



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

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# Mark scheme January 2004

## GCE

### Biology B

### Unit BYB678/B

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### 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.

**Question 1**

- |     |   |    |
|-----|---|----|
| (a) | fat → fatty acids + glycerol  | 1  |
| (b) | (i) to make solutions alkaline so that production of acid could be detected;  | 1  |
|     | (ii) so that concentration of enzyme/substrate same in each tube;   | 1  |
|     | (iii) to show that fat is not broken down by <u>bile</u> ;  | 1  |
| (c) | (i) colour changes because lipids broken down into fatty acids which lower pH;  | 1  |
|     | (ii) rapid breakdown of lipids since bile salts emulsify lipids giving larger surface for enzyme action;  | 1  |
| (d) | range of concentrations of enzyme solution;<br>tubes all contain same volume of milk, enzyme solution, sodium carbonate solution, bile salts and indicator / all other variables constant;<br>time measured;<br>to appearance of standard colour / yellow colour<br>(allow for colorimetric method) | 4  |
|     | Total   | 10 |
- 

**Question 2**

- |     |  |   |
|-----|--|---|
| (a) | phospholipids in a double layer / area covered is twice total surface area of red blood cells;<br>evidence of calculation of number × surface area ( $4.74 \times 10^9 \times 99.4 \mu\text{m}^2$ ) /<br>calculation of area of 1 cell $\frac{0.92}{4.74 \times 10^{-9}}$ ;<br>$0.471 \text{ m}^2 \approx 0.5 \times 0.92 \text{ m}^2 / 194 \mu\text{m} \approx 2 \times 99.4$ ; | 3 |
|-----|--|---|

- (b) EITHER feature + explanation  
 red blood cells do not contain organelles / nucleus;  
 so only surface membrane / no internal membranes in macerate;  
 OR  
 red blood cells have simple / regular / spherical shape;  
 so easy to calculate surface area;  
 OR  
*any two features, e.g.*  
 simple / regular shape;  
 all same size; 2
- Total 5
- 

**Question 3**

- (a) (i) to increase surface area (for carbon dioxide absorption); 1
- (ii) oxygen is used / carbon dioxide emitted is absorbed;  
 so decrease in volume / pressure; 2
- (iii) change of level of (manometer) liquid over time;  
 bore of tube;  
 mass of snails;  
 time interval; 3 max
- (b) (i) *valid similarity taking into account SD e.g. between 5 and 15 °C*  
 both show little effect of temperature / intakes similar  
 between 5 and 15 °C; 1  
*valid difference taking into account SD above 15 °C e.g.*  
 rise at 20 °C and above is less when snails kept in sea water; 1
- (ii) standard deviations high;  
 means unreliable;  
*(accept 25 °C being out of normal range for snail /  
 not enough temperature readings for 1 mark)* 2
- Total 10
-

**General Principles for marking the Essay:**

Four skill areas will be marked: scientific content, breadth of knowledge, relevance and quality of language. The following descriptors will form a basis for marking.

**Scientific Content** (maximum 16 marks)

Category	Mark	Descriptor
<b>Good</b>	16	Most of the material reflects a comprehensive understanding of the principles involved and a knowledge of factual detail fully in keeping with a programme of A-level study. Some material, however, may be a little superficial. Material is accurate and free from fundamental errors but there may be minor errors which detract from the overall accuracy.
	14	
	12	
<b>Average</b>	10	Some of the content is of an appropriate depth, reflecting the depth of treatment expected from a programme of A-level study. Generally accurate with few, if any, fundamental errors. Shows a sound understanding of the key principles involved.
	8	
	6	
<b>Poor</b>	4	Material presented is largely superficial and fails to reflect the depth of treatment expected from a programme of A-level study. If greater depth of knowledge is demonstrated, then there are many fundamental errors.
	2	
	0	

**Breadth of Knowledge** (maximum 3 marks)

Mark	Descriptor
3	A balanced account making reference to most areas that might realistically be covered on an A-level course of study.
2	A number of aspects covered but a lack of balance. Some topics essential to an understanding at this level not covered.
1	Unbalanced account with all or almost all material based on a single aspect.
0	Material entirely irrelevant or too limited in quantity to judge.

**Relevance** (maximum 3 marks)

<b>Mark</b>	<b>Descriptor</b>
3	All material presented is clearly relevant to the title. Allowance should be made for judicious use of introductory material.
2	Material generally selected in support of title but some of the main content of the essay is of only marginal relevance.
1	Some attempt made to relate material to the title but considerable amounts largely irrelevant.
0	Material entirely irrelevant or too limited in quantity to judge.

**Quality of language** (maximum 3 marks)

<b>Mark</b>	<b>Descriptor</b>
3	Material is logically presented in clear, scientific English. Technical terminology has been used effectively and accurately throughout.
2	Account is logical and generally presented in clear, scientific English. Technical terminology has been used effectively and is usually accurate.
1	The essay is generally poorly constructed and often fails to use an appropriate scientific style and terminology to express ideas.
0	Material entirely irrelevant or too limited in quantity to judge.

Total 25 marks

### **Additional guidance for assessing Scientific Content and Breadth of Knowledge in Essays**

The following provides guidance about topics which might be included in the essays. It is not an exclusive list; the assessment of scientific content does not place restrictions on topics that candidates might refer to, provided they are

- relevant;
- at an appropriate depth for A level and
- accurate.

It is not expected that candidates would refer to all, or even most, of the topics to gain a top mark; the list represents the variety of approaches commonly encountered in the assessment to the essays.

In both essays, topics either from the option modules or beyond the scope of the specification were also given credit where appropriate.

#### **(a) How the structure of proteins in relation to their functions.**

1. Structure (S)  
primary structure – peptide bond  
secondary structure  
tertiary structure. Globular - bonds between R groups give spherical shape – shape determines function – active sites and receptor sites  
*(allow quaternary structure – haemoglobin incorporates ions for oxygen transport)*
2. Structural proteins (ST)  
fibrous – regular pattern of hydrogen bonds – coiling,  
*(e.g. keratin coils twist together to form rope-like structures – flexible and strong)*  
*(e.g. collagen – coils more tightly bound – more rigid)*
3. Transport (T)  
channel – complementary shape – charges - gated  
carrier – complementary shape – can change shape  
active transport – phosphate group attached by energy from ATP – can change shape
4. Enzymes (E)  
active site, enzyme-substrate complex  
activation energy reduction - explanation e.g. brings molecules closer
5. Receptors (R)  
synapse  
insulin / glucagon  
ADH  
rhodopsin

6. Muscle (M)  
actin thin – binding site  
myosin thick - cross bridges  
tropomyosin – block binding sites

**Breadth of knowledge**

- 3 marks      Four or more of the above 6 areas  
2 marks      Three of the above 6 areas  
1 mark        Two of the above 6 areas

**(b) The causes of variation and its biological importance**

1. Gene mutation (G)  
addition  
deletion  
substitution  
effect on alleles  
effect on polypeptide / protein
2. Sexual reproduction (S)  
crossing over  
independent assortment  
random fusion  
(allow chromosome mutation)
3. Environmental (E)  
nutrients  
disease  
light  
temperature
4. Biological importance (B)  
enables adaptation  
natural selection  
speciation  
evolution

**Breadth of knowledge**

- 3 marks      Three of the above four areas including cause and importance  
2 marks      Two of the above four areas including cause and importance  
1 mark        Two of the above four areas