

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use
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General Certificate of Secondary Education  
January 2009



**ADDITIONAL SCIENCE**  
**Unit Biology B2**

**BLY2H**  
**H**

**BIOLOGY**  
**Unit Biology B2**

**Higher Tier**

Monday 12 January 2009 9.00 am to 9.45 am

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>a pencil and a ruler.</li> </ul> <p>You may use a calculator.</p>
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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.

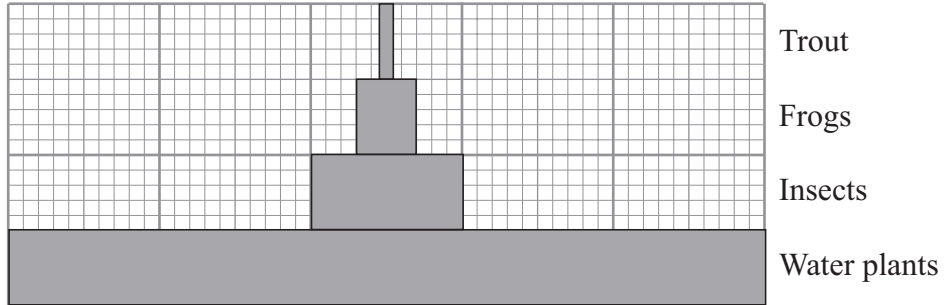
For Examiner's Use			
Question	Mark	Question	Mark
1		3	
2		4	
		5	
		6	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			



J A N O 9 B L Y 2 H O 1

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

1 The diagram shows a pyramid of biomass drawn to scale.



1 (a) What is the source of energy for the water plants?

.....  
 (1 mark)

1 (b) The ratio of the biomass of water plants to the biomass of insects is 5 : 1.

Calculate the ratio of the biomass of insects to the biomass of frogs.

Show clearly how you work out your answer.

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ratio = ..... : 1  
 (2 marks)

1 (c) Give **two** reasons why the biomass of the frog population is smaller than the biomass of the insect population.

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2 .....  
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(2 marks)



1 (d) Some insects die.

Describe how the carbon in the dead insect bodies may be recycled.

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(4 marks)

9

**Turn over for the next question**

**Turn over ▶**



2 Diabetes is a disease in which a person's blood glucose concentration rises to higher levels than normal.

Diabetes is caused by insufficient insulin being produced.

2 (a) (i) Which organ monitors blood glucose concentration?

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(1 mark)

2 (a) (ii) Insulin reduces the concentration of glucose in the blood.

Describe how insulin does this.

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(1 mark)

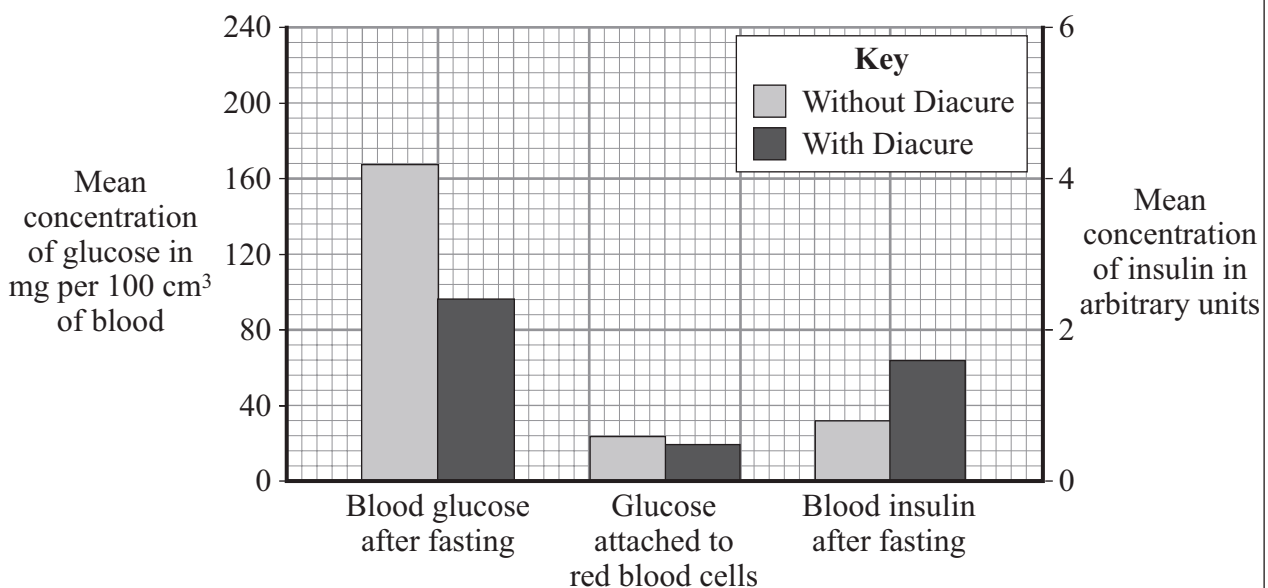
2 (b) A person with diabetes can be monitored in three ways:

- measuring the blood glucose concentration after fasting (going without food for 12 hours)
- measuring the amount of glucose attached to red blood cells: this is a measure of the average blood glucose concentration over the previous three months
- measuring the concentration of insulin in the blood after fasting

The manufacturer of a new treatment for diabetes, called Diacure, publishes the following two claims.

**1. 98.6% of all people who used Diacure reported an improvement in their condition.**

**2. An independent study of 30 diabetic patients showed a significant reduction in blood glucose concentrations and a significant increase in insulin production, as shown by the graph.**



2 (b) (i) Which of the manufacturer's claims is **not** based on scientific evidence?

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.....

(1 mark)

2 (b) (ii) Why might the data in this study be unreliable?

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(1 mark)

2 (b) (iii) The manufacturer did **not** draw attention to the data for the amount of glucose attached to red blood cells.

Suggest an explanation for this.

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(2 marks)

2 (b) (iv) The study of diabetic patients was carried out by an independent company.

Why is it important that the study should be independent?

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(1 mark)

7

Turn over ►

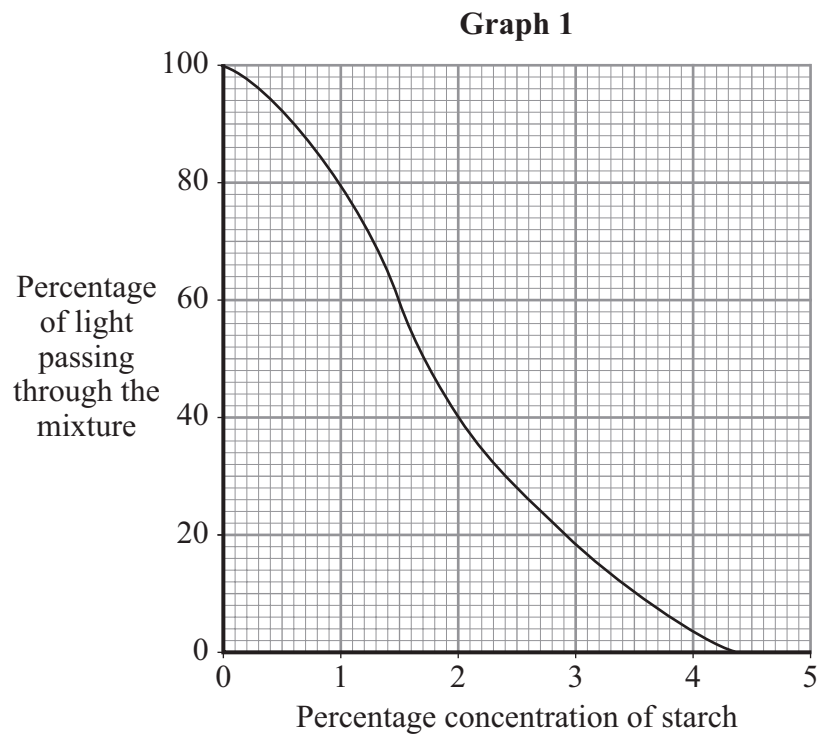


- 3 A manufacturer of slimming foods is investigating the effectiveness of carbohydrases from different microorganisms.

Iodine solution is a pale golden brown, transparent solution. Starch reacts with iodine to form a dark blue mixture.

Known concentrations of starch are added to iodine solution. The mixture is placed in a colorimeter which measures the percentage of light passing through the mixture.

**Graph 1** shows the results.



- 3 (a) Explain why less light passes through the mixture when the starch is more concentrated.

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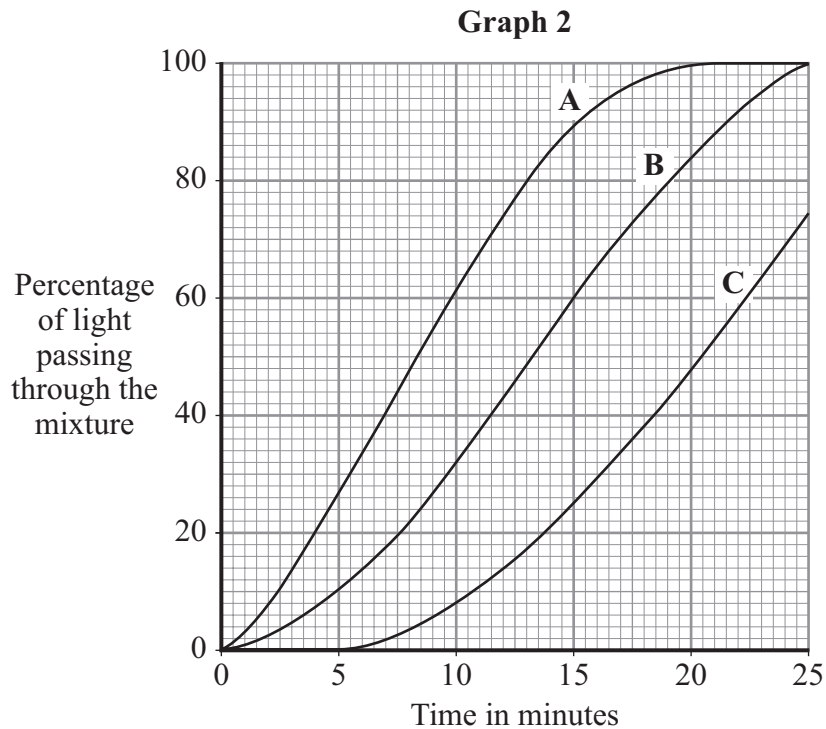
(1 mark)



- 3 (b) The manufacturer adds carbohydrase from each of three different microorganisms, **A**, **B** and **C**, to starch in flasks at 40 °C.

Every minute a sample of the mixture is added to iodine solution and placed in the colorimeter.

**Graph 2** shows these results.



- 3 (b) (i) When the concentration of starch reaches 2%, digestion is considered to be sufficient for the next stage in the manufacture of the slimming food.

How long does this take for the most effective carbohydrase?

Show clearly how you work out your answer.

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..... minutes  
 (2 marks)

**Question 3 continues on the next page**

**Turn over ►**



3 (b) (ii) Explain why the manufacturer carried out the investigation at 40 °C.

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(2 marks)

3 (c) Carbohydrases convert starch into glucose. To complete the manufacture of the slimming food the glucose should be converted into fructose.

3 (c) (i) Name the enzyme which would be used to convert glucose into fructose.

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(1 mark)

3 (c) (ii) Explain why fructose, rather than glucose, is used in slimming foods.

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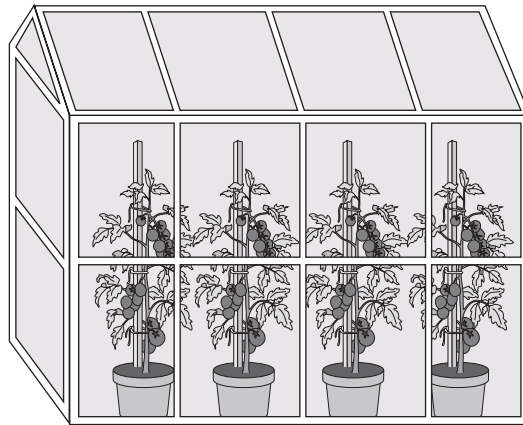
(2 marks)

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4 In this country most tomatoes are grown in greenhouses.



4 (a) Suggest **one** way in which a grower could increase the yield of tomatoes from plants growing in his greenhouse.

.....

.....

(1 mark)

4 (b) Large supermarkets often import tomatoes from overseas.

4 (b) (i) Suggest **two** reasons why a supermarket might decide to import tomatoes rather than buy them from British growers.

1 .....

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2 .....

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(2 marks)

4 (b) (ii) Importing tomatoes may be more damaging to the environment than selling tomatoes grown in this country. Explain why.

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(2 marks)

5
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Turn over ▶



5 During exercise an athlete's core body temperature may rise.

5 (a) What causes this rise in core body temperature?

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(1 mark)

5 (b) During a long race one athlete did not drink any liquid. Towards the end of the race the amount of sweat he produced began to fall.

5 (b) (i) This athlete's core body temperature increased more than that of other similar athletes who had drunk enough liquid during the race.

Explain why.

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(2 marks)

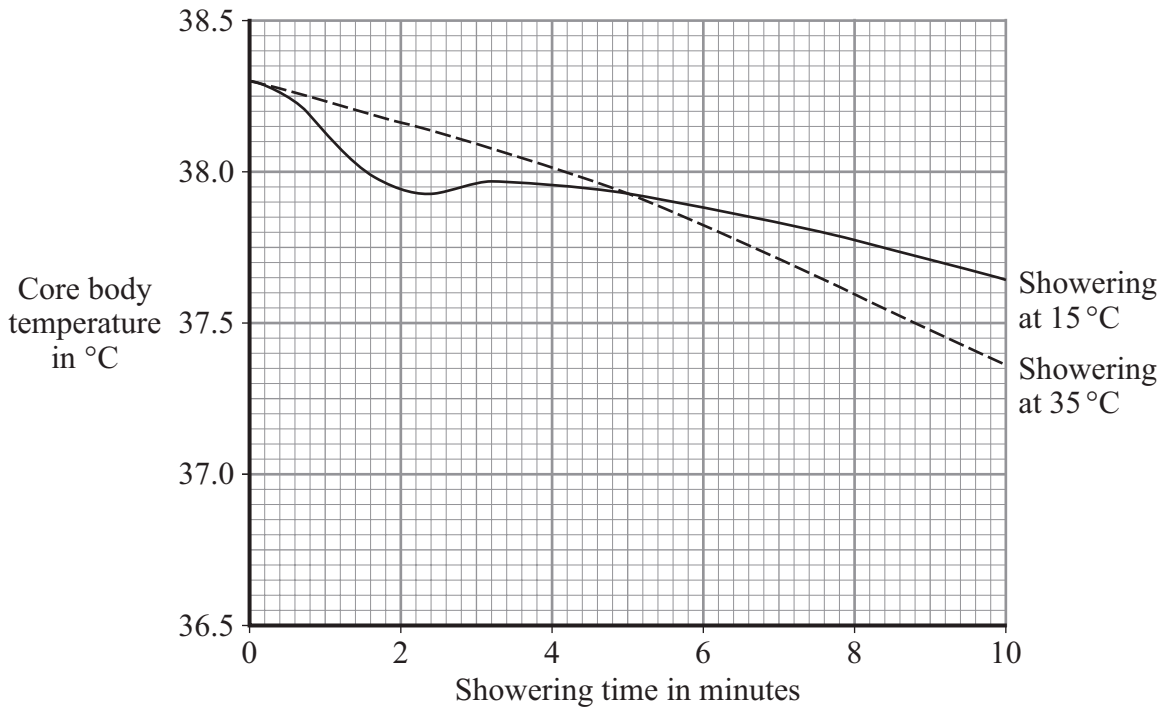
5 (b) (ii) Describe **one** other way in which this athlete's body would respond in order to reduce core body temperature.

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(2 marks)



5 (c) The graph shows the effects of showering for ten minutes at 15 °C and at 35 °C on core body temperature after a long race.



Suggest an explanation for the differences in core body temperature:

5 (c) (i) between 0 and 2 minutes

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(1 mark)

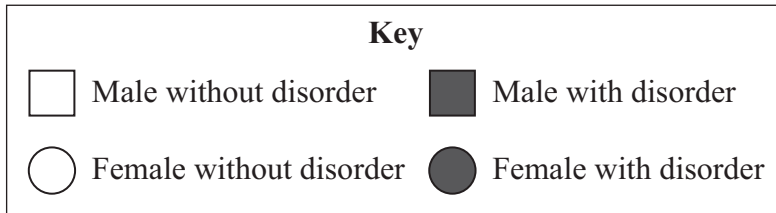
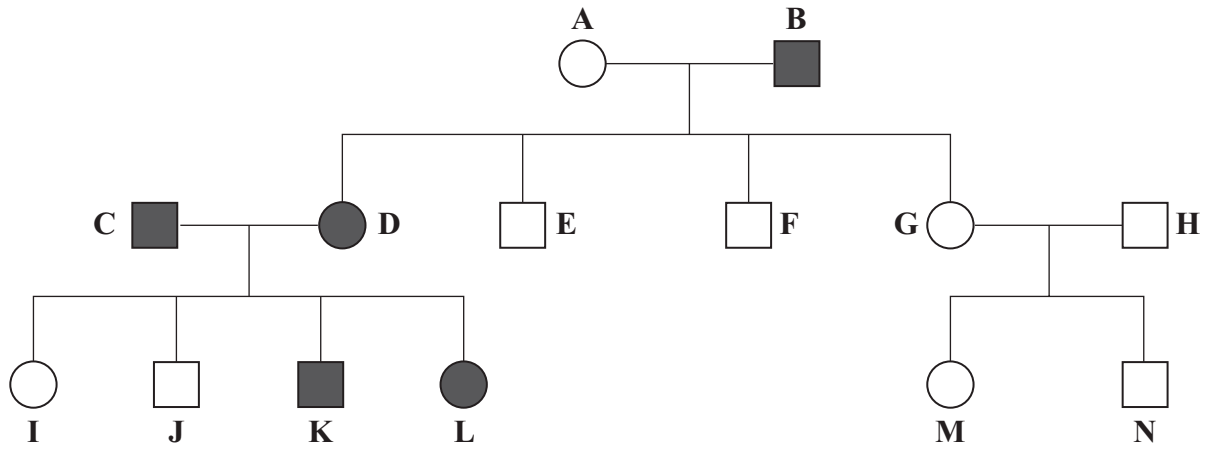
5 (c) (ii) between 4 and 10 minutes.

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(2 marks)



6 The diagram shows a family tree in which some individuals have an inherited disorder, which may cause serious long-term health problems.



6 (a) What proportion of the children of A and B have the disorder?

.....  
(1 mark)

6 (b) Explain the evidence from the diagram which shows that the allele for the disorder is dominant.

Use the appropriate letters to identify individuals in your answer.

You may use genetic diagrams in your explanation. There is space for you to draw a genetic diagram at the top of the facing page.

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(3 marks)

6 (c) (i) What is meant by ‘embryo screening’?

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(1 mark)

6 (c) (ii) A doctor suggests that couple **C** and **D** should have their embryos screened but that couple **G** and **H** do **not** need this procedure.

Explain the reasons for the doctor’s suggestions.

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(3 marks)

<b>8</b>

**END OF QUESTIONS**



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