Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2010

Additional Science
Unit Biology B2

BLY2H

H

Biology
Unit Biology B2

Written Paper

Friday 21 May 2010 9.00 am to 9.45 am

You will need no other materials.
You may use a calculator.

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. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- 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.

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

1 This question is about photosynthesis.

1 (a) Plants make glucose during photosynthesis. Some of the glucose is changed into insoluble starch.

What happens to this starch?

Tick (✓) **one** box.

The starch is converted into oxygen. ☐

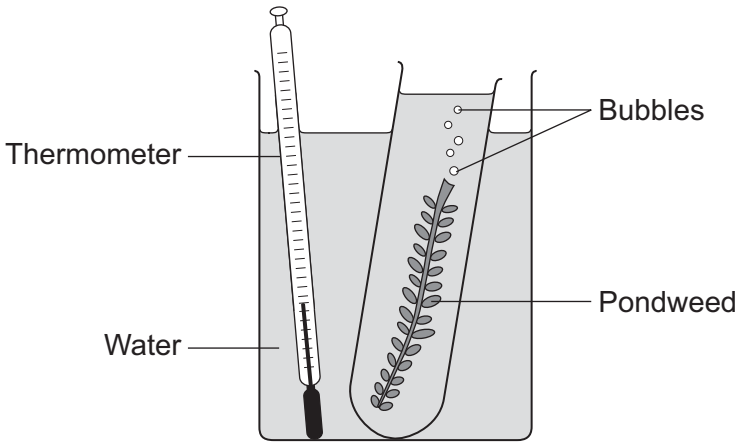
The starch is stored for later use. ☐

The starch is used to make the leaf green. ☐

(1 mark)

1 (b) A student investigated the effect of temperature on the rate of photosynthesis in pondweed.

The diagram shows the way the experiment was set up.



1 (b) (i) The student needed to control some variables to make the investigation fair.

State **two** of these variables.

1 .....

2 .....

(2 marks)

1 (b) (ii) The bubbles of gas are produced only while photosynthesis is taking place.

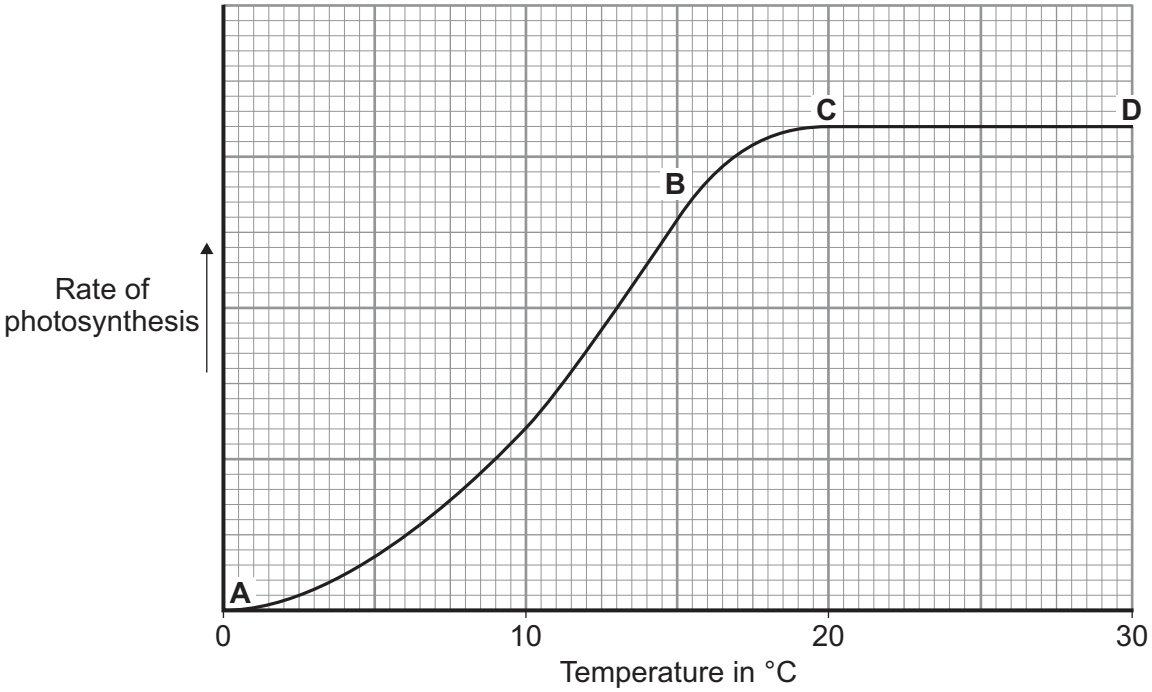
What **two** measurements would the student make to calculate the rate of photosynthesis?

1 .....

2 .....

(2 marks)

1 (c) The graph shows the effect of temperature on the rate of photosynthesis.



1 (c) (i) Name the factor that limits the rate of photosynthesis between the points labelled **A** and **B** on the graph.

.....

(1 mark)

1 (c) (ii) Suggest which factor, carbon dioxide, oxygen or water, might limit the rate of photosynthesis between the points labelled **C** and **D** on the graph.

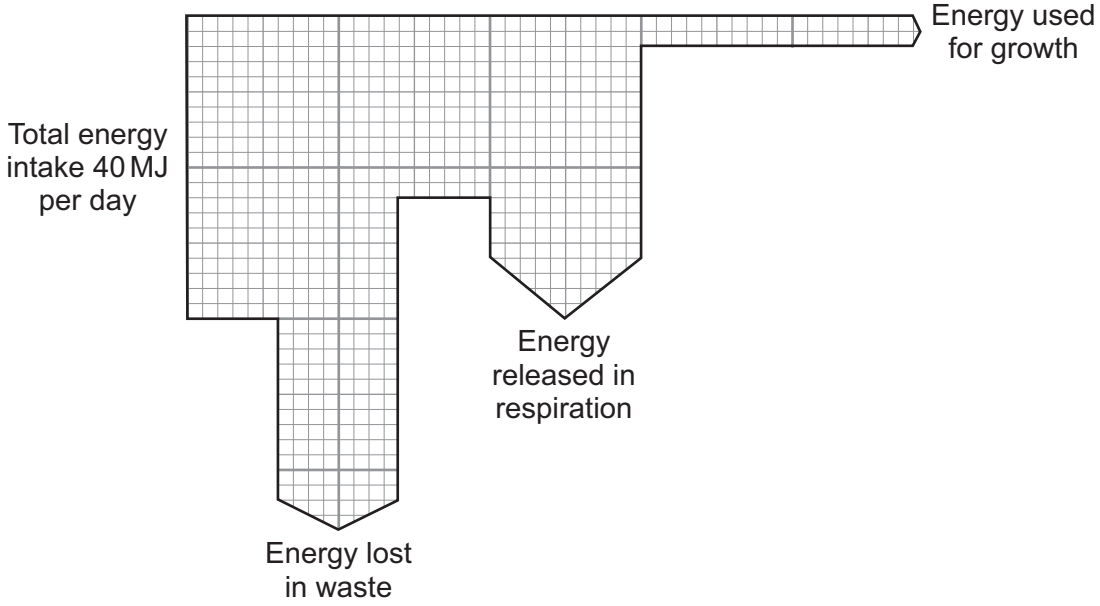
.....

(1 mark)

7

2 (a) **Diagram 1** represents what happens to the energy in the food eaten by a herbivore (an animal that eats plants).

Diagram 1



2 (a) (i) How much energy is released in respiration by the herbivore?

.....

.....

Answer ..... MJ per day
(1 mark)

2 (a) (ii) What proportion of the total energy intake of the herbivore is used for growth?

Show clearly how you work out your answer.

.....

.....

.....

Proportion .....
(2 marks)

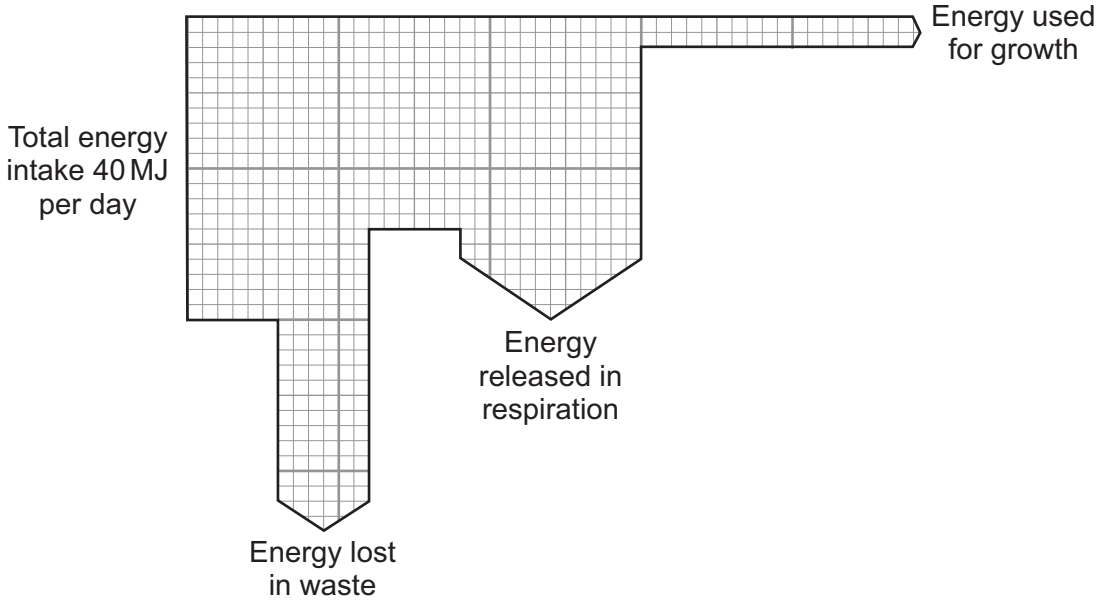
2 (b) Give **two** ways in which the energy, released in respiration, is used by a herbivore.

1 .....

2 .....
(2 marks)

2 (c) **Diagram 2** represents what happens to the energy in the food eaten by a carnivore (an animal that eats other animals).

Diagram 2



The carnivore releases a greater proportion of energy in respiration than the herbivore.

Suggest **one** reason for this.

.....

.....

(1 mark)

2 (d) Some farmers keep their animals outdoors. Other farmers keep their animals indoors.

Keeping farm animals indoors increases the proportion of energy in their food that is converted into growth.

Give **two** reasons why.

1 .....

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2 .....

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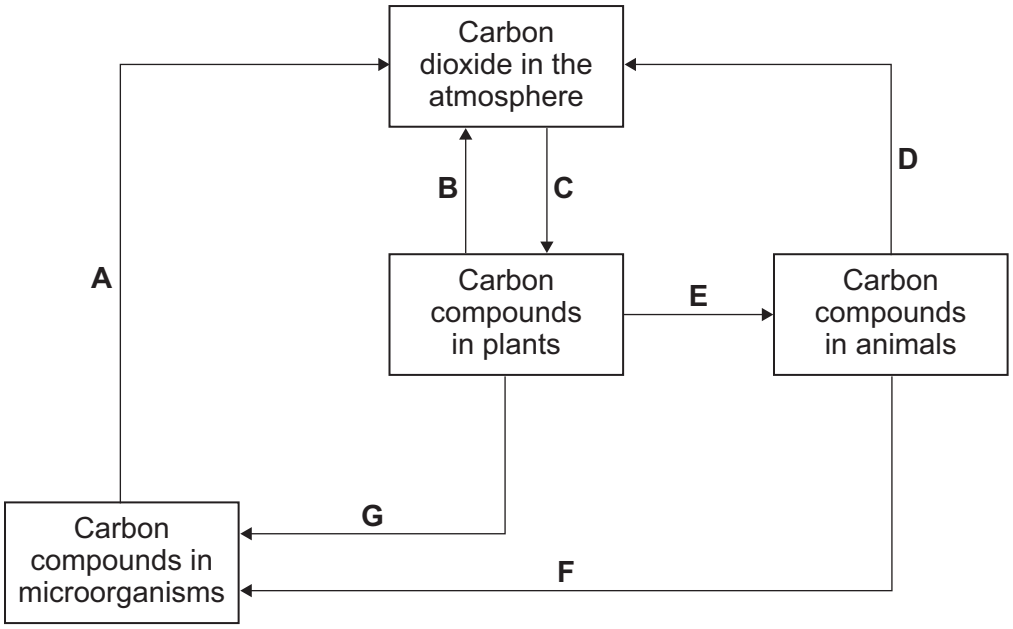
(2 marks)

8

3 The diagram shows part of the carbon cycle.



3 (a) Letter **A** represents respiration.

Which **two** other letters represent respiration?

☐ and ☐

(1 mark)

3 (b) Other than carbon dioxide name **two** carbon compounds found in plants.

1 .....

2 .....

(2 marks)

3 (c) Gardeners use compost heaps to decay dead plants. Decayed compost is then spread onto the soil in a garden.

Explain why gardeners spread decayed compost onto the soil.

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(2 marks)

5

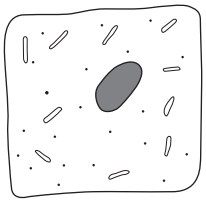
Turn over for the next question

There are no questions printed on this page

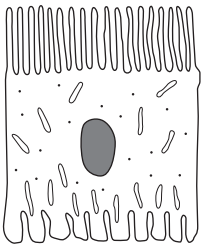
DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

4 Diagrams **A**, **B** and **C** show cells from different parts of the human body, all drawn to the same scale.

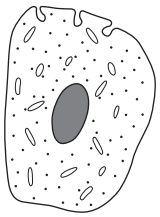
A



B



C



Key
Mitochondrion
Ribosome

4 (a) Which cell, **A**, **B** or **C**, appears to have adaptations to increase diffusion into or out of the cell? ☐

Give **one** reason for your choice.

.....

.....

(1 mark)

4 (b) (i) Cell **C** is found in the pancreas.

Name **one** useful substance produced by the pancreas.

.....

(1 mark)

4 (b) (ii) Use information from the diagram to explain how cell **C** is adapted for producing this substance.

.....

.....

.....

.....

(2 marks)

4

5 Conditions inside the body must be kept constant.

5 (a) Urea must be removed from the body.

5 (a) (i) Name the organ which makes urea.

.....

(1 mark)

5 (a) (ii) Which organ removes urea from the body?

.....

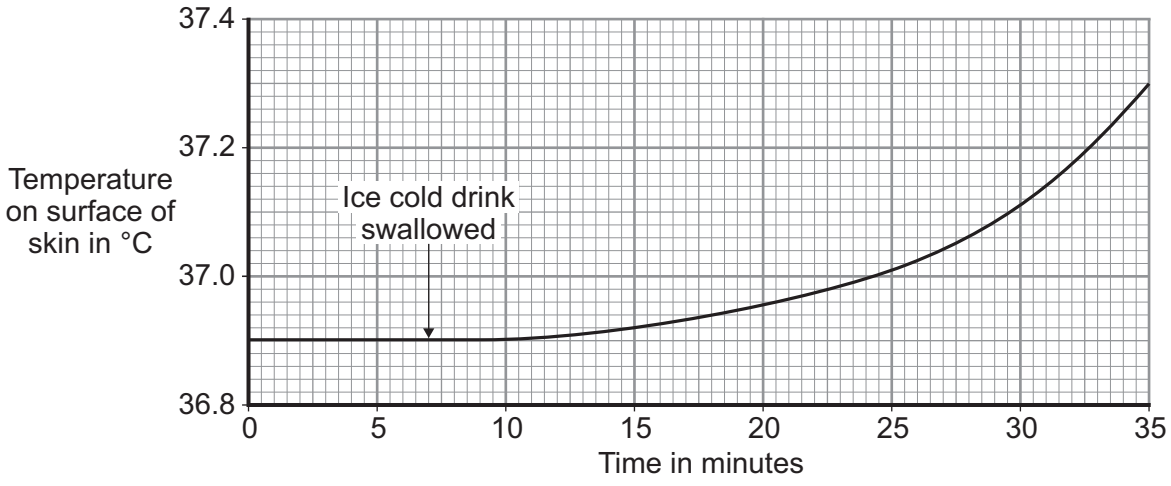
(1 mark)

5 (a) (iii) What is urea made from?

.....

(1 mark)

A man sat in a room where the temperature was maintained at 40 °C.
The temperature on the surface of his skin was monitored for 35 minutes.
He swallowed an ice cold drink at the time indicated on the graph.



5 (b) The sweat glands contribute to the change in the temperature on the surface of the skin shown on the graph.

Explain how.

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(2 marks)

5 (c) The blood vessels near the surface of the skin also contribute to the changes in skin temperature shown on the graph.

5 (c) (i) How do the blood vessels in the skin change when the core body temperature falls?

.....

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(1 mark)

5 (c) (ii) How does this change in the blood vessels explain the change in the skin temperature shown on the graph?

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.....

(1 mark)

7

Turn over for the next question

6 Fresh milk is a mixture of compounds including fat, protein and about 5% lactose sugar. Lactose must be digested by the enzyme lactase, before the products can be absorbed.

Lactase can be added to fresh milk to pre-digest the lactose. This makes 'lactose-free' milk, which is suitable for people who do not produce enough lactase of their own.

A student investigated the effect of changing pH and temperature on the digestion of lactose in milk.

The results are shown in **Tables 1** and **2**.

Table 1
Effect of pH

pH	Time taken to digest lactose in minutes
4.0	20
5.0	18
6.0	13
7.0	7
8.0	5
9.0	6

Table 2
Effect of temperature

Temperature in °C	Time taken to digest lactose in minutes
30	20
35	14
40	11
45	6
50	12
55	23

6 (a) The label on a carton of lactose-free milk states:

'Lactase is normally produced in the stomach of mammals.'

The results in **Table 1** show that this statement is unlikely to be true.

Explain how.

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(2 marks)

6 (b) Explain as fully as you can the results shown in **Table 2**.

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(3 marks)

6 (c) Bile is produced in the liver and is released into the small intestine.

Explain how bile helps the digestion of milk.

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(2 marks)

7

Turn over for the next question

7 The table shows the number of chromosomes found in each body cell of some different organisms.

Animals		Plants	
Species	**Number of chromosomes in each body cell**	**Species**	**Number of chromosomes in each body cell**
Fruit fly	8	Tomato	24
Goat	60	Potato	44
Human	46	Rice	24

7 (a) Nearly every organism on earth has an even number of chromosomes in its body cells.

Suggest why.

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(1 mark)

7 (b) Chromosomes contain DNA molecules.

Describe the function of DNA.

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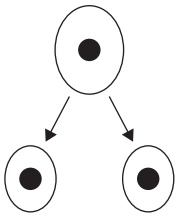
(2 marks)

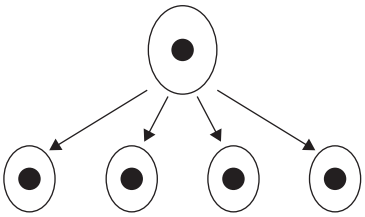
7 (c) Gametes are made in the testes by meiosis.

7 (c) (i) Look at the diagrams.

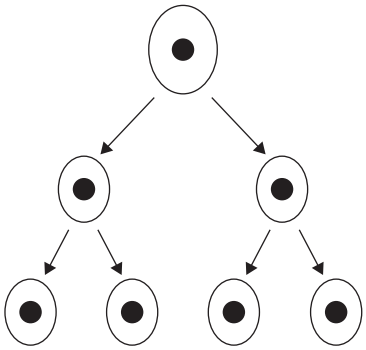
A



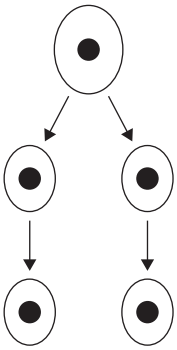
B



C



D



Which diagram, **A**, **B**, **C** or **D**, represents how cell division by meiosis produces gametes in the testes? ☐

(1 mark)

7 (c) (ii) How many chromosomes will each goat gamete contain?

.....

(1 mark)

Question 7 continues on the next page

7 (d) Body cells divide by mitosis.

7 (d) (i) Why is the ability of body cells to divide important?

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.....

(1 mark)

7 (d) (ii) When a body cell of a potato plant divides, how many chromosomes will each of the new cells contain?

.....

(1 mark)

7

END OF QUESTIONS