



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark scheme June 2002

GCE

Biology A / Human Biology

Unit BYA8

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Question 1

- (a) (i) Time interval of 1 month / too long;
Large number of mice born / added to the population in this time /
die / lost from population; *OR*
12 hours is too short a time;
For mice to mix in population / be recaptured; *OR*
In non-catch years number of mice is small;
So may not catch any / any marked mice; **2**
Reject answers about points not covered in the question.
- (ii) Number of captures will vary with number of traps set /
number of traps varies;
Standardises results;
Allows results to be compared; **2 max**
- (b) (i) Less than 5% / 1 in 20 probability;
Of results being due to chance / luck;
Accept converse argument relating to biological significance.
- (ii) More food;
Therefore mice able to produce more young / more mice survive; **2**
- (c) (i) Mass will vary with sex / one sex is lighter / heavier /
females may be pregnant; **1**
- (ii) Tooth wear linked to age / diet;
Confines sample to adult mice / mice eating same food;
Otherwise age / food contributes to variation / mass; **2 max**
- (d) (i) Smaller surface area to volume ratio;
So lose less heat; *OR*
More (subcutaneous) fat;
Insulation; *OR*
More respiration;
More heat produced; **2**
- (ii) Variation in size is genetic;
Selection for / against one extreme (*general point not related to data*) / for large mice / against small mice;
Only larger mice will (survive and) breed / pass on genes;
Leads to increase in mean mass;
In cold conditions (related to figure); **3 max**
- (e) (i) Grey by grey;
Produces some black; **2**
- (ii) Find frequency / percentage / proportion of black mice;
Square root;
Use Hardy-Weinberg equation; **2 max**

Total 20 marks

Question 2

- (a) More work done / more energy / ATP required;
To overcome greater buoyancy;
Look for idea of buoyancy, not term. **2**
- (b) (i) Retains oxygen until the partial pressure is low / myoglobin has high affinity for oxygen;
Partial pressure of oxygen late in dive low;
Gives up oxygen (readily) at low partial pressures; **2 max**
- (ii) Remains under water for long time;
Unable to breathe while under water;
Greater amount of myoglobin can release / provide more oxygen;
More myoglobin, the darker the muscle; **3 max**
- (c) (i) 0.267 hours or 16 minutes;; **2**
Error, but $30\ 00\ \text{cm}^3$ divided by 250 = 1 mark
- (ii) Heart rate slows;
Less blood flowing to / from muscles / liver / gut / blood flow to body other than brain reduced by 90%;
Large volume of blood compared with body mass;
Greater concentration of haemoglobin;
Less blood required to supply heart / to heart muscle; **2 max**
Reject imprecise answers relating to 'organs' / 'the body'.
- (a) Less blood to muscles / heart muscle / skin; **1**
- (e) Link between lactate and anaerobic respiration;
No lactate produced at start so none in blood;
Blood flow to / from muscles reduced so less lactate removed by blood;
Gradually builds up as muscles produce more;
Processed by liver so decreases; **3 max**

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