

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use

General Certificate of Secondary Education
June 2008

BIOLOGY
Unit Biology B3

Foundation Tier

BLY3F
F



Wednesday 21 May 2008 1.30 pm to 2.15 pm

<p>You will need no other materials. You may use a calculator.</p>

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

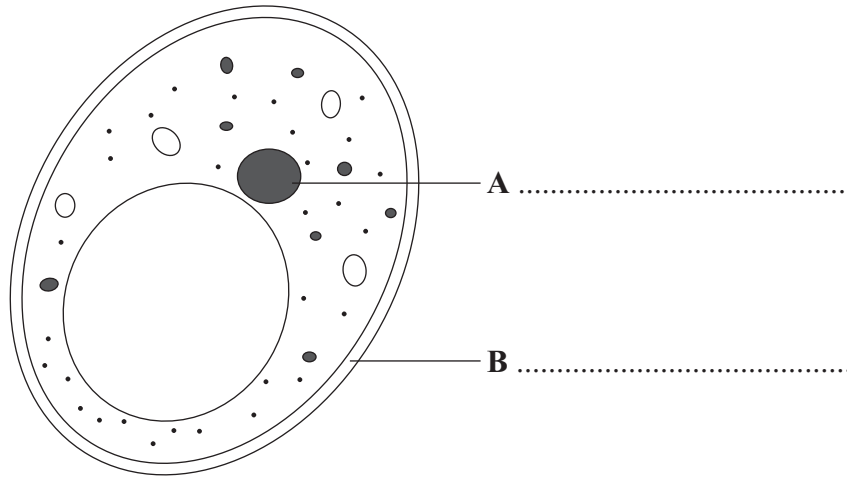
- In all calculations, show clearly how you work out your answer.

For Examiner's Use			
Question	Mark	Question	Mark
1		6	
2		7	
3		8	
4			
5			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			



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

1 The diagram shows a yeast cell.



1 (a) Label structures **A** and **B** on the diagram.

Choose your answers from the list in the box.

cell membrane	cell wall	nucleus	vacuole
---------------	-----------	---------	---------

(2 marks)

1 (b) In bread making, the dough rises because a gas is produced by the yeast.

1 (b) (i) Which gas is produced by the yeast?

Draw a ring around **one** answer.

carbon dioxide **oxygen** **sulfur dioxide**

(1 mark)

1 (b) (ii) Name the process which produces this gas.

Draw a ring around **one** answer.

digestion **respiration** **transpiration**

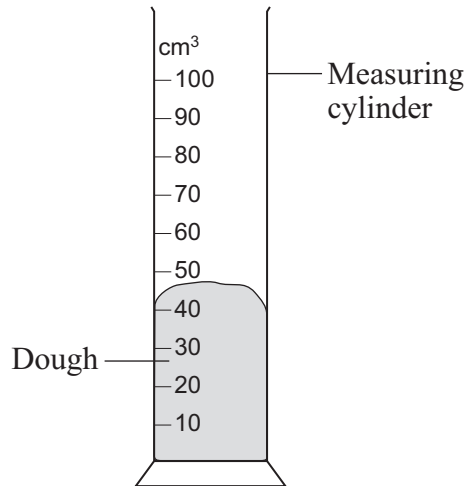
(1 mark)



- 1 (c) Some students investigated the effect of temperature on the rising of bread dough.

They mixed flour, yeast and water to make the dough.

They then placed pieces of dough into separate measuring cylinders, as shown in the diagram.



The students placed each measuring cylinder in a separate water bath.

Each water bath was at a different temperature.

The table shows the increase in volume of each piece of dough after 30 minutes.

Temperature in °C	0	10	20	25	30	35	40	50
Increase in volume of dough in cm³	0	6	20	30	42	50	40	11

- 1 (c) (i) Give **one** variable which the students should have kept constant for each measuring cylinder.

.....
(1 mark)

- 1 (c) (ii) Use the table of results to find the temperature which gave the largest increase in the volume of the dough.

..... °C
(1 mark)

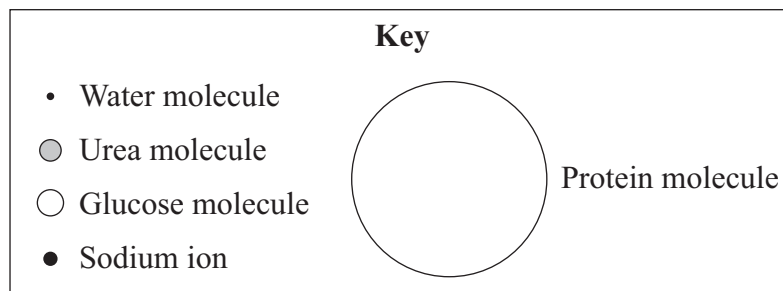
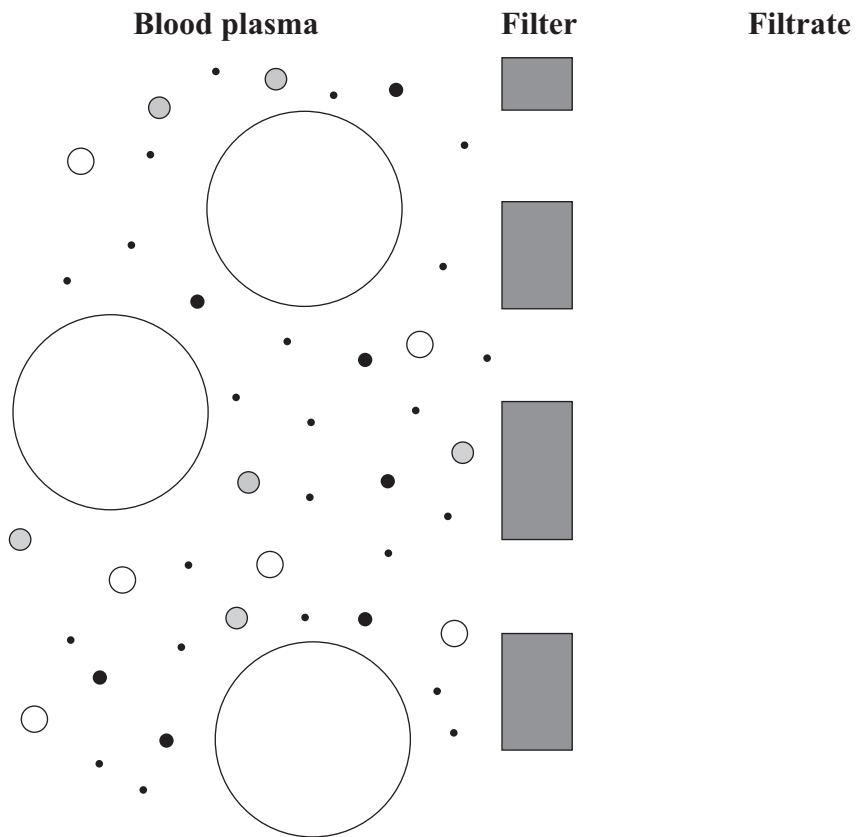
6

Turn over ►



2 The kidneys filter the blood.

The diagram shows the site of filtration in the kidney.



- 2 (a) Use information from the diagram to answer this question.

Put a tick (✓) in the box next to every substance that will pass through the filter from the blood plasma into the filtrate.

One has been done for you.

glucose	<input checked="" type="checkbox"/>
urea	<input type="checkbox"/>
water	<input type="checkbox"/>
sodium ions	<input type="checkbox"/>
protein	<input type="checkbox"/>

(2 marks)

- 2 (b) Proteins and glucose are not present in the urine of a healthy person.

- 2 (b) (i) Use information from the diagram to explain why protein is not found in the urine of a healthy person.

.....

(1 mark)

- 2 (b) (ii) Complete the sentence by drawing a ring around the correct answer.

After filtration, all the glucose is

reabsorbed
released
respired

(1 mark)

Question 2 continues on the next page

Turn over ►



- 2 (c) An athlete trained on a hot day and on a cold day. On each day, he did the same amount of exercise and drank the same volume of water.

Complete the sentences by drawing a ring around the correct answer.

- 2 (c) (i) On the hot day, the athlete would produce _____ urine.

less
more
the same amount of

(1 mark)

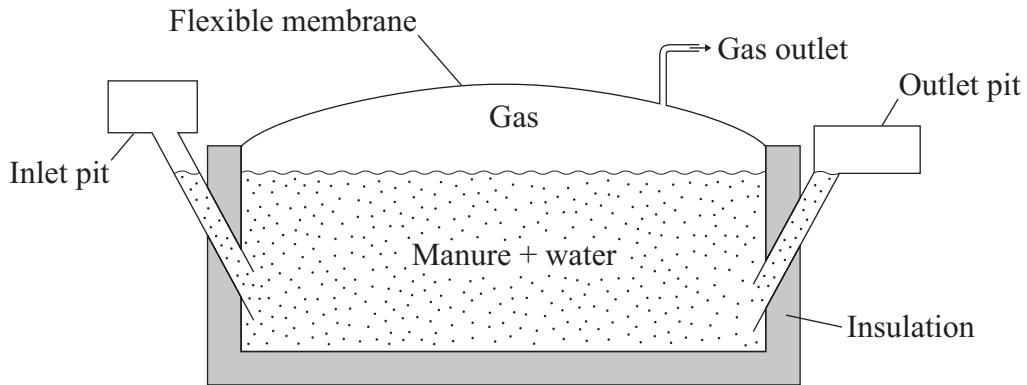
- 2 (c) (ii) This is because he would produce _____ sweat.

less
more
the same amount of

(1 mark)

6

- 3 The diagram shows one design of biogas generator used on a large dairy farm in the USA.



- 3 (a) What is the main, useful gas in biogas?

Draw a ring around **one** answer.

carbon dioxide

hydrogen

methane

(1 mark)



- 3 (b) The insulation is installed so that biogas is produced at a faster rate.

Why is biogas produced at a faster rate?

.....

.....

(1 mark)

- 3 (c) The table shows costs and income for this generator.

Item	Yearly costs in dollars	Yearly income in dollars
Electricity generated from biogas		22 800
Heating from burning biogas		4 200
Sale of fibre after biogas production		8 000
Operation and maintenance costs	10 000	

- 3 (c) (i) Calculate the yearly profit from the biogas generator.

Show your working.

.....

.....

.....

(2 marks)

- 3 (c) (ii) It cost 200 000 dollars to build the generator. Use your answer to part (c)(i) to calculate how many years it would take to pay back this cost.

.....

.....

.....

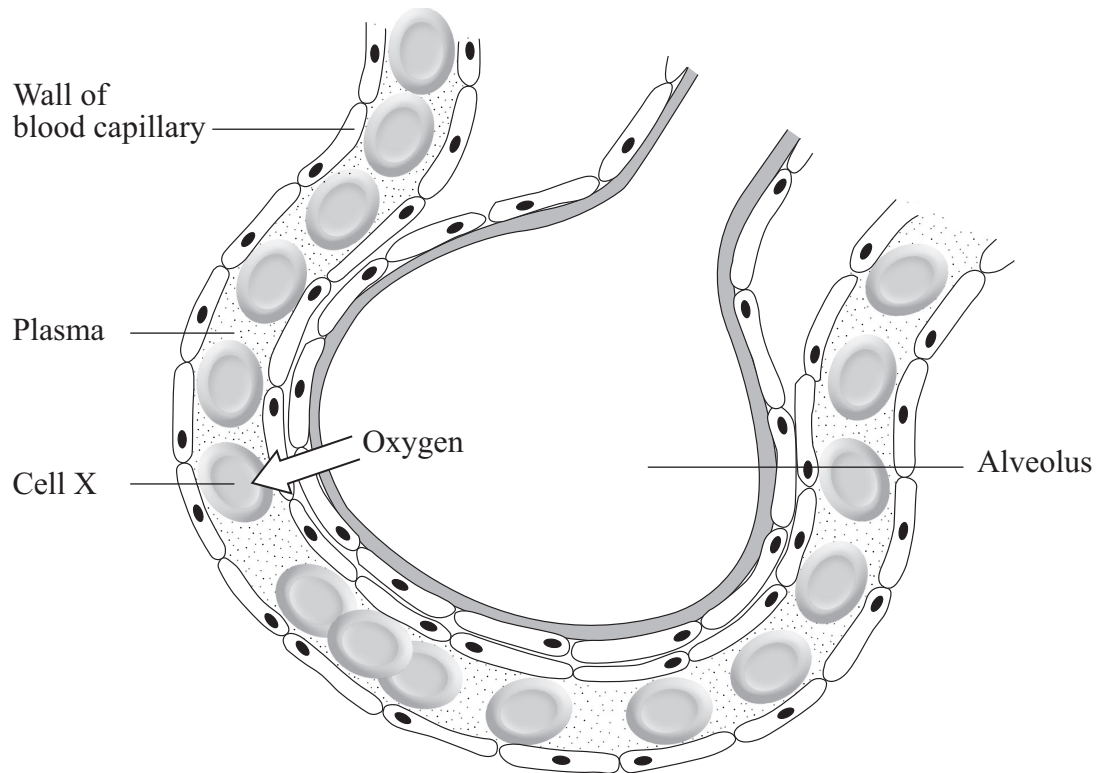
(2 marks)

6

Turn over ►



4 The diagram shows a small part of a lung.



4 (a) The arrow on the diagram shows the movement of oxygen from the air in the alveolus to cell X.

Complete the sentences by drawing a ring around the correct answer.

4 (a) (i) Cell X is a

platelet
red cell
white cell

(1 mark)

4 (a) (ii) Oxygen moves from the air in the alveolus into cell X by

diffusion
filtration
respiration

(1 mark)

4 (a) (iii) The substance in cell X that combines with oxygen is called

glycogen
haemoglobin
lactic acid

(1 mark)



- 4 (a) (iv) Cell X does **not** have

a cell membrane
cytoplasm
a nucleus

(1 mark)

- 4 (b) **On the diagram**, draw an arrow to show the movement of carbon dioxide during gas exchange.

(1 mark)

5

- 5 (a) Microorganisms can be grown in Petri dishes containing nutrient agar. The Petri dish and nutrient agar must be sterilised before use.

Which method is used to sterilise the Petri dish and nutrient agar?

Tick (✓) **one** box.

Heat at 120 °C for 30 minutes

Pass through a Bunsen burner flame

Place in an incubator at 25 °C for one day

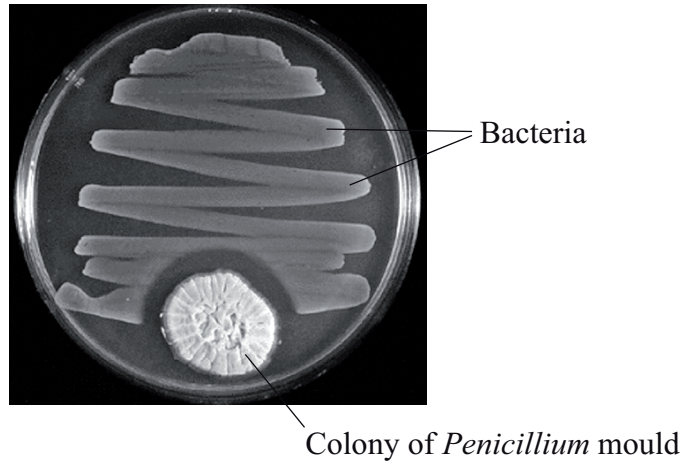
(1 mark)

Question 5 continues on the next page

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- 5 (b) The photograph shows *Penicillium* mould and one species of bacterium growing together on nutrient agar in a Petri dish.



The *Penicillium* mould produces an antibiotic.

How can you tell this from the photograph?

.....

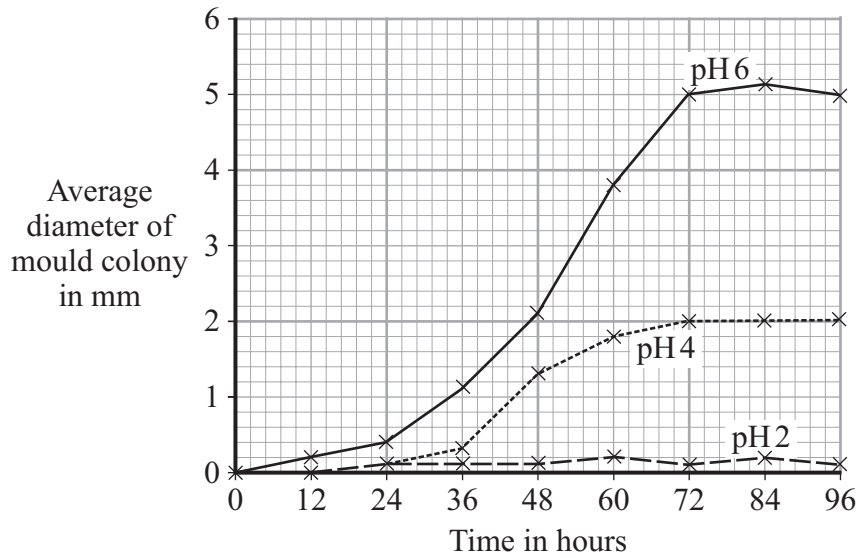
.....

(1 mark)

- 5 (c) A student investigated the effect of pH on the growth of *Penicillium*.
- He used three Petri dishes containing nutrient agar.
 - The pH of the nutrient agar in the three Petri dishes was 2, 4 and 6 respectively.
 - He inoculated each Petri dish with the same amount of *Penicillium* mould.
 - Every 12 hours, he measured the diameter of five *Penicillium* colonies in each dish.
 - From these measurements, he calculated the average diameter of the five colonies in each dish.

The graph on the opposite page shows the results.





5 (c) (i) Complete the sentence.

Calculating the average diameter of five colonies from each dish made the results more

(1 mark)

5 (c) (ii) At which pH did the mould grow best?

(1 mark)

5 (c) (iii) What was the maximum average diameter of the mould colony at pH4?

..... mm
(1 mark)

5 (c) (iv) During which 12-hour period was growth fastest at pH6?

From to hours.

(1 mark)

5 (d) pH is only one factor which affects the growth of *Penicillium* mould.

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

Give **two** of these other factors.

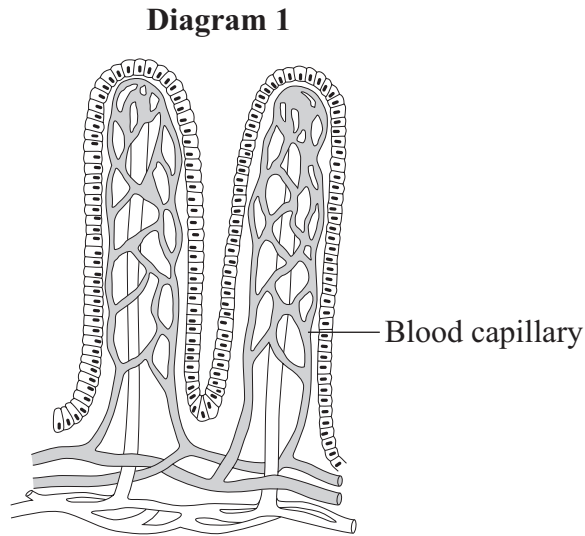
1

2

(2 marks)



6 **Diagram 1** shows two villi in the small intestine of a healthy person.



6 (a) Describe **two** features of the villi which help the small intestine to function.

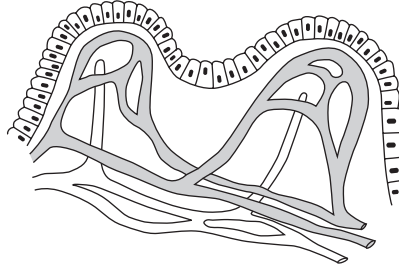
- 1
-
- 2
-

(2 marks)



- 6 (b) **Diagram 2** shows two villi in the small intestine of a person with coeliac disease.

Diagram 2



- 6 (b) (i) How do the villi of the person with coeliac disease differ from those of a healthy person?

.....

(1 mark)

- 6 (b) (ii) Suggest how this difference might affect how well the small intestine functions.

.....

(1 mark)

4

Turn over for the next question

Turn over ▶



7 A group of students looked at stomata on four different species of plants, **A**, **B**, **C** and **D**. They estimated the number of stomata per cm² on the upper and lower surfaces of the leaves of the four species.

Their results are shown in the table.

Plant species	Estimated number of stomata per cm ² of leaf surface	
	Upper surface of leaf	Lower surface of leaf
A	4000	28 000
B	0	800
C	8500	15 000
D	8000	26 000

7 (a) Which plant species probably lives in a dry region?

Explain the reason for your answer.

.....

.....

.....

.....

.....

.....

(3 marks)

7 (b) All four species have more stomata on the lower surface of their leaves than on the upper surface.

Suggest how this could help the plants to survive better.

.....

.....

.....

.....

(2 marks)

5



8 The table shows the amounts of energy used in running and in walking at different speeds by people of different body masses.

Activity	Energy used in kilojoules per hour			
	34 kg person	50 kg person	70 kg person	90 kg person
Running, 9 km per hour	1530	1850	2770	3700
Running, 11 km per hour	2140	2560	3860	5120
Running, 16 km per hour	2980	3570	5380	7140
Walking, 3 km per hour	530	670	1010	1340
Walking, 5 km per hour	740	880	1340	1760
Walking, 7 km per hour	1030	1240	1850	2480

8 (a) Describe **two** patterns you can see in the data.

1

.....

2

.....

(2 marks)

8 (b) Our breathing rate is much higher when running than when walking.

Explain the advantage of this to the body.

.....

.....

.....

.....

.....

.....

(3 marks)

5

END OF QUESTIONS



There are no questions printed on this page

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