

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use
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General Certificate of Secondary Education  
January 2008

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

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

**Higher Tier**

Tuesday 15 January 2008 1.30 pm to 2.15 pm

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

**BLY2H**  
**H**



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Question	Mark	Question	Mark
1		3	
2		4	
		5	
		6	
		7	
Total (Column 1)		→	
Total (Column 2)		→	
TOTAL			
Examiner's Initials			



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

- 1 (a) Tuna fish are carnivores. In the wild they feed on smaller fish called herring. Herring feed on plankton. Tuna can be attacked by parasitic worms which feed on their flesh.

- (i) In the space below sketch the appearance of a pyramid of biomass for this food chain.

Do not forget to label each section of the pyramid.

(2 marks)

- (ii) If a tuna eats 1 kg of herring, it gains about 65 g in mass.

Give **two** reasons why so little of the mass of the herring is converted into mass of the tuna.

1 .....

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2 .....

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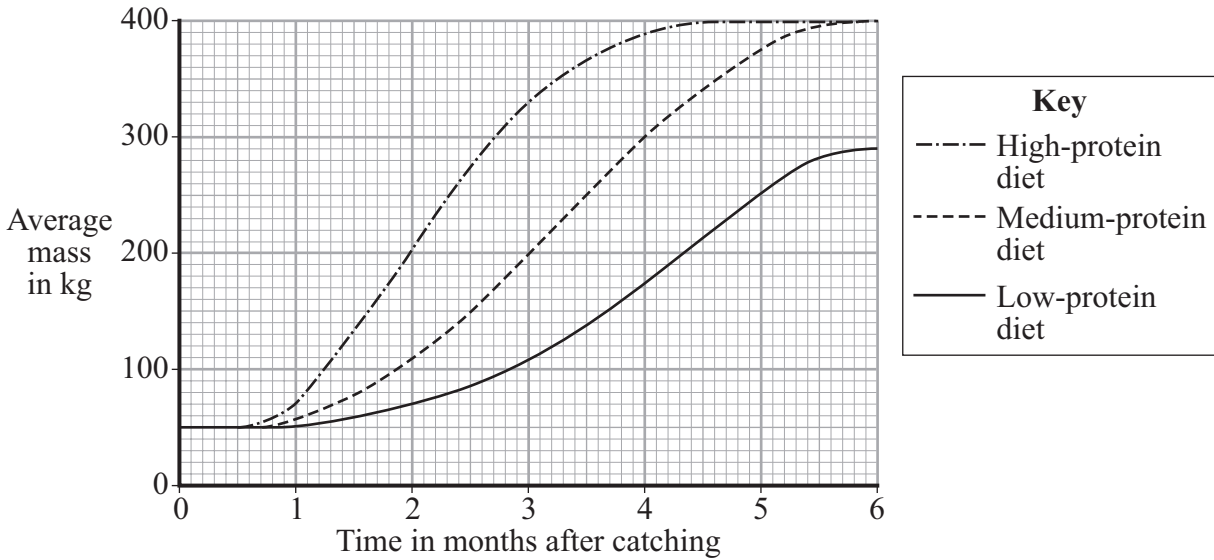
(2 marks)

- (b) Young tuna are caught by fish farmers and reared in large pens in the sea.

The fish are fed more food than they would normally catch themselves so they grow quickly. When they reach 400 kg they are sold.

The graph on the opposite page shows the effect of feeding tuna different amounts of protein in their food.





- (i) Calculate the average increase in mass per month of the fish fed on the low-protein diet over the six months.

Show clearly how you work out your answer.

.....  
 .....

Average increase in mass per month ..... kg  
 (2 marks)

- (ii) There is not enough information in the graph to allow the fish farmer to decide whether to use the high-protein diet or the medium-protein diet.

Suggest **one** other piece of information that he needs in order to make this decision.

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

- (c) Some consumers will not buy tuna grown in this way.

Suggest **one** reason for their decision.

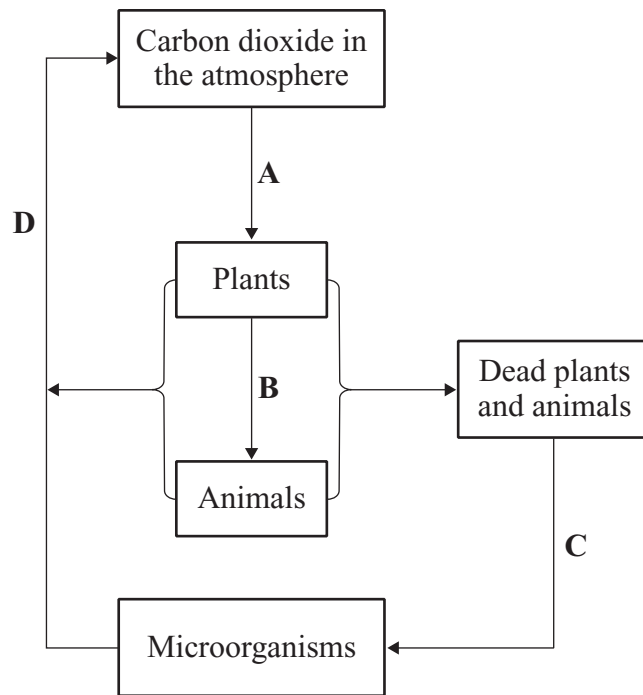
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 (1 mark)

8
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Turn over ►



2 The diagram shows part of the carbon cycle.



(a) Which letter, **A**, **B**, **C** or **D**, represents:

(i) respiration .....

(1 mark)

(ii) photosynthesis? .....

(1 mark)



- (b) Local authorities are encouraging people to recycle vegetable waste by converting it into compost.

Compost is made by mixing the vegetable waste with soil in a large container.

- (i) Decay occurs more quickly if the container has holes in the sides.

Explain why.

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.....  
.....  
.....

*(2 marks)*

- (ii) Spreading compost on the soil between plants leads to better growth of the plants.

Explain why.

.....  
.....

*(1 mark)*

5
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**Turn over for the next question**

**Turn over ►**



3 In the 1850s, Gregor Mendel carried out breeding experiments using peas.

(a) The importance of Mendel's work was not recognised until the early 1900s.

Explain why.

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.....

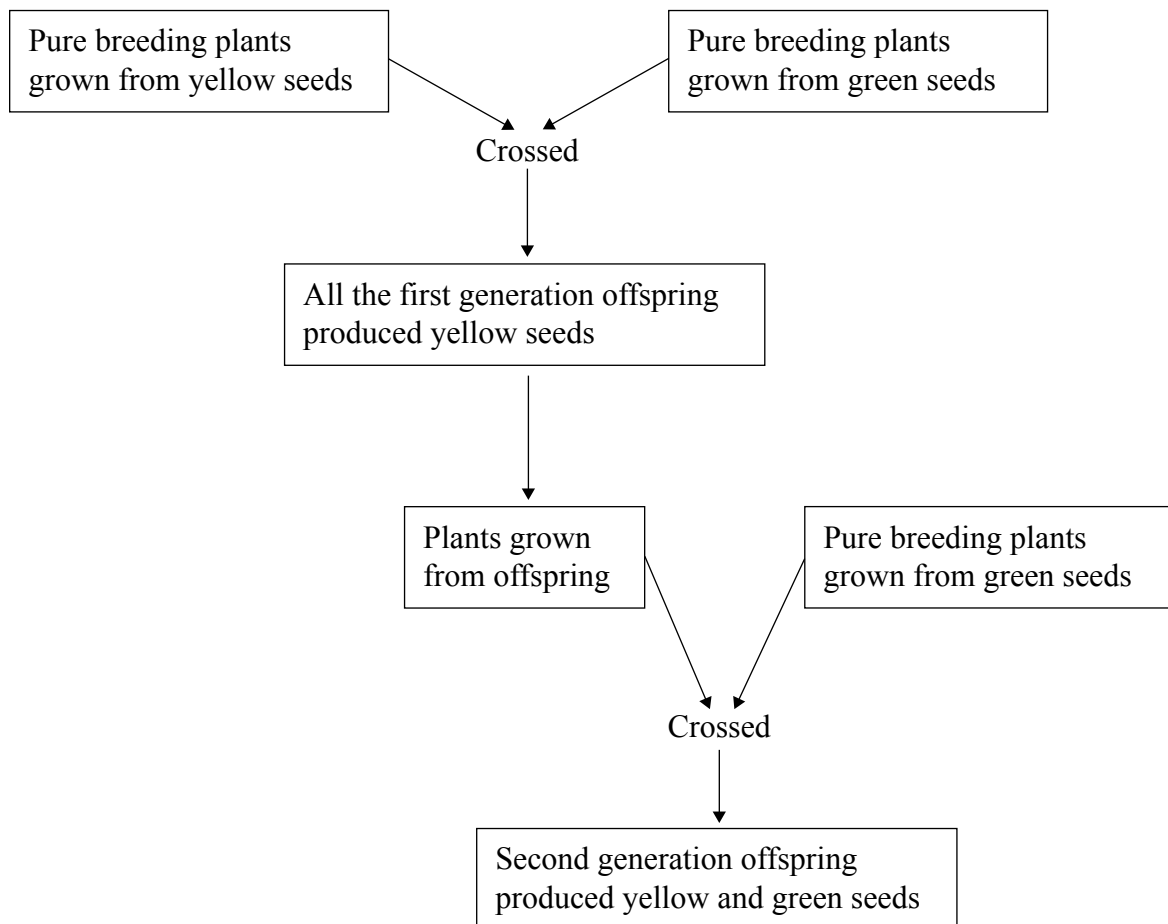
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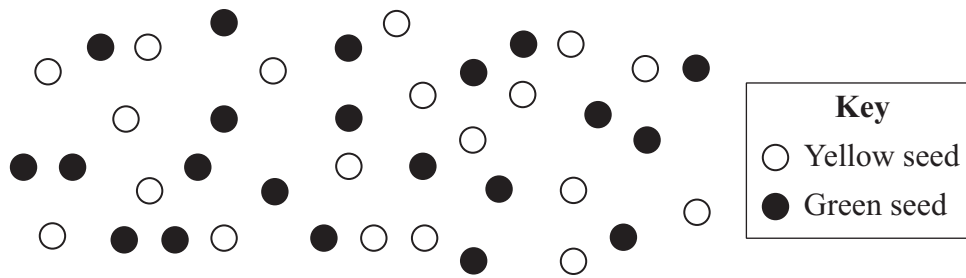
(2 marks)

(b) A student repeated one of Mendel's experiments.

The flow chart shows her procedure.



The diagram shows a representative sample of seeds produced by second generation plants.



- (i) Describe how the student could obtain a sample that is representative of seeds produced by the second generation.

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

- (ii) What was the approximate ratio of yellow seeds to green seeds in the seeds produced by the second generation?

.....  
 (1 mark)

- (iii) Seed colour in peas is controlled by a single gene which has two alleles.

Use a genetic diagram to show why this ratio of yellow seeds to green seeds was produced by the second generation.

Use the symbol **A** to represent the dominant allele, and **a** to represent the recessive allele.

(4 marks)

8

Turn over ►



4 The pancreas is involved in digestion and controlling the internal conditions of the body.

(a) Name **two** digestive enzymes produced by the pancreas.

1 .....

2 .....

(2 marks)

(b) Diabetes may be caused by a lack of insulin.

Part of the treatment for someone with diabetes is to pay careful attention to the diet.

(i) Give **one** symptom of diabetes.

.....

.....

(1 mark)

(ii) Give **one** way in which a diabetic may be advised to change their diet.

.....

.....

(1 mark)

(iii) How does this change in diet help the diabetic?

.....

.....

(1 mark)

(iv) State **one** other way in which the symptoms of diabetes may be treated.

.....

(1 mark)

(c) Many of the cells in the pancreas contain large numbers of ribosomes.

What is the function of ribosomes in a cell?

.....

.....

(1 mark)

7





5 Bile is produced in the liver, stored in the gall bladder, then released into the small intestine.

(a) Explain how bile affects the digestion of food in the small intestine.

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.....  
.....  
.....

(2 marks)

(b) Bile contains bile pigments and cholesterol.

If the diet contains too much cholesterol, some of it may form ‘gallstones’ in the bile.

These gallstones may prevent bile from moving out of the gall bladder into the small intestine.

Bilirubin is a yellow-brown bile pigment. This pigment is produced by the liver from haemoglobin released by broken-down red blood cells.

Suggest how gallstones may produce the following symptoms:

(i) very pale faeces

.....  
.....  
.....  
.....

(2 marks)

(ii) jaundice (a yellow tinge to the skin).

.....  
.....  
.....  
.....

(2 marks)

6

Turn over ►



6 The brain and the skin are involved in monitoring and controlling body temperature.

(a) Describe the parts played by the brain and the skin in monitoring body temperature.

(i) The brain

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.....  
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*(2 marks)*

(ii) The skin

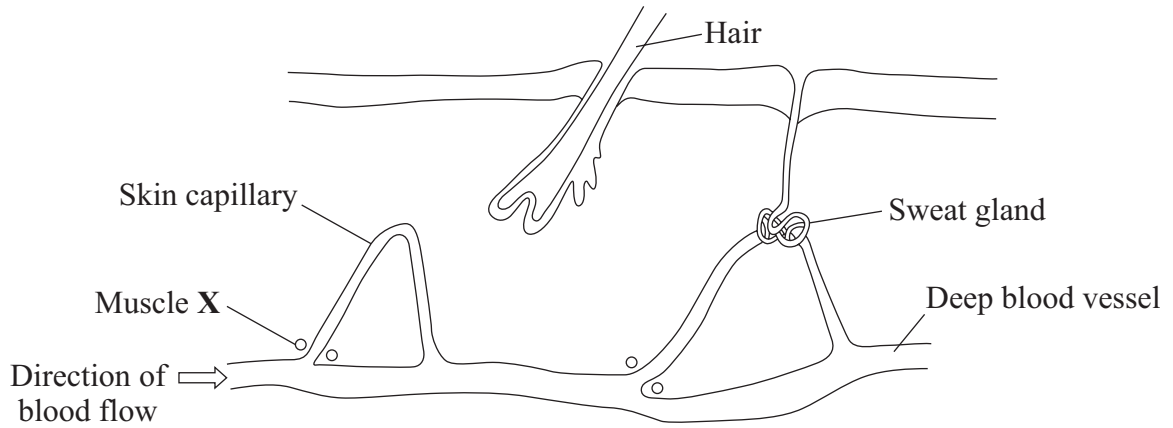
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*(1 mark)*



(b) The diagram shows a section through part of the skin.

The muscle labelled **X** controls the flow of blood into the skin capillary. When muscle **X** contracts, the flow of blood into the skin capillary is reduced.



Explain the role of muscle **X** in the control of body temperature.

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(3 marks)

6
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Turn over for the next question

Turn over ►

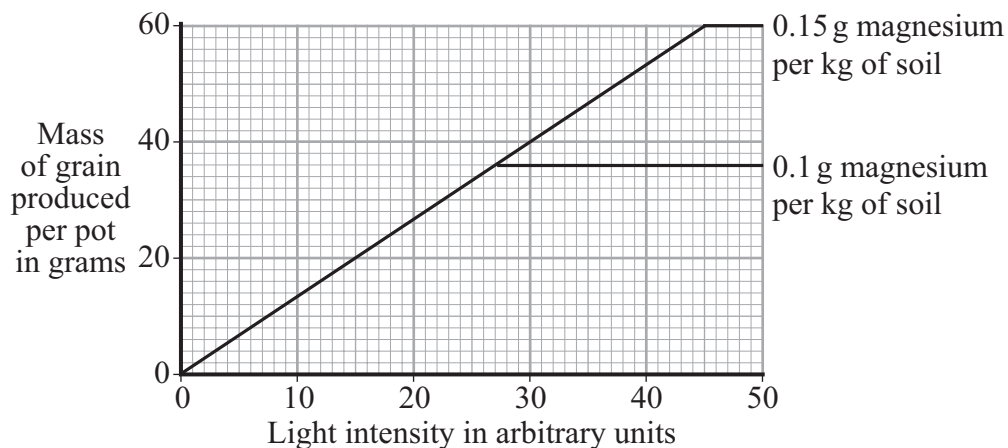


- 7 A student investigated the effect of magnesium salts on the production of grain by wheat plants kept at different light intensities.

He planted 15 wheat seeds in each of 10 pots of similar soil. Each pot contained one of two different concentrations of magnesium salts. He kept all the pots well watered. Each pot was kept at a different light intensity.

All the plants were maintained at 20 °C for six months. The grain produced by the plants in each pot was collected and weighed.

The student's results are shown on the graph.



- (a) In the pot supplied with 0.1 g of magnesium per kg of soil and kept at a light intensity of 20 arbitrary units, the yield of grain is 26.5 g.

- (i) Name the factor limiting the yield of grain under these conditions.

.....  
(1 mark)

- (ii) Using evidence from the graph, explain why the amount of magnesium is **not** the limiting factor under these conditions.

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



- (iii) Explain why the mass of magnesium available to the plants affects the yield of grain.

.....

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.....

(2 marks)

- (b) The average light intensity received by wheat crops in Britain is 30 arbitrary units.

Farmers are advised to add enough magnesium fertiliser to the soil to give a magnesium concentration of 0.1 g per kg of soil when growing wheat.

Suggest why farmers are advised **not** to add more magnesium fertiliser than would produce a concentration of 0.1 g of magnesium per kg of soil.

.....

.....

(1 mark)

5

**END OF QUESTIONS**



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