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Mark Scheme (Results)

Summer 2012

GCE Biology (6BI01) Paper 01
Lifestyle, Transport, Genes and Health

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

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

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

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

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

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

Question Number	Answer	Mark
1(g)	**mRNA** 1. idea of mRNA being a copy of the { antisense DNA strand / template DNA strand / coding DNA strand / gene / allele / part of DNA / eq } ; 2. idea that mRNA {made up of codons / codes for specific amino acids / code for amino acid sequence / eq} ; 3. idea of mRNA being taken {into the cytoplasm / to the ribosomes / out of the nucleus / eq} ; 4. used in translation ; 5. binds to ribosome ; **tRNA** 6. (tRNA) {attaches to / transports / eq } (specific) amino acid / eq ; 7. idea that tRNA binds to mRNA / reference to anticodon codon interaction ; 8. idea that two tRNA bring amino acids together (for peptide bonds to be formed) ;	**(4)**

Question Number	Answer	Mark
2(a)(i)	1. idea that a monosaccharide consists of one {sugar / named sugar / eq} (unit) whereas a disaccharide consists of two (sugar units) ; 2. idea that disaccharide has a glycosidic bond (whereas monosaccharide does not) ; 3. general formula for a monosaccharide is $C_nH_{2n}O_n$ whereas formula for disaccharide is $C_nH_{2n-2}O_{n-1}$ / eq ;	**(2)**

Question Number	Answer	Mark
2(a)(ii)	1. amylose is {straight chained / unbranched / eq} whereas amylopectin is branched ; 2. amylose {coiled / eq} (whereas amylopectin is not) / eq ; 3. amylose has 1-4 (glycosidic) bonds whereas amylopectin has 1-4 and 1-6 (glycosidic) bonds ;	**(2)**

Question Number	Answer	Mark
2(b)	1. idea of carbohydrates providing a source of energy ; 2. if the {energy / carbohydrate / eq} input is greater than the {energy output / carbohydrate use / eq} (weight will be gained) / eq ; 3. idea of excess carbohydrate converted to fat ;	**(2)**

Question Number	Answer	Mark
***3(a)QWC**	**Take into account quality of written communication when awarding the following points.** 1. idea that there are four chambers ; 2. correct reference to relative position of *atria* and *ventricles* ; 3. idea of left and right sides separate / *septum* ; 4. reference to muscular nature of walls ; 5. reference to *cardiac* muscle ; 6. idea of relative thickness of *ventricle* (walls) ; 7. correct reference to position of {*atrioventricular valves* / eq} ; 8. correct reference to position of *semilunar valves* ; 9. reference to position of {*tendons / tendinous cords / papillary muscles* / eq} ; 10. correct reference to position of {*aorta / pulmonary artery}* ; 11. correct reference to position of {*vena cava / pulmonary vein}* ; 12. correct reference to *coronary arteries* ; 13. reference to {*SAN / Sino Atrial Node / pacemaker/ AVN /Atrioventricular Node / Purkinje fibres /Purkyne fibres / Bundle of His/eq } ;*	**(5)**

Question Number	Answer	Mark
3(b)	1. idea that the heart has to pump blood a long way around the body of the giraffe ; 2. (therefore) blood needs to be (pumped) at high pressure / eq; 3. blood vessels are needed to contain the blood / reference to closed circulation / eq ; 4. idea of double circulatory system ; 5. capillaries needed to ensure that all parts of giraffe are close to blood supply/ eq ; 6. idea of need for a circulation to {provide oxygen / remove carbon dioxide / other correct named substance} ; 7. idea of {oxygen / glucose} needed as {high metabolic rate / high rate of respiration / eq} ; 8. idea of diffusion not meeting the requirements of the giraffe ; 9. reference to low surface area to volume ratio ; 10. idea that circulatory system helps regulation of body temperature ;	**(4)**

Question Number	Answer	Mark
4(a)	1. reference to enzyme increasing the rate of reaction (higher than the rate if no enzyme present) ; 2. idea that the rate of reaction with the enzyme present is non-linear ; 3. Idea that increase in (initial) rate of reaction is same with or without enzyme present above (substrate concentration) of {10 / 12} ; 4. credit correct manipulation of figures (in relation to the effect of the enzyme) ;	**(2)**

Question Number	Answer	Mark
4(b)(i)	ester ;	**(1)**

Question Number	Answer	Mark
4(b)(ii)	Any **two** from: 1. fatty acid (s) / carboxylic acid(s) 2. glycerol / propan1,2,3 triol 3. monoglyceride 4. diglyceride ;;	**(2)**

Question Number	Answer	Mark
4(b)(iii)	(pH) would {fall / drop / get lower / decrease / eq} ;	**(1)**

Question Number	Answer	Mark
***4(c) QWC**	**Take into account quality of written communication when awarding the following points.** 1. reference to use of a range of substrate (triglyceride) concentrations ; 2. idea of mixing (enzyme and substrate) ; 3. identification of a suitable dependent variable e.g. pH ; 4. description of how to measure the dependent variable e.g. use of pH indicator ; 5. reference to measuring time ; 6. description of how to calculate (initial) rate of reaction ; 7. idea of repeating experiment without the enzyme ; 8. idea of control of enzyme (lipase) concentration ; 9. reference to one other named controlled variable (e.g. temperature, type of triglyceride, volume of solutions) ; 10. reference to {replicates / repeats} (using the same triglyceride concentration) ;	**(5)**

Question Number	Answer	Mark
5(a)	1. correct measurements of wall without plaque = {8 +/- 1} (mm) ; 2. correct measurements of wall with plaque = {25 +/- 2} (mm); 3. correct calculation ;	**(3)**

Question Number	Answer	Mark
5(b)(i)	1. reference to decrease in (energy /ATP) (with time) ; 2. idea that the drop in the fall of (energy /ATP) gets less with time ; 3. credit correct manipulation of figures ;	**(2)**

Question Number	Answer	Mark
5(b)(ii)	1. idea of {less / no /eq } oxygen (available) ; 2. idea of {less / no / eq} {respiratory substrate / glucose / eq} ; 3. {less / no/ eq} (cellular/ aerobic) respiration / eq ;	**(2)**

Question Number	Answer	Mark
5(b)(iii)	1. idea that at 8 minutes insufficient {energy / ATP} is available for contraction ; 2. idea that after 20 minutes the {energy / ATP} levels are too low to sustain cell survival ; 3. credit correct value for {energy / ATP} availability read from graph e.g. 50-52 % at 8 min / 22-24% at 20 min ; 4. credit one other named use of {energy / ATP} e.g. active transport ; 5. idea that lactic acid {inhibits contraction / inhibits enzymes / eq} ;	**(3)**

Question Number	Answer	Mark
5(b)(iv)	1. idea that (restored blood flow) provides (muscle /cells) with oxygen / removes lactic acid / eq ; 2. (aerobic) respiration {rate increases / restarts / eq} ;	**(2)**

Question Number	Answer	Mark
6(a)(i)	1. no {amino / amine / NH_2 / NH_3^+ } group ; 2. no {carboxyl / carboxylic acid / COOH / COO^- } group ; 3. no {central / alpha} carbon (atom) / eq ; 4. no {R / residual} group(s) ; 5. ring structures present (amino acids only have them in some R groups) / eq ;	**(2)**

Question Number	Answer	Mark
6(a)(ii)	1. idea that position of CH_3 different ; 2. idea that position of {H / NH/ N-H} different ; 3. reference to being isomerically different ;	**(2)**

Question Number	Answer	Mark
6(a)(iii)	1. idea of specificity of {active site/enzyme} ; 2. idea that the products are different {shapes / structures} ; 3. idea that P450 consists of (at least) three {enzymes / active sites} ; 4. idea that products could be interconverted ;	**(3)**

Question Number	Answer	Mark
6(b)	**Conclusion 1:** 1. idea that the first conclusion is {valid for some of the data / not valid (for all data) / misleading /eq} ; 2. coffee and hot chocolate do have different concentrations **OR** only 4 drinks tested / concentration not measured / volumes not controlled / eq ; **Conclusion 2:** 3. idea that the second conclusion is not valid ; 4. no indication of the volumes of tea and cola / volume not controlled / impossible to calculate concentration of caffeine in all four drinks (using information given) / eq ;	**(3)**

Question Number	Answer	Mark
7(a)(i)	antihypertensives / antihypertensive drug / beta blockers / diuretics / ACE inhibitors / calcium ion channel blockers / vasodilators / eq ;	**(1)**

Question Number	Answer	Mark
7(a)(ii)	1. high blood pressure {can cause / increases risk of} {CVD / correctly named complication / description / eq} / eq ; 2. idea that older people are (more) at risk of {CVD/ eq} ;	**(2)**

Question Number	Answer	Mark
7(b)(i)	1. reference to (group B) as {control / comparison / check validity / eq} ; 2. both groups given two tablets / reference to placebo / eq ;	**(2)**

Question Number	Answer	Mark
7(b)(ii)	1. systolic blood pressure decreased in both groups / eq ; 2. systolic blood pressure decreased more {in the treated group / by the drug / group A} than the {control / placebo / group B / eq} / eq ; 3. diastolic blood pressure decreased {in the treated group / by the drug / group A} / eq ; 4. diastolic blood pressure {unchanged / decreased slightly} {in the control group / by the placebo /group B} / eq ; 5. systolic blood pressure was affected more than the diastolic blood pressure; 6. greatest decrease in first year / eq ; 7. credit correct manipulation of data (e.g. Systolic dropped 3 kPa in group B, systolic dropped 5.4 kPa in group A, 2.4 more than group B, diastolic dropped 0.6 kPa in group B, diastolic dropped 2 kPa in group A, 1.4 more than group B) ;	**(3)**

Question Number	Answer	Mark
7(b)(iii)	to see if the drugs affected both types of blood pressure / eq ;	**(1)**

Question Number	Answer	Mark
7(b)(iv)	{incidence / numbers} of {deaths / heart attacks / strokes / any other correctly named condition } ;	**(1)**

Question Number	Answer	Mark
8(a)(i)	1. reference to alteration in DNA ; 2. change in {base (sequence) / quantity of DNA} / eq ;	**(2)**

Question Number	Answer	Mark
8(a)(ii)	idea that both of these alleles need to be present in order for the recessive phenotype to be expressed ;	**(1)**

Question Number	Answer	Mark
8(b)	1. idea of a gene being a sequence of bases that code for the sequence of amino acids in the {protein / polypeptide chain /enzyme / galactocerebrosidase} ; 2. (gene) mutation will alter {DNA triplet / DNA code / codon / eq} / eq ; 3. this may result in a different {amino acid / stop codon / amino acid sequence / primary structure / eq} / eq ; 4. idea that this may change the {shape / eq} of {protein / enzyme} ; 5. therefore causing {no synthesis / incomplete / eq} of {enzyme / galactocerebrosidase} / change of active site / eq ;	**(3)**

Question Number	Answer	Mark
8(c)	1. genotype of parents shown ; 2. alleles in the gametes shown ; 3. possible genotypes of children shown ; 4. corresponding phenotypes shown ; 5. (probability =) ¼ / 25% / 1 in 4 / 0.25 ;	**(5)**

Question Number	Answer	Mark
8(d)	amniocentesis / chorionic villus sampling / CVS / eq ;	**(1)**

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