



# General Certificate of Education

## Biology 6411 *Specification A*

*BYA8/W Written Synoptic Paper*

# 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.

## BYA8

### Question 1

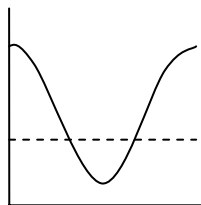
- (a) (form part of) membrane/bilayer;  
act as energy store/respiratory substrate/used for respiration; 2
- (b) amount of water present is variable;  
(need the concept of variable rather than just that water is present in large amounts) 1
- (c) (i) carbohydrate is stored as glycogen/glycogen made in liver; 1
- (ii) carbohydrate would decrease;  
while other substances would increase;  
glucagon;  
(stimulates) conversion of glycogen to glucose/glucose enters circulation/  
glucose respired;  
as percentage of carbohydrate decreases, relative amounts of remaining  
substances increase; 4
- (d)  $A = \frac{B \times C}{D}$  (allow two marks)
- $\frac{B}{A} = \frac{D}{C}$  (incorrect derivation from relationship shown,  
allow one mark) 2
- (e) (i) proteins have large molecules;  
will not pass through capillary walls/will remain in blood;  
(accept converse) 2
- (ii) substance has not had time to mix;  
if a little/none present in the sample, will produce an overestimate/  
if a lot present in the sample, will produce an underestimate; 2
- (f) (i) phosphate (taken up) by algae/plants/phytoplankton/producers  
stimulates growth/ multiply;  
link established between algae/plants/phytoplankton/producers and  
chlorophyll; 2
- (ii) more decomposing bacteria;  
bacterial respiration decreases oxygen concentration;  
*OR*  
More photosynthesising bacteria;  
Bacterial photosynthesis increases oxygen concentration; 2
- (g) plot graph;  
extrapolate; 2

Total 20

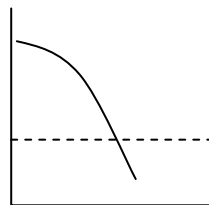
**Question 2**

- (a) correct reference to water potential gradient between cell and surroundings;  
 water enters (red blood cells) by osmosis;  
 increased pressure/volume bursts cell/ causes plasma membrane to rupture; 3

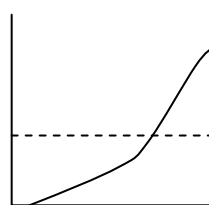
(b)



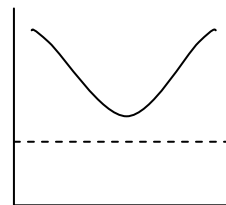
2 marks



1 mark



1 mark



1 mark

2

- (c) proteins/receptors found in plasma membrane;  
 concept of shape and fit in relation to digitalis/ are complementary;  
 these proteins only found in cardiac muscle/not in other types of muscle; 3  
*(do not penalise for use of the term "active site". However do not accept answers based on enzymes)*

- (d) (i) correct quotation of Fick's law in terms of rate of diffusion/  
 rate of diffusion correctly related to both parameters chosen;  
 squamous epithelium identified with thin surface/short pathway;  
 blood flow in capillaries identified with difference in concentration;  
 many capillaries identified with large surface area; 3  
*(maximum of two marks for specific features)*

- (ii) little/no digestion has taken place/no enzymes in the mouth;  
*(reject converse)*  
 molecules insoluble/too large; 2

- (e) blood does not enter liver/go through hepatic portal vein;  
 liver alters /detoxifies/affects molecules/poisons; 2

Total 15



**Question 3****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
	16	
<b>Good</b>	14	Most of the material of a high standard reflecting 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.
	12	
	10	
<b>Average</b>	8	A significant amount 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 most of the principles involved.
	6	
	4	
<b>Poor</b>	2	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.
	0	

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

Mark	Descriptor
3	A balanced account making reference to most if not all 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.

**Relevance** (maximum 3 marks)

Mark	Descriptor
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)

Mark	Descriptor
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

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***The following symbols should be used in marking***

- √ A valid point reflecting the level of knowledge expected of an A-level candidate
- X Incorrect biology
- Q Quality of written communication poor
- ⋈ Material irrelevant

**Additional notes on marking Question 3**

Care must be taken in using these notes. It is important to appreciate that the only criteria to be used in awarding marks to a particular essay are those corresponding to the appropriate descriptors. Candidates may gain credit for any information providing that it is biologically accurate, relevant and of a depth in keeping with an A-level course of study. Material used in the essay does not have to be taken from the specification, although it is likely that it will be. These notes must therefore be seen merely as guidelines providing an indication of areas of the specification from which suitable factual material might be drawn.

In determining the mark awarded for breadth, content should ideally come from each of the areas specified if maximum credit is to be awarded. Where the content is drawn from two areas, two marks should be awarded and where it is taken only from a single area, one mark should be awarded. However, this should only serve as a guide. This list is not exhaustive and examiners should be prepared to offer credit for the incorporation of relevant material from other areas of study.

**Essay A      Inorganic ions include those of sodium, phosphorus and hydrogen.  
Describe how these and other inorganic ions are used in living organisms.**

	<b>Specification section</b>
<b>Inorganic ions are involved in physiological processes</b>	
Nitrogen cycles	14.9
Action potentials and nerve impulses	15.8
Receptors convert stimuli into electrical impulses	15.9
<b>Inorganic ions are incorporated into biologically important molecules</b>	
Respiration produces ATP which is the immediate form of energy for many cell activities	14.8
Photosynthesis uses energy from sunlight to synthesise organic molecules from inorganic sources	14.6
DNA as genetic material	11.3
Fertilisers and plant growth	11.6
<b>Hydrogen ions affect pH</b>	
Factors which affect enzyme action	10.5
The control of blood pH	15.5
Digestion in the stomach and small intestine	15.6
The role of H <sup>+</sup> in respiration & photosynthesis	14.6; 14.8

**Essay B**      **Bacteria affect the lives of humans and other organisms in many ways. Apart from causing disease, describe how bacteria may affect the lives of other organisms.**

	<b>Specification section</b>
<hr/>	
<b>Making use of bacteria</b>	
Commercial production of enzymes from microorganisms	11.1
Gene technology	11.4
<hr/>	
<b>Bacteria and the recycling of nutrients</b>	
Carbon and nitrogen cycles	14.9
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<b>Bacteria in mutualistic relationships</b>	
Nitrogen cycle and nitrogen fixation;	14.9
Cellulose digestion in ruminants	15.6
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