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Centre Number		Candidate Number	
Candidate Signature			

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General Certificate of Secondary Education
June 2006



SCIENCE: SINGLE AWARD B (CO-ORDINATED)
Paper 1
Higher Tier

3463/1H

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Wednesday 7 June 2006 1.30 pm to 2.15 pm

<p>For this paper you must have:</p> <ul style="list-style-type: none"> a ruler <p>You may use a calculator.</p>
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Time allowed: 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.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

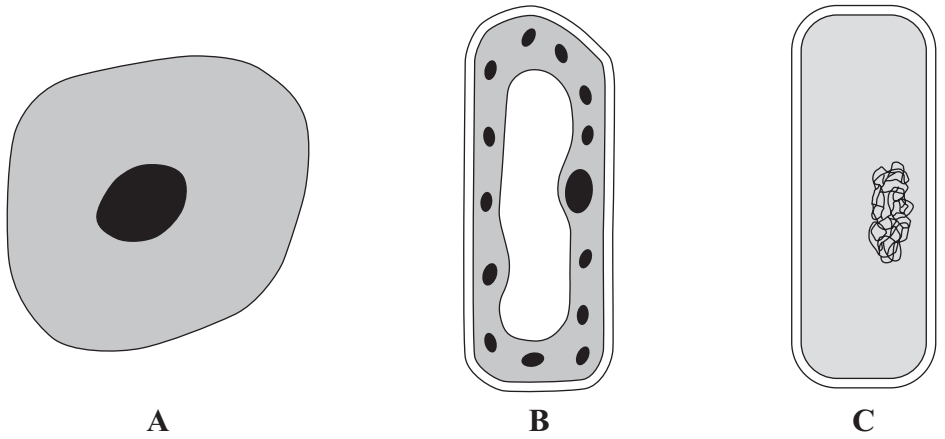
- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use			
Number	Mark	Number	Mark
1		4	
2		5	
3		6	
		7	
		8	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

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

1 Tuberculosis (TB) is a disease caused by a bacterium.

(a) The diagram shows three types of cell.



(not to scale)

(i) Which cell, **A**, **B** or **C**, is a bacterium?
(1 mark)

(ii) Describe **one** feature you can see in the diagram which helps you to identify this cell as a bacterium.
.....
(1 mark)

(b) TB is spread by coughs and sneezes. It is more common when people live together in crowded conditions. TB usually affects the lungs first, although other organs may later become infected.

(i) Why is TB more likely to spread when people live in crowded conditions?
.....
.....
(1 mark)

(ii) Why does TB affect the lungs first?
.....
.....
(1 mark)

(iii) How could TB later spread to other regions of the body?

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.....

(1 mark)

(c) The human body has several natural defences against bacteria. Some of these prevent bacteria from entering the body. Others act once the bacteria have entered.

Give **two** ways in which the body stops bacteria from entering.

1
2

(2 marks)

7

Turn over for the next question

Turn over ►

- 2 A slice of bread contains 300 kilojoules of energy.
A typical teenage girl needs 10 200 kilojoules of energy each day.

- (a) A girl eats only bread and drinks only water for one day.
How many slices of bread must she eat to supply her energy needs for the day?

Show clearly how you work out your final answer.

.....
.....

..... slices of bread
(2 marks)

- (b) Most of the carbohydrate in bread is starch.

- (i) Name **one** part of the digestive system where starch is digested.

.....
(1 mark)

- (ii) Name the enzyme which digests starch.

.....
(1 mark)

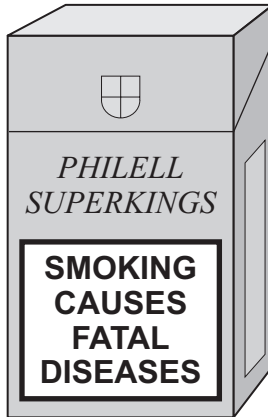
- (iii) Name **one** product of starch digestion.

.....
(1 mark)

- (iv) Name **one** part of the digestive system where the products of starch digestion are absorbed into the blood.

.....
(1 mark)

3 The following warning was printed on a packet of cigarettes.



Explain how cigarette smoking can cause fatal diseases.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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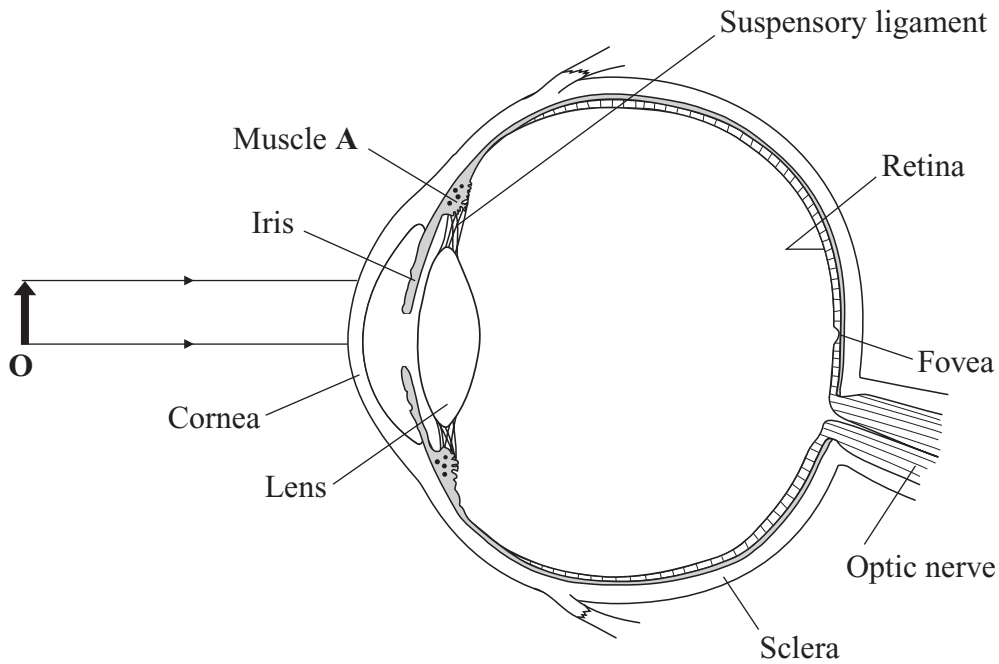
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(5 marks)

5

4 The diagram shows a section through the human eye.



(a) Which **two** parts of the eye help to bend the light rays to bring them to a focus?

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(1 mark)

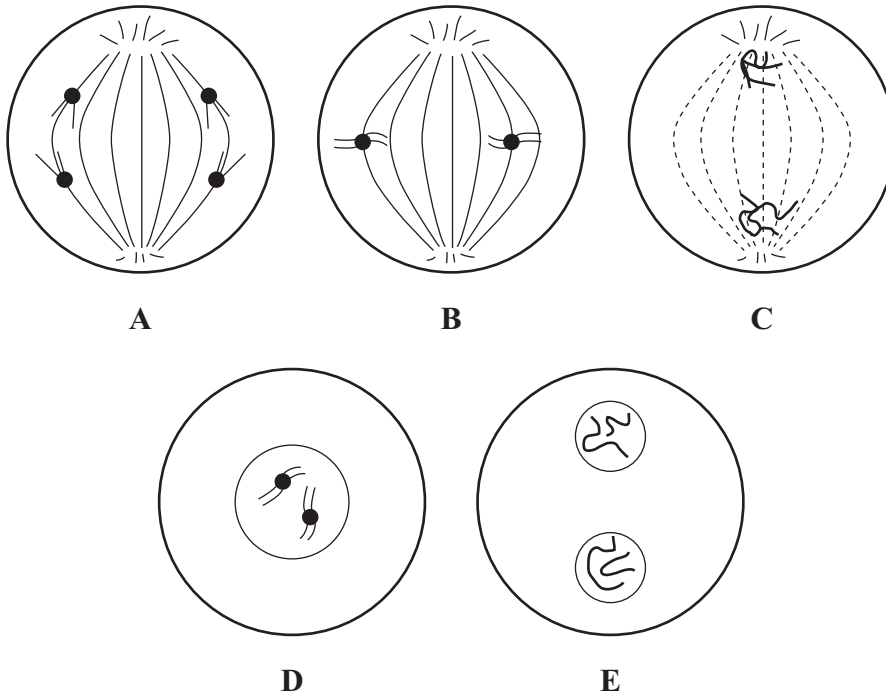
(b) If object **O** were moved closer to the eye, what would muscle **A** do and how would this help to bring the light to a focus?

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.....
.....
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(2 marks)

3

- 5 The diagram shows five stages in one type of cell division. The stages are not in the correct order. Cells produced by this type of cell division are genetically identical.



- (a) (i) Name the type of cell division shown in the diagram.
(1 mark)

- (ii) What is the correct order of stages **A**, **B**, **C**, **D** and **E**?

.....
(1 mark)

- (b) Approximately one in every million cells produced by this type of cell division will be genetically different.

- (i) What name do scientists use to describe a change in a gene?

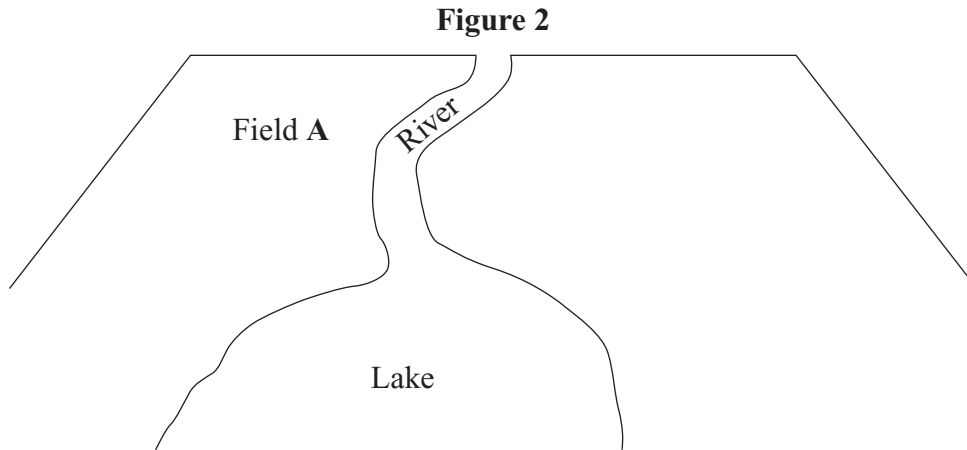
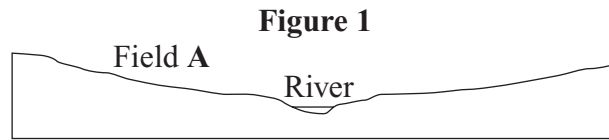
.....
(1 mark)

- (ii) The rate of genetic change can be increased by some environmental factors.

Give **one** environmental factor that would cause an increase in the rate of genetic change.

.....
(1 mark)

6 **Figure 1** shows a section through part of a farm. **Figure 2** shows a map of the farm. A river flows through the farm and then enters a small lake.



The farmer added inorganic fertiliser to Field A. This was followed by heavy rainfall and then several weeks of hot, sunny weather. The water in the lake turned green and cloudy and many fish died.

Explain what caused these changes in the lake.

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(4 marks)

4

7 Cystic fibrosis is an inherited disorder caused by a recessive allele, **n**. People with cystic fibrosis produce thick, sticky mucus in their lungs which makes breathing difficult. Heterozygous individuals are unaffected because they have the dominant allele, **N**, in their genotype.

(a) What is the genotype of:

(i) a person with cystic fibrosis;

(ii) a person who is heterozygous for cystic fibrosis?
(2 marks)

(b) A man and his wife have a child with cystic fibrosis. Neither the man nor his wife has cystic fibrosis. What is the probability that their next child will have cystic fibrosis?

Use a genetic diagram to explain your answer.

Probability =
(4 marks)

(c) Gene therapy is being developed to treat cystic fibrosis. The patient breathes in tiny droplets from an inhaler which contain the functional gene wrapped up in fatty material. The fatty droplets are taken in through the surfaces of cells lining the lung, delivering the gene into these cells.

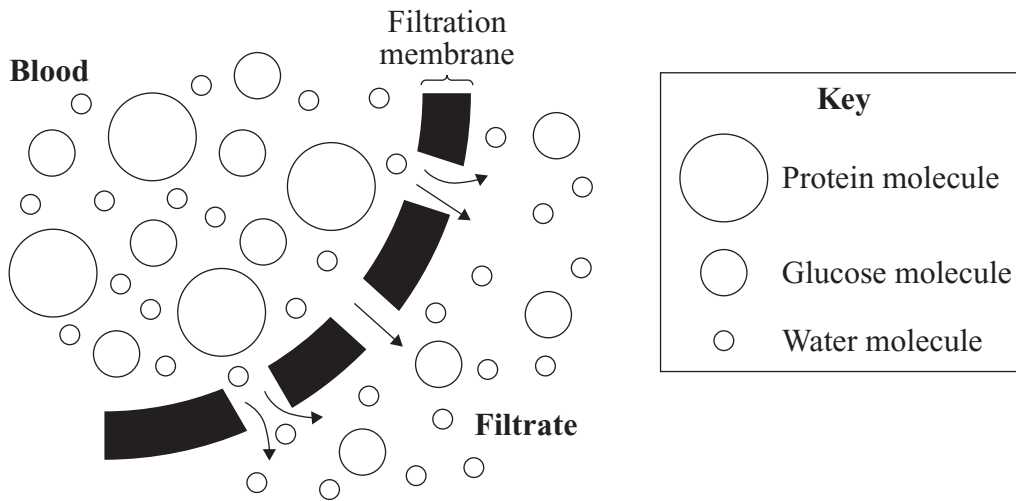
(i) Name the structure which controls the passage of substances into a cell.

.....
(1 mark)

(ii) Suggest why someone treated by gene therapy would not be able to pass on the functional gene to any offspring.

.....
.....
(1 mark)

8 The diagram shows the process of filtration in the kidney.



(a) Use information in the diagram and your own knowledge of how the kidney works to explain why:

(i) protein molecules are not normally present in urine;

.....

(1 mark)

(ii) glucose molecules are not normally present in urine.

.....

(3 marks)

- (b) An athlete trained for two hours on a hot summer's day. At the end of the training session, the athlete had a higher concentration of antidiuretic hormone (ADH) in his blood than at the start of the training session.

Explain why.

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(4 marks)

8

END OF QUESTIONS

Turn over ▶

There are no questions printed on this page