

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use

General Certificate of Secondary Education
June 2008

ADDITIONAL SCIENCE
Unit Biology B2

BIOLOGY
Unit Biology B2

Higher Tier

Wednesday 21 May 2008 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>

Time allowed: 45 minutes

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

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

Advice

- In all calculations, show clearly how you work out your answer.

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



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

1 Enzymes are used in biological detergents.

1 (a) Name the type of enzyme that digests stains containing fats.

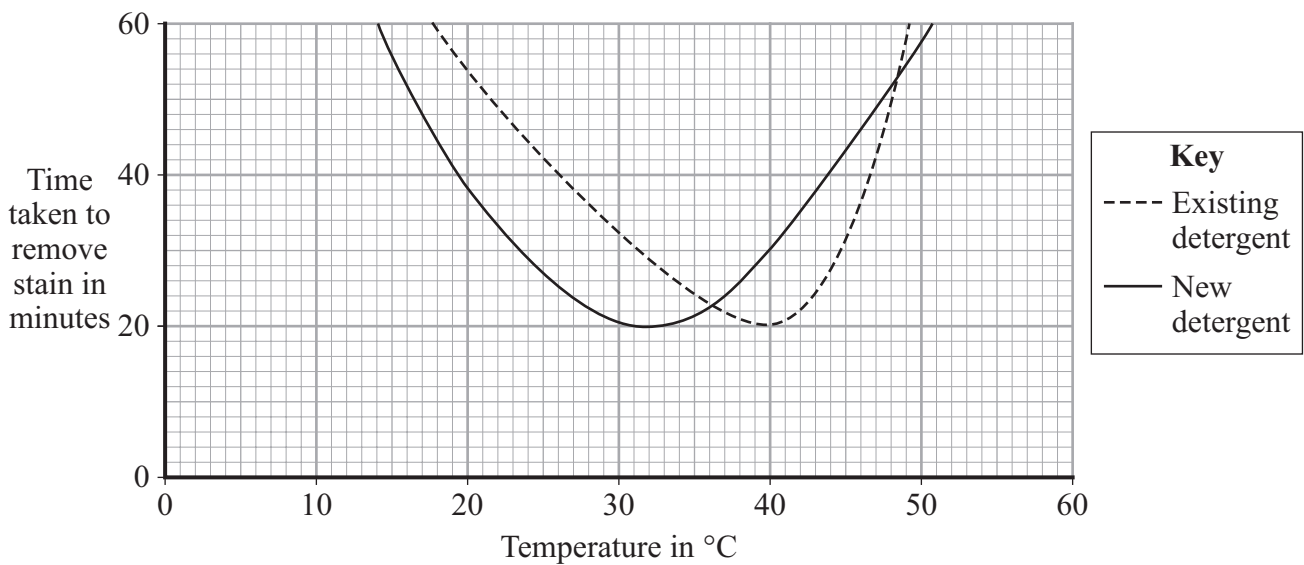
.....
 (1 mark)

1 (b) A new detergent is marketed as being ‘environmentally-friendly’.

Scientists compared the performance of this new detergent with an existing detergent.

They measured the time taken by the two detergents to remove a fat stain at different temperatures.

The graph shows their results.



1 (b) (i) Describe the effect of increasing the temperature on the time taken by the existing detergent to remove the stain.

.....

(2 marks)



1 (b) (ii) The new detergent works at a lower temperature than the existing one.

Is the new detergent likely to be more ‘environmentally-friendly’ than the existing detergent?

Draw a ring around your answer. **Yes / No**

Explain the reason for your answer.

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(2 marks)

1 (c) Neither detergent works well at 60°C.

Explain why.

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(2 marks)

7

Turn over for the next question

Turn over ►



2 Cystic fibrosis is an inherited disorder that can seriously affect health.

2 (a) Which **one** of these is affected by cystic fibrosis?

Draw a ring around your answer.

blood

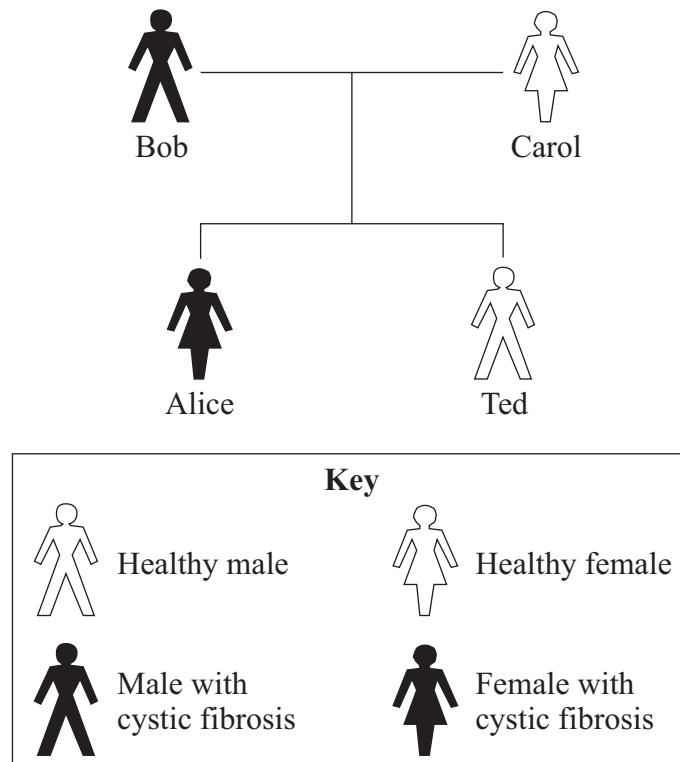
cell membranes

kidneys

nervous system

(1 mark)

2 (b) The diagram shows the inheritance of cystic fibrosis in a family. The allele that produces cystic fibrosis is recessive.



2 (b) (i) Explain why Alice inherited cystic fibrosis.

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(2 marks)



2 (b) (ii) Explain why Ted did **not** inherit cystic fibrosis.

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(2 marks)

2 (c) Bob and Carol know that there is a risk that their next baby will have cystic fibrosis.

Embryos can be screened for the allele that produces cystic fibrosis.

Many people support the screening of embryos, but others do not.

2 (c) (i) Suggest **one** reason why many people support the screening of embryos for the cystic fibrosis allele.

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(1 mark)

2 (c) (ii) Suggest **one** reason why many people are against the screening of embryos for the cystic fibrosis allele.

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(1 mark)

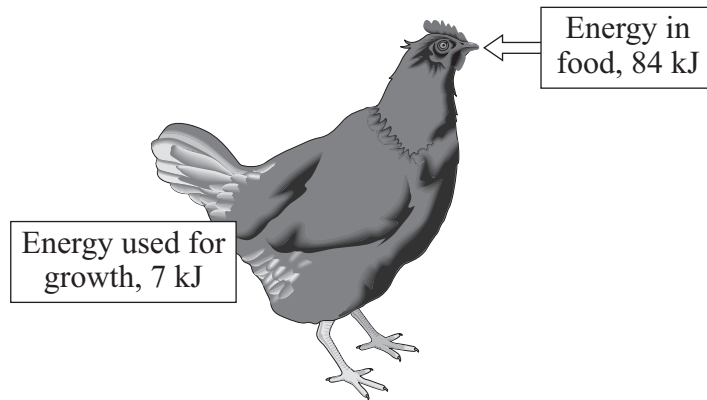
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Turn over for the next question

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- 3 The diagram shows what happens to some of the energy in the food that a chicken eats.



- 3 (a) Calculate the percentage of energy used for growth.

Show clearly how you work out your answer.

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Energy used for growth = %
 (2 marks)

- 3 (b) The energy that is not transferred into growth is lost.

Give **three** ways in which this energy is lost.

1

2

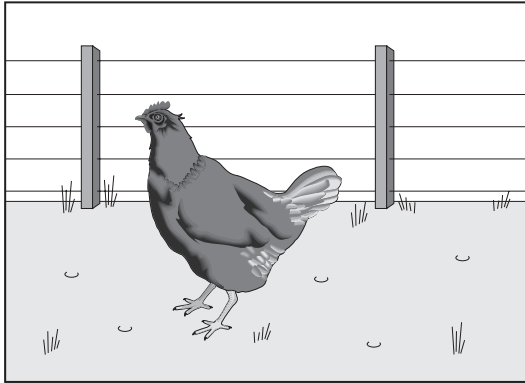
3

(3 marks)

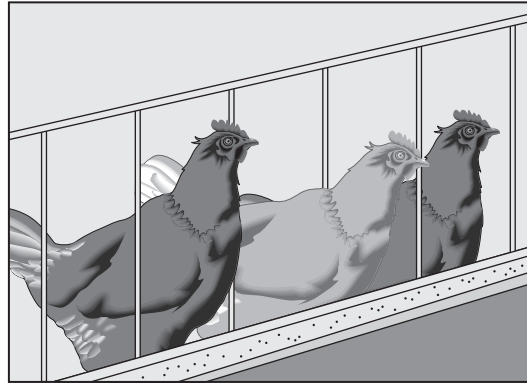


3 (c) The pictures show two ways of keeping chickens to produce eggs.

Chickens kept outdoors (free-range)



Chickens kept in cages (battery chickens)



Battery chickens produce more eggs per year than free-range chickens.

Suggest **one** reason why.

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(1 mark)

3 (d) The animals that we raise for food are usually herbivores (plant eaters) rather than carnivores (flesh eaters).

Explain why.

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(2 marks)

Turn over for the next question

Turn over ▶



4 Chromosomes contain molecules of DNA. Genes are small sections of DNA.

4 (a) Each gene contains a code.

What does a cell use this code for?

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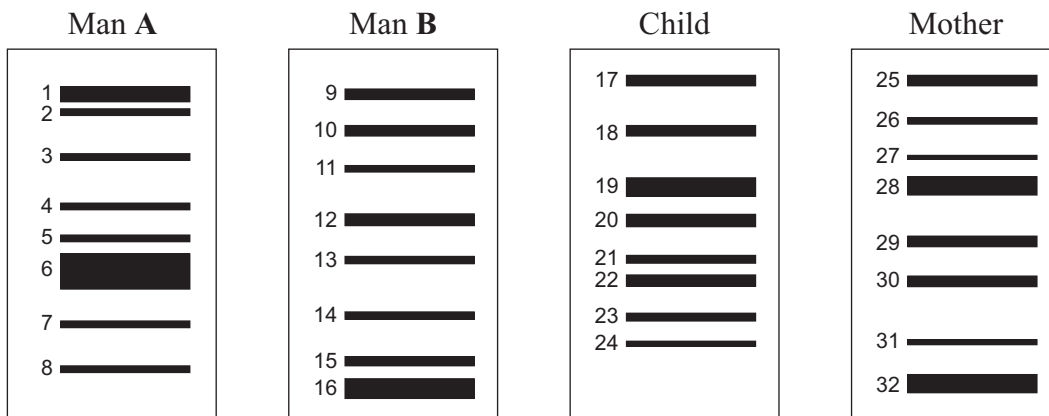
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(2 marks)

4 (b) DNA fingerprints can be used to identify people. One example of the use of DNA fingerprints is to find out which man is the father of a child.

The diagram shows the DNA fingerprints of a child, the child's mother and two men who claim to be the child's father.

The numbers refer to the bars on the DNA fingerprints.



4 (b) (i) Which man, **A** or **B**, is more likely to be the father of the child?

Use the numbers on the DNA fingerprints to explain your choice.

In your answer you should refer to all four people.

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(3 marks)

4 (b) (ii) Only half the bars of the child's DNA fingerprint match the mother's DNA fingerprint.

Explain why.

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(2 marks)

7

Turn over for the next question

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5 The hormone insulin is a protein. Insulin is produced in the pancreas and controls blood glucose concentration.

5 (a) Which organ in the body monitors blood glucose concentration?

.....
 (1 mark)

5 (b) We now know that a lack of the hormone insulin causes diabetes. In the early twentieth century there was no known cure for diabetes.

Frederick Banting and Charles Best carried out a number of experiments on dogs.

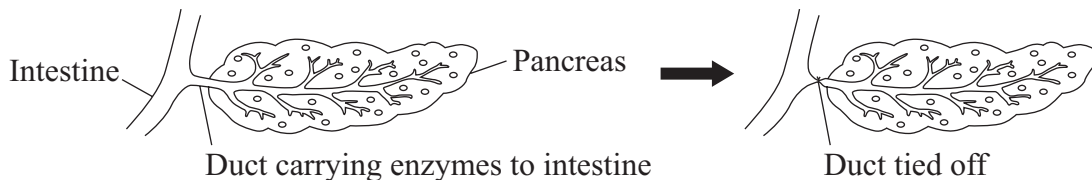
In the first experiment they removed part of the pancreas from a healthy dog (dog **A**). They ground up the pancreas tissue and injected an extract into dog **B**, whose pancreas had been removed to make it diabetic. Dog **B**'s diabetes was **not** cured.

Banting thought that an enzyme produced in the pancreas of dog **A** had digested the hormone before it was injected.

Name the enzyme that might have been responsible for digesting the hormone.

.....
 (1 mark)

5 (c) In the second experiment with another healthy dog, Banting and Best tied off the duct which normally carries digestive enzymes out of the pancreas. This did **not** kill the dog.



5 (c) (i) The dog survived even though enzymes from the pancreas could not digest food in the intestine.

Explain why the dog survived.

.....

(1 mark)



5 (c) (ii) As a result of these experiments, a method was developed to extract insulin from the pancreas.

Insulin is used to treat humans with diabetes.

The amount of insulin injected needs to be carefully controlled.

Explain why.

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(1 mark)

5 (d) Evaluate the use of dogs in experiments of this type.

Remember to include a conclusion to your evaluation.

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(3 marks)

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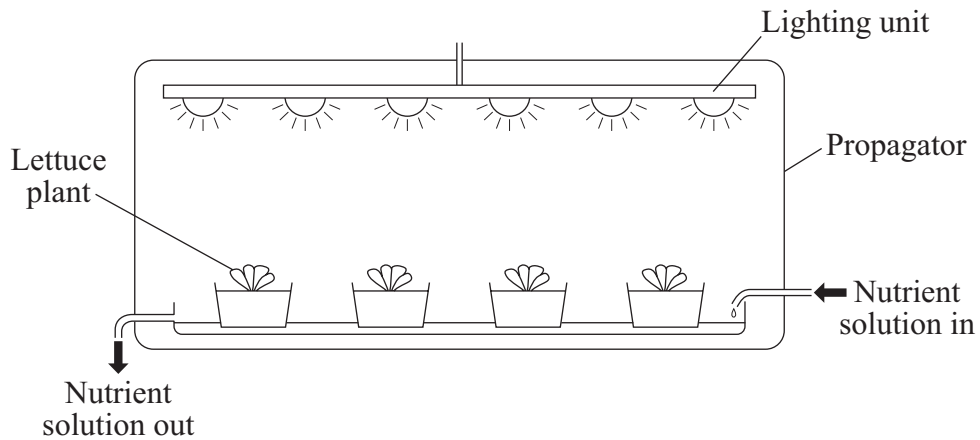
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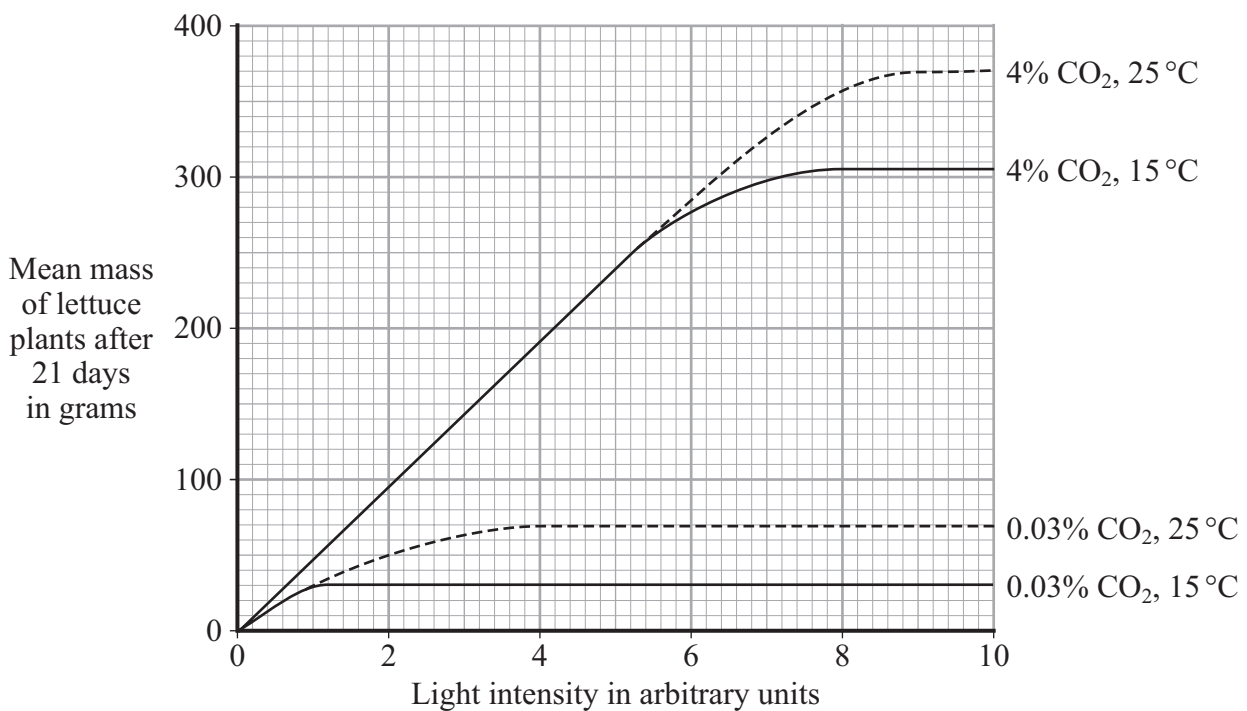


6 Changing the conditions in which plants grow affects how fast they grow.

The diagram shows a propagator in which scientists can control temperature, light intensity and carbon dioxide concentration.



The graph shows the effects of changing the temperature, light intensity and carbon dioxide concentration on the growth of lettuce plants.



6 (a) Describe and explain the effect of increasing light intensity on the mean mass of lettuce plants at 4% carbon dioxide and 15 °C.

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(3 marks)

6 (b) Growers wish to make maximum profits from their lettuces.

What do they need to consider before making decisions about the growing conditions for their lettuces?

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(2 marks)

Question 6 continues on the next page



- 6 (c) The nutrient solution contains nitrate ions and magnesium ions.

Complete the table to show the functions of these ions in plants and their deficiency symptoms.

Ion	Function in plants	Deficiency symptoms
Nitrate

Magnesium

(4 marks)

9

END OF QUESTIONS



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