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
Foundation Tier
June 2011

Biology

BLY3F

F

Unit Biology B3

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.

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

1 Microorganisms are used to make yoghurt and alcoholic drinks.

List A gives four materials used in making yoghurt and alcoholic drinks.
List B gives information about these materials.

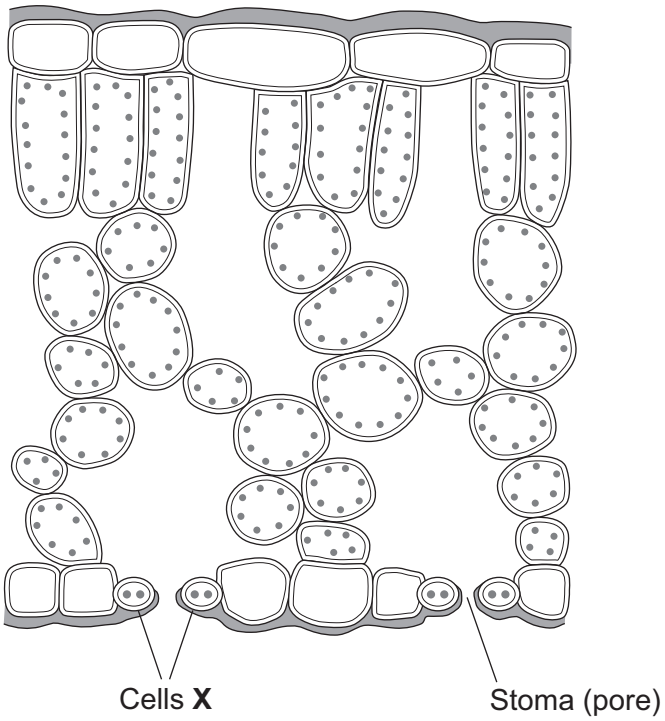
Draw a line from each material in **List A** to the correct information in **List B**.

List A **Material**	**List B** **Information**
	The sugar in milk
Lactose	
	Used in brewing beer to give a bitter flavour
Lactic acid	
	Enzyme made by yeast
Hops	
	Causes milk to clot in yoghurt making
Ethanol	
	Made in fermentation by yeast

(4 marks)

4

2 The diagram shows a section through a plant leaf.



2 (a) The cells labelled **X** surround a stoma (pore).

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

Cells **X** are called

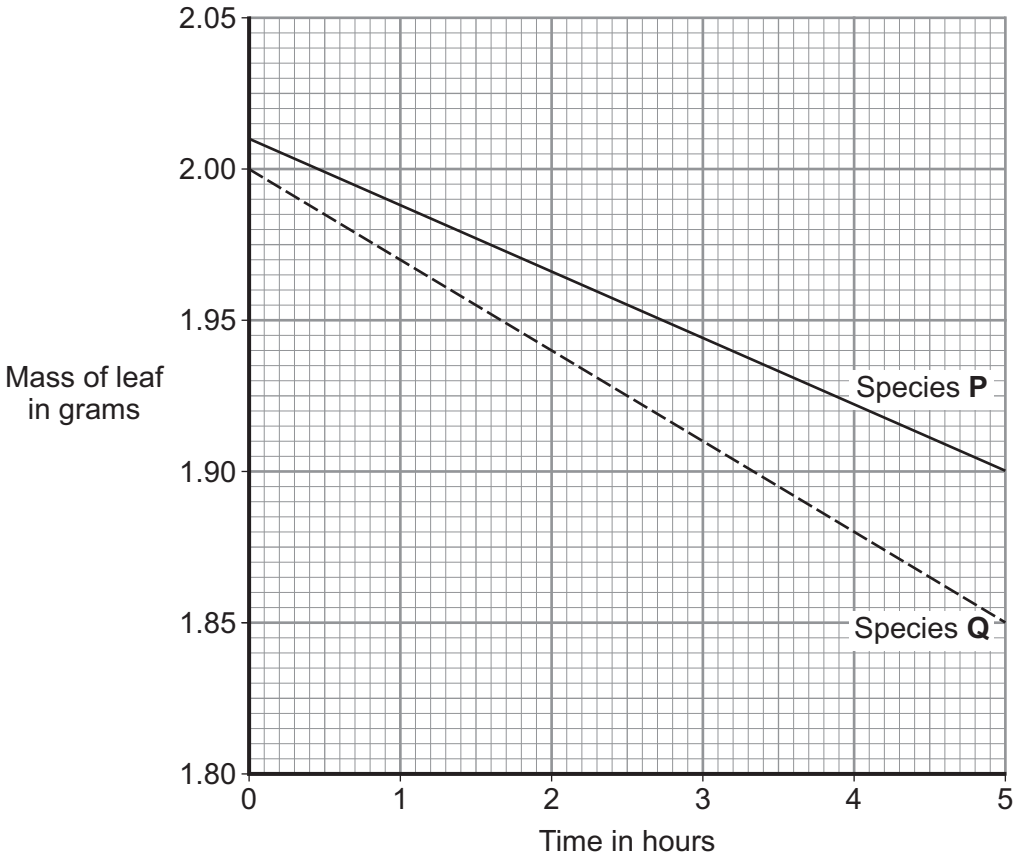
- alveoli.
- guard cells.
- villi.

(1 mark)

Question 2 continues on the next page

2 (b) Water vapour is lost from leaves. Water loss causes a leaf to lose mass.

The graph shows how the masses of leaves from two plant species, **P** and **Q**, changed over several hours. Both leaves were kept in the same conditions.



2 (b) (i) What was the mass of the leaf of species **Q** at 0 hours? ..... grams
(1 mark)

2 (b) (ii) What was the difference between the mass of the leaf of species **P** and the mass of the leaf of species **Q** after 5 hours?

..... grams
(1 mark)

2 (b) (iii) The leaf of species **Q** lost water at a faster rate than the leaf of species **P**.

Suggest **one** reason why.

.....

.....
(1 mark)

2 (b) (iv) Which weather conditions would cause the greatest rate of loss of mass for both species **P** and species **Q**?

Tick (✓) **one** box in the table.

Weather conditions		**Tick (✓)**
Still air or wind	**Temperature in °C**	
Wind	30	
Still air	30	
Wind	20	

(1 mark)

2 (c) Draw a ring around the correct answer to complete the sentence.

In very hot, dry conditions, the stomata close.

This is to prevent

anaerobic respiration.

breathing.

wilting.

(1 mark)

6

Turn over for the next question

3 Mycoprotein is produced from the fungus *Fusarium*. Mycoprotein is sometimes used instead of meat in foods for vegetarians.

3 (a) The table shows the amounts of some substances in mycoprotein and in chicken.

Substance	Mass in grams per 100 grams	
	Mycoprotein	**Chicken**
Protein	11.8	22.0
Dietary fibre	4.8	0.0
Fat	3.5	6.2
Carbohydrate	2.0	0.0
Cholesterol	0.0	0.1

3 (a) (i) Draw a ring around the correct answers to complete the sentence.

Eating mycoprotein instead of chicken helps to lower the risk of heart disease because

mycoprotein contains no | fat / carbohydrate / cholesterol | and

mycoprotein contains less | dietary fibre. / fat. / carbohydrate. |

(2 marks)

3 (a) (ii) A body-builder ate 4 kilograms of chicken each week to help him build up his muscles.

If he ate mycoprotein instead of chicken, he would need to eat about twice as much to have the same effect.

Use information from the table to give **one** reason why.

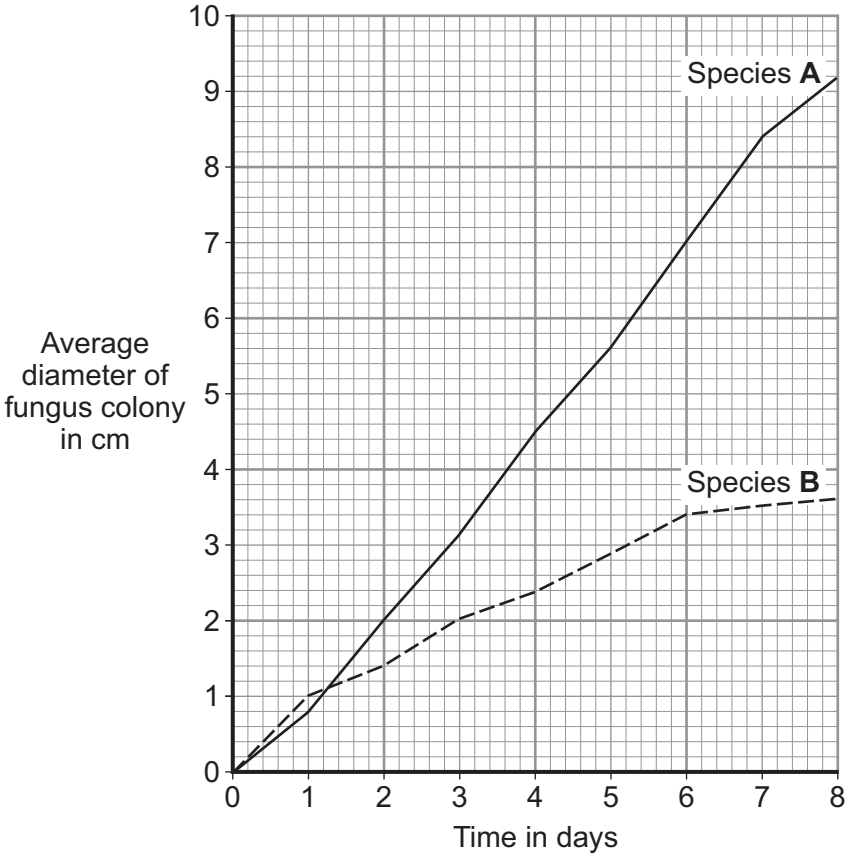
.....

.....

(1 mark)

3 (b) Scientists investigated the growth of two species, **A** and **B**, of the fungus *Fusarium.*
The scientists grew the fungus on agar jelly in Petri dishes.
They measured the diameter of a colony of each fungus every day for 8 days.

The graph shows the results.



3 (b) (i) Describe how the diameter of the colony of species **A** changed between day 0 and day 8.

.....

.....

.....

.....

(2 marks)

3 (b) (ii) Give **one** difference between the results for species **A** and the results for species **B**.

.....

.....

(1 mark)

Question 3 continues on the next page

3 (c) Both Petri dishes contained the same nutrients.
Both Petri dishes were kept at 25 °C.

When *Fusarium* is grown in an industrial fermenter, other factors also need to be controlled.

Give **two** of these other factors.

1 .....

2 .....

(2 marks)

8

4 Muscles need energy during exercise.

Draw a ring around the correct answer in parts (a) and (b) to complete each sentence.

4 (a) (i) The substance stored in the muscles and used during exercise is

glycogen.

lactic acid.

protein.

(1 mark)

4 (a) (ii) The process that releases energy in muscles is

digestion.

respiration.

transpiration.

(1 mark)

4 (b) The table shows how much energy is used by two men of different masses when swimming at different speeds.

Speed of swimming in metres per minute	Energy used in kJ per hour	
	34 kg man	**70 kg man**
25	651	1155
50	1134	2103

4 (b) (i) When the 34 kg man swims at 50 metres per minute instead of at 25 metres per minute,

the extra energy he uses each hour is

- 36 kJ.
- 483 kJ.
- 948 kJ.

(1 mark)

4 (b) (ii) When swimming at 50 metres per minute, each man's heart rate is faster than when swimming at 25 metres per minute.

A faster heart rate helps to supply the muscles with more

- carbon dioxide.
- glycogen.
- oxygen.

(1 mark)

4 (b) (iii) During the exercise the arteries supplying the muscles would

- constrict.
- dilate.
- pump harder.

(1 mark)

4 (c) When a person starts to swim, the breathing rate increases.

Give **one** way in which this increase helps the swimmer.

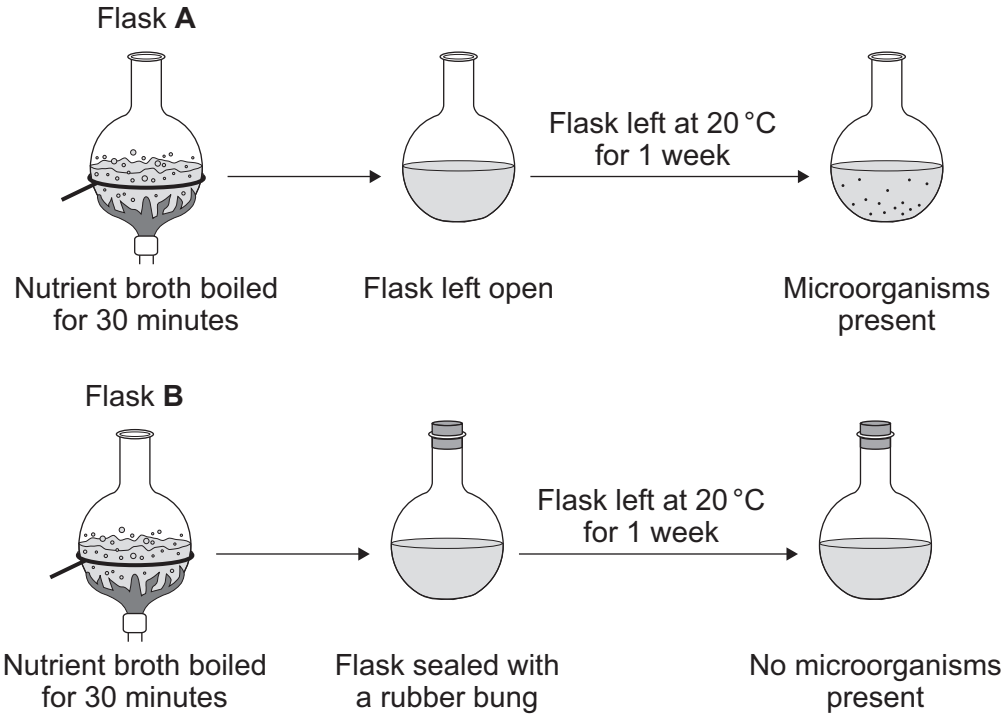
.....

.....

(1 mark)

6

5 The diagram shows how some students did an investigation.



5 (a) Each flask of nutrient broth was first boiled for 30 minutes.

Why?

.....

.....

(1 mark)

5 (b) Flask **A** and flask **B** were set up differently.

5 (b) (i) Describe the difference in the way in which flask **A** and flask **B** were set up.

.....

.....

(1 mark)

5 (b) (ii) Describe the difference in the results for flask **A** and flask **B** after one week.

.....

.....

(1 mark)

5 (b) (iii) Suggest a reason for the difference in the results.

.....

.....

(1 mark)

5 (b) (iv) At the end of one week, the rubber bung was removed from flask **B**. Flask **B** was then left open at 20 °C for one more week.

What result would you expect?

.....

.....

(1 mark)

5 (c) The results of the investigation give evidence that supports the theory of biogenesis.

What is meant by *biogenesis*?

Tick (✓) **one** box.

The spontaneous generation of living organisms from non-living matter ☐

New species of organisms develop from an existing species ☐

Living organisms are produced only by other living organisms ☐

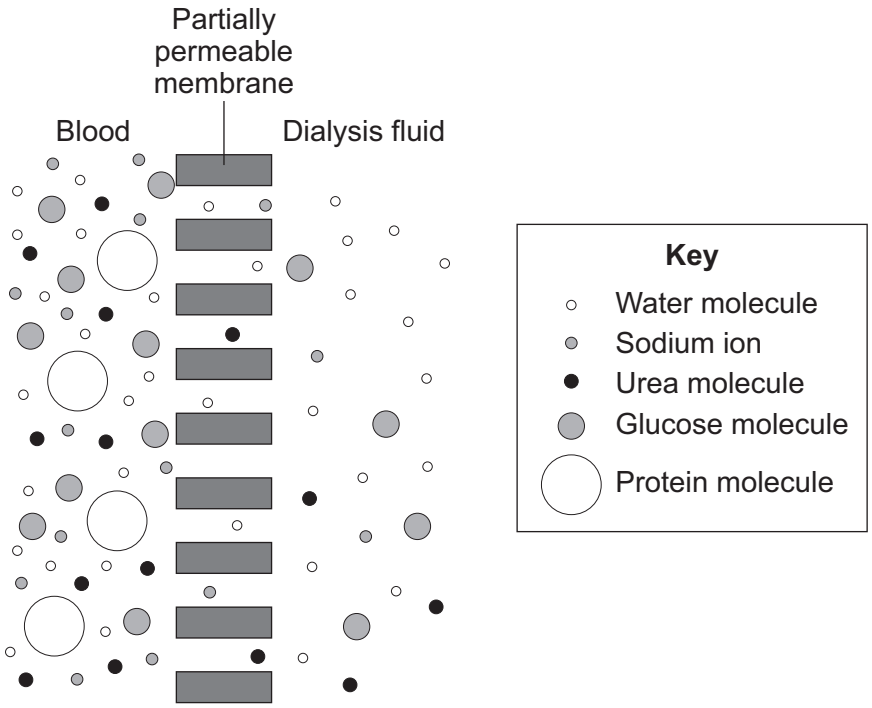
(1 mark)

6

Turn over for the next question

6 Dialysis can be used to treat a person with kidney disease.

The diagram shows blood and dialysis fluid separated by a partially permeable membrane.



Blood plasma and dialysis fluid contain several substances dissolved in water.

The table shows the concentrations of some of these substances in dialysis fluid and in the blood plasma of a person with kidney disease immediately before dialysis.

Substance	Concentration of substance in grams per dm^3	
	Blood plasma of person with kidney disease	**Dialysis fluid**
Sodium ions	3.26	3.15
Urea	0.45	0.00
Glucose	0.90	0.99
Protein	60.00	0.00

6 (a) Protein molecules are **not** able to move from the blood to the dialysis fluid.
Use information from the diagram to explain why.

.....

.....

(1 mark)

6 (b) Urea molecules move from the blood into the dialysis fluid.

6 (b) (i) Give the name of this type of movement. .....

(1 mark)

6 (b) (ii) Why do the urea molecules move in this direction?

Use information from the table to help you to answer this question.

.....

.....

(1 mark)

6 (c) The concentration of sodium ions in the blood plasma will change during dialysis.

Suggest a value for the concentration of sodium ions in the plasma at the end of dialysis.

Use information from the table.

Concentration of sodium ions = ... grams per dm^3

(1 mark)

6 (d) For most patients a kidney transplant is better than continued treatment by dialysis.

6 (d) (i) Give **two** advantages of having a kidney transplant rather than treatment by dialysis.

1 .....

.....

2 .....

.....

(2 marks)

6 (d) (ii) Give **two** possible disadvantages of having a kidney transplant.

1 .....

.....

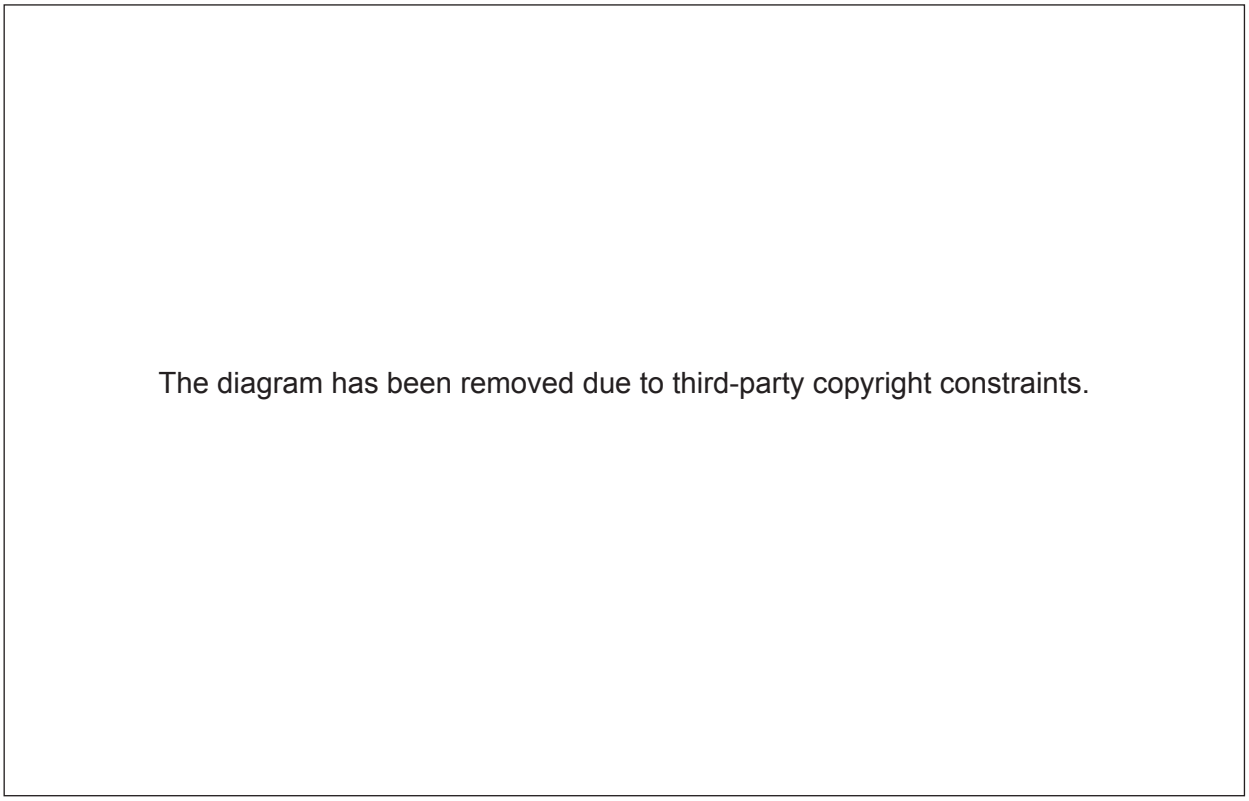
2 .....

.....

(2 marks)

8

7 The diagram shows part of a biogas generator. Organic matter flows through the generator, as shown in the diagram.



7 (a) The table shows the composition of the biogas produced by this generator.

Gas	Percentage
Carbon dioxide	27.0
Water vapour	2.0
Hydrogen sulfide	0.5
Ammonia	0.5
Gas **X**	

7 (a) (i) Name gas **X**. .....

(1 mark)

7 (a) (ii) Calculate the percentage of gas **X** in the biogas.

Show clearly how you work out your answer.

.....

.....

Percentage of gas **X** = ... %

(2 marks)

7 (b) (i) Some biogas is pumped back in at the base of the generator. This biogas moves around inside the generator, as shown by the arrows in the diagram.

The movement of the biogas makes the breakdown of the organic matter more efficient.

Suggest how.

.....

.....

(1 mark)

7 (b) (ii) Biogas is pumped into the generator rather than air.

Suggest **one** reason why.

.....

.....

(1 mark)

7 (c) The biogas generator is usually kept underground in a large tank of water. The water can be heated to keep the temperature at 35 °C.

Explain why the biogas generator is kept at 35 °C.

.....

.....

.....

.....

(2 marks)

7

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements in future papers if notified.

Question 7 Copyright © 2010 Organic Power Ltd.