



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Biology 5416/6416 *Specification B*

Core Principles BYB1

Mark Scheme

2005 examination – June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Dr Michael Cresswell Director General

General Guidance for the Mark Scheme

The following conventions are used in the mark scheme:

- A semicolon (;) separates each mark point
- An oblique stroke (/) separates alternatives within a mark point
- Underlining of a word or phrase means that the term must be used by candidates
- Brackets are used to indicate contexts for which a mark point is valid, but which may just be implied by a candidate's answer
- '*Accept*' and '*reject*' show answers which should be allowed or not allowed.
- Additional instructions may be shown in *italics*

The scheme shows the minimum acceptable answer(s) for each mark point - better, more detailed, or more advanced answers are always accepted, provided that they cover the same key ideas. Occasionally, a candidate will give a biologically correct answer that has not come up at standardising. If it is equivalent in standard to the mark scheme answers, it may be credited.

In some cases a mark may be awarded for understanding of a general principle, even though the detailed mark points on the scheme have not been made. This will be indicated on the mark scheme.

All mark points are awarded independently, unless a link between points is specified in the scheme.

Converse answers are normally acceptable, unless the wording of the question rules this out.

Disqualifiers

A correct point is disqualified when the candidate contradicts it in the same answer.

The list rule

When a question asks for a specific number of points, and the candidate gives more, any wrong answer cancels a correct answer. For example, if a question asks for two points and three answers are given, two correct and one clearly wrong, the mark awarded is one, whatever the order of the answers.

Valid points from **diagrams** are credited, if they are not duplicated in the text.

Where a question asks for **differences** between X and Y, the mark may be awarded for a feature of X without the converse for Y, if it is absolutely clear which is being referred to.

Guidance on the award of the marks for Quality of Written Communication on Section B of Unit Tests

Quality of Written Communication assessment requires candidates to:

- select and use a form and style of writing appropriate to purpose and complex subject matter;
- organise relevant information clearly and coherently, using specialist vocabulary when appropriate; and
- ensure text is legible, and spelling, grammar and punctuation are accurate, so that meaning is clear.

For a candidate to be awarded 1 mark for quality of written communication on Section B in a unit test, the minimum acceptable standard of performance should be:

- the longer parts (worth 4 marks or more) should be structured in a reasonably logical way, appropriate and relevant to the question asked;
- ideas and concepts should be explained sufficiently clearly to be readily understood. Continuous prose should be used and sentences should be generally be complete and constructed grammatically. However, minor errors of punctuation or style should not disqualify;
- appropriate AS/A level terminology should be used. Candidates should not use such phrases as ‘fighting disease’, ‘messages passing along nerves’, ‘enzymes being killed’ etc, but a single lapse would not necessarily disqualify. Technical terms should be spelled correctly, especially where confusion might occur, e.g. mitosis/meiosis, glycogen/glucagon.

The Quality of Written Communication mark is intended as a recognition of competence in written English. Award of the mark should be based on overall impression of performance on Section B. Perfection is not required, and typical slips resulting from exam pressure such as ‘of’ for ‘off’ should not be penalised. Good performance in one area may outweigh poorer performance in another. Care should be taken not to disqualify candidates whose lack of knowledge relating to certain parts of a question hampers their ability to write a clear and coherent answer; in such cases positive achievement on other questions might still be creditworthy. No allowance should be made in the award of this mark for candidates who appear to suffer from dyslexia or for whom English is a second language. Other procedures will be used by the Board for such candidates.

Examiners should record 1 or 0 at the end of Section B in the Quality of Written Communication lozenge. This mark should then be transferred to the designated box on the cover of the script.

BYB1**Question 1**

- (a) (i) line drawn vertically down left side; 1
- (ii) d – a, going left to right; 1
- (b) (i) correct method $\frac{\text{distance travelled by amino acid}}{\text{distance travelled by solvent}}$; = 1 mark
- both correct answers $\frac{11.0 \pm 2}{80} = 0.10 - 0.163$, 2
- $\frac{30.0 \pm 2}{50} = 0.56 - 0.64$;
- (allow correct calculation for d if wrongly labelled in (a)(ii))
- (ii) different solubility in the solvent; 1
- (c) heat different (sugar) solutions with Benedict's (reagent); (*dq heat with HCl*)
sugar which does not turn orange/green/yellow is non-reducing / sugars which are reducing will change colour;
- or*
- use Benedict's to confirm which is reducing/non-reducing;
heat with HCl, neutralise, add Benedict's, orange/green/yellow
shows non-reducing; 2
- Total 7**

Question 2

- (a) (i) box drawn around R group (i.e. CH₂OH group)
(allow circle if labelled R); 1
- (ii) circle drawn around either of the Hs on NH₂ group and
circle drawn around the OH; 1
- (b) (i) (di)peptide and water; 1
- (ii) peptide; 1
- (c) sequence of amino acids changes;
tertiary structure changes/folds in a different way;
bonds form in different places;
(Reject peptide bonds) 3
- Total 7**

Question 3

- | | | | |
|-----|------|--|----------------|
| (a) | (i) | homogeniser/blender/pestle and mortar/ description e.g. grind with sand; | |
| | (ii) | centrifuge/ description e.g. spin at high speeds; | 2 |
| (b) | (i) | chloroplast; | 1 |
| | (ii) | (outer) membrane breaks down / inner membranes/grana separate;
solution has a higher/less negative water potential;
<i>(accept description of relative concentrations)</i>
water moves <u>into organelle/chloroplast</u> by osmosis / from higher to lower
water potential / into more concentrated solution; <i>(reject into cell)</i>
organelle swells/increase in pressure and bursts; | 4 |
| | | | Total 7 |

Question 4

- | | | | |
|--|------------------------|---|----------------|
| (a) | endopeptidase/ pepsin | polypeptides/peptides; | |
| | lipid/fat/triglyceride | fatty acids and glycerol; | |
| | amylase | maltose; | |
| | maltase | maltose; | 4 |
| <i>(both correct in each row for one mark)</i> | | | |
| (b) | (i) | absorbs/transport triglycerides/fats/lipids/chylomicrons; | 1 |
| | (ii) | enables villi to move;
increased contact with food; | 2 |
| | | | Total 7 |

Question 5

- | | | | |
|-----|------|---|-------|
| (a) | (i) | absorbed by diffusion;
no energy/ATP available / active transport requires energy/ATP;
<i>(disqualify energy made)</i>
<i>(allow energy reference in either (i) or (ii))</i> | 2 max |
| | (ii) | absorbed by active transport; | 1 |

- (b) (absorption by) diffusion no longer occurs / diffusion/movement of ions equal in both directions;
because no concentration/diffusion gradient / reached equilibrium; 2
- (c) malonate fits into/blocks active site of enzyme / complementary to active site;
(prevents fitting neutral)
competes with substrate / is a competitive inhibitor / prevents substrate forming enzyme-substrate complex; 2

Total 7**Question 6**

- (a) contraction of (diaphragm) muscles flattens diaphragm;
contraction of intercostal muscles raises ribcage;
increase in volume decreases pressure; 3
- (b) (i) tidal volume increases steeply, then increase slows down after 10 to 15 kmh⁻¹; 1
- (ii) breathing rate increases slowly then steeply after 10 to 15 kmh⁻¹;
(max 1 if no reference to speed where change occurs in either (i) or (ii)) 1
- (c) $20 \times 2.75 = 55 \text{ dm}^2$;
(award 1 mark for correct method i.e. tidal volume. \times rate); 2

Total 7**Question 7**

- (a) colour results from starch-iodine reaction;
decrease due to breakdown of starch by carbohydrase/enzyme; 2
- (b) (i) curve drawn below curve on graph and starting at same point; 1
- (ii) curve drawn above curve on graph and starting at same point but finishing above;
(allow curve or horizontal line) 1
(allow alternative curve for pH if explanation in (ii) is consistent)

- (c) (i) 1 increase in temperature increases kinetic energy;
2 increases collisions (between enzyme/active site and substrate) / increases formation of enzyme/substrate complexes;
3 increases rate of breakdown of starch /rate of reaction/carbohydrase activity;
- (ii) 4 (decrease in pH) increases H⁺ ions/protons;
5 attach/attracted to amino acids;
6 hydrogen/ionic bonds disrupted/broken;
7 denatures enzyme / changes tertiary structure;
8 changes shape/charge of active site;
9 active site/enzyme unable to combine/fit with starch/enzyme-substrate complex no longer able to form;
10 decreases rate of breakdown of starch/rate of reaction/carbohydrase activity;

(allow alternative explanation for pH if consistent with line drawn in (ii))

7 max

Total 11

QWC 1