Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **0610/51**

Paper 5 Practical Test **May/June 2017**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
Total	

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **9** printed pages and **3** blank pages.

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1 Proteins are an important part of the diet. These proteins are used in the body to make enzymes and other cell structures.

You are going to estimate the concentration of protein in two solutions, **A** and **B**, using a set of standard protein solutions.

Read all the instructions but DO NOT CARRY THEM OUT until you have drawn a table for your results in the space provided in (a)(ii).

You should use the gloves and eye protection provided while you are carrying out the practical work.

Step 1 Label seven empty test-tubes **1**, **2**, **3**, **4**, **5**, **6** and **7**.

Step 2 Make the seven solutions containing the different concentrations of protein shown in Table 1.1.

To make solution **1** use a clean syringe, of appropriate size, to measure the volumes of 1% protein solution and distilled water stated in Table 1.1. Add these volumes to the test-tube labelled **1**. Continue this procedure until you have made all seven solutions in the seven labelled test-tubes.

Table 1.1

	test-tube number						
	1	**2**	**3**	**4**	**5**	**6**	**7**
volume of 1% protein solution / cm^3	4.00	3.00	2.00	1.00	0.50	0.25	0.00
volume of distilled water / cm^3	1.00	2.00	3.00	4.00	4.50	4.75	5.00
percentage concentration of protein solution		0.60	0.40	0.20		0.05	0.00

(a) (i) Complete Table 1.1 by calculating the percentage concentration of the protein solutions in test-tubes **1** and **5**. Write your answers in Table 1.1.

Show your working.

[2]

Step 3 Add 2 cm^3 of biuret reagent to each of the solutions in the test-tubes, **1** to **7**. Shake each test-tube gently to mix the contents.

Step 4 Place the test-tubes in a test-tube rack in order of concentration, from the least concentrated to the most concentrated. Leave for 5 minutes.

Step 5 You have been provided with two test-tubes labelled **A** and **B**. They contain protein solutions of unknown concentrations.

Add 2 cm^3 of biuret reagent to the protein solution in the test-tube labelled **A**. Shake the test-tube gently to mix the contents.

Step 6 Add 2 cm^3 of biuret reagent to the protein solution in the test-tube labelled **B**. Shake the test-tube gently to mix the contents.

Step 7 Leave test-tubes **A** and **B** in a test-tube rack for 5 minutes. Continue with the other steps.

Step 8 Hold each of the test-tubes **1** to **7** against a white background and record the colour in your table.

Step 9 Give each of the test-tubes **1** to **7** a colour intensity score using the symbols in Table 1.2.

Test-tubes that have the same colour intensity should have the same score.

Table 1.2

colour intensity	palest → darkest			
score	+	++	+++	++++

(ii) Prepare a table to record your results for test-tubes **1** to **7**.

Your table should show:

- the concentration of the protein solutions
- the colour of each of the solutions
- the colour intensity score given to each of the solutions.

Record your results in your table as you carry out the practical work.

[5]

Step 10 Compare the colour intensity of the solution in test-tube **A** with the colour intensity of the solutions in test-tubes **1** to **7**. Give test-tube **A** a colour intensity score and record it in **(a)(iii)**.

Step 11 Repeat step 10 for test-tube **B**.

(iii) Record the colour intensity scores for test-tubes **A** and **B**.

colour intensity score for test-tube **A** .....

colour intensity score for test-tube **B** .....
[1]

(iv) Use your table in **(a)(ii)** and Table 1.1 to estimate the percentage concentration of the protein solutions in test-tubes **A** and **B**.

concentration of the protein solution in test-tube **A** .....%

concentration of the protein solution in test-tube **B** .....%
[2]

(b) (i) Identify the control for this experiment **and** explain why it is used.

control .....

why it is used .....

.....

.....
[2]

(ii) Explain why the method used to find the concentration of the protein solutions in test-tubes **A** and **B** can only be an estimate.

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.....[2]

[Total: 14]

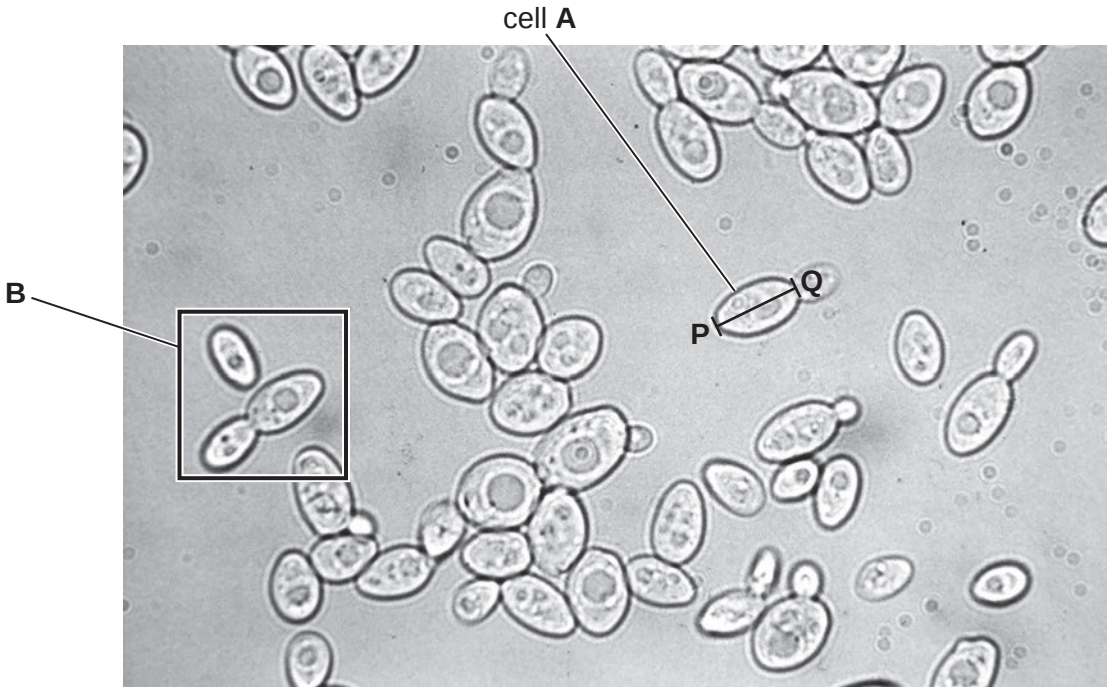
2 Yeast cells have a **cell wall** on the outside that appears as a dark layer and a large paler coloured **vacuole** occupying most of the cell.

The **nucleus** is round and often found near the centre of the cell. It is much smaller and darker than the vacuole.

Yeast grows by forming small **buds** on one side of the cell that eventually break off.

Fig. 2.1 shows a photograph of yeast cells viewed through a microscope.

(a) (i) On Fig. 2.1 label **two** of these features of yeast cells.



magnification ×800

Fig. 2.1

[1]

(ii) Measure the length of **four** yeast cells. Show where you have measured each of these cells **on** Fig. 2.1.

Record the length of each cell and calculate the average length of all four cells. Include the units.

length of **four** yeast cells

1 ..... 2 ..... 3 ..... 4 .....

average length of the four yeast cells .....

[2]

(iii) Measure the length of cell **A** along the line **PQ** drawn on Fig. 2.1. Include the units.

length of cell **A** .....

Calculate the **actual** length of cell **A** using the formula:

$$\text{actual length} = \frac{\text{length of cell } \mathbf{A} \text{ on Fig. 2.1}}{\text{magnification}}$$

Give your answer to three decimal places and include the unit.

actual length of yeast cell **A** .....

[3]

(iv) Make a large drawing of the yeast cells that are inside the box labelled **B** on Fig. 2.1.

[4]

[Turn over

(b) Some students measured respiration in yeast using a culture of active yeast.

Yeast produces a gas during respiration.

Two syringes were filled with 20 cm^3 of the active yeast culture and each syringe was placed into a large test-tube containing water at 35 °C. Both were placed in a water-bath at 35 °C as shown in Fig. 2.2.

The volume of gas in each syringe was measured every 5 minutes for 25 minutes.

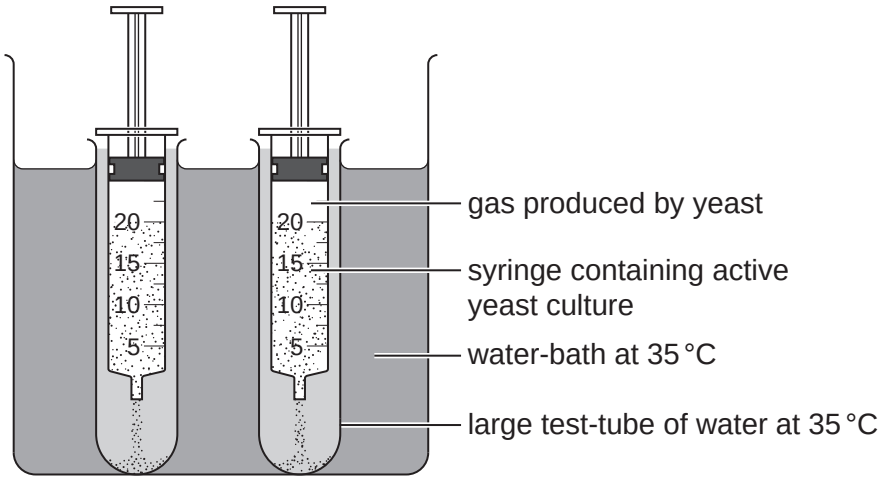


Fig. 2.2

(i) State **two** variables that have been kept constant in this method.

1 .....

2 .....

[2]

(ii) Identify **one** source of error in this method and suggest an improvement.

error .....

.....

improvement .....

.....

.....

[2]

(c) Table 2.1 shows their results.

Table 2.1

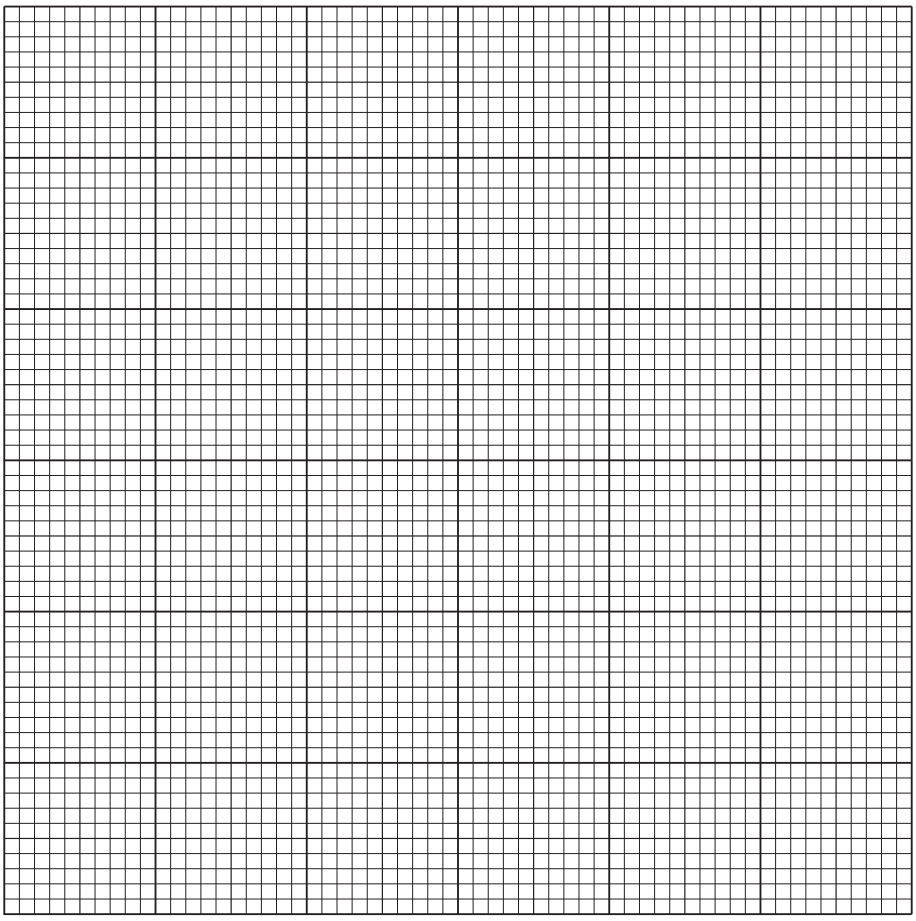
time / min	volume of gas collected / cm^3		
	syringe 1	syringe 2	average
5	2	3	2.5
10	5	7	6.0
15	7	11	9.0
20	12	13	12.5
25	13	14	

(i) Calculate the average volume of gas collected at 25 minutes.

Write your answer in Table 2.1. [1]

(ii) Plot a graph on the grid of the average volume of gas collected against time.

Add a line of best fit.



[4]

(iii) One of the students decided that the result collected in syringe 1 at 15 minutes was anomalous.

Suggest a reason for their decision.

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.....[1]

(d) Describe how the students could use the method in **2(b)** to investigate the effect of pH on respiration in yeast.

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.....[6]

[Total: 26]

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