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| 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                   |      |
| TOTAL               |      |



General Certificate of Secondary Education  
Foundation Tier  
January 2011

# Biology

**BLY3F**

**Unit Biology B3**

**F**

**Written Paper**

**Thursday 13 January 2011 9.00 am to 9.45 am**

**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**

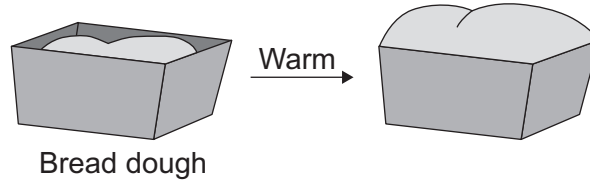
- In all calculations, show clearly how you work out your answer.



J A N 1 1 B L Y 3 F 0 1

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

- 1** Yeast produces a gas. This gas makes bread dough rise.



- 1 (a)** Draw a ring around the correct answer to complete each sentence.

- 1 (a) (i)** The gas that makes bread dough rise is

carbon dioxide.  
methane.  
oxygen.

(1 mark)

- 1 (a) (ii)** The process which produces this gas is called

biogenesis.  
fermentation.  
malting.

(1 mark)



1 (b) The table shows the effect of temperature on how quickly bread dough rises.

| Temperature<br>in °C | Rate of rising<br>in arbitrary units |
|----------------------|--------------------------------------|
| 10                   | 0.14                                 |
| 15                   | 0.41                                 |
| 20                   | 1.00                                 |
| 25                   | 1.73                                 |
| 30                   | 1.50                                 |
| 35                   | 0.00                                 |

At which temperature did the bread dough rise fastest?

..... °C  
(1 mark)

|   |
|---|
| 3 |
|---|

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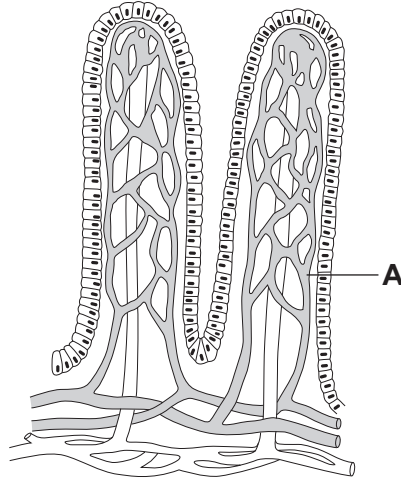
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2 Villi are found in some parts of the digestive system.

Diagram 1 shows two villi.

Diagram 1



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

2 (a) (i) Structure A is a

muscle.

nerve.

capillary.

(1 mark)

2 (a) (ii) The villi absorb the products of digestion by

dialysis.

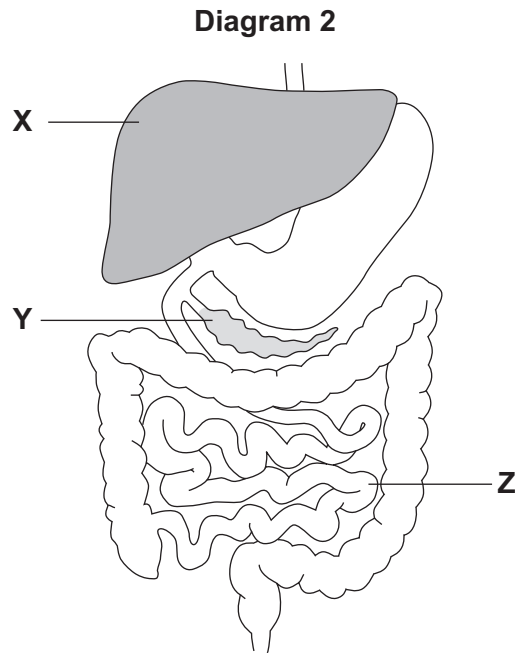
diffusion.

osmosis.

(1 mark)



2 (b) Diagram 2 shows the digestive system.



2 (b) (i) In which part of the digestive system, **X**, **Y** or **Z**, are most villi found?

(1 mark)

2 (b) (ii) There are about 2000 villi in each  $\text{cm}^2$  of this part of the digestive system.

Why is it helpful to have lots of villi?

.....

.....

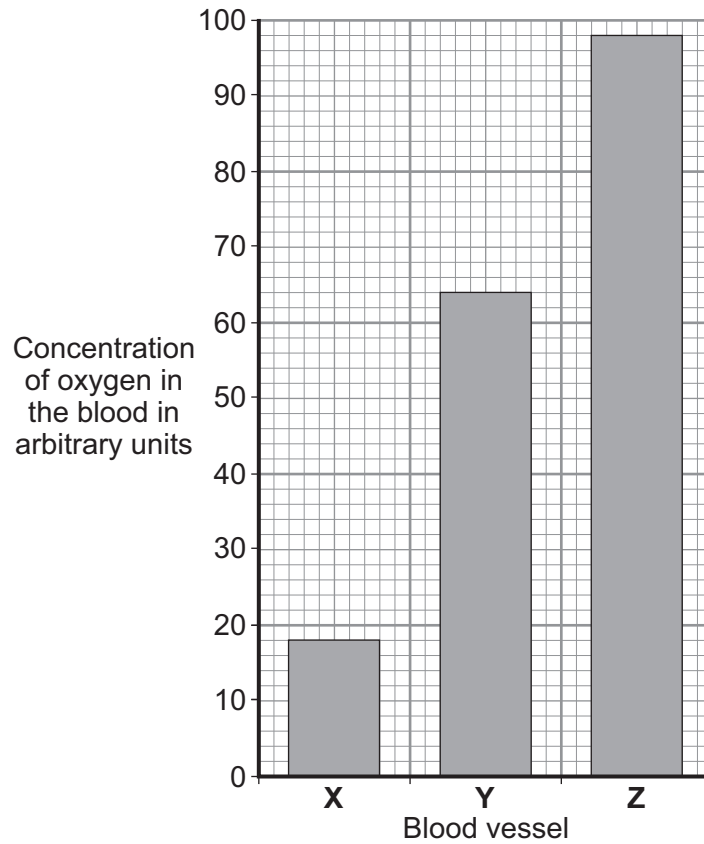
(1 mark)

4

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- 3** The bar chart shows the concentration of oxygen in the blood in three different blood vessels, **X**, **Y** and **Z**.



- 3 (a) (i)** What is the concentration of oxygen in blood vessel **X**?

Answer ..... arbitrary units.  
(1 mark)

- 3 (a) (ii)** Which blood vessel, **X**, **Y** or **Z**, carries blood from the lungs to the heart?

(1 mark)



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

**3 (b) (i)** Most of the oxygen in the blood is carried by the

plasma.

red blood cells.

white blood cells.

(1 mark)

**3 (b) (ii)** Oxygen combines with a coloured pigment in the blood.

This coloured pigment is called

alveoli.

haemoglobin.

lactic acid.

(1 mark)

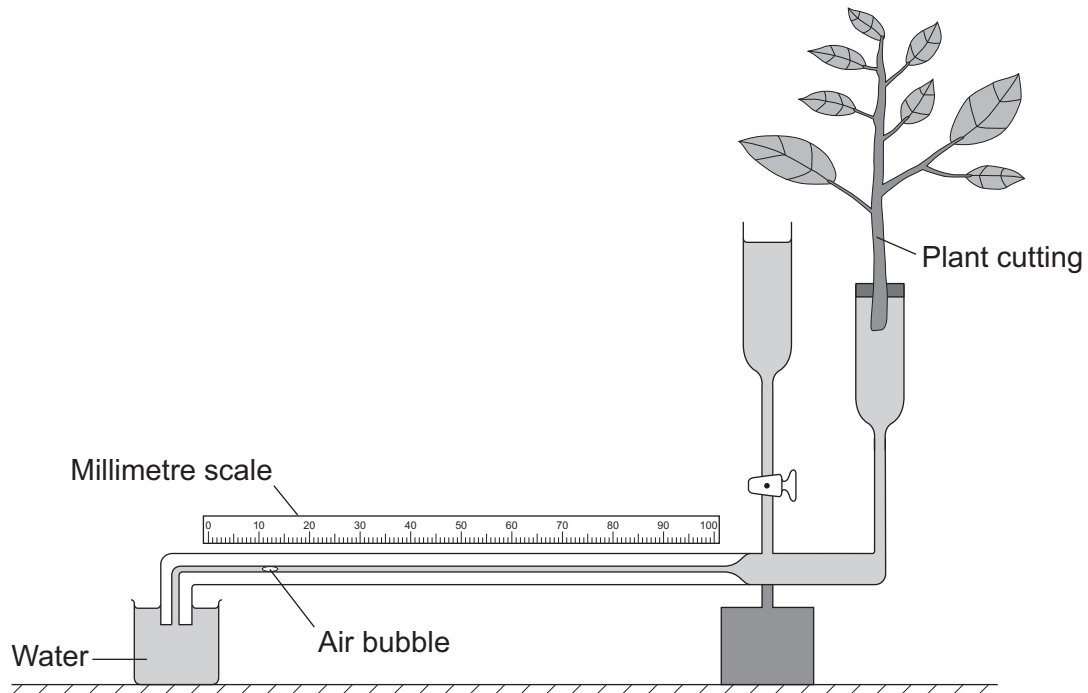
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**Turn over for the next question**

**Turn over ►**



- 4 Some students used the apparatus shown in the diagram to measure the rate of water uptake by a plant cutting.



The students set up the apparatus in three different conditions:

- no wind at 15°C
- no wind at 25°C
- wind at 25°C

For each experiment, the students recorded the movement of the air bubble along the scale.

- 4 (a) (i) Name the **two** variables that the students chose to change in these experiments.

1 .....

2 .....

(2 marks)

- 4 (a) (ii) It was important to use the same plant cutting each time to make these experiments fair.

Explain why.

.....

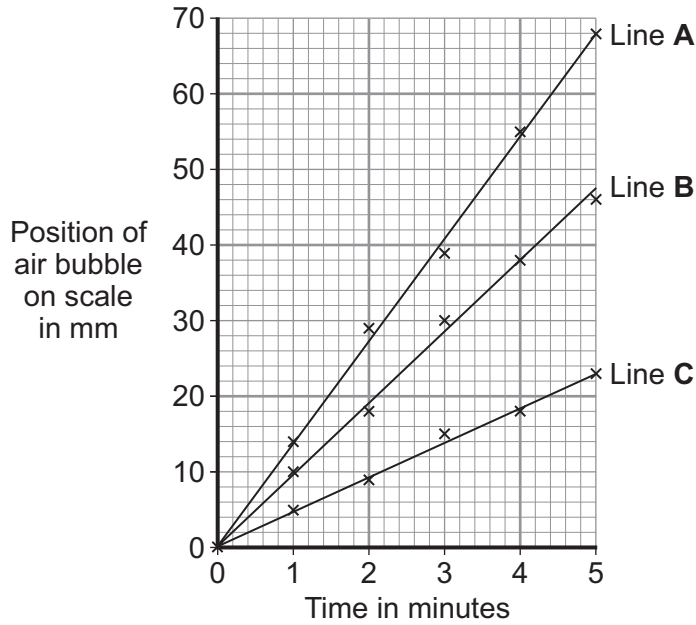
.....

(1 mark)





4 (b) The graph shows the students' results.



Which line on the graph, **A**, **B** or **C**, shows the results for each of the three different experiments?

Write each of the letters **A**, **B** or **C** in the correct boxes in the table.

| Condition       | Letter |
|-----------------|--------|
| No wind at 15°C |        |
| No wind at 25°C |        |
| Wind at 25°C    |        |

(2 marks)

4 (c) Water is lost from the leaves of the plant cutting.

Name this process.

Draw a ring around **one** answer.

**distillation**

**respiration**

**transpiration**

(1 mark)

|   |
|---|
| 6 |
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Turn over ►



**5 (a)** Urine contains mineral ions, and other substances, dissolved in water.

What effect will each of the activities in **Table 1** have on the concentration of mineral ions in the urine?

Use words from the box to complete **Table 1**.

|                 |                 |                      |
|-----------------|-----------------|----------------------|
| <b>increase</b> | <b>decrease</b> | <b>stay the same</b> |
|-----------------|-----------------|----------------------|

**Table 1**

| <b>Activity</b>                          | <b>Concentration of mineral ions in urine</b> |
|--|---|
| Drinking a large bottle of water         |   |
| Eating salty foods such as potato crisps |   |

(2 marks)

**5 (b)** A person with kidney disease may be treated by having a kidney transplant.

**Table 2** shows the effect of a person's age on the success of a kidney transplant.

**Table 2**

|  | <b>Age of patient</b> |                      |
|--|-----------------------|----------------------|
|  | <b>50–59 years</b>    | <b>Over 60 years</b> |
| Percentage of kidneys rejected                                     | 38                    | 23                   |
| Percentage of kidneys which continued to work for at least 5 years | 82                    | 87                   |
| Percentage of patients who survived for at least 10 years          | 82                    | 76                   |



Some doctors think that people over 60 years of age should not be given transplants.

From the data in the table, do you agree with these doctors?

Draw a ring around your answer. **Yes / No**

Give **two** reasons for your answer.

1 .....

.....

2 .....

.....

(2 marks)

|          |
|----------|
|          |
| <b>4</b> |

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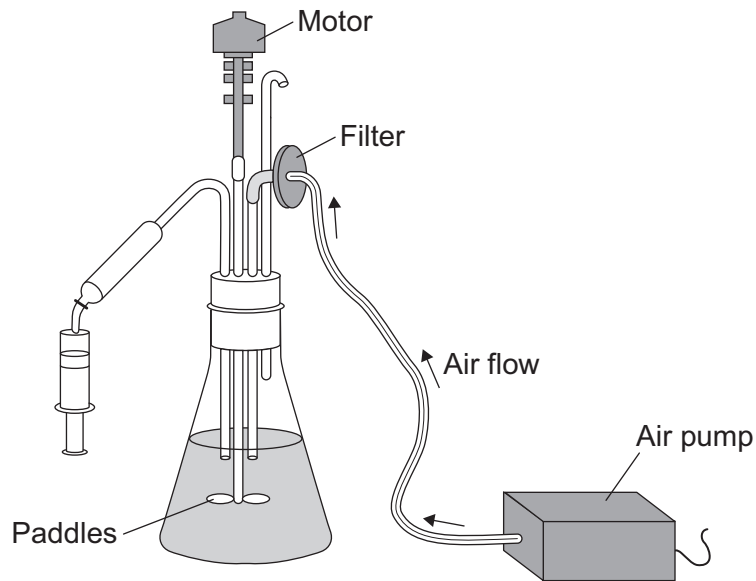


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- 6 The diagram shows a simple laboratory fermenter.



Some students grew the fungus *Fusarium* in this fermenter.  
After 5 days the students measured the dry mass of the *Fusarium*.

- 6 (a) **List A** gives the names of three pieces of apparatus in the diagram.  
**List B** gives four possible functions of these pieces of apparatus.

Draw **one** line from each piece of apparatus in **List A** to its correct function in **List B**.

**List A**  
**Apparatus**

**List B**  
**Function**

Air pump

To stop microorganisms entering the flask

Filter

To allow gases to escape from the flask

Paddles

To supply oxygen to the fungus

To keep the contents well mixed

(3 marks)

Question 6 continues on the next page

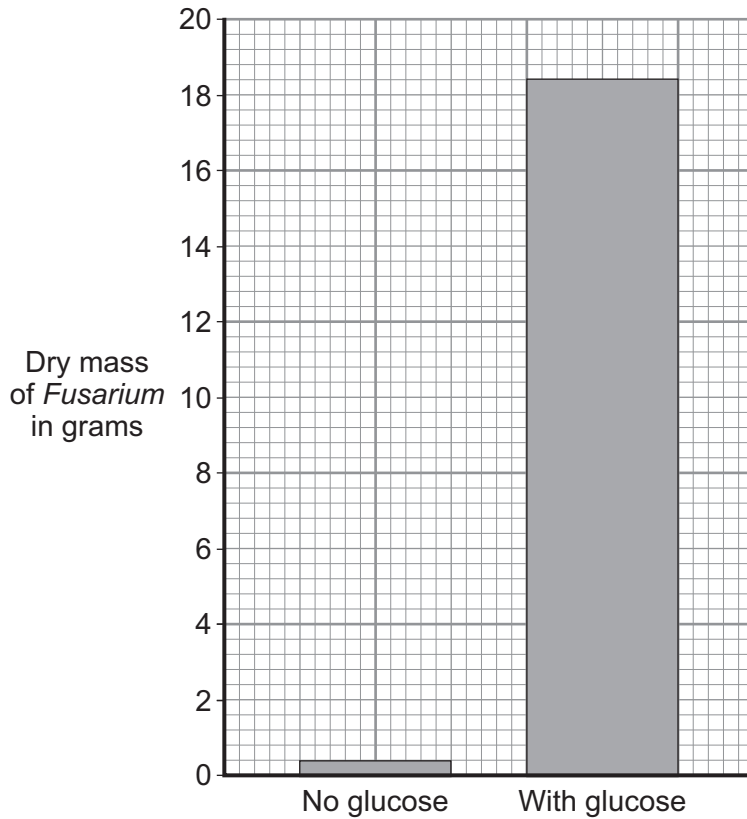
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**6 (b)** The students grew the *Fusarium* in a culture solution of minerals dissolved in water.

The students repeated the experiment with the same concentration of minerals, but this time they also added glucose.

The bar chart shows the effect of adding glucose to the culture solution.



**6 (b) (i)** Describe, in detail, the effect of adding glucose to the culture solution.

.....  
.....  
.....  
.....

(2 marks)

**6 (b) (ii)** Suggest an explanation for the effect of adding glucose.

.....  
.....

(1 mark)



- 6 (c)** The students repeated the investigation four more times. They used the culture solution with added glucose but each time they left out one of the minerals.

Their results are given in the table.

| Mineral left out of the culture solution | Dry mass of <i>Fusarium</i> in grams |
|--|--------------------------------------|
| Calcium                                  | 18.50                                |
| Iron                                     | 16.80                                |
| Magnesium                                | 1.90                                 |
| Potassium                                | 10.80                                |

Which mineral is most important for the growth of *Fusarium*?

Draw a ring around **one** answer.

**calcium**

**iron**

**magnesium**

**potassium**

(1 mark)

- 6 (d)** Draw a ring around the correct answer to complete the sentence.

In industry, *Fusarium* is usually grown to make

alcohol.

biogas.

mycoprotein.

(1 mark)



- 7 The table shows the volume of blood flowing through different organs at three levels of exercise.

| Organ(s)         | Volume of blood flowing through organ(s)<br>in cm <sup>3</sup> per minute |                      |                   |
|------------------|---|----------------------|-------------------|
|                  | Light<br>exercise   | Moderate<br>exercise | Heavy<br>exercise |
| Gut              | 1 100   | 600                  | 300               |
| Kidneys          | 900   | 600                  | 250               |
| Brain            | 750   | 750                  | 750               |
| Heart muscles    | 350   | 750                  | 1 000             |
| Skeletal muscles | 4 500   | 12 500               | 22 000            |
| Skin             | 1 500   | 1 900                | 600               |
| Other            | 400   | 500                  | 100               |
| <b>Total</b>     | <b>9 500</b>  | <b>17 600</b>        | <b>25 000</b>     |

- 7 (a) (i) Which organ has a constant flow of blood through it?

.....  
(1 mark)

- 7 (a) (ii) Which organ has the greatest reduction in the volume of blood supplied during heavy exercise compared with light exercise?

.....  
(1 mark)

- 7 (a) (iii) What proportion of the blood flows through the heart muscle during heavy exercise?

.....  
(1 mark)





**7 (b)** The volume of blood flowing through the skeletal muscles increases greatly during exercise.

Give **two** ways in which the body brings about this increase.

1 .....

.....

2 .....

.....

*(2 marks)*

**7 (c)** During exercise, the concentration of carbon dioxide in the blood increases.

Explain what causes this increase.

.....

.....

.....

.....

.....

.....

.....

*(3 marks)*

|          |
|----------|
|          |
| <b>8</b> |

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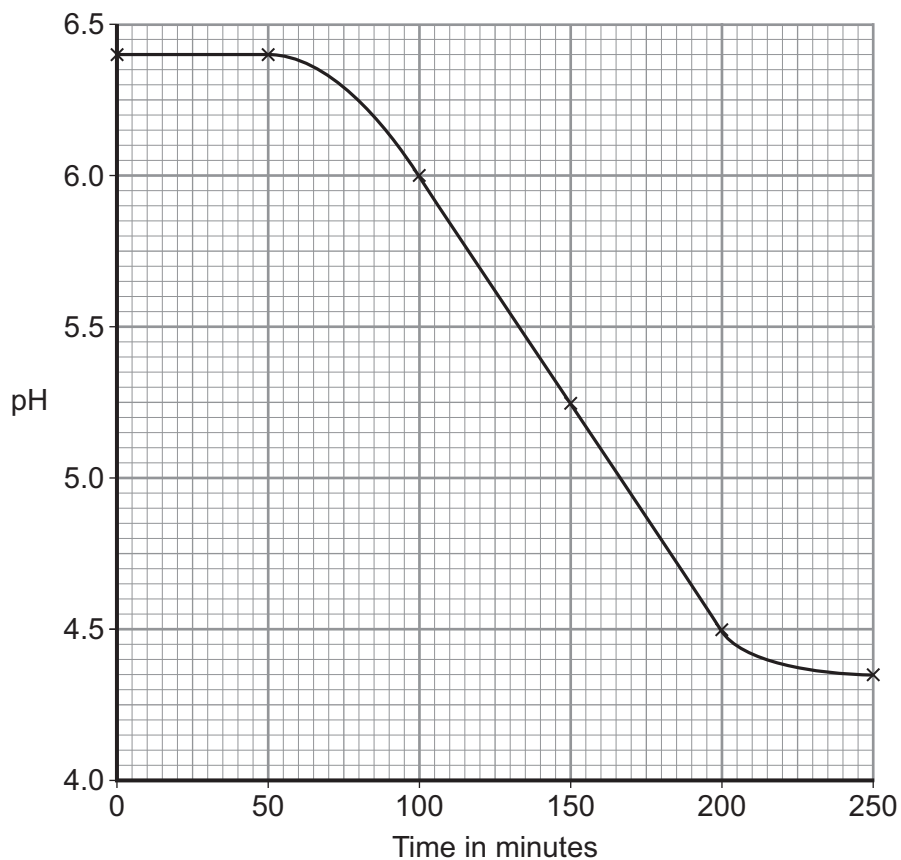


**8** A student investigated the production of yoghurt.

The student:

- boiled  $200\text{ cm}^3$  of milk in a flask for 10 minutes
- let the milk cool to room temperature
- then added  $20\text{ cm}^3$  of 'yoghurt starter culture' (plain yoghurt which contains living bacteria)
- put the flask in a water bath at room temperature
- measured the pH of the yoghurt every 50 minutes.

The results are shown in the graph.



**8 (a)** The milk was boiled for 10 minutes before it was used.

Explain why this was necessary.

.....

.....

(1 mark)



**8 (b) (i)** Use information from the graph to calculate the rate of fall in pH between 100 and 200 minutes.

Show clearly how you work out your answer.

.....  
.....  
.....

Answer = ..... pH units per minute  
(2 marks)

**8 (b) (ii)** Suggest **one** reason why the rate of fall in pH slowed down after 200 minutes.

.....  
.....

(1 mark)

**8 (c)** What substance causes the yoghurt to thicken after 200 minutes?

.....  
.....

(2 marks)

**8 (d)** The yoghurt would have been produced more quickly at 35°C.

**8 (d) (i)** What is the maximum temperature at which bacteria should be grown in a school laboratory?

..... °C  
(1 mark)

**8 (d) (ii)** It is **not** safe to grow bacteria at 35 °C in a school laboratory.

Explain why.

.....  
.....

(1 mark)

8

**END OF QUESTIONS**



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