



General Certificate of Education

Biology 6411 *Specification A*

BYA8/W Written Synoptic Paper

Mark Scheme

2006 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.

Question 1

- (a) (variation in) temperature will affect the solubility of oxygen/ rate of respiration / use of oxygen by cells/ diffusion/ gas exchange; 1
to gain credit point made must concern oxygen
- (b) (i) there is no difference between the partial pressure of oxygen in the two groups / the partial pressure of oxygen is the same in each group; 1
- (ii) results may have been due to chance;
 statistical test allows us to determine the probability of this / of the difference between results being significant;
 enables acceptance or rejection of null hypothesis; 2 max
The key points here are chance and probability used in the correct context.
- (c) **A;**
 because partial pressure of oxygen only reduced when zinc in water / in **Y** / because when injected zinc / in **X** has no effect on partial pressure of oxygen in blood; 2
- (d) less oxygen transport to cells / in fish / in blood;
 anaerobic respiration;
 lactic acid produced / less carbon dioxide removed (from gills);
 more H⁺; 3 max
- (e) (i) copper;
 calculation based on comparing concentration in woodlice with that in leaves; 2
accept any suitable method here, giving marks for the method and explanation. For example, calculating ratio of concentration in woodlice to concentration in leaves.
- (ii) not absorbed from gut / passes out in faeces/ egested / urine / excreted; 1
- (iii) woodlice eat large amount of leaves;
 copper stored/accumulates in body; 2
- (f) (i) mutation; 1
- (ii) (as a component of) nucleic acids / DNA / RNA / nucleotides;
 phospholipids;
 ATP/ADP; 2 max
- (iii) arsenic-tolerant plants would not be able to take up phosphates / take up a little phosphate;
 since likely to involve same mechanism/same carrier/protein;
 (process of) growth would be poorer than non-tolerant plants; 3
- Total 20

Question 2

- (a) hepatic vein, vena cava, aorta;
inclusion of incorrect vessel negates mark
pulmonary artery and pulmonary vein; 2
- (b) (i) endocytosis / pinocytosis; 1
- (ii) enzymes;
reject lysosomes are enzymes / lysosyme
digest/break down/hydrolyse (lipo)proteins/envelope/membrane; 2
- (c) produce faulty/different receptor protein;
with different shape/tertiary structure;
LDLs will not fit/bind to receptor site;
LDLs not removed from blood / taken into cell / taken up;

OR

- does not produce receptor protein;
no receptors in membrane;
nowhere for LDLs to bind;
LDLs not removed from blood / taken into cell / taken up; 3
do not penalise use of the term active site unless used in context of enzymes
- (d) increase;
causes genes (controlling HMGCoA reductase/LDL receptors) to be switched off;
no more synthesised / taken into cell;
continues to be used and therefore falls/returns to norm; 3 max
- (e) (i) adds hydrogen (ion)/proton to HMGCoA / mevalonic acid has extra hydrogen;
ignore references to electrons 1
- (ii) similar shape/structure to substrate/HMGCoA;
fits active site of enzyme /acts as competitive inhibitor;
prevents HMGCoA/substrate fitting / fewer enzyme-substrate complexes formed; 3

Total 15

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	
Good	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	
Average	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	
Poor	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
- 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 Polymers have different structures. They also have different functions.

Describe how the structures of different polymers are related to their functions

Section of specification

	Polymers as molecules associated with storage
10.4	Biological molecules, carbohydrates and proteins
14.8	The release of energy from carbohydrate
15.2	The control of blood glucose
	Polymers as informational molecules
10.5	Enzymes
11.3	DNA as genetic material, structure of nucleic acids
11.5	Principles of immunology
15.5	The transport of respiratory gases
	Polymers as structural molecules
10.2	Cell ultrastructure, cell walls
10.4	Biological molecules, carbohydrates and proteins

Essay B Describe how nitrogen-containing substances are taken into and metabolised in animals and plants**Section of specification**

Intake

- 10.3 Active transport and facilitated diffusion
10.4 Biological molecules, carbohydrates and proteins
15.6 Digestion and absorption of the products
-

Synthesis of polymers

- 11.3 Replication of DNA, Protein synthesis
-

Other metabolic reactions

- 10.4 Digestion of cellulose
15.3 Method of removing nitrogenous wastes.
Deamination and the production of urea
-

Although the specification makes no specific reference to uptake by plants, candidates should be able to apply some of their understanding of the nitrogen cycle and water uptake.