

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	
8	
TOTAL	



General Certificate of Secondary Education  
Higher Tier  
June 2011

## Additional Science

Unit Biology B2

**BLY2H**

## Biology

Unit Biology B2

**H**

### Written Paper

Thursday 19 May 2011 1.30 pm to 2.15 pm

**For this paper you must have:**

- a ruler.
- 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.



J U N 1 1 B L Y 2 H 0 1

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

**1** Cells contain a solution of salts and sugars.

A student is investigating how cells change when they are put into water.

**1 (a)** The student:

- looks at a plant cell using a microscope
- adds water to the cell.

The plant cell swells up.

Explain why, as fully as you can.

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(3 marks)

**1 (b)** When **animal** cells are put in water, they swell up, and then burst.  
When **plant** cells are put in water, they swell up, but do **not** burst.

How does the structure of plant cells prevent them from bursting?

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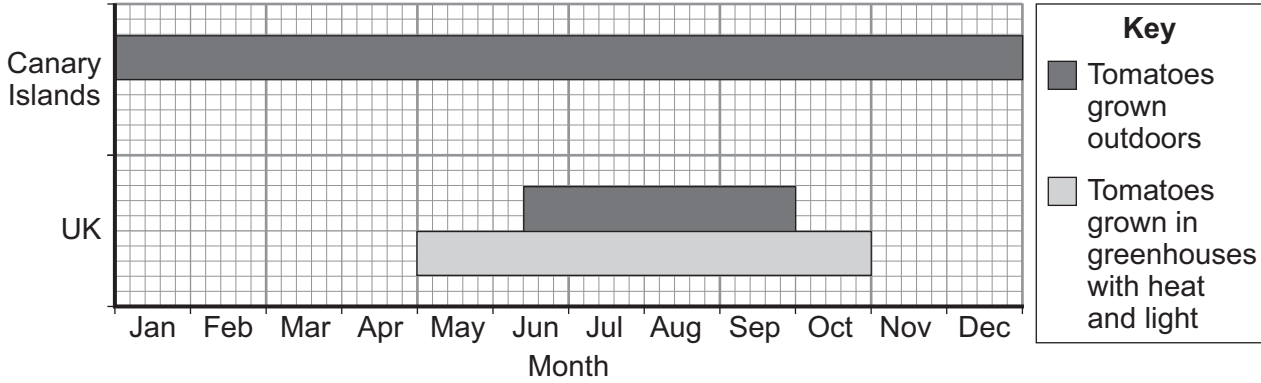
(1 mark)

<b>4</b>



2 Tomatoes are grown in greenhouses in the UK and outdoors in the UK and the Canary Islands.

The chart shows in which months these tomatoes can be bought in shops in the UK.



The Canary Islands are about 3000 km from the UK.

Some people prefer to buy tomatoes grown in the UK.

What are the **advantages** and **disadvantages** of buying tomatoes grown in the UK, instead of buying tomatoes grown in the Canary Islands?

**Advantages** of buying tomatoes grown in the UK

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**Disadvantages** of buying tomatoes grown in the UK

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(3 marks)

3
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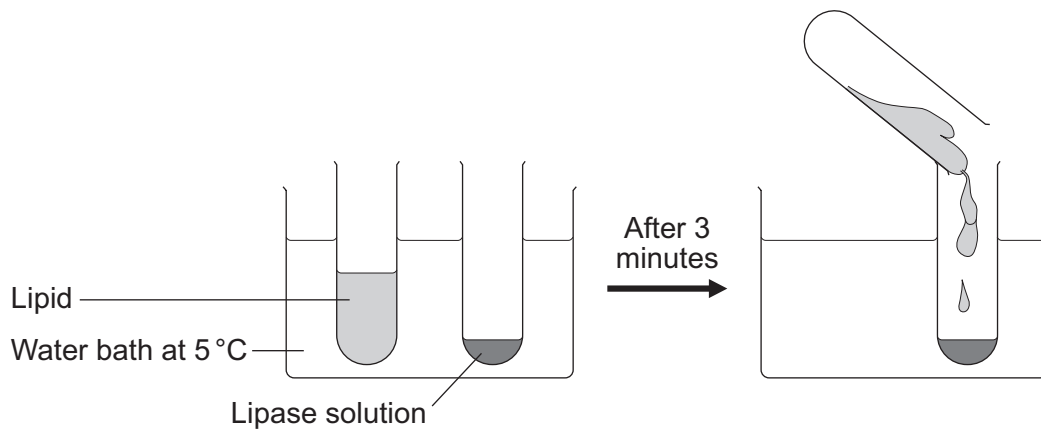
Turn over ►



3 A group of students investigated the effect of temperature on the action of the enzyme lipase.

The students:

- put 1 cm<sup>3</sup> of lipase solution into a test tube
- put 5 cm<sup>3</sup> of lipid into a different test tube
- put both tubes in a water bath at 5°C for 3 minutes
- mixed the lipid with the lipase solution.



Every five minutes the students tested a sample of the mixture for lipid, until no lipid remained.

The students repeated the experiment at different temperatures.

3 (a) To make their investigation fair the students needed to control some variables.

Give **one** variable the students controlled in their investigation.

.....  
(1 mark)

3 (b) The tubes of lipase solution and lipid were kept separately in the water bath for 3 minutes before mixing. Why?

Tick (✓) **one** box.

So that the lipase broke down the lipid quickly

So that the lipase and the lipid reached the right temperature

To give enough time for the lipase to break down the lipid

To give enough time for the water bath to heat up

(1 mark)



The table shows the students' results.

Temperature in °C	Time taken until no lipid remained in minutes
5	40
20	15
35	5
50	30
95	lipid still there after 120 minutes

- 3 (c)** Describe the effect on the breakdown of the lipid of increasing the temperature from 5°C to 50°C.

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(2 marks)

- 3 (d)** Suggest **two** ways in which the students could have improved their investigation.

Use information from the students' method and the results table to help you.

1 .....

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2 .....

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(2 marks)

**Question 3 continues on the next page**

**Turn over ►**



**3 (e) (i)** The lipase did **not** break down the lipid at 95°C.

Why?

.....  
.....

(1 mark)

**3 (e) (ii)** At 35°C the lipase broke down the lipid after 5 minutes.

What new substances will be in the tube?

Draw a ring around **one** answer.

**amino acids**

**fatty acids and glycerol**

**sugars**

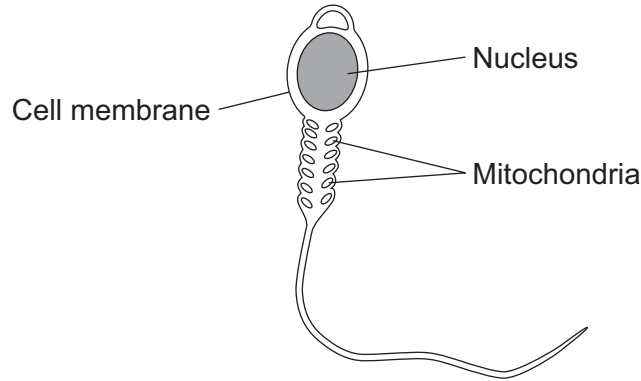
(1 mark)

8



4 Cells in the human body are specialised to carry out their particular function.

4 (a) The diagram shows a sperm cell.



The sperm cell is adapted for travelling to, then fertilising, an egg.

4 (a) (i) How do the mitochondria help the sperm to carry out its function?

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

4 (a) (ii) The nucleus of the sperm cell is different from the nucleus of body cells.

Give **one** way in which the nucleus is different.

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

4 (b) Stem cells from human embryos are used to treat some diseases in humans.

Explain why.

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 .....  
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 (2 marks)

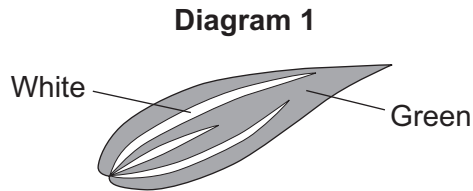
4
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Turn over ►



- 5 Students investigated the effect of changing the carbon dioxide concentration on the rate of photosynthesis in pieces of leaf.

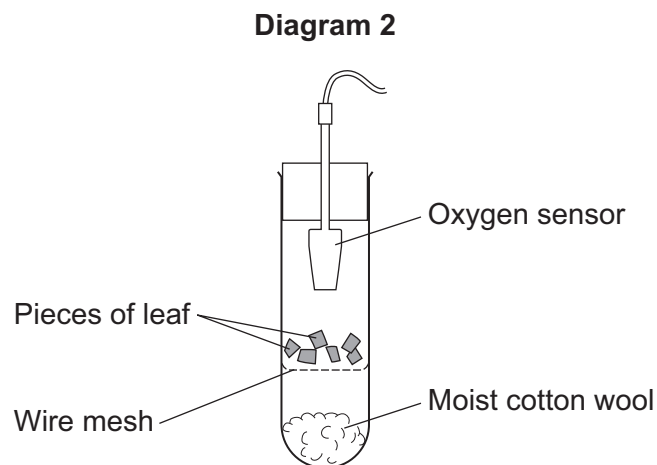
**Diagram 1** shows the type of leaf used by the students.



The students:

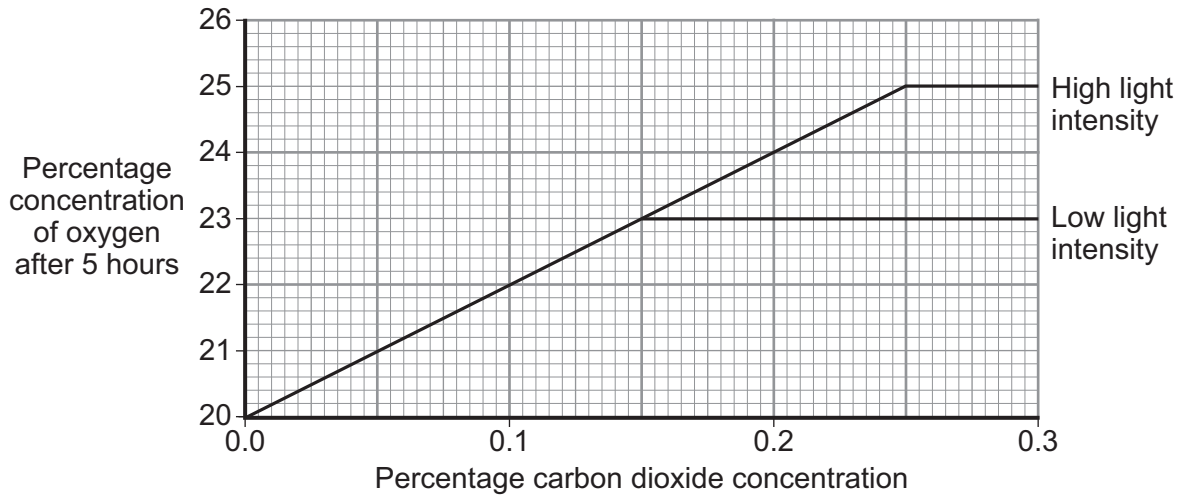
- cut pieces of leaf from the green region
- put the pieces into tubes
- added different concentrations of carbon dioxide to each tube
- shone lights on the tubes with either high or low light intensity
- recorded the concentration of oxygen in the tubes after 5 hours.

**Diagram 2** shows how each experiment was set up.





The graph shows the results of the investigation.



5 (a) (i) Describe the effect of increasing carbon dioxide concentration on the rate of photosynthesis at low light intensity.

.....

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(1 mark)

5 (a) (ii) Explain the effect that you have described.

In your answer you should refer to limiting factors.

.....

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(2 marks)

5 (b) What would have been the effect on oxygen concentration over the five-hour period if a white region of the leaf had been used, instead of a green region?

Effect.....

Explain your answer.

Explanation .....

.....

.....

(2 marks)

Question 5 continues on the next page

Turn over ►



5 (c) Some people keep indoor plants which have variegated leaves (leaves with green and white regions).

If plants with variegated leaves are kept in dim light conditions the white areas of the leaves start to turn green.

This is an advantage to the plant.

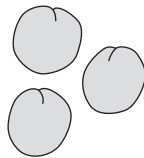
Suggest why.

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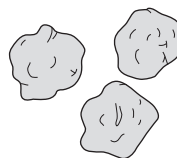
(2 marks)

7

6 In the 1860s, Gregor Mendel studied inheritance in nearly 30 000 pea plants. Pea plants can produce either round seeds or wrinkled seeds.



Round pea seeds



Wrinkled pea seeds

6 (a) Mendel crossed plants that always produced round seeds with plants that always produced wrinkled seeds.

He found that all the seeds produced from the cross were round.

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

Which alleles did the seeds from the cross have? .....

(1 mark)



**6 (b)** Mendel grew hundreds of plants from the seeds of the offspring.  
He crossed these plants with each other.

**6 (b) (i)** Mendel's crosses produced 5496 round pea seeds and 1832 wrinkled pea seeds.

Explain why Mendel's crosses gave him these results.

In your answer you should use:

- a genetic diagram
- the symbols **A** and **a**.

(3 marks)

**6 (b) (ii)** One of Mendel's crosses produced 19 round seeds and 16 wrinkled seeds.

These numbers do **not** match the expected ratio of round and wrinkled seeds.

Suggest why.

.....

.....

(1 mark)

**6 (c)** The importance of Mendel's discovery was not recognised until many years after his death.

Give **one** reason why.

.....

.....

(1 mark)

6

Turn over ►



**7** A walker falls through thin ice into very cold water.



The walker's core body temperature falls. He may die of hypothermia (when core body temperature falls too low).

**7 (a) (i)** Which part of the brain monitors the fall in core body temperature?

.....  
(1 mark)

**7 (a) (ii)** How does this part of the brain detect the fall in core body temperature?

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

**7 (b)** While in the water the walker begins to shiver.

Shivering helps to stop the core body temperature falling too quickly.

Explain how.

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.....  
(2 marks)



**7 (c)** The walker had been drinking alcohol.

Alcohol causes changes to the blood vessels supplying the skin capillaries, making the skin look red.

**7 (c) (i)** Describe the change to the blood vessels.

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.....

(1 mark)

**7 (c) (ii)** The walker is much more likely to die of hypothermia than someone who has not been drinking alcohol.

Explain why.

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(2 marks)

8

**Turn over for the next question**

**Turn over ►**



**8** The table shows energy transfers in a large insect and a small mammal. Both animals feed mainly on grass.

Energy transfer	Amount of energy in kJ	
	Large insect	Small mammal
Eaten as grass	4.00	25.00
Absorbed into body	1.60	12.50
Leaves body as faeces	2.40	12.50
Production of new tissue	0.64	0.25
Transferred by respiration	0.96	12.25

**8 (a)** What percentage of the energy in food is transferred into new tissue in the large insect?  
Show clearly how you work out your answer.

.....

.....

.....

Answer = ..... %  
(2 marks)



**8 (b)** The proportion of energy in the food transferred into new tissue is much greater in the large insect than in the small mammal.

Explain why as fully as you can.

You should include references to the data in your answer.

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(3 marks)

<b>5</b>

**END OF QUESTIONS**



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ANSWER IN THE SPACES PROVIDED**

