

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

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

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

Question Number	Answer	Mark
2	1. transcription ; 2. mRNA / eq ; 3. translation ; 4. ribosomes / rough endoplasmic reticulum / RER ; 5. tRNA / eq ; 6. peptide / covalent ;	**(6)**

Question Number	Answer	Mark
3 (a)	1. rate is same for up to 30 minutes / eq ; 2. faster (uptake) for A than B / eq ; 3. (uptake of) A is linear throughout whereas (uptake of) B is not / eq ; 4. uptake of substance B levels off at {2 to 2.2} hours whereas uptake of A does not / eq ; 5. credit correct manipulation of comparative figures ;	**maximum (3)**

Question Number	Answer	Mark
3* (b) QWC	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) 1. correct ref to diffusion (of substance B) occurring due to concentration difference / eq ; 2. idea of rate of uptake decreases ; 3. as the concentration gradient decreases / eq ; 4. (net) uptake stops / eq ; 5. when concentration inside cell equals that outside the cell / eq ;	**maximum (4)**

Question Number	Answer	Mark
3 (c)	1. active transport is {against /eq} concentration gradient /eq ; 2. active transport requires ATP /eq ; 3. ref to involvement of (membrane) proteins in active transport ;	**maximum (2)**

Question Number	Answer	Mark
4 (a)	<table><tr><th>Name of blood vessel</th><th>Carries blood away from the heart</th><th>Carries oxygenated blood</th></tr><tr><td>Aorta</td><td>✓</td><td>✓</td></tr><tr><td>Vena cava</td><td>×</td><td>×</td></tr><tr><td>Pulmonary artery</td><td>✓</td><td>×</td></tr><tr><td>Pulmonary vein</td><td>×</td><td>✓</td></tr></table> [Any 2 correct answers for 1 mark];;;;	**(4)**

Question Number	Answer	Mark
4 (b)(i)	1. (blood flows) from heart to gills ; 2. (blood flows) from gills to (rest of) body / eq ; 3. (blood flows) from body back to heart ; 4. ref to single circulation ;	**maximum (3)**

Question Number	Answer	Mark
4 (b)(ii)	1. blood flows {faster /at higher pressure / eq} (to the body) ; 2. blood flows {slower /at lower pressure / eq} to the lung ; 3. idea that this reduces risk of damage to lungs ; 4. correct ref to more efficient {exchange / transport} of gases / eq ;	**maximum (2)**

Question Number	Answer	Mark
4 (c)	1. correct ref to large surface area to volume ratios ; 2. idea that (all) {cells / eq} are very close to the {blood / heart} ; 3. idea that diffusion is fast enough for exchange of {nutrients / gases / waste} ; 4. idea of low metabolism ; 5. idea that movement of blood back into the heart is fast enough (to return blood back into the heart) ;	**maximum (2)**

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. idea that there is a cascade of events (leading to blood clotting) ; 2. ref to *thromboplastin* (starting the cascade) ; 3. ref to conversion of *prothrombin* into *thrombin* ; 4. idea that {*thromboplastin* / *thrombin*} is {an enzyme / a catalyst} ; 5. ref to conversion of *fibrinogen* into *fibrin* ; 6. ref to formation of mesh of {fibres / *fibrin*} ; 7. ref to requirement of {calcium ions/ Ca^{2+} / vitamin K} ; 8. ref to {*platelets* / blood cells} getting trapped (in the mesh) ;	**maximum (4)**

Question Number	Answer	Mark
5(b)(i)	1. snake venom decreases the clotting time /eq ; 2. (overall) as mass of snake venom increases the clotting time decreases /eq ; 3. idea that only a very small increase (0.004) in mass causes very sharp drop in clotting time ; 4. concentrations above {0.004 /0.02} cause little change in clotting time / eq ; 5. credit correct use of manipulated figures ;	**maximum (3)**

Question Number	Answer	Mark
5(b) (ii)	idea of one of the following: if the snake venom has similar effects as a known clotting factor an idea of its mode of action can be worked out / how deadly the snake is / compare to normal (clotting) process / possible use as medication / for research into antidotes / eq ;	**(1)**

Question Number	Answer	Mark
5(c) (i)	1. ref to an enzyme as a protein ; 2. ref to {3D / tertiary / globular} structure ; 3. ref. to named bonds (holding structure in place) ; 4. between the R groups ; 5. ref to active site ; 6. idea of specificity of active site ;	**maximum (3)**

Question Number	Answer	Mark
5(c)(ii)	1. it is one of the enzymes /similar to one of the enzymes, in the clotting process / eq ; 2. idea that has active site complementary to one of the substrates ; 3. ref to it activating other enzymes ; 4. ref to effect on platelets ; 5. idea that it triggers the clotting process ;	**maximum (2)**

Question Number	Answer	Mark
6(a)	1. each {drink / tea} has different caffeine contents / eq ; 2. coffee has the highest and white tea has the lowest caffeine / eq ; 3. idea that coffee has far more caffeine than the others ; 4. cocoa has a similar caffeine content to Oolong tea / eq ; 5. credit manipulated figures to quantify any of the statements ;	**maximum (3)**

Question Number	Answer	Mark
6(b)(i)	1. idea of heart rate determined before treatment ; 2. idea that daphnia need to be put into tea and allowed to acclimatise ; 3. practical detail e.g. use of microscope ; 4. details of determining heart rate described /eq ; 5. ref to named controlled variable ; 6. ref to {repeats /replicates} ; 7. idea that heart rate of daphnia determined in {white tea (only) / known caffeine concentration} ;	**maximum (4)**

Question Number	Answer	Mark
6(b)(ii)	**For**: 1. *Daphnia* are very simple organisms / *Daphnia* have basic nervous system / eq ; **Against**: 1. use of (any) animal is wrong / how can we be sure what the *Daphnia* can feel / ref. to possibility that the *Daphnia* could die / eq ;	**(2)**

Question Number	Answer	Mark
7(a)	1. idea that these cells are {easy / painless} to collect ; 2. idea that a relatively {large amount of DNA / large number of cells} can be collected ; 3. they {contain diploid cells / have (23) pairs of chromosomes} ; 4. cells {are genetically identical / have same DNA / have same alleles} ; 5. any {recessive allele / mutated (CF) gene} will be present in them / eq ; 6. idea that if the gametes were tested they may not contain the {recessive allele / mutated (CF) gene}(as they are haploid) ;	**maximum (2)**

Question Number	Answer	Mark
7(b)	1. cystic fibrosis results from one of a number of possible mutations (of this gene) /eq ; 2. idea that testing for only one will miss other recessive alleles ;	**(2)**

Question Number	Answer	Mark
7(c)	1. ref to false negatives / eq ; 2. idea that the screening programme does not test for all the possible mutations that can cause cystic fibrosis ; 3. idea that a mutation may occur in the formation of the gametes ; 4. idea of mutation in both gametes ; 5. idea that a mutation may occur after fertilisation ;	**maximum (2)**

Question Number	Answer	Mark
7(d)	1. idea that any other family member could be a carrier ; 2. idea that informed choices can be made about having children (if they know that they are carriers) ;	**(2)**

Question Number	Answer	Mark
7(e)	1. heterozygous genotype of both parents shown or stated ; 2. possible alleles carried in the gametes shown (can be shown in a Punnet square) ; 3. possible genotypes of offspring clearly shown (can be shown in a Punnet square) ; 4. corresponding phenotypes given ; 5. (probability of having child with cystic fibrosis is) 25% / 1 in 4 / ¼ / 0.25 / ;	**maximum (5)**

Question Number	Answer	Mark
8(a)(i)	correct substitution (e.g. 83 / 1.8 x 1.8) ; answer = 25.6 ; correct answer = 2 marks	**(2)**

Question Number	Answer	Mark
8(a)(ii)	1. calculated value is 25.6 which is {greater than 25.0 / in range 25.0 to 29.9} ; 2. (therefore) man is overweight ; 3. but only just (overweight) ;	**maximum (2)**

Question Number	Answer	Mark
8(b)	1. relative mortality decreases as BMI increases from 19 to {20 to 23} in (both men and women) / eq ; 2. little change in relative mortality within the range {20 / 21 to 24 / 25} / eq ; 3. as BMI increases from above {22 to 25} risk increases (in both men and women) / eq ; 4. idea that from above {20 to 25} the risk for men is greater than that for women / risk the same between 19 and {20 to 25} ;	**maximum (3)**

Question Number	Answer	Mark
8(c)(i)	1. (relative mortality is) {1.24 to 1.26} ; 2. idea that risk is low / no need to be concerned ; 3. ref to need to {reduce / be concerned} about {BMI / weight / obesity} ;	**maximum (2)**

Question Number	Answer	Mark
8* (c)(ii) QWC	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) 1. idea that the woman could reduce her {energy / eq} intake ; 2. {weight/ BMI} decreases if her energy expenditure greater than intake / eq ; 3. diet should have reduced cholesterol levels / eq ; 4. cholesterol has been associated with {high blood pressure / atherosclerosis / eq} ; 5. diet should have reduced saturated fat / eq ; 6. reduces blood {cholesterol /LDL} / eq ; 7. idea that the woman could increase the amount of exercise she took ; 8. weight decreases if energy expenditure is greater than her intake / exercise helps maintain a healthy heart /reduces blood pressure / eq ; 9. idea that if the woman smoked she should reduce it ; 10. smoking {reduces oxygen uptake / increases stickiness of platelets / increases blood pressure / increases risk of atheroma / eq} ; 11. idea that diet should have reduced salt ; 12. high salt associated with high blood pressure ; 13. idea of moderate alcohol intake ; 14. high alcohol associated with high blood pressure ;	**maximum (4)**

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