Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **May/June 2017**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

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.

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 the results from a set of standard protein solutions.

Known concentrations of protein solution were made. Using biuret reagent, the colour intensity score was determined at each concentration.

Step 1 Seven test-tubes were labelled **1**, **2**, **3**, **4**, **5**, **6** and **7**.

Step 2 Solutions containing different concentrations of protein were made using the volumes of 1% protein solution and distilled water shown in Table 1.1.

Table 1.1

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

(a) (i) Complete Table 1.1 by calculating the percentage concentration of the protein solutions in test-tubes **3** and **7**. Write your answers in Table 1.1.

Show your working.

View solution

[2]

(ii) State the colour that shows the presence of protein when tested with biuret reagent.

.....[1]

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

Step 4 The test-tubes were placed in a test-tube rack in order of concentration, from the least concentrated to most concentrated.

Step 5 2 cm^3 of biuret reagent was added to the protein solution in the test-tube labelled **A** and shaken gently to mix the contents.

Step 6 Step **5** was repeated for the protein solution in test-tube **B**.

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Step 7 Test-tubes **1** to **7** were held against a white background so that the colour of the solutions were clearly visible. These test-tubes are shown in Fig. 1.1.

Step 8 The colour intensity of the solution in test-tube **7** was given a score using Table 1.2.

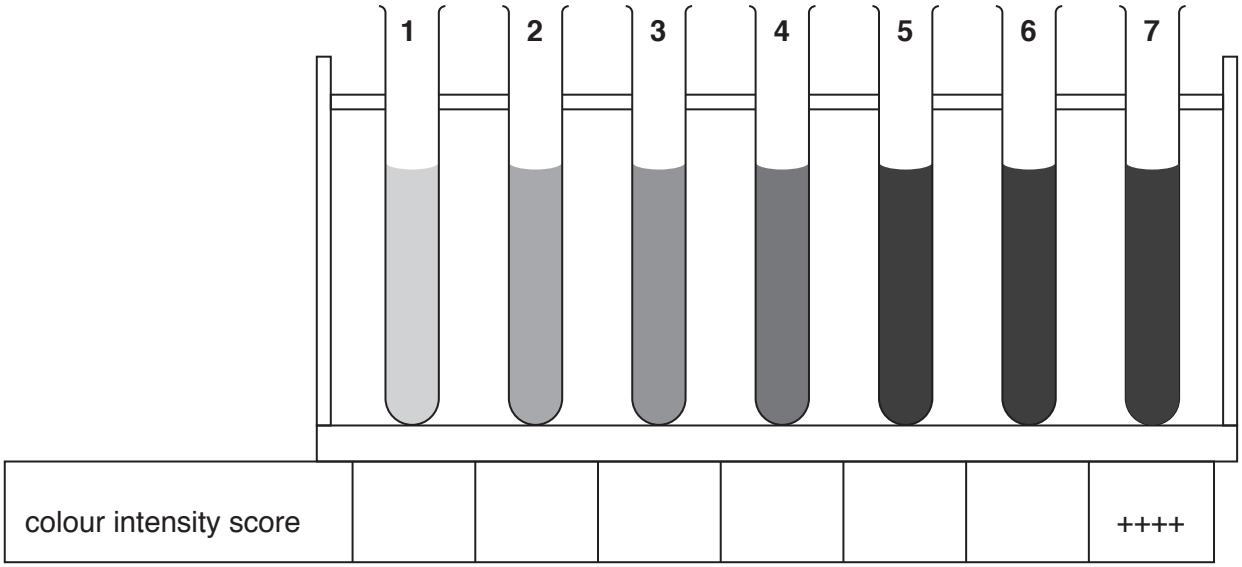

Fig. 1.1

Table 1.2

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

(iii) Use Table 1.2 to complete Fig. 1.1 by writing in the score for test-tubes **1** to **6**.

Test-tubes that have the same colour intensity should be given the same score. [1]

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

Your table should show:
- the concentration of the protein solutions
- the colour intensity score given to each of the solutions.

[3]

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The results for tubes **A** and **B** are shown in Fig. 1.2.

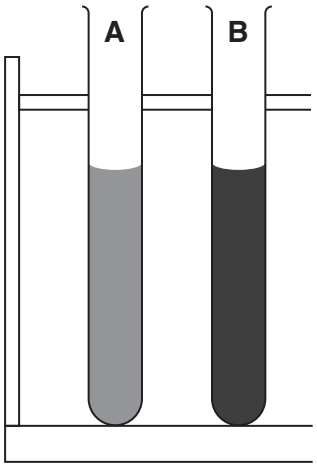

Fig. 1.2

(v) Use Fig. 1.1 to determine the colour intensity scores for test-tubes **A** and **B** in Fig. 1.2.

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

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

(vi) Use your table from **(a)(iv)** 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.

View solution

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.

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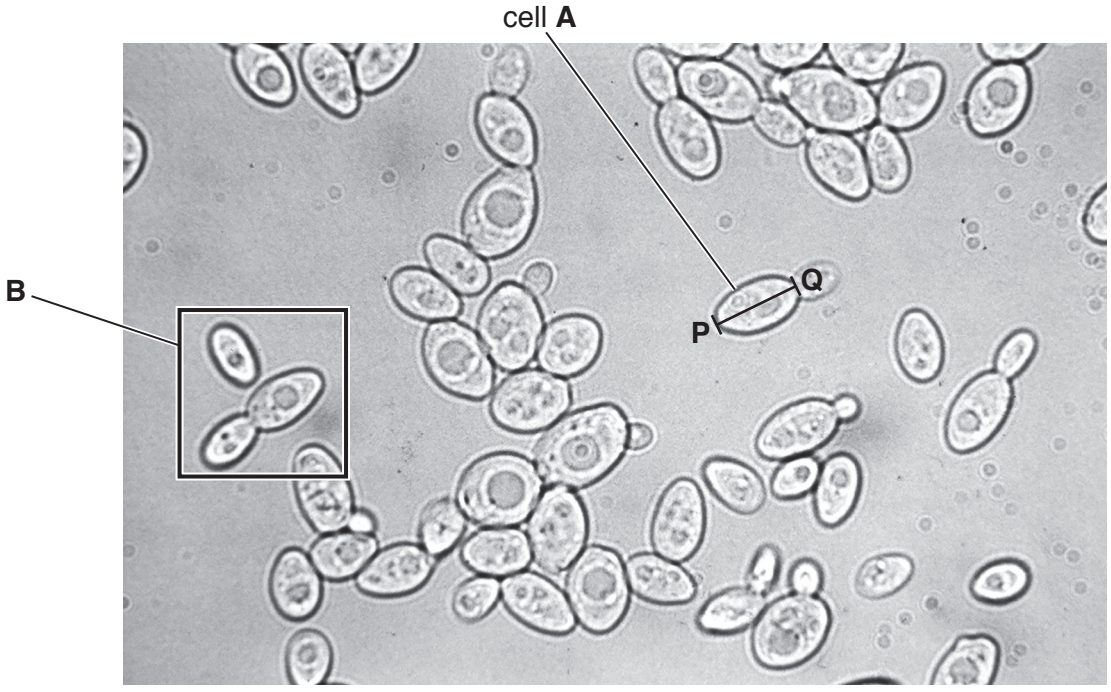

magnification ×800

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.

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length of **four** yeast cells

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

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

[2]

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

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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.

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[4]

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

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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.

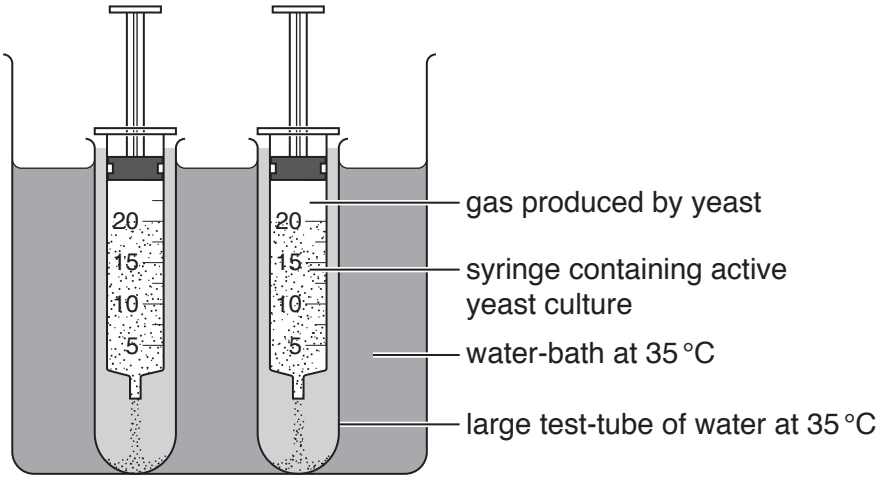

Fig. 2.2

(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.

View solution

error .....

.....

improvement .....

.....

.....

[2]

(c) Table 2.1 shows their results.

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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]

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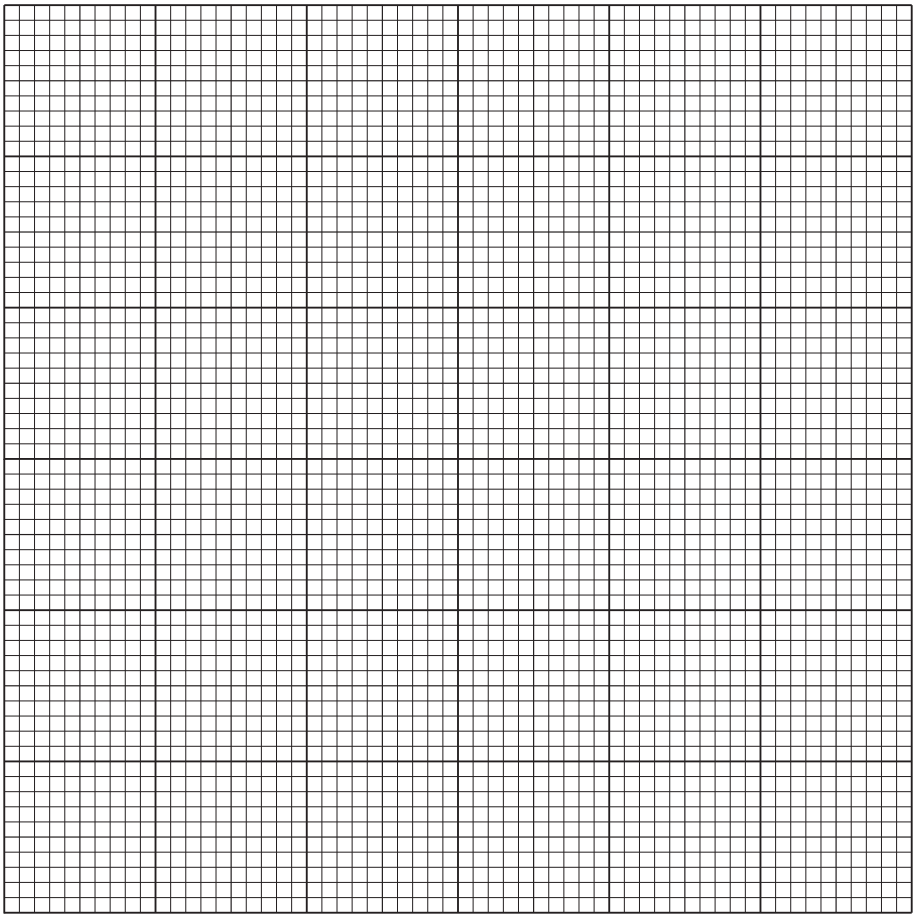
(ii) Plot a graph on the grid of the **average** volume of gas collected against time.

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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