Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

For Examiner's Use

General Certificate of Secondary Education
January 2009

ADDITIONAL SCIENCE **BLY2F**
Unit Biology B2

F

BIOLOGY
Unit Biology B2

Foundation Tier

Monday 12 January 2009 9.00 am to 9.45 am

For this paper you must have:
- a pencil and 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. Answers written in margins or on blank pages will not be marked.
- 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.

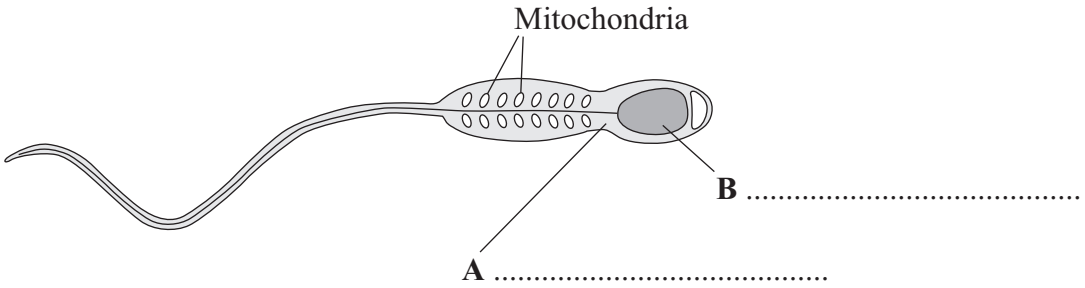
Advice
- In all calculations, show clearly how you work out your answer.

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

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

1 This question is about cells.

1 (a) (i) The diagram shows a sperm cell.

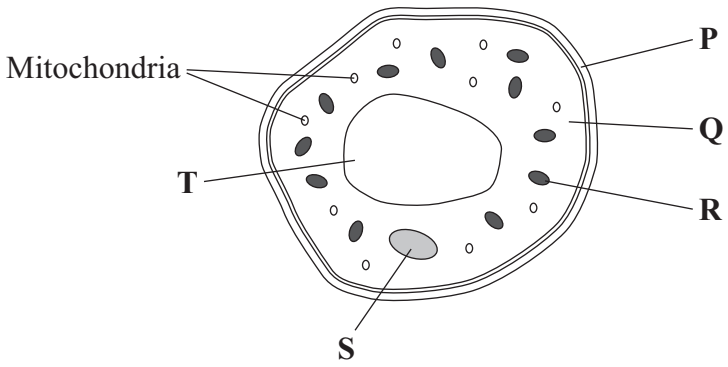


Use words from the box to label parts **A** and **B**.

cell membrane	**cytoplasm**	**nucleus**

(2 marks)

1 (a) (ii) The diagram shows a cell from a leaf.



Give the letters of **two** parts of the leaf cell which would **not** be found in a sperm cell. ☐ and ☐

(1 mark)

1 (b) Sperm cells have many mitochondria.

Why do sperm cells need many mitochondria?

Tick (✓) **one** box.

Sperm cells are involved in fertilisation. ☐

Sperm cells are produced in very large numbers. ☐

Sperm cells need a lot of energy to swim. ☐

(1 mark)

4

Turn over for the next question

2 Enzymes have many uses in the home and in industry.

2 (a) Which type of organism is used to produce these enzymes?

Tick (✓) **one** box.

Mammals ☐

Microorganisms ☐

Plants ☐

(1 mark)

2 (b) Babies may have difficulty digesting proteins in their food. Baby food manufacturers use enzymes to 'pre-digest' the protein in baby food to overcome this difficulty.

Use words from the box to complete the sentences.

amino acids	**amylases**	**proteases**	**sugars**

2 (b) (i) Proteins are 'pre-digested' using enzymes called .....

(1 mark)

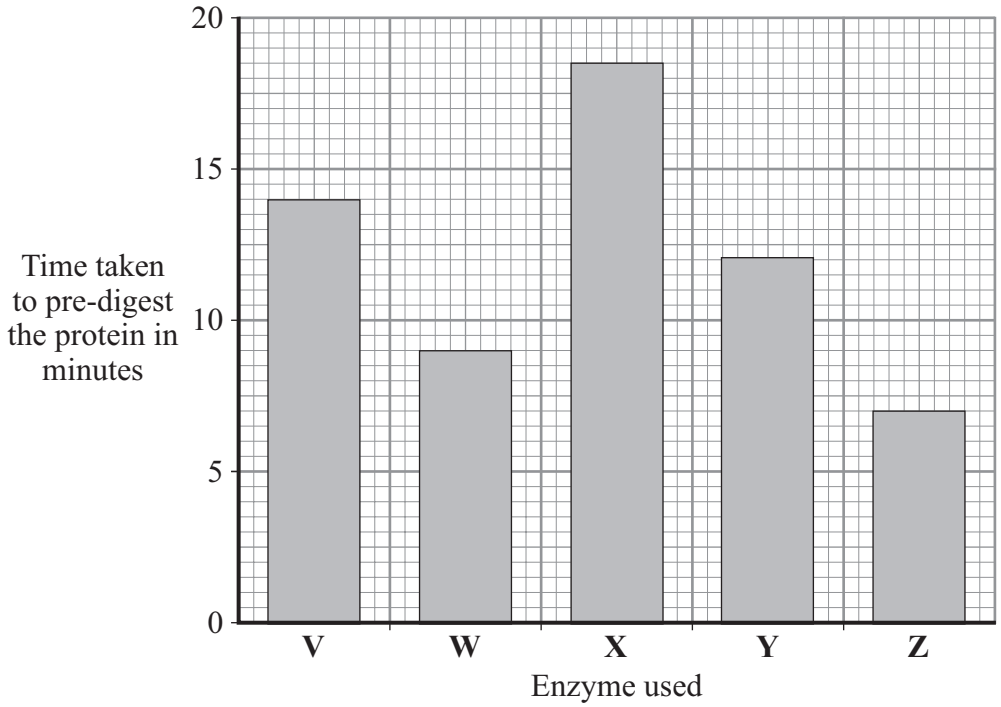
2 (b) (ii) This pre-digestion produces .....

(1 mark)

2 (c) A baby food manufacturer uses enzyme **V** to pre-digest protein.
He tries four new enzymes, **W**, **X**, **Y** and **Z**, to see if he can reduce the time taken to pre-digest the protein.

The graph shows the time taken for the enzymes to completely pre-digest the protein.

The manufacturer uses the same concentration of enzyme and the same mass of protein in each experiment.



2 (c) (i) How long did it take enzyme **V** to pre-digest the protein? ☐ minutes

(1 mark)

2 (c) (ii) Which enzyme would you advise the baby food manufacturer to use?

Draw a ring around your answer.

enzyme V **enzyme W** **enzyme X** **enzyme Y** **enzyme Z**

Give a reason for your answer.

.....

.....

(2 marks)

2 (c) (iii) Give **two** factors which should be controlled in the baby food manufacturer's investigations.

Tick (✓) **two** boxes.

Oxygen concentration ☐

Temperature ☐

Light intensity ☐

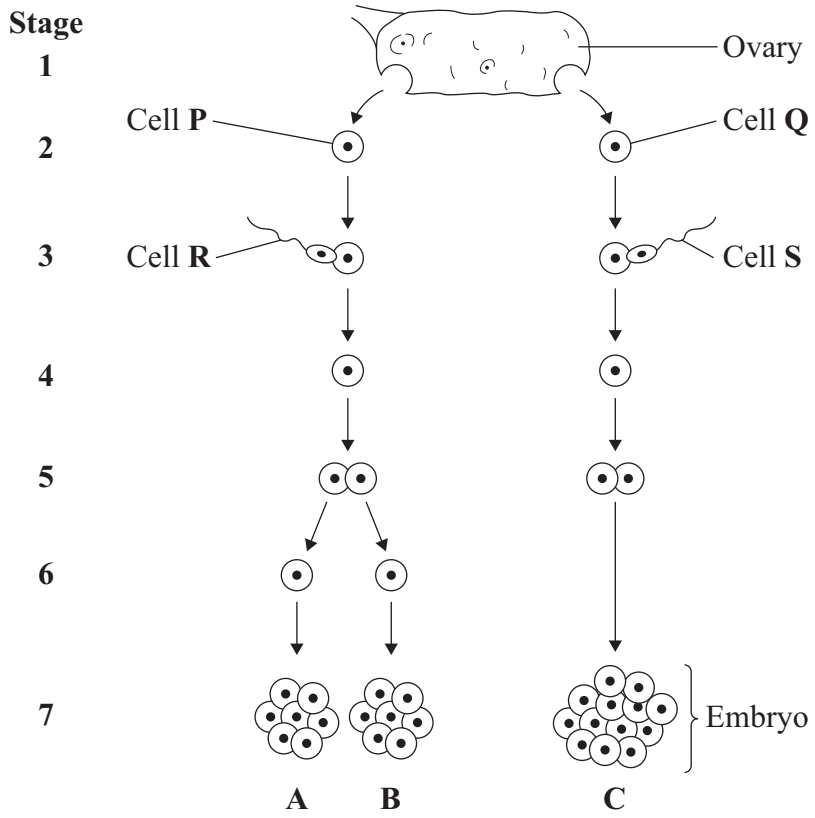
pH ☐

(2 marks)

8

3 A woman gives birth to triplets.
Two of the triplets are boys and the third is a girl.
The triplets developed from two egg cells released from the ovary at the same time.

The diagram shows how triplets **A**, **B** and **C** developed.



3 (a) Which stages on the diagram show gametes?

Draw a ring around your answer.

1 and 2 **2 and 3** **3 and 7** **1 and 7**

(1 mark)

3 (b) Embryo **B** is male.

Which of the following explains why embryo **B** is male?

Tick (✓) **one** box.

Cell **P** has an X chromosome; cell **R** has an X chromosome. ☐

Cell **P** has a Y chromosome; cell **R** has an X chromosome. ☐

Cell **P** has an X chromosome; cell **R** has a Y chromosome. ☐

(1 mark)

3 (c) The children that develop from embryos **A** and **C** will **not** be identical.

Explain why.

You may use words from the box in your answer.

egg	**genes**	**sperm**

.....

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(2 marks)

Question 3 continues on the next page

3 (d) Single cells from an embryo at **Stage 7** can be separated and grown in a special solution.

3 (d) (i) What term describes cells that are grown in this way?

Draw a ring around your answer.

alleles **screened cells** **stem cells**

(1 mark)

3 (d) (ii) What happens when the cells are placed in the special solution?

Tick (✓) **two** boxes.

The cells divide ☐

The cells fertilise ☐

The cells differentiate ☐

The cells separate ☐

(2 marks)

3 (d) (iii) Give **one** use of cells grown in this way.

.....

.....

(1 mark)

3 (d) (iv) Some people might object to using cells from embryos in this way.

Give **one** reason why.

.....

.....

.....

(1 mark)

9

4 Waste products, such as carbon dioxide and urea, have to be removed from the body.

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

4 (a) Carbon dioxide is produced by [breathing / diffusion / respiration] .

(1 mark)

4 (b) Most carbon dioxide leaves the body through the [kidneys / lungs / skin] .

(1 mark)

4 (c) Urea is produced in the [kidneys / liver / lungs] .

(1 mark)

4 (d) Urea is produced from the breakdown of [amino acids / glucose / urine] .

(1 mark)

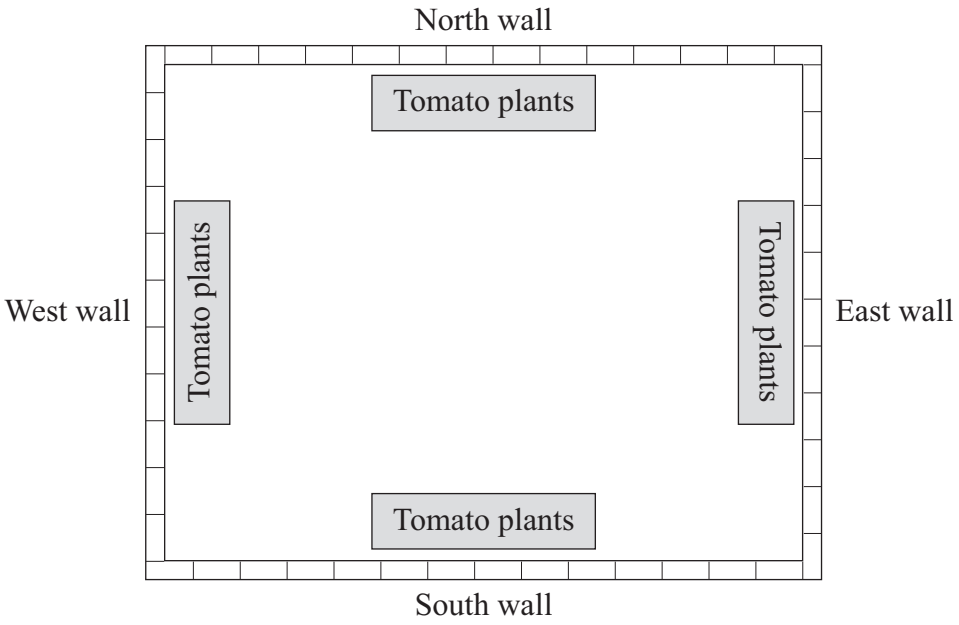
4

Turn over for the next question

5 A gardener grows tomatoes.

He wants to find out how to get the biggest mass of tomatoes.

He plants different varieties of tomato against different walls in his garden.



5 (a) The gardener wants his test to be fair.

Name **one** condition which he should keep the same for all his tomato plants.

.....

.....

(1 mark)

5 (b) The table shows the gardener's results.

Variety of tomato plant	**Sungold**	**Sungold**	**Sungold**	**Sungold**	**Nugget**	**Champion**
Wall they were planted against	North	West	South	East	East	East
Mean mass of tomatoes produced in kilograms per plant	3.5	3.0	1.2	2.5	3.2	2.7

Use these results to answer the questions.

5 (b) (i) To obtain the biggest mass of tomatoes, against which wall is it best to grow the tomato plants?

Tick (✓) **one** box.

North wall ☐

South wall ☐

East wall ☐

West wall ☐

(1 mark)

5 (b) (ii) To obtain the biggest mass of tomatoes, which variety of tomato plant would it be best to grow?

.....

(1 mark)

5 (c) From the information in the table, the gardener's test was **not** fair.

Give **one** way in which the test was **not** fair.

.....

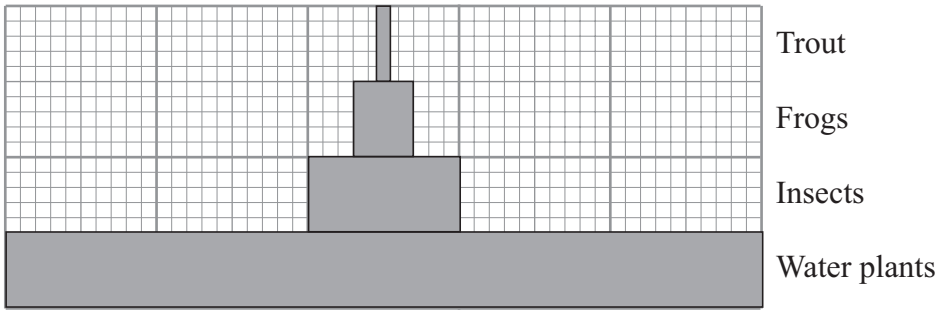
.....

(1 mark)

4

Turn over ▶

6 The diagram shows a pyramid of biomass drawn to scale.



6 (a) What is the source of energy for the water plants?

.....

(1 mark)

6 (b) The ratio of the biomass of water plants to the biomass of insects is 5 : 1.

Calculate the ratio of the biomass of insects to the biomass of frogs.

Show clearly how you work out your answer.

.....

.....

ratio = ... : 1

(2 marks)

6 (c) Give **two** reasons why the biomass of the frog population is smaller than the biomass of the insect population.

1 .....

.....

2 .....

.....

(2 marks)

6 (d) Some insects die.

Describe how the carbon in the dead insect bodies may be recycled.

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(4 marks)

9

Turn over for the next question

7 Diabetes is a disease in which a person's blood glucose concentration rises to higher levels than normal.
Diabetes is caused by insufficient insulin being produced.

7 (a) (i) Which organ monitors blood glucose concentration?

.....

(1 mark)

7 (a) (ii) Insulin reduces the concentration of glucose in the blood.

Describe how insulin does this.

.....

.....

(1 mark)

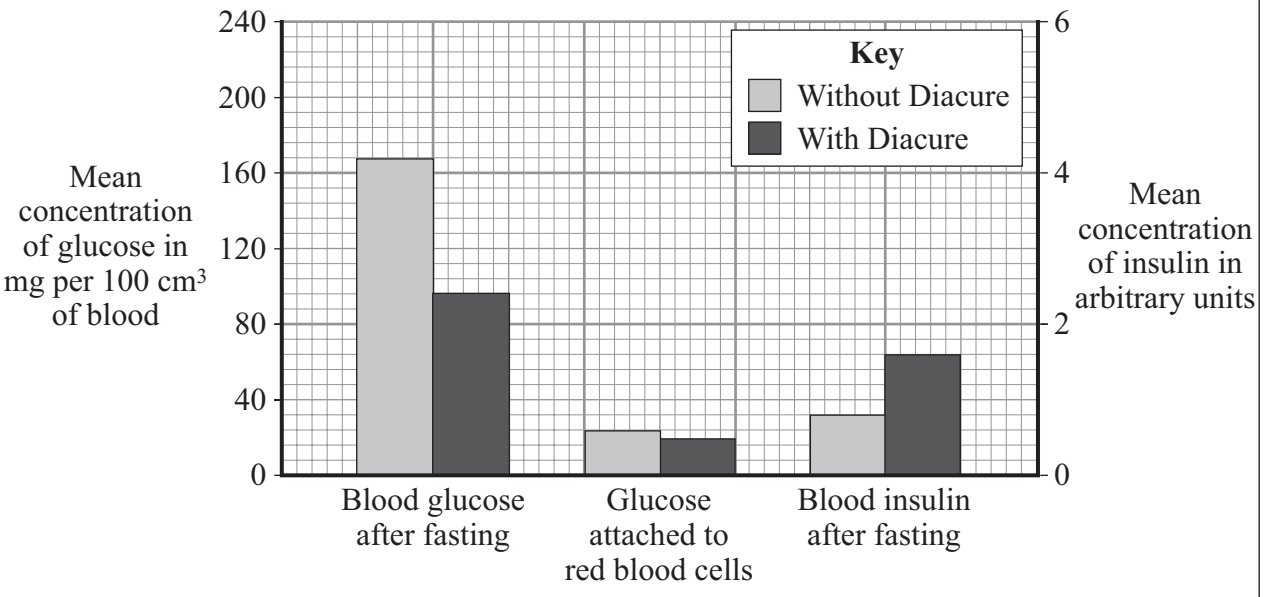
7 (b) A person with diabetes can be monitored in three ways:

- measuring the blood glucose concentration after fasting (going without food for 12 hours)
- measuring the amount of glucose attached to red blood cells: this is a measure of the average blood glucose concentration over the previous three months
- measuring the concentration of insulin in the blood after fasting

The manufacturer of a new treatment for diabetes, called Diacure, publishes the following two claims.

1. 98.6% of all people who used Diacure reported an improvement in their condition.

2. An independent study of 30 diabetic patients showed a significant reduction in blood glucose concentrations and a significant increase in insulin production, as shown by the graph.



7 (b) (i) Which of the manufacturer's claims is **not** based on scientific evidence?

.....

.....

(1 mark)

7 (b) (ii) Why might the data in this study be unreliable?

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(1 mark)

7 (b) (iii) The manufacturer did **not** draw attention to the data for the amount of glucose attached to red blood cells.

Suggest an explanation for this.

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(2 marks)

7 (b) (iv) The study of diabetic patients was carried out by an independent company.

Why is it important that the study should be independent?

.....

.....

.....

(1 mark)

7

END OF QUESTIONS

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED