

GCE 2005

January Series



Mark Scheme

Biology Specification B

BYB1 Core Principles

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

Guidance on the award of the mark for Quality of Written Communication

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 the question identified as assessing QWC 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 the question identified on the paper as assessing QWC. 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 the paper 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) | A mitochondria;
B ribosomes (<i>accept ribosomes and rER</i>); | 2 |
| (b) | idea of <u>sections</u> or cuts;
idea of mitochondria orientated differently or in different positions /
description of 3D structure of mitochondria, e.g. sausage-shaped; | 2 |
| (c) | translation / protein/polypeptide synthesis; | 1 |
| (d) | provide/produce energy or ATP (<i>reject create energy</i>);
(<i>disqualify first mark if 'for respiration'</i>)
high respiration (rate) (<i>accept lots</i>);
for active uptake / transport (<i>accept description</i>);
absorption of <u>digested</u> food/substances/products/correctly named product
(<i>only accept monosaccharides, amino acids, dipeptides</i>); | 3 max |
| | Total | 8 |
-

Question 2

- | | | | |
|-----|------|--|---|
| (a) | (i) | fructose; | 1 |
| | (ii) | correctly drawn (OH group at bottom left); | 1 |
| (b) | | hydrolysis; | 1 |
| (c) | (i) | <u>heat</u> with Benedict's solution (<i>disqualify if HCl added</i>);
orange/brown/brick red/green/yellow colour or precipitate; | 2 |
| | (ii) | biuret test / NaOH + CuSO ₄ ;
purple / violet / lilac / mauve; | 2 |
| | | Total | 7 |
-

Question 3

- | | | | |
|-----|------|---|---|
| (a) | (i) | endopeptidases break proteins/polypeptides into shorter chains /
break bonds at a number of sites within molecule;
exopeptidases break off terminal/end amino acids;
(<i>principle – 1 mark only for correct sequence but reversed names</i>
<i>ignore peptide bonds but disqualify H bonds / disulphide bonds</i>) | 2 |
| | (ii) | increases surface area / more ends;
increases efficiency / rate of breakdown
(<i>allow increased rate of reaction</i>); | 2 |

(b)	(i)	line drawn <u>below</u> dotted line and above bottom of paper;	1
	(ii)	0.65 – 0.70; (7.2 – 7.7 divided by 11)	1
	(iii)	most/more soluble (<i>allow smallest/lightest/least dense</i>);	1
			Total 7

Question 4

(a)	B; D;	2
(b)	idea of molecules/named molecules <u>moving</u> = Fluid; idea of both <u>proteins</u> and <u>phospholipids</u> = Mosaic;	2
(c)	slow rise, sharp rise, levelling off (<i>reject 'becomes constant'</i>); <u>diffusion</u> rate increases / description of diffusion rate, e.g. increase in kinetic energy increases loss of ions; sharp rise / above 50°C proteins are denatured; levelling off due to concentration of chloride ions in water becoming equal / maximum loss of Cl ⁻ ions;	1 2 max
		Total 7

Question 5

(a)	(i)	villus; (<i>reject microvilli</i>)	1
	(ii)	contracts / peristalsis; moves/pushes/forces food through gut;	2
(b)	many / projecting villi (X) (<i>no double penalty for microvilli</i>); large surface area (for absorption); large/good blood supply / many capillaries/blood vessels; maintains concentration gradients / efficient removal of digested products; thin outer layer / blood vessels near to surface; short <u>diffusion</u> pathway;	4 max	
		Total 7	

Question 6

(a)	maximum rate at which enzyme can combine with substrate / form enzyme-substrate complexes / substrate no longer limiting / enzyme is a limiting factor; (active site of) enzyme saturated with substrate (<i>disqualify active sites/enzymes 'used up'</i>);	2
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- (b) inhibitor attaches to enzyme away from the active site;
changes shape of active site;
prevents formation of enzyme-substrate complex; 2 max
- (c) $\frac{7.6 - 5.6}{7.6} \times 100$;
= 26.32%; (accept 26% or 26.3%) 2
(correct answer = 2 marks)
(principle - $\frac{\text{decrease in rate}}{\text{max rate}} \times 100 = 1 \text{ mark}$)
- (d) curve below top curve (without inhibitor) joining to top curve /
continues to increase to end of x-axis
(must not exceed or level out below 'without inhibitor curve' and
must start from origin); 1
- Total 7

Question 7

- (a) 1. mouth opens, operculum/opercular valve shuts;
2. floor of mouth lowered;
3. water enters due to decreased pressure / increased volume;
4. mouth closes, operculum/opercular valve opens;
5. floor raised results in increased pressure / decreased volume;
6. high/increased pressure forces/pushes water over gills; 4 max
- (b) 1. alveoli provide a large surface area;
2. walls of alveoli thin to provide a short diffusion pathway;
3. walls of capillary thin/close to alveoli provides
a short diffusion pathway;
4. walls (of capillaries/alveoli) have flattened cells;
5. cell membrane permeable to gases;
6. many blood capillaries provide a large surface area;
7. intercostal/chest muscles/diaphragm muscles / to ventilate lungs /
maintain a diffusion/concentration gradient;
8. wide trachea / branching of bronchi/bronchioles for efficient
flow of air;
9. cartilage rings keep airways open;
(reject moist and thin membranes) 6 max

Total 10

QWC (See guidance)

1