Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

For Examiner's Use

General Certificate of Secondary Education
January 2009

BIOLOGY **BLY3F**
Unit Biology B3

F

Foundation Tier

Monday 12 January 2009 9.00 am to 9.45 am

You will need no other materials.
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		7	
2		8	
3		9	
4			
5			
6			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

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

1 (a) Draw a ring around **one** word to answer each of the following questions.

1 (a) (i) Which type of blood vessel carries blood out of the heart?

artery **capillary** **vein**

(1 mark)

1 (a) (ii) Which type of blood vessel allows substances to enter and leave the blood?

artery **capillary** **vein**

(1 mark)

1 (b) Use words from the box to complete the sentences.

alveoli	**cell membrane**	**nucleus**
plasma	**red blood cells**	**villi**

Oxygen enters the blood through the walls of the ..... .

Most of the oxygen transported by the blood is carried in the

..... .

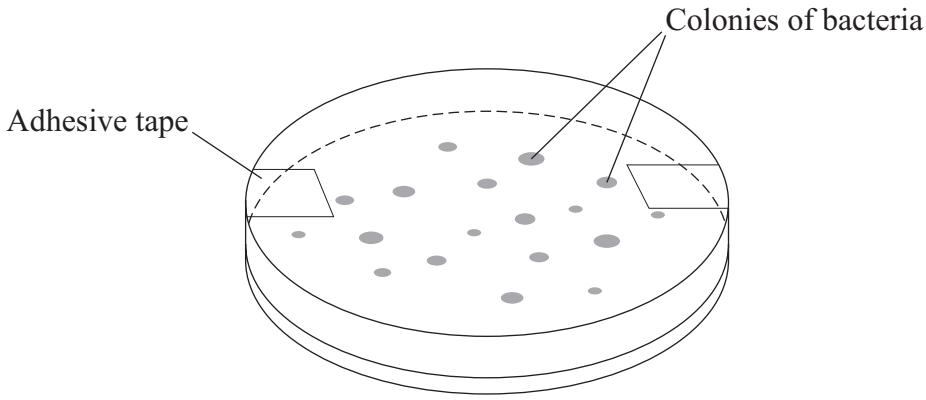
A red blood cell is different from other body cells because it does not have a

..... .

(3 marks)

5

2 The diagram shows a Petri dish containing nutrient agar. Colonies of bacteria are growing on the nutrient agar.



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

2 (a) (i) Agar jelly contains carbohydrates.

These carbohydrates are a source of [energy / minerals / protein] for the bacteria.

(1 mark)

2 (a) (ii) The dish is sealed with adhesive tape to prevent the entry of

[carbon dioxide / microorganisms / oxygen] from the air.

(1 mark)

2 (b) (i) The dish is placed in an incubator at a temperature of [10 °C / 25 °C / 75 °C] .

(1 mark)

2 (b) (ii) This temperature is used rather than 35 °C so that it is

less likely that [fungi / pathogens / yeasts] will grow in the dish.

(1 mark)

4

3 (a) The kidney controls the amount of water in the body.
The table shows the volume of water filtered from the blood and the volume of urine produced in one day.

	Volume in dm^3
Water filtered from blood	180
Urine	2

Calculate the volume of water reabsorbed into the blood.

Show clearly how you work out your answer.

.....

Volume of water reabsorbed = ...dm^3

(2 marks)

3 (b) On a hot sunny afternoon, Man **A** sat in the shade, drinking beer. Man **B** went jogging in the desert.

Man **A**

Man **B**

As a result, the volume and concentration of the urine of the two men were different.

Complete the table by writing the word '**higher**' or '**lower**' in each box.

The first line has been completed for you.

	Man A	**Man B**
Volume of urine produced	higher	lower
Volume of water reabsorbed by the kidneys		
Concentration of urine		

(2 marks)

4

4 Ethanol (alcohol) can be mixed with petrol and used as a fuel in motor vehicles.

4 (a) Which type of microorganism is used to make ethanol from sugar?

Draw a ring around **one** answer.

bacterium **mould** **yeast**

(1 mark)

4 (b) Read the information about ethanol and petrol.

Ethanol
- One litre releases 23.5 megajoules of energy when it is burned.
- It releases carbon dioxide and water when it is burned.
- It can be made from crops such as sugar cane and maize.

Petrol
- One litre releases 34.8 megajoules of energy when it is burned.
- It releases carbon dioxide, water, carbon monoxide, sulfur dioxide and oxides of nitrogen when it is burned.
- It is made from crude oil which is pumped out of the ground.

4 (b) (i) Use the information above to explain **two** advantages of using ethanol rather than petrol as a fuel in motor vehicles.

Explanation 1 .....

.....

.....

.....

Explanation 2 .....

.....

.....

.....

(4 marks)

4 (b) (ii) Give **one** disadvantage of using ethanol rather than petrol as a fuel in motor vehicles.

.....

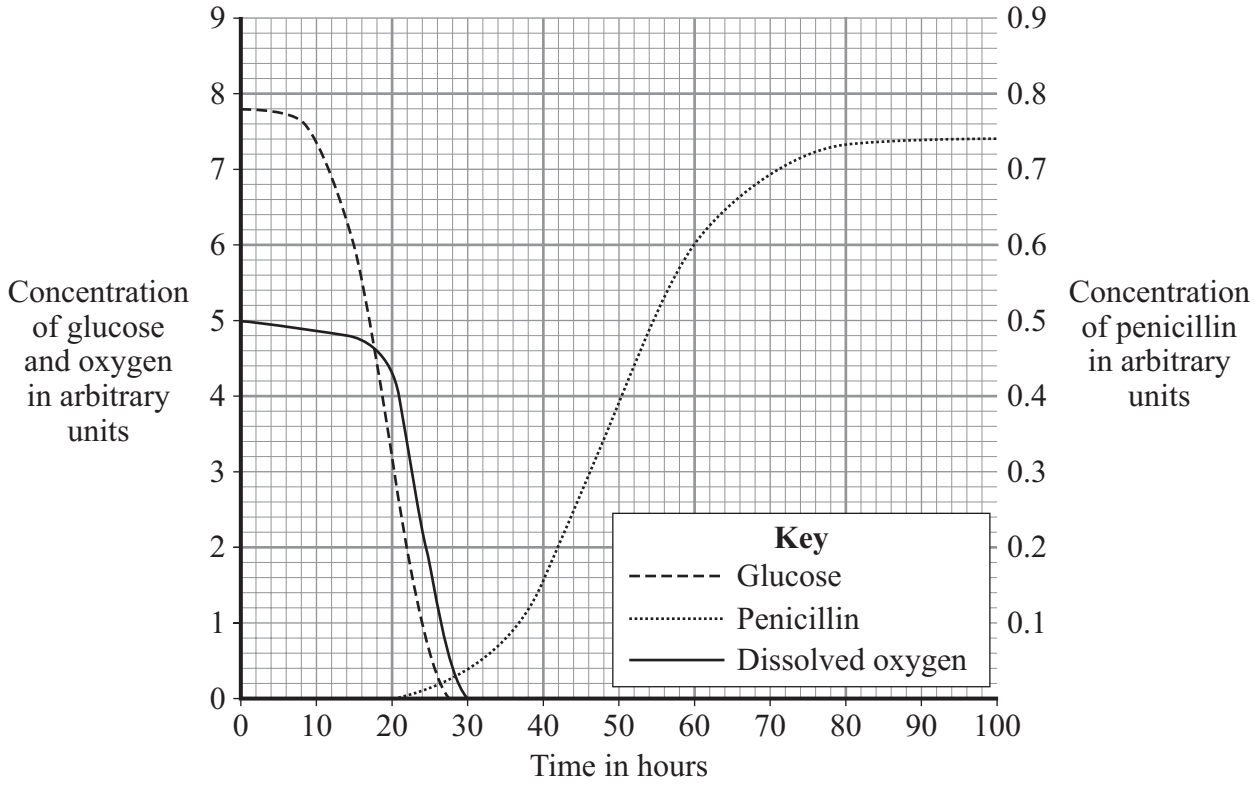
.....

(1 mark)

6

5 The mould *Penicillium* can be grown in a fermenter. It produces the antibiotic penicillin.

The graph shows changes that occurred in the fermenter during the production of penicillin.



5 (a) During which time period was penicillin produced most quickly?

Draw a ring around **one** answer.

0 – 20 hours **40 – 60 hours** **80 – 100 hours**

(1 mark)

5 (b) (i) Describe how the concentration of glucose in the fermenter changes between 0 and 30 hours.

.....

.....

.....

.....

(2 marks)

5 (b) (ii) How does the change in the concentration of oxygen in the fermenter compare with that of glucose between 0 and 30 hours?

Put a tick (✓) in **two** boxes next to your choices.

The oxygen concentration changes after the glucose concentration. ☐

The oxygen concentration changes before the glucose concentration. ☐

The oxygen concentration changes less than the glucose concentration. ☐

The oxygen concentration changes more than the glucose concentration. ☐

(2 marks)

5 (b) (iii) What is the name of the process that uses both glucose and oxygen?

Draw a ring around **one** answer.

aerobic respiration **distillation** **filtration**

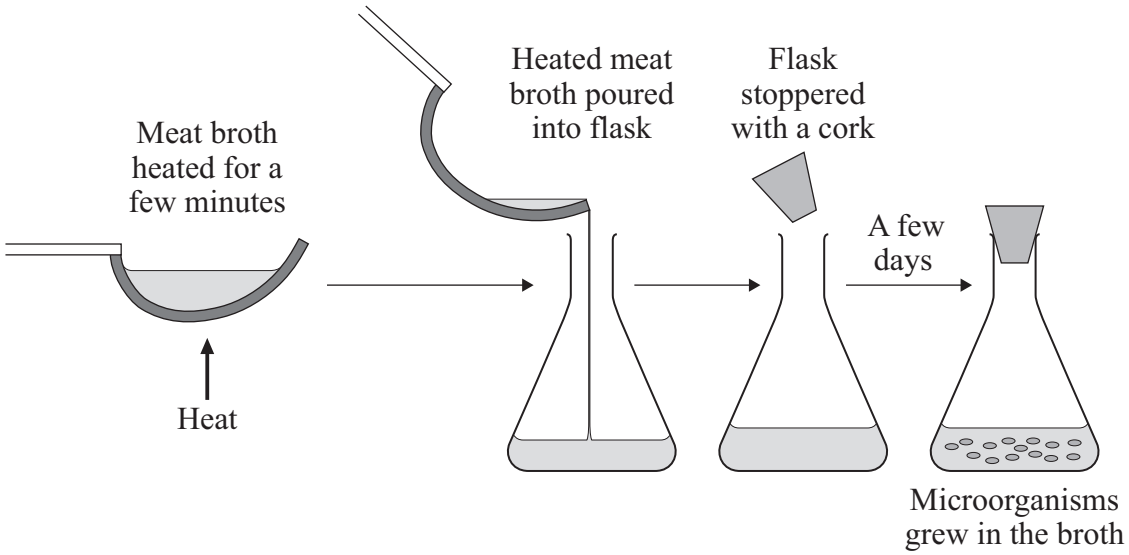
(1 mark)

6

Turn over for the next question

6 For thousands of years, many people believed that living organisms could be produced from non-living substances.

6 (a) In 1745, John Needham carried out the following investigation.



Needham concluded that the broth produced microorganisms from non-living substances.

6 (a) (i) Why did Needham heat the broth?

.....

.....

(1 mark)

6 (a) (ii) Why did microorganisms grow in the broth?

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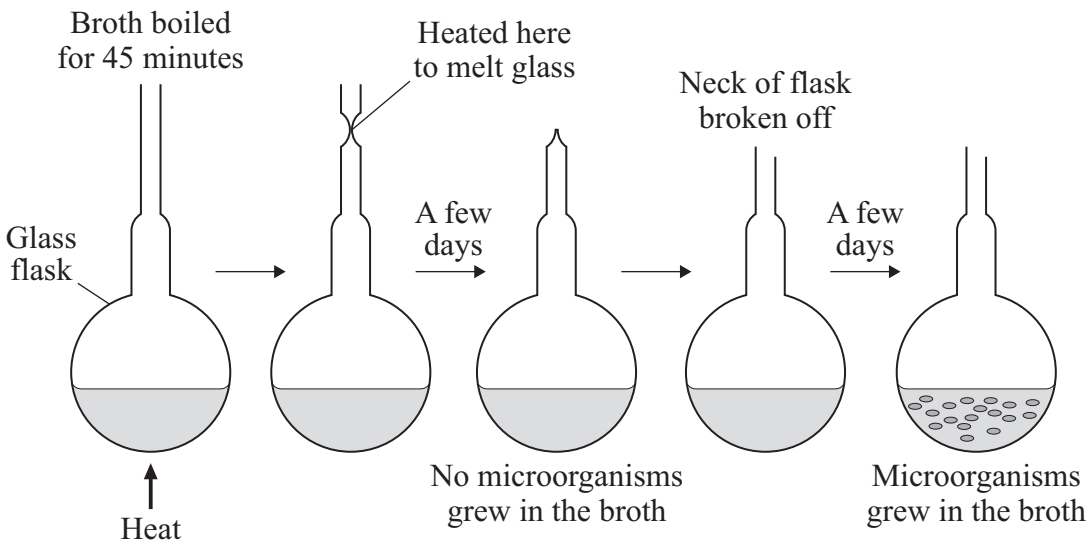
(1 mark)

6 (b) In 1767, Spallanzani improved Needham's investigation, as follows.



Explain why Spallanzani's method was better than Needham's.

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.....

(2 marks)

6 (c) Complete the sentence.

Spallanzani's investigation provided evidence for the theory of

..... .

(1 mark)

5

7 (a) The table shows the effect of exercise on the action of one person's heart.

	At rest	**During exercise**
Heart rate in beats per minute	72	165
Volume of blood leaving the heart in each beat in cm^3	75	120
Heart output in cm^3 per minute	5400	

7 (a) (i) Calculate the heart output for this person during exercise.

Show clearly how you work out your answer.

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.....

.....

Answer = ... cm^3 per minute

(2 marks)

7 (a) (ii) During exercise, more oxygen is carried to the working muscles.

Explain why this is helpful during exercise.

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(2 marks)

7 (b) Give **two** other changes in the body that help to increase the amount of oxygen delivered to the working muscles during exercise.

1 .....

.....

2 .....

.....

(2 marks)

6

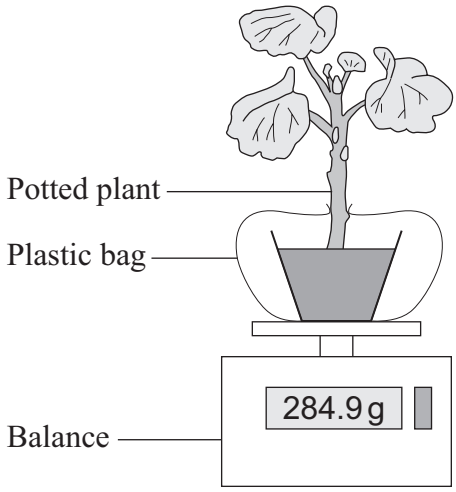
Turn over for the next question

8 (a) Name the process by which water is lost from plant leaves.

.....

(1 mark)

8 (b) Some students set up the apparatus shown in the diagram to measure the water loss from a potted plant.



The apparatus was placed in different environmental conditions:

A in still air at 20 °C.
B in still air at 25 °C.
C in a wind at 20 °C.
D in a wind at 25 °C.

Readings from the balance were recorded by a datalogger at 10-minute intervals.

The results are given in the table.

Time in minutes	**Balance reading in grams**			
	A	**B**	**C**	**D**
0	285.6	284.6	282.9	280.9
10	285.3	284.2	282.4	280.2
20	284.9	283.8	281.9	279.4
30	284.7	283.4	281.4	278.8

8 (b) (i) Under which conditions, **A**, **B**, **C** or **D**, was water lost most rapidly? ☐

(1 mark)

8 (b) (ii) Explain, as fully as you can, why water was lost most rapidly under these conditions.

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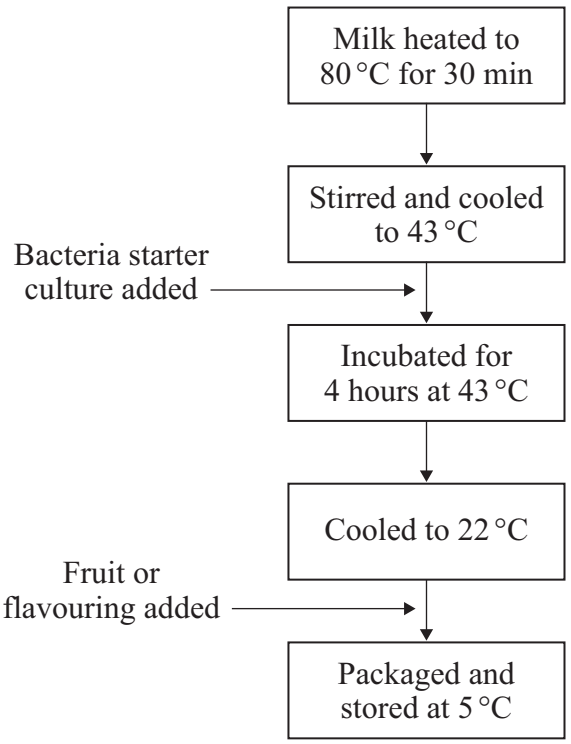
(2 marks)

4

Turn over for the next question

9 The diagram shows how yoghurt is produced.



9 (a) After being heated to 80 °C, the milk is cooled to 43 °C.

Why is the milk cooled before the bacteria are added?

.....

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(1 mark)

9 (b) The pH of milk falls from 6.7 to 4.0 when it is incubated with the bacteria.

9 (b) (i) What causes this fall in pH?

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(2 marks)

9 (b) (ii) Give **one** way in which this fall in pH is useful in yoghurt production.

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(1 mark)

9 (c) Suggest why the yoghurt is stored at 5 °C.

.....

.....

(1 mark)

5

END OF QUESTIONS

There are no questions printed on this page

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