



# **General Certificate of Education**

## **Biology 6411**

### *Specification A*

#### **BYA8/W Written Synoptic Paper**

## **Mark Scheme**

*2008 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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**Question 1**

- (a) (i) Would not compete;  
With weeds;  
Temperature affects growth of different plants in different ways/  
may affect growth of weeds differently to growth of crop plants; 2 max
- (ii) Roots are restricted/don't grow well;  
Might affect water/nutrient uptake; 2
- (b) (i) 16.5(cm<sup>2</sup>); 1
- (ii) Longer and narrower/thinner; 1
- (iii) *Do not give credit for references to yes or no.*  
At higher temperatures/30<sup>0</sup>C decrease in surface area/wilting/stomatal  
closure would lower rate of photosynthesis;  
Less light falls on leaf/fewer chloroplasts/ less chlorophyll;  
Less carbon dioxide (enters leaf);  
Temperature increases rate of reaction of photosynthetic enzymes;  
Don't know to what extent this effect is offset by loss due to reduced surface  
area; 3 max
- (c) (i) As temperature increases, so do (mean) breathing rate and (mean core)  
body temperature/positive correlation with breathing rate and body temperature; 1
- (ii) Breathing results in water evaporating/loss of water vapour (from gas exchange  
system);  
Heat required to evaporate water/change to water vapour;  
Heat drawn from blood/body (lowering core temperature); 3
- (d) (i) No difference in the breathing rate of the cattle at the two temperatures/  
breathing rate will not be affected by temperature; 1
- (ii) Results close together so may be due to chance;  
Statistical test determines probability of them being due to chance;  
Null hypothesis being accepted/rejected; 2 max
- (e) (i) Able to spend more time in cool conditions feeding;  
Spend less time resting/in shade;  
Hot conditions lead to greater water loss;  
Food/water linked to milk production; 2 max
- (ii) Inherit genes;  
For high milk yield from European cattle;  
Associated with temperature control from Sahiwal/local cattle; 2 max
- Total 20

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**Question 2**

- (a) (Oxygen) obtained by diffusion;  
Large surface area to volume ratio;  
Short distance to inside cells/all cells; 3  
*Note that third marking point must clearly relate to cells inside the worm*
- (b) It would diffuse into gut;  
From capillaries/blood/tissue fluid in intestine wall; 2
- (c) Causes displacement of dissociation curve to the right/Bohr shift;  
Therefore haemoglobin less saturated with oxygen/have lower affinity for oxygen;  
(Host) haemoglobin releases more oxygen; 3
- (d) (i) Changes shape of/charge of/denatures;  
Carriers/membrane proteins/transport proteins/channel proteins; 2
- (ii) More glucose available for uptake by the parasite; 1
- (e) (Reaction between) acid from stomach/in stomach contents;  
(and) hydrogencarbonate in pancreatic juice/from pancreas; 2
- (f) Produces NAD;  
Acting as hydrogen acceptor / reduced (in glycolysis); 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)

<b>Category</b>	<b>Mark</b>	<b>Descriptor</b>
	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 marks

The following symbols should be used in marking

- ✓ A valid point reflecting the level of knowledge expected of an A-level candidate
- ✗ Incorrect biology
- Q Quality of written communication poor
- ~~~~ Material irrelevant

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**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 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 be drawn 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      Hydrogen bonds and their importance in living organisms.****Section of specification**

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15.1      **Hydrogen bonds associated with the properties of water**  
The passage of water through a plant and cohesion tension

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10.4      **Hydrogen bonds associated with secondary and tertiary structure**  
The structure of proteins, starch and cellulose  
10.5      Enzymes

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11.3      **Hydrogen bonds associated with nucleic acids**  
DNA as genetic material, structure of nucleic acids  
11.4      Gene technology

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**Essay B      How nitrogen-containing substances are made available to and are used by living organisms.****Section of specification**

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**Nutrient cycling**

- 14.9      Nitrogen cycle  
14.10     The influence of deforestation of nitrogen cycling
- 

**The uses of proteins**

- 10.4      Proteins as biological molecules  
10.5      Enzymes and enzyme action  
15.5      Haemoglobin and the exchange of respiratory gases  
15.8      The use of membrane proteins in the nervous system
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**The uses of nucleic acids and other nitrogen-containing substances**

- 11.3      DNA and protein synthesis  
14.6      Chlorophyll, NADP and photosynthesis  
14.8      ATP and respiration
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