

Mark Scheme (Results) January 2007

GCE

GCE SNAB Biology (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) diffusion;
facilitated diffusion;
active transport / uptake;
energy / ATP;
carrier / channel;
endocytosis;

[Reject exocytosis]

6 correct - 3 marks
5 or 4 correct - 2 marks
3 or 2 correct - 1 mark
1 or 0 correct - 0 marks

3 marks

- (b) (i) similarity

both passive / do not require energy / eq /
move (molecules) down a concentration gradient;

difference

osmosis involves transport of water only / converse /
osmosis always involves movement of molecules through a partially permeable
membrane / converse;

2 marks

- (ii) similarity

both involve the use of vesicles to move contents / eq /
both involved in bulk transport / eq
both require energy / ATP ;

difference

endocytosis involves transport of substances into the cell, exocytosis transports
substances out of the cell;

2 marks

Total 7 marks

Question 2

Maximum mark

(a) A description to include two from:

1. narrowing leads to higher blood pressure;
2. increases risk of {further damage to the artery wall / aneurysm}
3. platelets stick to damaged wall;
4. triggers blood clotting process / eq;
5. correct reference to mast / foam cells / inflammatory response;

(b) (i) A description to include three from:

1. platelets stick to damaged wall of artery / eq;
2. thromboplastin released (from damaged tissue/platelets);
3. correct reference to Ca^{2+} / Vit. K;
4. prothrombin converted to thrombin;
5. fibrinogen converted to fibrin;
6. fibrin mesh traps blood cells forming a clot;

3 marks

(ii) An explanation to include two from:

1. blood clot blocks coronary artery;
2. restricts blood flow to heart muscle;
3. lack of oxygen to heart (muscle) / ischaemic;
4. for respiration / reference to anaerobic respiration;
5. insufficient energy release for contraction / infarction / damage to heart muscle;

3 marks

Total 8 marks

Question 3

Maximum mark

(a) (i) 1 - Hh;
4 - hh;

(ii) gametes shown clearly;
genotypes of offspring;
all three children hh / each child has 50% chance of being normal / eq;

(b) A description to include five from:

1. correct reference to use of restriction enzymes;
2. use of agarose gel / DNA loaded into wells in the gel;
3. pass current through the gel / ref. to electrophoresis / negatively charged DNA moves to positive electrode / anode;
4. smaller fragments travel faster / further (in a given time);
5. reference to (use of alkali) to make DNA single stranded / reference to southern blotting / use of nylon membrane / eq;
6. reference to probe with complementary bases to faulty gene;
7. probe contains radioactive or fluorescent markers / eq;

5 marks

Total 10 marks

Question 4

Maximum mark

(a) (i) COOH group;
NH₂ group;
ACCEPT correct structures drawn out

2 marks

(ii) An explanation to include three from:

1. appropriate reference to {secondary structure / α -helix or β -pleated sheet};
2. polypeptide chain folded in a specific shape / reference to tertiary structure;
3. reference to R groups;
4. bonding between R groups determines the shape;
5. named bond ie. hydrogen, disulphide, ionic;

3 marks

(b) (i) 6;

1 mark

(ii) transcription;

1 mark

(iii) AUG CCA UAC GGU UGG AAG;;

[1 mark if T instead of U given]

2 marks

Total 9 marks

Question 5

Maximum mark

(a)

	Polysaccharides	Lipids	Proteins
Are polymers	✓	X	✓
Have ester bonds	X	✓	X
Contain carbon, hydrogen, oxygen and nitrogen	X	X	✓
Form components making up the structure of cell membranes	✓	✓	✓

- 12 correct - 6 marks
- 11 or 10 correct - 5 marks
- 9 or 8 correct - 4 marks
- 7 or 6 correct - 3 marks
- 5 or 4 correct - 2 marks
- 3 or 2 correct - 1 mark
- 1 or 0 correct - 0 marks

6 marks

(b) (i) saturated (lipids) have no double bonds in the hydrocarbon chain / $C = C$ / between carbon atoms and unsaturated have double bonds / $C = C$

saturated (lipids) from animal sources and unsaturated from plant sources

saturated (lipids) tend to be solid and unsaturated liquids at r.t. ;

(ii) starch has {two components / amylose and amylopectin} and glycogen does not
 starch stored in plant cells and glycogen in animal cells
 glycogen has a branched structure but {starch / amylose} has a coiled structure
 glycogen has more branches than {starch / amylopectin};

2 marks

Total 8 marks

Question 6

Maximum mark

- (a) (i) reduce intake of fat /
particularly saturated fat / correct examples /
increase fibre / fresh fruit and vegetables /
increase intake of foods containing sterols / stanols /
include oily fish;

1 mark

- (ii) A suggestion and an explanation to include two from:

1. cholesterol synthesized by the body ;
2. further detail e.g. made in liver / cholesterol made from saturated fats;
3. genetic factors;
4. further detail e.g. hypercholesterolaemia / number of LDL receptors;

- (b) (i) 39.9 / 40.0%;;
(if wrong, 14.8 - 8.9 OR 5.9 seen;)

2 marks

- (ii) (Statin) B;

1 mark

- (iii) ref to {validity / reliability / identification of anomalous results / allows for
variation };
NOT accuracy / precision

to confirm the drug was having the effect / eq;

2 marks

Total 8 marks

Question 7

Maximum mark

(a) (i) A description to include three from:

1. increase in the percentage of {all / the population} classed as obese (from 1980-2000);
2. increase in both males and females / females higher than males;
3. bigger difference between males and females in 1986;
4. 3 to 4 fold increase from 1980-2000 / correct manipulation of figures;

3 marks

(ii) A suggestion to include two from:

1. inactivity / lack of exercise / high fat diet / eq ;
2. energy intake greater than energy loss ;
3. advertising and commercial pressures;
4. genetic reference to male and female differences / women {post-pregnancy / menopause}/ eq;

2 marks

(b) $(76 \div 1.70^2)$ / 26.29 / 26.3 / 26;
no;

ALLOW $76 \div 1.70 = 45 = \text{yes} / \text{obese}$;

2 marks

Question 7 continued

Maximum Mark

(c) An explanation to include three from:

1. increase in blood pressure;
2. increased risk of {damage to arteries / plaque / atheroma / atherosclerosis};
3. increased risk of stroke / blood clotting an artery / coronary heart disease / CVD / eq ;
4. increase in blood cholesterol ;
5. increased risk of Type II diabetes;
6. joint damage / eq;

Total 10 marks

TOTAL FOR PAPER: 60 MARKS