Surname		Other Names	
Centre Number			Candidate Number	
Candidate Signature			

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General Certificate of Education
June 2002
Advanced Level Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

BIOLOGY (SPECIFICATION A) BYA8/W
Unit 8 (Written Synoptic)

Thursday 20 June 2002 Afternoon Session

No additional materials are required.
You may use a calculator.

Time allowed: 1 hour 45 minutes

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided but note that **Question 3** offers a choice of essays.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

- The maximum mark for this paper is 60.
- Mark allocations are shown in brackets.
- This unit assesses your understanding of the relationship between the different aspects of Biology.
- You will be assessed on your ability to use an appropriate form and style of writing, to organise relevant information clearly and coherently, and to use specialist vocabulary, where appropriate.
- The degree of legibility of your handwriting and the level of accuracy of your spelling, punctuation and grammar will also be taken into account.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
3			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

Answer **all** the questions in the spaces provided.

1 New Zealand beech trees do not produce seeds every year. A study was carried out on the mice living in an isolated New Zealand beech forest. Because of the location of this forest, biologists could only visit it at monthly intervals and stay approximately 12 hours on each visit.

At the beginning of each visit, they set all the traps they had available. This number varied. At the end of the visit, they collected the traps and released any mice they had captured.

Figure 1 shows the population density of the mice at different times during a New Zealand beech seed year and a non-seed year.

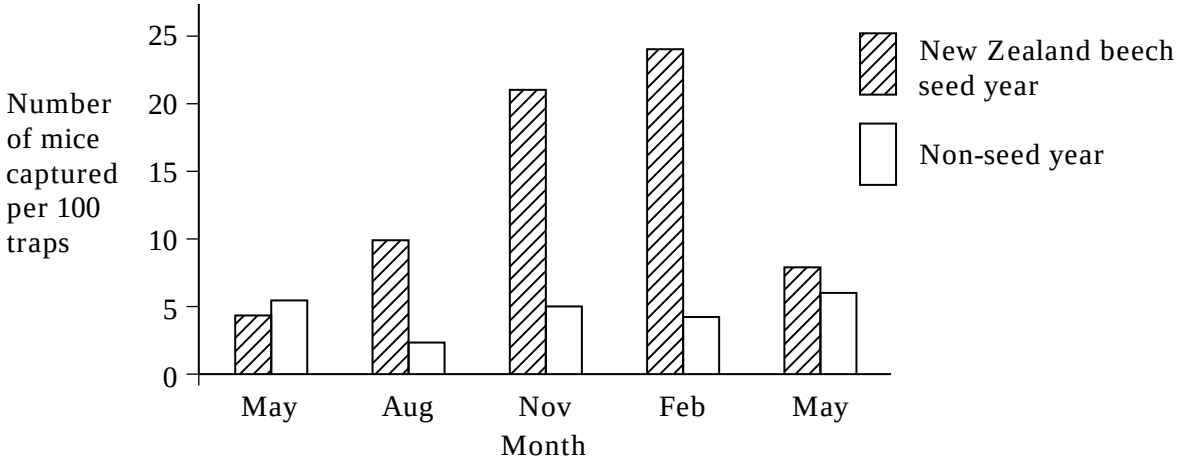

Figure 1

(a) Use the information in the question to suggest

(i) why the mark-release-recapture method would have given unreliable results;

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(2 marks)

(ii) the advantage of giving the number of mice captured per 100 traps rather than just the number of mice captured.

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(2 marks)

(b) (i) A statistical test was carried out on the August figures. The population density of mice in the seed year was found to be significantly different at the p = 0.05 level from the population density in the non-seed year. Explain the meaning of this statement.

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(2 marks)

(ii) Suggest why the population density increases in a seed year.

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(2 marks)

In a different survey, mice were trapped at various sites in the UK. **Figure 2** shows the mean body mass and the standard deviation of the adult males that were among the trapped mice.

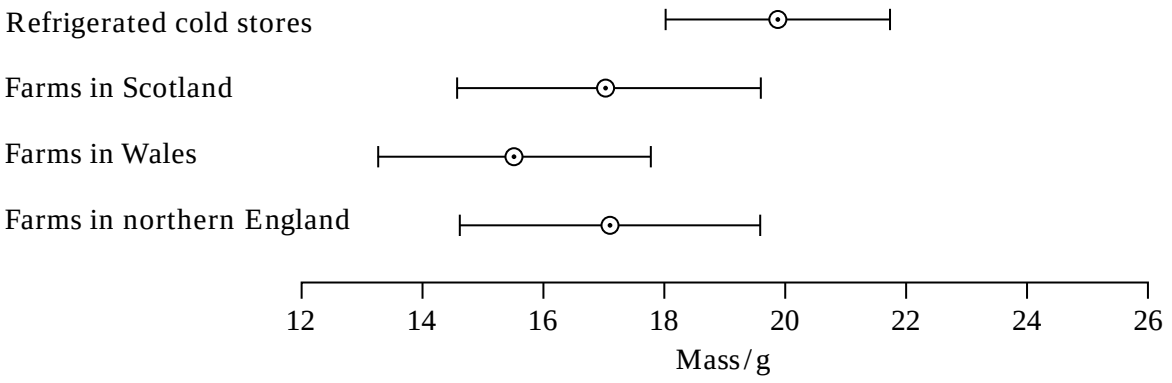

Figure 2

(c) (i) Explain why the data for only the male mice were plotted in **Figure 2**.

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(1 mark)

QUESTION 1 CONTINUES ON THE NEXT PAGE

(ii) In collecting the raw data in this survey, the investigators also measured the amount of tooth wear shown by the mice. Suggest why.

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(2 marks)

(d) (i) Explain the advantage of a large body mass to mice living in a refrigerated cold store.

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(2 marks)

(ii) Use the information in **Figure 2** to explain what is meant by directional selection.

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(3 marks)

(e) The colour of wild mice is grey but in some island populations there are black mice. The difference in colour is caused by a single pair of alleles.

(i) Describe how you could use genetic crosses to show that the allele for black is the recessive allele.

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(2 marks)

(ii) Explain how you could find the frequency of the recessive allele in a population of mice living on an island.

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(2 marks)

20

TURN OVER FOR THE NEXT QUESTION

2 Read the following passage.

The passage from Seals and Sea Lions of the World , Bonner (Blandford, 1994) is not reproduced here due to third-party copyright constraints.

The full copy of this paper can be obtained by ordering BYA8 from our Publications section Tel: 0161 953 1170

Use information from the passage and your own knowledge to answer the following questions.

(a) Explain why full lungs would make it 'energetically expensive to swim down through the water' (lines 6-7).

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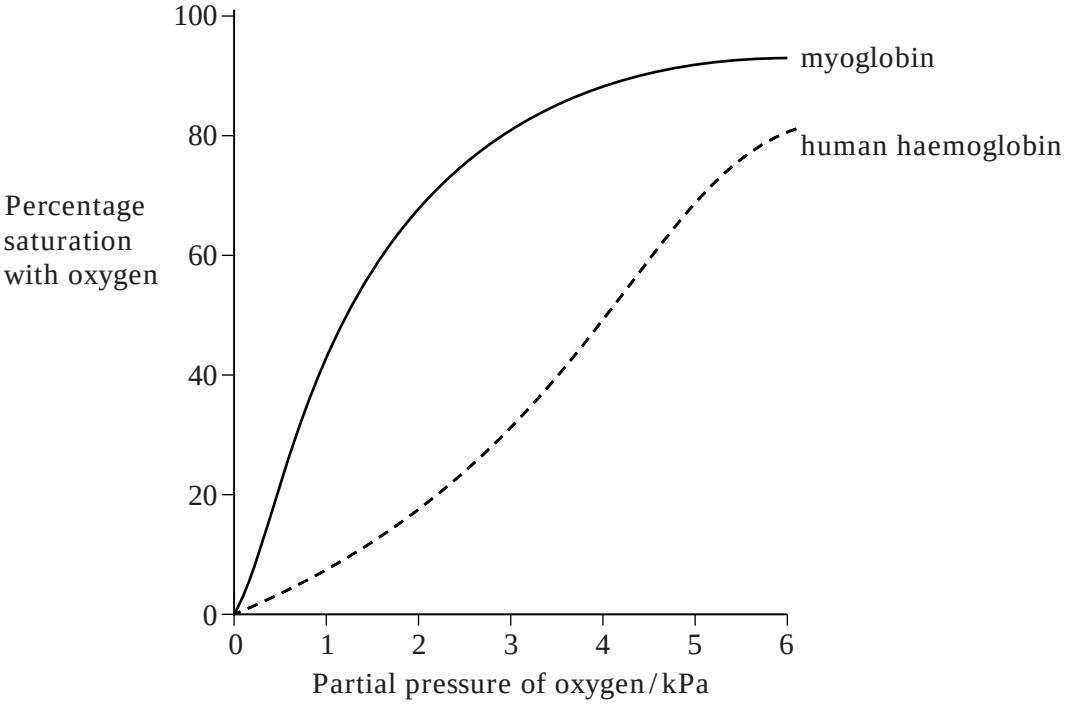
(2 marks)

(b) (i) The graph shows the dissociation curve for myoglobin.



Use this graph to explain how the presence of myoglobin in its muscles can be of benefit to a seal.

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(2 marks)

QUESTION 2 CONTINUES ON THE NEXT PAGE

(ii) Weddell seals get their food by diving to great depths. Explain the link between the colour of a Weddell seal's muscles and the animal's diving habits.

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(3 marks)

(c) (i) Use the figures in paragraph 4 to calculate the time you would expect a 450 kg Weddell seal to be able to remain under water, respiring aerobically. Explain your working.

Answer .....

(2 marks)

(ii) Weddell seals can remain under water for longer than this. Describe **two** adaptations of the blood system which allow them to remain under water longer.

1. .....

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2. .....

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(2 marks)

(d) Describe **one** way in which the change in blood flow to the organs of the body of a diving seal differs from that in a human undergoing moderate exercise.

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(1 mark)

(e) Explain the changes in the lactate concentration in the blood of a Weddell seal during and after a dive.

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(3 marks)

15

TURN OVER FOR THE NEXT QUESTION

3 Write an essay on **one** of the following topics. You should select and use information from different parts of the specification. Credit will be given not only for the biological content, but also for the selection and use of relevant information, and for the organisation and presentation of the essay.

EITHER **A** The different ways in which organisms use ATP *(25 marks)*

OR **B** How the structure of cells is related to their function *(25 marks)*

END OF QUESTIONS