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
Foundation Tier
January 2011

Additional Science BLY2F
Unit Biology B2

Biology F
Unit Biology B2

Written Paper

Thursday 13 January 2011 9.00am to 9.45 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 45 minutes

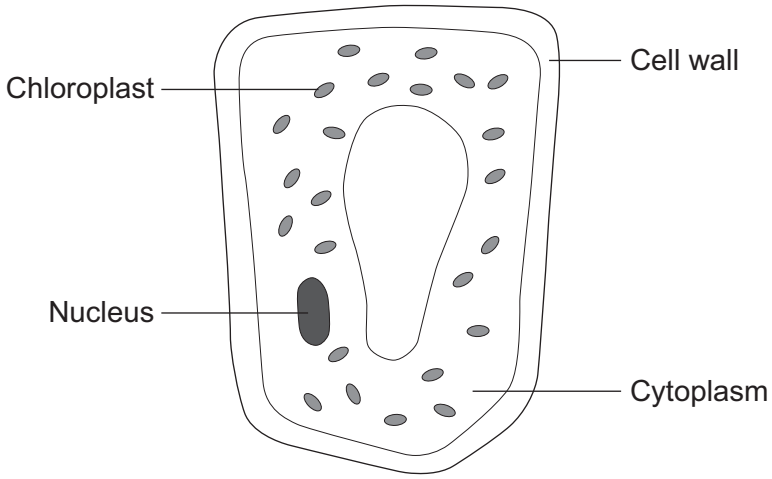
Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work 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.

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

1 The diagram shows a plant cell from a leaf.



1 (a) **List A** gives the names of three parts of the cell.
List B gives the functions of parts of the cell.

Draw a line from each part of the cell in **List A** to its function in **List B**.

List A **Parts of the cell**	**List B** **Functions**
	Where most of the chemical reactions take place
Nucleus	
	Absorbs light energy to make food
Cytoplasm	
	Strengthens the cell
Chloroplast	
	Controls the activities of the cell

(3 marks)

1 (b) Respiration takes place in the cell.

Draw a ring around the correct answer to complete the sentence.

All cells use respiration to release

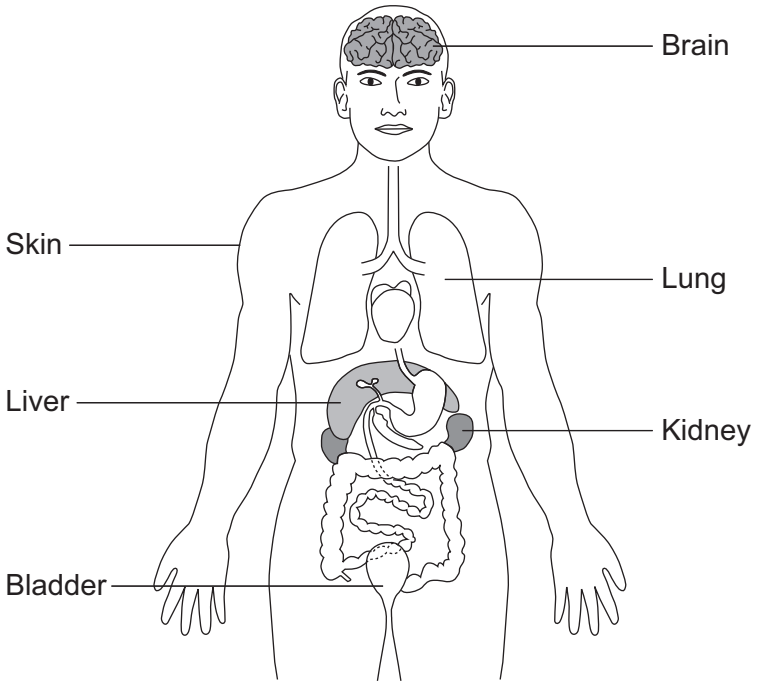
energy.
oxygen.
sugar.

(1 mark)

4

Turn over for the next question

2 (a) The diagram shows organs which help to control conditions inside the body.



Draw a ring around the correct answer to complete each sentence.

2 (a) (i) Carbon dioxide is removed from the body by the

kidney.
lung.
skin.

(1 mark)

2 (a) (ii) Urine is made in the

kidney.
lung.
skin.

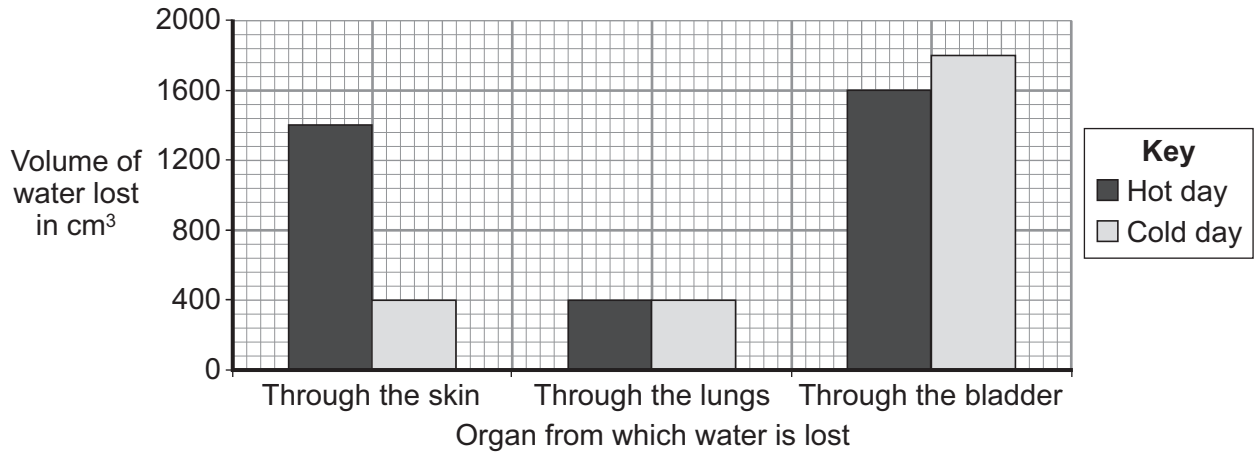
(1 mark)

2 (a) (iii) Urine is stored in the

bladder.
liver.
skin.

(1 mark)

2 (b) The bar chart shows the volume of water lost from different organs of the body. The information is shown for a hot day and for a cold day.



2 (b) (i) Look at the bar chart.

How does the volume of water lost on the hot day compare with the volume of water lost on the cold day for each organ?

Complete the table using words from the box.

the same	**less**	**more**

Organ	**Volume of water lost on a hot day compared with volume of water lost on a cold day**
Skin	
Lungs	
Bladder	

(3 marks)

2 (b) (ii) In total, more water is lost on the hot day than on the cold day.

How does the increase in the volume of water lost on the hot day help to control the body temperature?

.....

.....

(1 mark)

7

3 The amount of carbon dioxide in the atmosphere is increasing.

The table shows the estimated mass of carbon dioxide exchanged with the atmosphere in one year.

	Mass of carbon dioxide exchanged with the atmosphere in millions of tonnes	
	Passed out into the atmosphere	**Taken in from the atmosphere**
Plants	30	64
Animals	10	0
Microorganisms	24	0
Combustion	6	0

3 (a) (i) Calculate the total mass of carbon dioxide passed out into the atmosphere in one year.

Show clearly how you work out your answer.

.....

.....

Answer ..... million tonnes
(2 marks)

3 (a) (ii) Calculate the increase in the mass of carbon dioxide in the atmosphere in one year.

You should use your answer to part (a)(i) in your calculation.

Show clearly how you work out your answer.

.....

.....

Answer ..... million tonnes
(2 marks)

3 (b) Draw a ring around the correct answer to complete the sentence.

Plants use carbon dioxide in the process of

decomposition.

photosynthesis.

respiration.

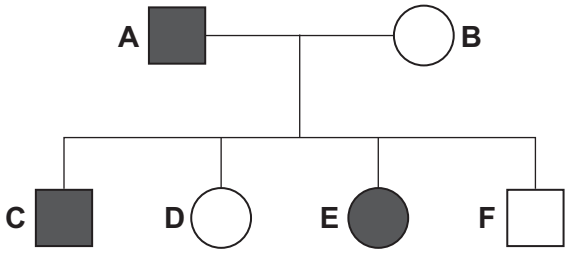
(1 mark)

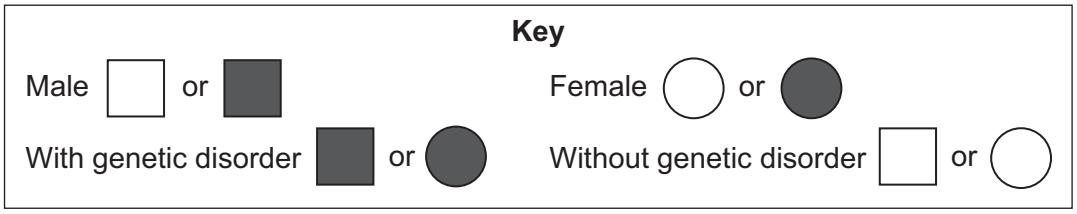
5

Turn over for the next question

4 The diagram shows the family tree of a pair of pigs, **A** and **B**.
Pigs **A** and **B** have four offspring, **C**, **D**, **E** and **F**.

Some of the pigs have a genetic disorder.





4 (a) Which pig, **A**, **B**, **C**, **D**, **E** or **F**, is:

4 (a) (i) a male pig with the genetic disorder ☐

(1 mark)

4 (a) (ii) a female pig without the genetic disorder? ☐

(1 mark)

4 (b) Draw a ring around the correct answer to complete the sentences.

Pig **C** has the genetic disorder.

4 (b) (i) Pig **C** inherited the genetic disorder from

pig **A**.
pig **B**.
pig **E**.

(1 mark)

4 (b) (ii) The gene for the genetic disorder was passed on in

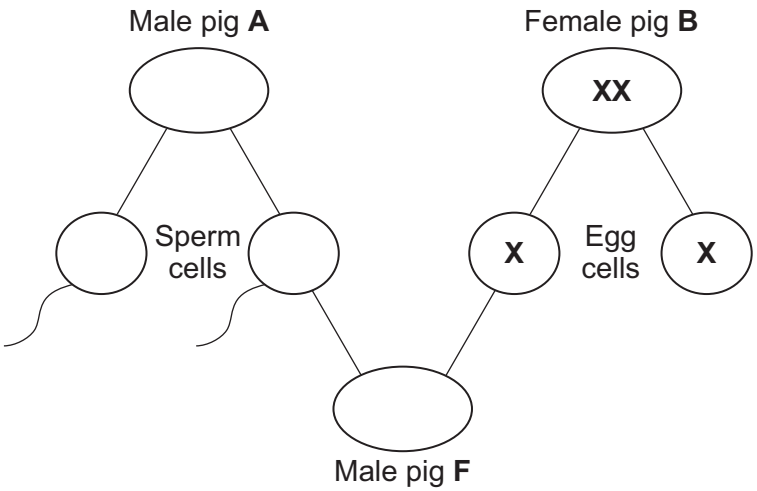
an embryo.
an enzyme.
a gamete.

(1 mark)

4 (c) Pig **F** is a male.

Complete the diagram to show how the sex of pig **F** depends on the inheritance of the sex chromosomes **X** and **Y**.

The sex chromosomes of pig **B** and the egg cells have been completed for you.



(3 marks)

7

Turn over for the next question

5 Denim jeans can be coloured with blue dye. The dye joins on to the fibres of the material. Some people like their denim jeans to look faded. This is called 'stonewashed'. There are two different ways to make denim material look faded.

Traditional stone washing

- Denim material is put in a slowly spinning container with large stones.
- Very hot water is added.
- Washing takes up to five hours.
- Washing breaks some of the denim fibres and lets the dye come out from the fibres.
- Washing will work with any dye.

Bio-stonewashing

- Denim material is washed with enzymes in warm water.
- Washing takes half an hour.
- The enzymes let the dye come out from the fibres.
- Different enzymes are needed for different dyes.
- The enzymes are expensive.
- After the treatment the enzymes have to be removed from the denim.

5 (a) Use **only** the information above to answer this question.

5 (a) (i) Suggest **two advantages** of using the bio-stonewashing method instead of the traditional stonewashing method.

1 .....

.....

2 .....

.....

(2 marks)

5 (a) (ii) Suggest **two disadvantages** of using the bio-stonewashing method instead of the traditional stonewashing method.

1 .....

.....

2 .....

.....

(2 marks)

5 (b) Some blue dyes are made of protein.

What type of enzyme would be used to remove these blue dyes from denim?

Draw a ring around **one** answer.

carbohydrase **lipase** **protease**

(1 mark)

5

Turn over for the next question

6 Substances can move into and out of cells.

6 (a) (i) How does oxygen move into and out of cells?

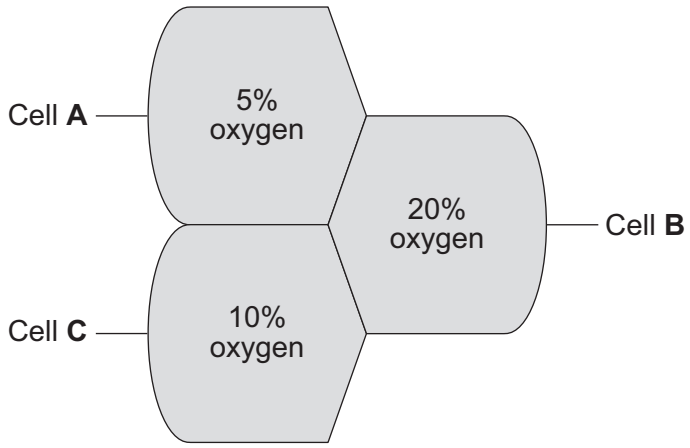
Draw a ring around **one** answer.

diffusion **digestion** **photosynthesis**

(1 mark)

6 (a) (ii) **Diagram 1** shows the percentage concentration of oxygen in three cells, **A**, **B** and **C**.

Diagram 1



Oxygen can move from cell to cell.

Into which cell, **A**, **B** or **C**, will oxygen move the fastest? ☐

(1 mark)

6 (b) (i) How does water move into and out of cells?

Draw a ring around **one** answer.

breathing **osmosis** **respiration**

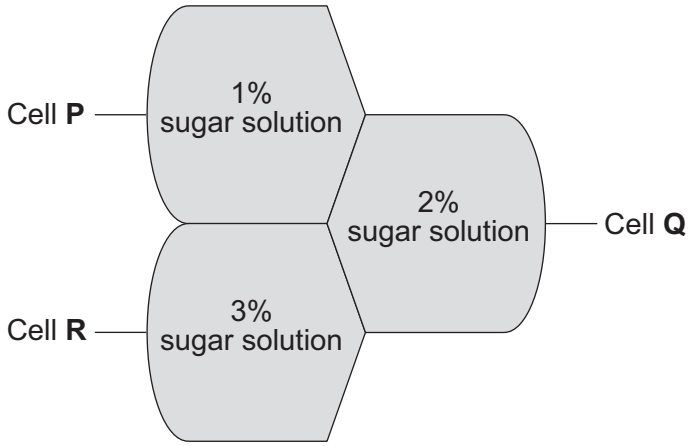
(1 mark)

6 (b) (ii) Differences in the concentration of sugars in cells cause water to move into or out of cells at different rates.

Diagram 2 shows three different cells, **P**, **Q** and **R**.

The information shows the percentage concentration of sugar solution in cells **P**, **Q** and **R**.

Diagram 2



Water can move from cell to cell.

Into which cell, **P**, **Q** or **R**, will water move the fastest? ☐

(1 mark)

4

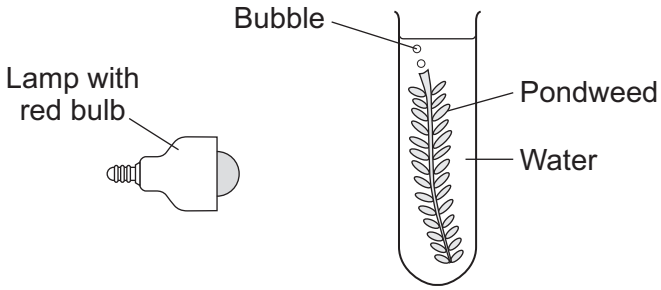
Turn over for the next question

7 A group of pupils investigated the way in which the colour of light affects photosynthesis.

The pupils:

- put a piece of pondweed into a test tube of water
- shone light from a lamp with a red light bulb onto the pondweed
- counted the bubbles of gas produced by the pondweed every minute for three minutes.

The diagram shows the experiment.



The pupils repeated their experiment using a yellow light bulb, a green light bulb and a blue light bulb.

7 (a) (i) What was the independent variable in the investigation?

.....

(1 mark)

7 (a) (ii) To make the investigation fair the pupils needed to control some variables.

Suggest **one** variable that the pupils should have controlled during their investigation.

.....

(1 mark)

7 (a) (iii) It is better to count the bubbles every minute for three minutes than to count all the bubbles in three minutes.

Why?

.....

.....

(1 mark)

7 (b) The table shows the pupils' results.

Colour of bulb	Number of bubbles produced in one minute			
	1st minute	2nd minute	3rd minute	Mean
Red	24	19	21	21
Yellow	18	14	15	16
Green	6	4	3	4
Blue	32	34	32	33

Algae are tiny organisms that photosynthesise.
In natural light algae grow very quickly on the sides of a fish tank.
The algae make it difficult to see the fish.

7 (b) (i) What would be the best colour of light bulb to illuminate the fish tank to reduce the growth of algae?

Use the results in the table to help you to decide.

Draw a ring around **one** answer.

red **yellow** **green** **blue**

(1 mark)

7 (b) (ii) Explain why the colour you have chosen is the best.

.....

.....

.....

.....

(2 marks)

6

Turn over for the next question

8 A group of students investigated a food chain in a garden.

The table shows the estimates of the population and biomass of some of the organisms the students found.

Organism	Number in the garden	Mean mass of each one in g	Biomass of population in g
Hedgehog	1	200	200
Slug	600	2	1200
Lettuce	20	300	

8 (a) (i) Calculate the biomass of the lettuce population.

Show clearly how you work out your answer.

.....

.....

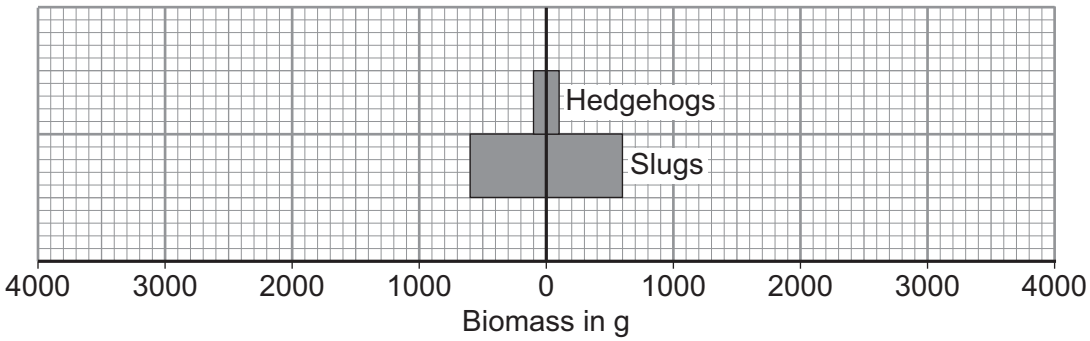
.....

Biomass = ... g

(2 marks)

8 (a) (ii) Use your answer to part (a)(i) to complete the pyramid of biomass.

Show the biomass of the lettuces in the garden.



(2 marks)

8 (b) Hedgehogs eat slugs.

The biomass of the hedgehog population is much less than the biomass of the slug population.

Explain why as fully as you can.

.....

.....

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.....

.....

(3 marks)

7

END OF QUESTIONS

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