

Mark Scheme (Results) Summer 2007

GCE

GCE Biology SNAB (6131/01)

General Principles

Symbols used in the mark scheme

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. It is used because it is not always possible to list every alternative answer that a candidate may write that is worthy of credit.
/ 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.

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 1

Maximum mark

- (a) {fatty deposits / plaques / cholesterol / atheroma / eq} {narrows / blocks} arteries;
less blood flow {to cardiac muscle (cells/tissues) / through coronary artery};
less oxygen;
anaerobic respiration;
build up of {lactic acid / lactate} (causes pain);
- 3 marks
- (b) (i) 1873, 1614, 1790 kJ;
[all three required for (1) mark]
- 1 mark
- (ii) A;
- 1 mark
- (iii) A
less saturated fatty acids / FA;
less {cholesterol/LDLs} (made by liver);
less / no cholesterol in diet;
less chance of atherosclerosis/eq / {atheroma / fats} building up / depositing /
being laid down on arteries;
- 3 marks
- Total 8 marks**

Question 2

Maximum mark

- (a) (i) arrows moving from direction of veins through the atria towards ventricles on both sides; 1 mark
- (ii) sinoatrial node / SAN / pacemaker; 1 mark
- (b) (i) some backflow of blood {(from ventricle) to atrium / through A-V valve};
during ventricular systole / eq;
less blood (pressure) into the {aorta / artery};
less (efficient supply of) oxygen to the body / muscles / less aerobic respiration; 2 marks
- (ii) ECG / electrocardiogram / MRI / magnetic resonance imaging / CT scan / CAT scan / blood pressure monitor / sphygmomanometer; 1 mark

Total 5 marks

Question 3**Maximum mark**

- (a) mother's and father's genotypes correctly stated e.g. mother Aa and father aa;
gametes shown clearly and correctly;
F1 genotypes clearly linked to phenotypes;
probability 50% / 0.5 / 1 in 2 / $\frac{1}{2}$ / eq;
- 3 marks**
- (b) (i) amniocentesis / chorionic villus sampling / CVS / pre-implantation
genetic diagnosis / PIGD;
- 1 mark**
- (ii) 1. extract DNA from cells;
2. cut DNA using a restriction enzyme;
3. gel electrophoresis;
4. credit one further correct detail of gel electrophoresis;
5. treat with alkali / make DNA single stranded;
6. southern blotting / transfer to a {nylon/nitrocellulose} membrane;
7. use of a gene probe;
8. further detail of a gene probe (complementary sequence /
radioactively labelled / fluorescent marker / eq);
9. disclosure {x-ray film / UV light / laser};
10. comparison with marker gene;
- 5 marks**
- Total 9 marks**

Question 4

Maximum mark

- (a) (i) X: phospholipid;
Y: (channel) protein;
Z: glycoprotein / carbohydrate;
- 3 marks
- (ii) P: (passive) diffusion;
Q: active transport;
R: facilitated diffusion;
- 3 marks
- (b) 1. CFTR protein defective / eq;
2. chloride ions remain in cells / eq;
3. mucus lacks water/is very sticky / eq;
4. mucus blocks pancreatic (duct);
5. {fewer enzymes / correctly named enzyme} released into the small intestine;
6. lower concentration of enzymes / fewer active sites;
7. fewer collisions between substrate and the active site of the enzymes / named substrate and enzyme;
- 4 marks

Total 10 marks

Question 5**Maximum mark**

- (a) (i) ester; 1 mark
- (ii) hydrolysis; 1 mark
- (iii) fatty acids;
glycerol; 2 marks
- (iv) unsaturated / eq are {liquid at room temperature / lower melting point} whilst saturated / eq solid at room temperature;
MUST be a comparative point 1 mark
- (b) (i) phosphate; 1 mark
- (ii) ref. to {hydrophilic / charged / polar / water attracting} {head/group} and
{hydrophobic /not charged / non-polar / water repelling} {tail /group } / eq;
ref. to forming a bilayer;
ref. to orientation in membrane; 2 marks
- Total 8 marks**

Question 6

Maximum mark

- (a) (i) E: phosphate;
F: ribose;
G: uracil; 3 marks
- (ii) nucleus; 1 mark
- (b) (i) Tyr, Val, Glu, Arg;; 2 marks
- (ii) translation; 1 mark
- (iii) 1. change in amino acid sequence / primary structure of the protein;
2. Tyr replaced by a stop codon / UAG;
3. {polypeptide chain/protein} would be shorter / eq;
4. protein would have a different shape/structure / fold differently / eq;
5. protein would not function (normally);
6. RNA polymerase not functioning would mean that {no/less} transcription could take place;
7. {no/less} RNA could be synthesised by this cell;
8. {no/less} proteins could be made by this cell; 5 marks
- Total 12 marks**

Question 7**Maximum mark**

- (a) energy / glucose storage; 1 mark
- (b) (i) diagram showing 1 glucose molecule / monosaccharide;
diagram shows H and OH groups on each of carbon 1 and carbon 4; 2 marks
- (ii) ref to specificity / shape;
correct ref to active site on enzyme;
correct ref to enzyme-substrate complex / eq;
lock and key concept / induced fit;
ref to amino acids in proteins versus glucose in glycogen / peptide versus
glycosidic bonds; 3 marks
- (c) reduces activation energy / provides an alternative reaction pathway;
(biological) catalyst / speeds up reaction without being used up;
allows reactions to occur rapidly at body/lower temperature; 2 marks

Total 8 marks**PAPER TOTAL 60 MARKS**

