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Centre Number		Candidate Number	
Candidate Signature			

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General Certificate of Education
June 2006
Advanced Level Examination



BIOLOGY (SPECIFICATION B)
Unit 8 Section A Behaviour and Populations

BYB8/A

Friday 23 June 2006 1.30 pm to 3.45 pm

For this paper you must have:

- Section B provided as an insert (enclosed)
- a ruler with millimetre measurements

You may use a calculator.

Time allowed: The total time for Section A and Section B of this paper is 2 hours 15 minutes

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer the questions in **Section A** in the spaces provided.
- **Section A** and **Section B** will be marked by different examiners. You must ensure that any supplementary sheets are fastened to the appropriate question paper answer book.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

- The maximum mark for **Section A** is 50.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.
- Use accurate scientific terminology in all answers.
- You are advised to spend 1 hour on **Section A**.
- You are reminded that **Section A** requires you to use your knowledge of different parts of the specification as well as Module 8 in answering synoptic questions. These questions are indicated by the letter S.

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

SECTION A

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

- 1 (a) Name **one** female hormone used in oral contraceptives and explain how it is effective.

Hormone

Explanation

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(2 marks)

- (b) Explain **one** way in which human growth hormone increases growth during puberty.

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(2 marks)

- (c) Explain **one** advantage of a long pre-puberty stage in humans.

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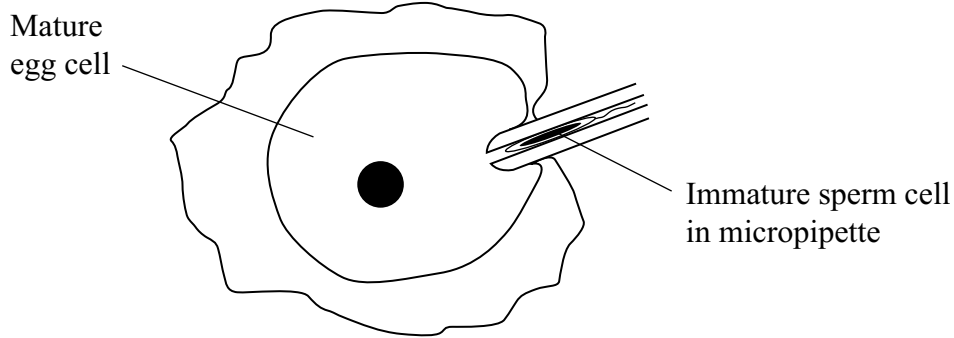
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(2 marks)

2 Some men have no sperm cells in their semen because the cells fail to mature. Immature sperm cells can be extracted from samples taken from their testes. An egg cell can then be fertilised by injecting an immature sperm cell into it.



(a) Suggest and explain **one** reason why an immature sperm cell is unable to fertilise an egg cell unless injected.

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(2 marks)

S (b) Describe how differential centrifugation could be used to extract immature sperm cells from the sample of testis tissue.

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(3 marks)

5

Turn over 

3 (a) In a demographic transition, give **one** factor that might cause

(i) an increase in the birth rate;

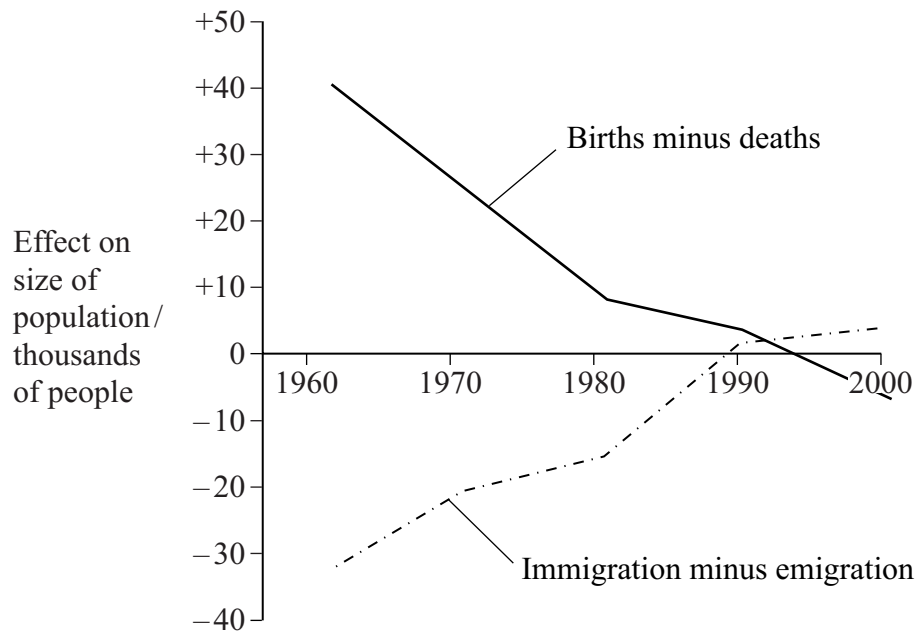
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(ii) a decrease in the death rate.

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(2 marks)

(b) Births, deaths and migration affect population growth. The graph shows the effects of these factors on a human population between 1960 and 2000. During this period the death rate was almost constant.



(i) From the information given, what does the graph show about changes in birth rate between 1960 and 1980? Explain your answer.

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(2 marks)

(ii) Describe the effect of immigration and emigration on the growth of this population between 1960 and 2000.

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(2 marks)

6

Turn over for the next question

Turn over 

There are no questions printed on this page

- 4 (a) The table shows data about the hearts of women who are not pregnant and of women in late pregnancy.

	Not pregnant	Late pregnancy
Mean heart rate / beats per minute	65	80
Mean diameter of left ventricle when full / cm	4.56	4.90
Mean time for left ventricle to empty / ms	312	287

- (i) Use information in the table to explain the increase in cardiac output during pregnancy.

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(2 marks)

- (ii) The data about the diameter of the ventricle were obtained using ultrasound. Suggest the advantage of using ultrasound rather than X-rays.

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(2 marks)

- S (b) Describe the pathway by which the mother's blood leaving the uterus in a vein gets back to the left atrium of her heart.

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(3 marks)

Turn over 

- 5 (a) Explain **one** effect in humans of a deficiency of calcium ions in the diet.

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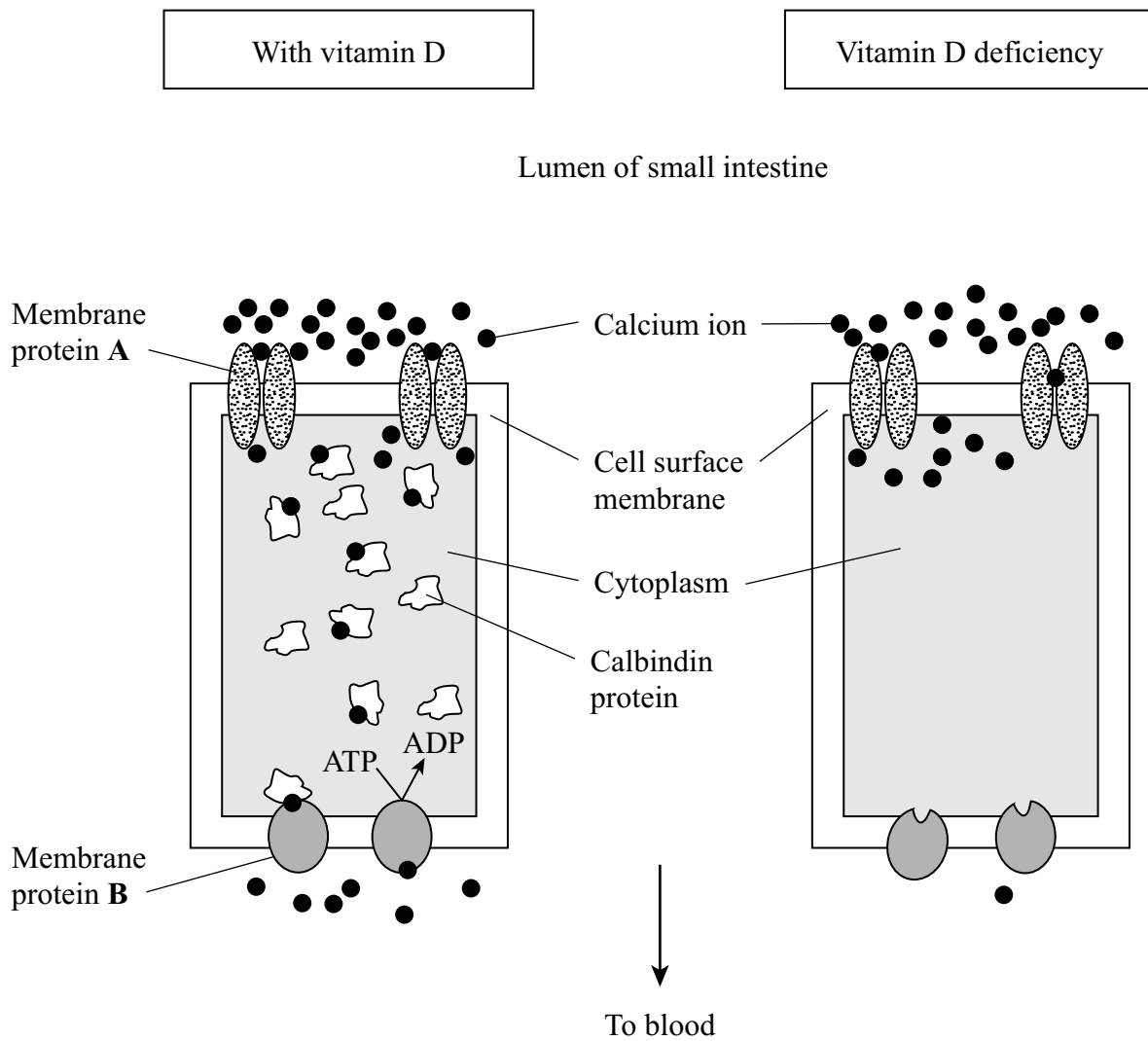
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(2 marks)

- (b) Vitamin D deficiency reduces the uptake of calcium ions by epithelial cells lining the small intestine. The diagrams show how calcium ions are transported through normal epithelial cells and those deficient in vitamin D.



(i) Use the information in the diagrams to explain how vitamin D deficiency reduces calcium ion uptake through gut epithelial cells.

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(2 marks)

S (ii) Membrane proteins **A** and **B** transport calcium ions through cell surface membranes. Explain how each type of membrane protein transports calcium ions.

Protein **A**
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(2 marks)

Protein **B**
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(2 marks)

6 The red grouse is a bird that lives on moorland. Each male fights for, and then defends, a territory into which he attracts females.

S (a) Male grouse vary in how aggressive they are. Suggest and explain **two** possible causes of this variation in aggressive behaviour.

1

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(4 marks)

(b) **Figure 1** and **Figure 2** give information about aggressiveness of males, the size of their territories and the number of females they mate with.

Figure 1

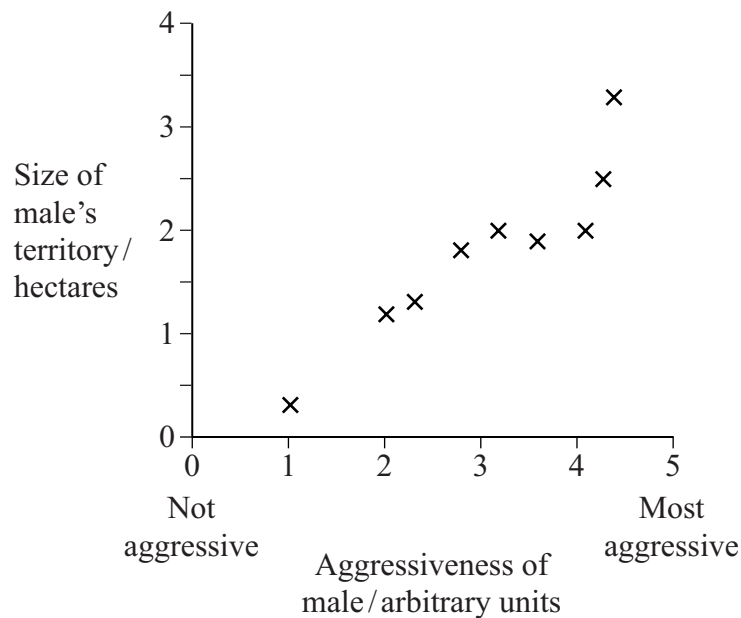
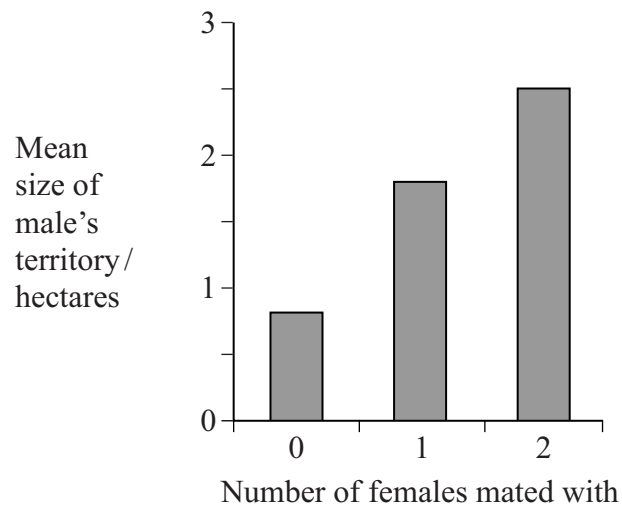


Figure 2



Use information in **Figure 1** and **Figure 2** to describe how the defence of a territory by a male grouse affects his success in reproduction.

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(3 marks)

7

Turn over 

7 When a puff of air hits the surface of the eye, the eye-blink reflex causes the eyelids to close briefly and protect the eye. In an investigation, human volunteers were exposed to a flash of light followed soon afterwards by a puff of air on the eye. This trial was repeated eight times at regular time intervals. The investigator recorded the percentage of people who showed the eye-blink reflex after the flash but before the puff of air in each trial.

(a) Explain how the investigation involves classical conditioning.

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(2 marks)

S (b) The eye-blink reflex is controlled by the brain. Receptors in the eye detect a stimulus and send nerve impulses to the brain. Name **two** areas of the brain and describe their role in producing this reflex response.

Name of area

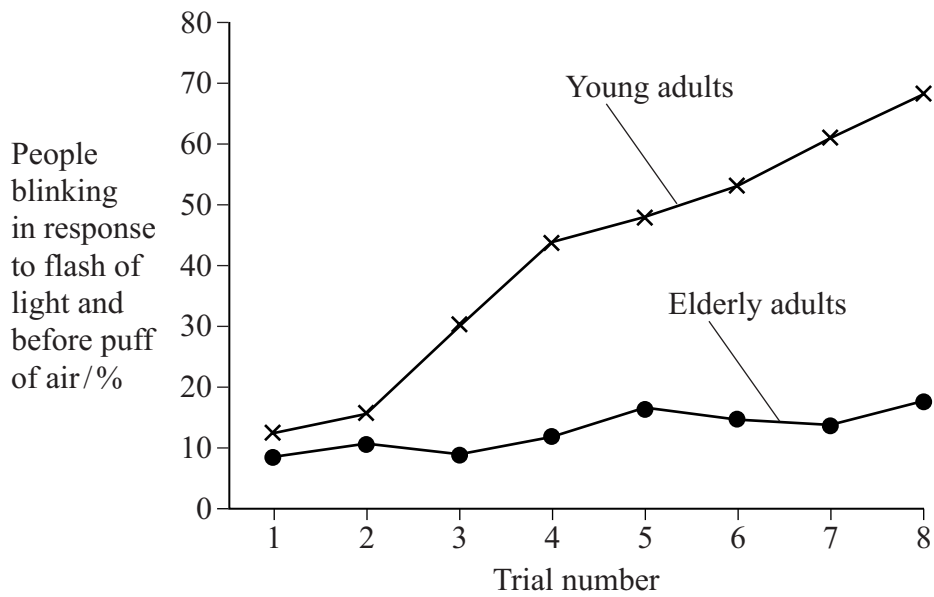
Role
.....

Name of area

Role
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(4 marks)

- (c) Two groups of volunteers took part in the investigation, young adults and elderly adults. The graph shows the results.



- (i) Describe the difference between the results for young adults and elderly adults.

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(1 mark)

- (ii) Suggest **one** explanation for this difference.

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(2 marks)

Question 7 continues on the next page

Turn over

- S (d) Dementia is a condition caused by a reduced ability of the brain to function normally. The table shows measurements of the rate at which glucose is used by brain tissue in a sample of elderly people not affected with dementia and in a sample of elderly people with dementia.

	Mean rate at which glucose is used by the brain / mg dm^{-3} per minute
Unaffected elderly	57
Elderly with dementia	35

Suggest **one** explanation for the reduced use of glucose by brain tissue in elderly people with dementia.

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(2 marks)

END OF QUESTIONS

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