



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme January 2003

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## GCE

### Biology/ Human Biology A

### Unit BYA8/W

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**Unit 8: Written synoptic (Biology A)****Question 1**

- (a) Decreases; = 1 mark  
Decreases with reference made to more rapid at first/ slower rate of decrease as fish gets longer/ proportionately, the decrease remains the same;; = 2 marks 2
- (b) Volume may not be directly proportional to mass over entire range/ relative amounts of various tissues may change; 1
- (c) (i) More tissue/ cells/ required for specific purpose in adult;  
More (oxygen for) respiration; 2
- (ii) More via gills/ less via body surface; 1
- (d) (i) Blood with high oxygen content;  
Will meet water with higher oxygen content;  
[Accept: Blood always meets water with higher oxygen content for both points]  
Maintains concentration gradient/ does not reach equilibrium;  
Allows more oxygen to diffuse into the blood/ more efficient diffusion; max 3
- (ii) Increases chance of coming into contact with oxygenated water/  
greater flow of oxygen/ water over body/ gills;  
In still water much oxygen will have diffused into fish/ increases  
concentration gradient/ concentration difference over exchange surface/ skin; 2
- (e) (i) The valves will only allow blood in this direction/ prevent backflow; 1
- (ii) Pressure increases in sinus venosus/ higher than in veins;  
No valves to prevent backflow; 2
- (iii) Gills; 1
- (a) 0.2 seconds;  
Pressure in ventricle higher than in artery A; 2
- (b) Stroke volume more important in fish/ heart rate more important in mammals;  
Calculation clearly compares change in heart rate and stroke volume in each animal;  
Calculation based on factor/ percentage increase; 3

Total 20 marks

**Question 2**

- (a) (i) Same general structure as all amino acids; = 1 mark  
Same general structure as all amino acids and answer making specific reference to amino/  $\text{NH}_2$  group and carboxyl/  $\text{COOH}$  group; 2
- (ii) Not normally found in proteins/ polypeptides; 1  
[Note: Alternative answers must fit with information provided in passage]
- (b) (i) Protein will have different tertiary structure;  
Affecting shape of active site;  
Therefore unable to bind to substrate/substrate not able to fit/cannot form enzyme-substrate complex; 3
- (ii) tRNA does not bind with non protein amino acids/ACA;  
tRNA will only bring proline/will not bring ACA to ribosome/mRNA;  
Enzyme molecules will only contain proline/will not contain ACA; max 2
- (c) Competitive because toxin/swainsonine has sugar-shaped molecules;  
Which will fit into active site of enzyme/mannosidase; 2
- (d) (i) Contains waste produced in the body/ as a result of metabolism; 1
- (ii) In renal/Bowman's capsule/glomerulus;  
Small molecules filtered from blood/into filtrate ; 2
- (e) Some species can make particular toxins harmless;  
Therefore can feed on particular plants;  
OR Toxins distributed in different quantities in different parts of plants;  
Therefore different species can feed on different parts of plant/  
can eat different part of plant at different time; max 2

Total 15 marks

**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                                                                                                                                                                                                                                                                                                                                                                          |
|----------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Good     | 16   | 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. |
|          | 14   |                                                                                                                                                                                                                                                                                                                                                                                     |
|          | 12   |                                                                                                                                                                                                                                                                                                                                                                                     |
|          |      |                                                                                                                                                                                                                                                                                                                                                                                     |
| Average  | 10   | 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.                                                                                                              |
|          | 8    |                                                                                                                                                                                                                                                                                                                                                                                     |
|          | 6    |                                                                                                                                                                                                                                                                                                                                                                                     |
|          |      |                                                                                                                                                                                                                                                                                                                                                                                     |
| Poor     | 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 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