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	
9	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2014

Additional Science
Unit Biology B2

BL2FP

F

Biology
Unit Biology B2

Tuesday 13 May 2014 9.00 am to 10.00 am

For this paper you must have:
- a ruler.

You may use a calculator.

A

Time allowed
- 1 hour

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.

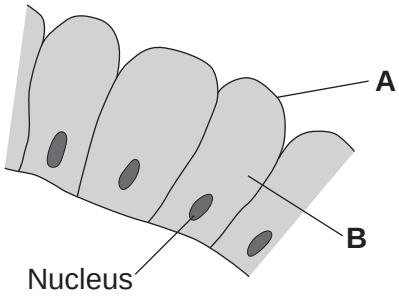
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 8 should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

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

1 **Figure 1** shows some cells in the lining of the stomach.

Figure 1



1 (a) (i) Use words from the box to name structures **A** and **B**.

[2 marks]

cell membrane	**chloroplast**	**cytoplasm**	**vacuole**

A .....

B .....

1 (a) (ii) What is the function of the nucleus?

Tick (✓) **one** box.

[1 mark]

To control the activities of the cell ☐

To control movement of substances into and out of the cell ☐

To release energy in respiration ☐

1 (b) Draw **one** line from each part of the human body to its correct scientific name.

[3 marks]

Part of human body	Scientific name
Layer of cells lining the stomach	An organ
Stomach	An organism
Mouth, stomach, intestines, liver and pancreas	An organ system
	A tissue

6

Turn over for the next question

2 Some students investigated the distribution of dandelion plants in a grassy field. The grassy field was between two areas of woodland.

Figure 2 shows two students recording how many dandelion plants there are in a 1 metre x 1 metre quadrat.

Figure 2

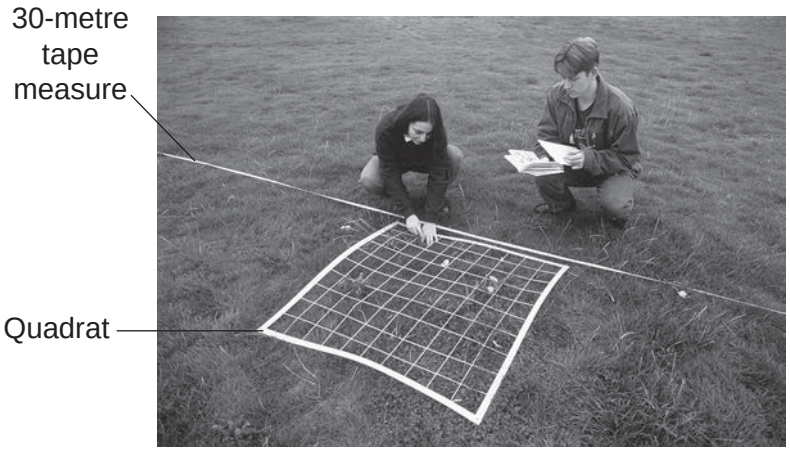


Figure 3 shows a section across the area studied and **Figure 4** shows a bar chart of the students' results.

Figure 3

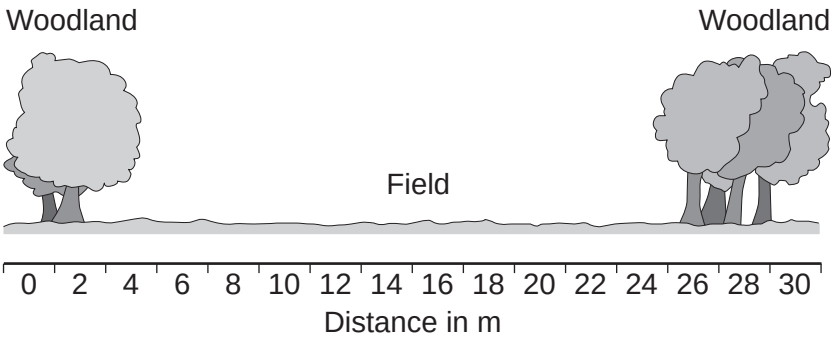
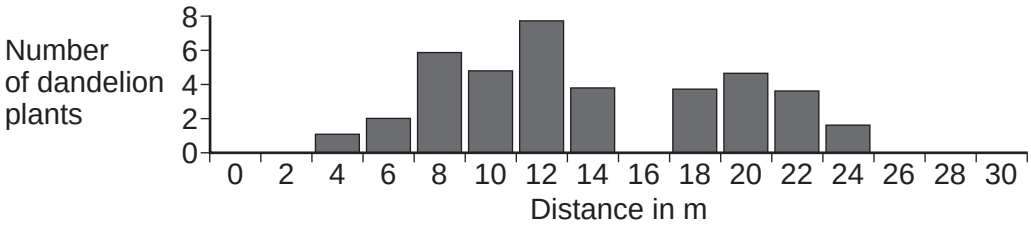


Figure 4



2 (a) How did the students use the quadrat and the 30-metre tape measure to get the results in **Figure 4**?

Use information from **Figure 2**.

[3 marks]

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2 (b) (i) Suggest **one** reason why the students found no dandelion plants under the trees.

[1 mark]

.....

.....

2 (b) (ii) Suggest **one** reason why the students found no dandelion plants at 16 metres.

[1 mark]

.....

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2 (c) The teacher suggested that it was **not** possible to make a valid conclusion from these results.

Describe how the students could improve the investigation so that they could make a valid conclusion.

[2 marks]

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7

3 Enzymes are used in many industrial processes.

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

3 (a) (i) An enzyme is

- an antibody.
- a catalyst.
- a mineral.

[1 mark]

3 (a) (ii) In industry, enzymes are used so that reactions work well at

- all pH values.
- higher pressures.
- lower temperatures.

[1 mark]

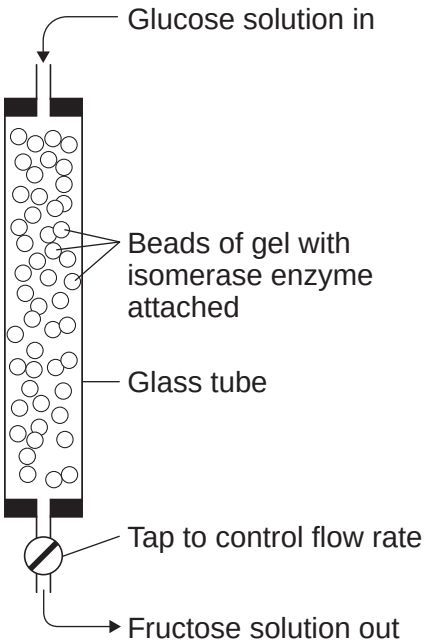
3 (a) (iii) In industry, the enzyme carbohydrase is used to change starch into

- amino acids.
- fatty acids.
- sugar.

[1 mark]

3 (b) The enzyme isomerase changes glucose into fructose. In industry, the enzyme isomerase is attached to beads of gel in a glass tube, as shown in **Figure 5**.

Figure 5



Give **two** advantages of using an enzyme attached to beads of gel.

Tick (✓) **two** boxes.

[2 marks]

The enzyme would be denatured. ☐

The enzyme can easily be used again. ☐

The fructose does not have any enzyme in it. ☐

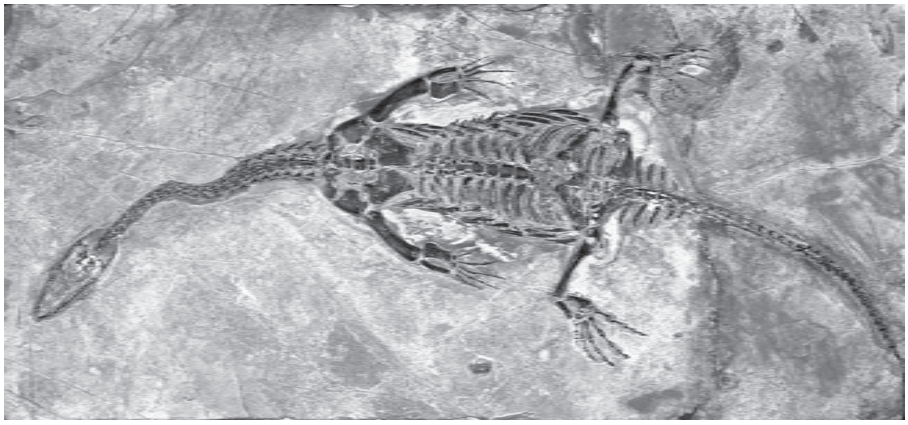
The enzyme can also be used to pre-digest baby foods. ☐

5

Turn over for the next question

4 **Figure 6** shows a fossil of a sea animal called a Plesiosaur.
The Plesiosaur was alive about 135 million years ago.

Figure 6



4 (a) How can fossils give evidence for evolution?

Tick (✓) **one** box.

[1 mark]

Newer fossils are simpler than older fossils. ☐

Fossils show change over time. ☐

All fossils show the bones of animals. ☐

4 (b) Plesiosaurs lived in the sea. There was mud at the bottom of the sea.

Suggest how the fossil shown in **Figure 6** may have been formed after the animal died.

[3 marks]

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4 (c) **Figure 7** shows what scientists think a living Plesiosaur may have looked like.

Figure 7

Scientists think that the Plesiosaur had smooth skin, with no scales.

The scientists **cannot** be certain what the skin of a Plesiosaur was like.
Suggest why.

[1 mark]

.....

.....

4 (d) Plesiosaurs are now extinct.

Give **two** possible reasons why.

[2 marks]

1 .....

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2 .....

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7

5 In sexual reproduction, an egg fuses with a sperm.

5 (a) (i) Draw a ring around the correct answer to complete the sentence.

[1 mark]

An egg and a sperm fuse together in the process of

cloning.
fertilisation.
mitosis.

5 (a) (ii) Egg cells and sperm cells each contain the structures given in the box.

chromosome	**gene**	**nucleus**

List these three structures in size order, starting with the smallest.

[2 marks]

1 ..... (smallest)

2 .....

3 ..... (largest)

5 (a) (iii) The egg and the sperm contain genetic material.

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

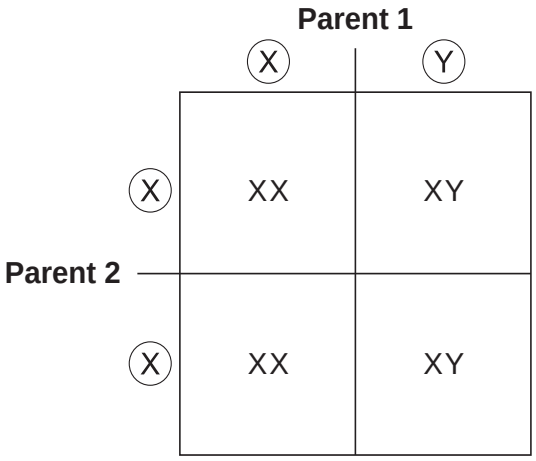
[1 mark]

The genetic material is made of

carbohydrate.
DNA.
protein.

5 (b) **Figure 8** shows the inheritance of **X** and **Y** chromosomes.

Figure 8



5 (b) (i) **On Figure 8**, draw a tick (✓) on the part of the diagram that shows a sperm cell.

[1 mark]

5 (b) (ii) What is the chance of having a female child?

Give the reason for your answer.

[2 marks]

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7

Turn over for the next question

6 (a) A student carried out the following investigation using a plant with variegated leaves.
A variegated leaf has green and white stripes.

The student:

- left the plant in the dark for 3 days to remove the starch
- fixed two pieces of card to a leaf on the plant
- left the plant in the light for 2 days
- removed the leaf from the plant
- tested the leaf for starch.

Figure 9 shows how the two pieces of card were attached to the leaf.

Figure 9

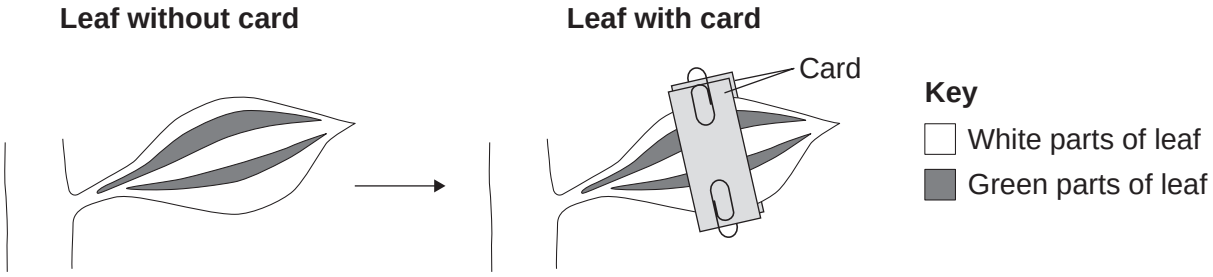
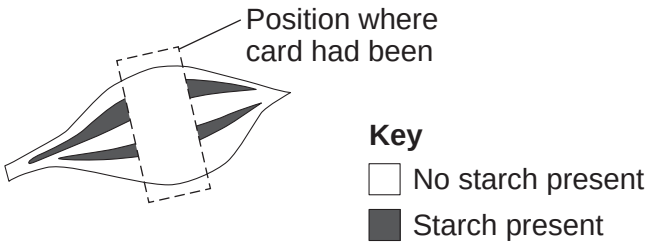


Figure 10 shows the same leaf after 2 days in the light.
The leaf has been tested for starch.

Figure 10



Give **two** conclusions from this investigation.

Tick (✓) **two** boxes.

[2 marks]

Carbon dioxide is needed for photosynthesis. ☐

Chlorophyll is needed for photosynthesis. ☐

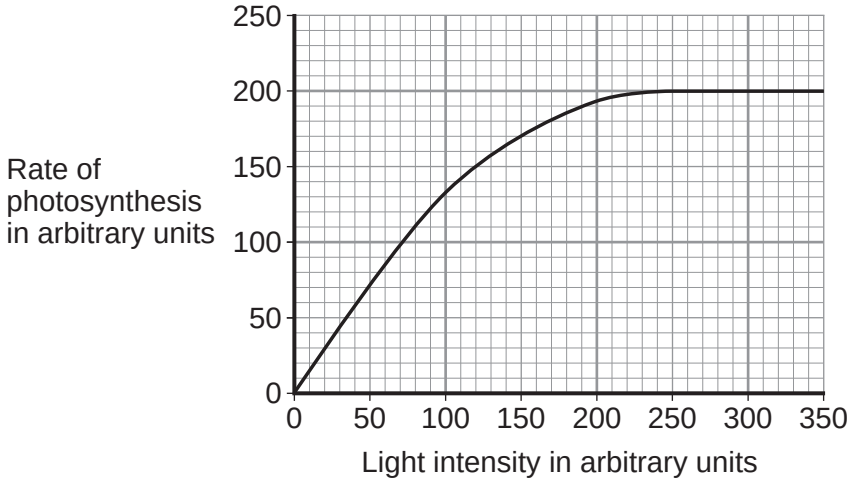
Light is needed for photosynthesis. ☐

Water is needed for photosynthesis. ☐

6 (b) Scientists investigated the effect of light intensity on the rate of photosynthesis.

Figure 11 shows the scientists' results.

Figure 11



Describe the effect of increasing light intensity on the rate of photosynthesis.
You should include numbers from **Figure 11** in your description.

[3 marks]

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6 (c) At a light intensity of 250 arbitrary units, light is **not** a limiting factor of photosynthesis.

6 (c) (i) What is the evidence for this in **Figure 11**?

[1 mark]

.....

.....

6 (c) (ii) Give **two** factors that could be limiting the rate of photosynthesis at a light intensity of 250 arbitrary units.

[2 marks]

1 .....

2 .....

8

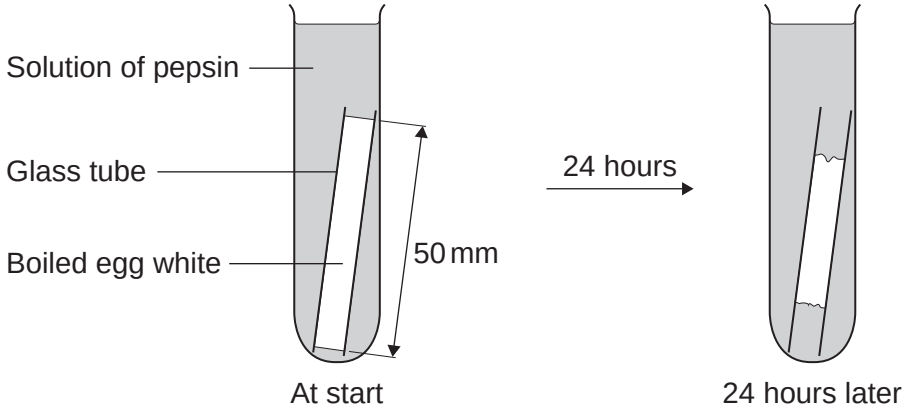
7 Some students investigated the effect of pH on the digestion of boiled egg white by an enzyme called pepsin. Egg white contains protein.

The students:

- put a glass tube containing boiled egg white into a test tube
- added a solution containing pepsin at pH 7
- set up six more tubes with solutions of pepsin at different pH values
- left the test tubes for 24 hours at room temperature.

Figure 12 shows one of the test tubes, at the start and at the end of the 24 hours.

Figure 12



7 (a) (i) Name the product of protein digestion.

[1 mark]

.....

7 (a) (ii) What type of enzyme digests protein?

Tick (✓) **one** box.

[1 mark]

amylase ☐

lipase ☐

protease ☐

7 (b) The egg white in each tube was 50 mm long at the start of the investigation. **Table 1** shows the students' results.

Table 1

pH	Length in mm of boiled egg white after 24 hours
1	38
2	20
3	34
4	45
5	50
6	50
7	50

7 (b) (i) At which pH did the pepsin work best?

[1 mark]

pH .....

7 (b) (ii) The answer you gave in part **(b)(i)** may not be the exact pH at which pepsin works best.

What could the students do to find a more accurate value for this pH?

[2 marks]

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7 (b) (iii) There was no change in the length of the egg white from pH 5 to pH 7.

Explain why.

[2 marks]

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Question 7 continues on the next page

Turn over ▶

7 (c) Pepsin is made by the stomach.

Name the acid made by the stomach which allows pepsin to work well.

[1 mark]

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8

8 **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Diffusion is an important process in animals and plants.

The movement of many substances into and out of cells occurs by diffusion.

Describe why diffusion is important to animals and plants.

In your answer you should refer to:

- animals
- plants
- examples of the diffusion of named substances.

[6 marks]

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Extra space .....

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6

9 **Figure 13** shows an athlete running on a treadmill.

Figure 13

After running for several minutes, the athlete's leg muscles began to ache.
This ache was caused by a high concentration of lactic acid in the muscles.

9 (a) The equation shows how lactic acid is made.

glucose ⟶ lactic acid (+ energy)

Name the process that makes lactic acid in the athlete's muscles.

[1 mark]

.....

9 (b) Scientists investigated the production of lactic acid by an athlete running at different speeds.

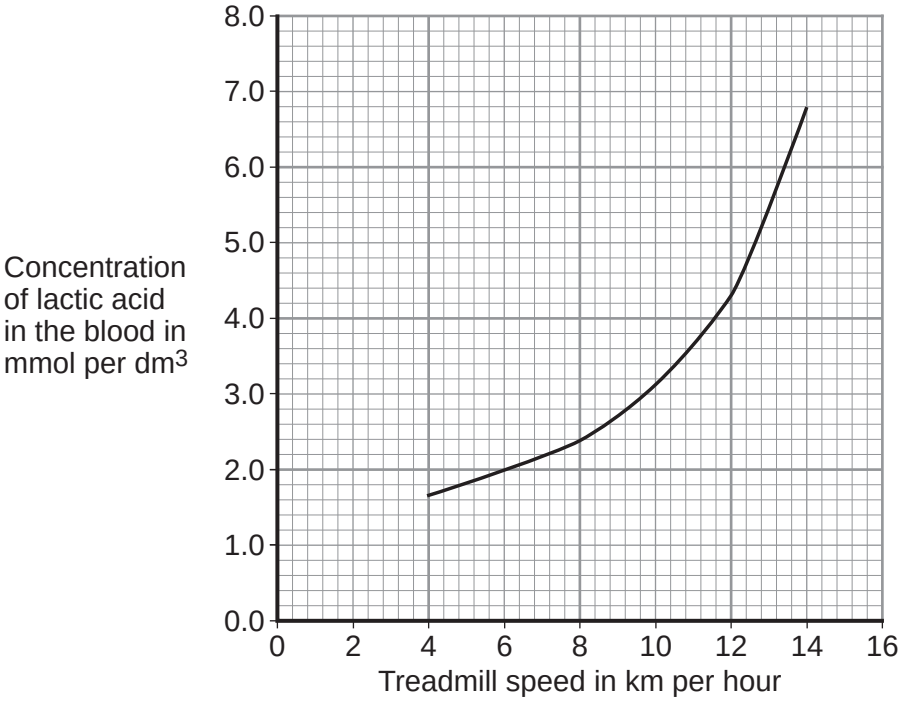
In the investigation:

- the athlete ran on the treadmill at 4 km per hour
- the scientists measured the concentration of lactic acid in the athlete's blood after 2 minutes of running.

The investigation was repeated for different running speeds.

Figure 14 shows the scientists' results.

Figure 14



9 (b) (i) How much more lactic acid was there in the athlete's blood when he ran at 14 km per hour than when he ran at 8 km per hour?

[2 marks]

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Answer = ... mmol per dm^3

9 (b) (ii) Why is more lactic acid made in the muscles when running at 14 km per hour than when running at 8 km per hour?

[3 marks]

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6

END OF QUESTIONS

There are no questions printed on this page

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