

GCE

Edexcel GCE

Biology / Biology (Human) (6101/01)

Summer 2006

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Mark Scheme (Results)

Edexcel GCE
Biology / Biology (Human)
(6101/01)

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 marks

Statement	DNA	mRNA
Double stranded	✓	✗
Adenine and uracil	✗	✓
Pentose sugar	✓	✓
Phosphodiester	✓	✓

[Any 2 correct = 1 mark]

Total 4 marks

Question 2

Maximum marks

- 1 Energy store ;
- 2 Heat insulation / protection / buoyancy / energy store ;
- 3 Heat insulation / protection / buoyancy /energy store ;
- 4 Waterproof/eq ;

Total 4 marks

Question 3

Maximum marks

Diagram mark (cell wall, no nucleus, slime capsule, pili or membrane-bound organelles, genetic material or flagellum) ;

Any 3 labelled structures:

Cell wall ;

Invaginations / mesosome ;

Flagellum ;

Bacterial chromosome / circular DNA ;

Plasmid ;

70s ribosomes

Total 4 marks

Question 4

Maximum marks

- (a) A Granum / (stack of) thylakoids ;
 B Stroma ;
 C Starch grain ;

3 marks

- (b) Correct width measured (mm / cm) ;
 Width / 5000 ;
 Correct conversion into μm ;

3 marks

- (c) Palisade (mesophyll cells) ;
 Spongy (mesophyll cell) ;
 Guard (cells) ;
 [“Mesophyll” unqualified = 1 mark]

2 mark

Total 8 marks

Question 5

Maximum marks

- (a) Peptide bond drawn correctly ;
Rest of both amino acids drawn correctly ;
2 marks
- (b) (i) Reference to α -helix / β -pleated sheet ;
Reference to hydrogen bonds ;
2 marks
- (ii) 1. The primary structure is the same length at both temperatures ;
2. The secondary structure is shorter at 25 °C ;
3. Length decreases from primary to secondary at both temperatures ;
4. Correct manipulation of figures ;
2 marks
- (iii) 1. Reference to increase in kinetic energy at (55 °C) ;
2. (More) vibrations within molecule ;
3. Therefore hydrogen bonds (holding α -helix / β -pleated sheet together) break/eq;
4. (Molecule) starts to unwind ;
2 marks

Total 8 marks

Question 6

Maximum marks

- (a)
1. Tendency of water molecules to move/ to be lost / to be gained ;
 2. Determined by the {solute potential / concentration of solute / eq} ;
 3. Reference to units ;
- 2 marks
- (b) (i) (Increase in mass) due to uptake of water / eq ;
- Idea of {water potential of potato is less than (0.2 mol dm⁻³) sucrose solution / lower water concentration in potato cell than in sucrose solution / eq} ;
- 2 marks
- (ii) 0.74 ± 0.01 (mol dm⁻³) ;
- 1 mark
- (iii) No difference in water potentials / eq ;
- So no net movement of water molecules / eq ;
- 2 marks
- (c)
1. Reference to cellulose ;
 2. Reference to hydrogen bonds (between chains) ;
 3. Reference to microfibrils ;
 4. Reference to criss-cross arrangement (of microfibrils)/ eq ;
 5. Embedded in matrix/ Reference to {pectin / hemicellulose} ;
- 3 marks

Total 10 marks

Question 7

Maximum marks

(a) (i) 4 ;

(ii) 4 ;

2 marks

- (b)
1. Idea of using a short length of root tip ;
 2. Ref. to acidification ;
 3. Add {acetic orcein / acetocarmine / Feulgens stain / Schiffs reagent / Toluidine Blue / Lactopropionic Acid} ;
 4. Warm / heat ;
 5. Break open tip (with mounted needle / eq) ;
 6. Mount/ eq in {stain / acid / water} ;
 7. (Gently) squash under coverslip or slide ;
 8. Warm slide (to intensify staining) ;

5 marks

(c) (i) Metaphase /prophase ;

1 mark

(ii) Spindle is made during prophase ;

(If there is no spindle) {there is nothing for the chromosomes to attach to (in metaphase)} / {chromatids cannot be pulled apart (in anaphase)} ;

2 marks

Total 13 marks

Question 8

Maximum marks

- (a) (i) 1. (Due to) inhibitor/eq having similar shape/eq to substrate ;
2. {Attach to / block} active site ;
3. Therefore substrate cannot bind / eq. ;
4. Reference to competition ;
5. Reference to reversible and irreversible (inhibition) ;
- 6 Reduces {rate of reaction / enzyme activity} / stops the reaction (in correct context);

3 marks

- (ii) All molecules {have COO^- / same charge/ same groups} at each end / eq / similar chemical structure ;

1 mark

- (iii) 1. Not similar shape to substrate / eq ;
2. Does not compete with substrate ;
3. Binds to {a different site / allosteric site / eq} ;
4. Changing the shape of the active site ;

2 marks

Question 8 continued

Maximum marks

- (b) (i) Increases as substrate concentration increases up to $29/30 \text{ mg cm}^{-3}$;
Linear between $0 - 15 \text{ mg cm}^{-3}$ or $15 - 25 \text{ mg cm}^{-3}$;
Remains {constant / eq} after $29/30 \text{ mg cm}^{-3}$;
- 2 marks
- (ii) All active sites are occupied / eq ;
At any given time / eq ;
Enzyme concentration is limiting / substrate concentration is not limiting / V_{max} ;
- 2 mark
- (iii) Rate of reaction is slower ;
Reaches a lower maximum rate of reaction ;
Correct manipulation of data ;
- 2 marks

Total 12 marks