Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME										
CENTRE NUMBER						CANDIDATE NUMBER				

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BIOLOGY **0610/53**

Paper 5 Practical Test **October/November 2023**

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

INSTRUCTIONS
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION
- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

For Examiner's Use	
1	
2	
Total	

This document has **12** pages.

1 Flour and yeast are used to make bread dough, as shown in Fig. 1.1. Respiration in yeast produces carbon dioxide gas bubbles that make the bread dough increase in volume.

Fig. 1.1

You are going to use bread dough to investigate the effect of temperature on the rate of respiration in yeast.

Read all the instructions but DO NOT DO THEM until you have drawn a table for your results in the space provided in 1(a)(i).

You should use the safety equipment provided while you are doing the practical work.

Step 1 Label three large test-tubes **C**, **R** and **H** and place them in the test-tube rack.

Step 2 Use the measuring cylinder to add 20 cm^3 of water from the beaker labelled **W** to each of the test-tubes labelled **C**, **R** and **H**.

Step 3 Place test-tube **C** into the empty beaker labelled **cold water-bath**.

Step 4 Leave test-tube **R** in the test-tube rack.

Step 5 Place test-tube **H** into the empty beaker labelled **hot water-bath**.

Step 6 Raise your hand when you are ready for hot water to be added to your hot water-bath and ice water to be added to your cold water-bath.

Step 7 Start the stop-clock and leave the test-tubes for five minutes. Continue with steps 8, 9 and 10 during this time.

Step 8 Label three cups **C**, **R** and **H**.

Step 9 Use a ruler and a permanent marker pen to draw a line 2 cm from the base of all three cups, as shown in Fig. 1.2.

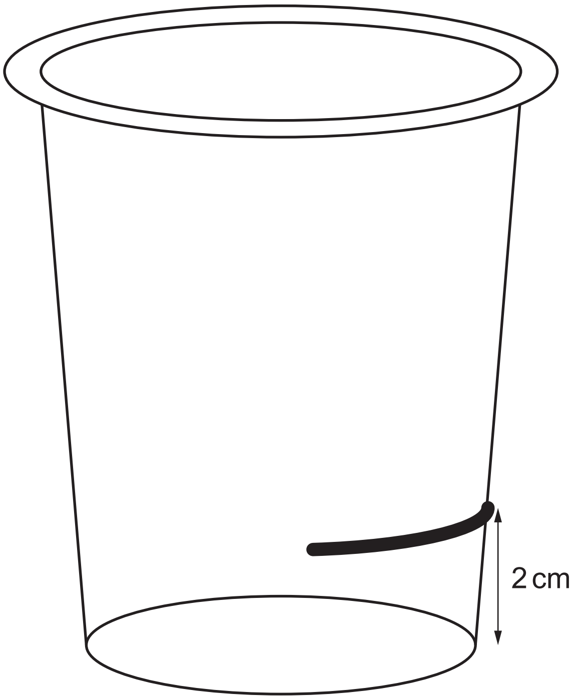

Fig. 1.2

Step 10 Add the flour and yeast mixture from beaker **F** up to the lines you have drawn on cups **C**, **R** and **H**.

Step 11 Measure the temperature of the water in test-tubes **C**, **R** and **H**. Record these temperatures in your table in **1(a)(i)**.

Step 12 Pour the contents of test-tube **C** into cup **C**. Use the glass rod to stir the mixture to form a dough.

Step 13 Pour the contents of test-tube **R** into cup **R**. Use the glass rod to stir the mixture to form a dough.

Step 14 Pour the contents of test-tube **H** into cup **H**. Use the glass rod to stir the mixture to form a dough.

Step 15 Draw a new line on each cup to mark the position of the top of the dough.

Step 16 Start the stop-clock and leave the dough for 20 minutes.

Continue with the other questions while you are waiting.

Step 17 After 20 minutes, draw a third line on each cup to mark the position of the top of the dough.

Step 18 Measure the distance between the lines drawn in Step 15 and Step 17 and record your measurements in your table in **1(a)(i)**.

(a) **(i)** Prepare a table and record your results.

[5]

(ii) State a conclusion for your results.

....

....

.... [1]

(iii) State the independent variable in the investigation.

.... [1]

(iv) Identify **one** possible source of error with the method used to measure the dependent variable.

....

....

.... [1]

(v) State a piece of laboratory equipment that could be used to improve the method in step 10.

.... [1]

(vi) Explain why test-tubes **C** and **H** were kept in the water-baths for five minutes.

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.... [1]

(vii) This investigation was done by another student using three cups which had different diameters, as shown in Fig. 1.3.

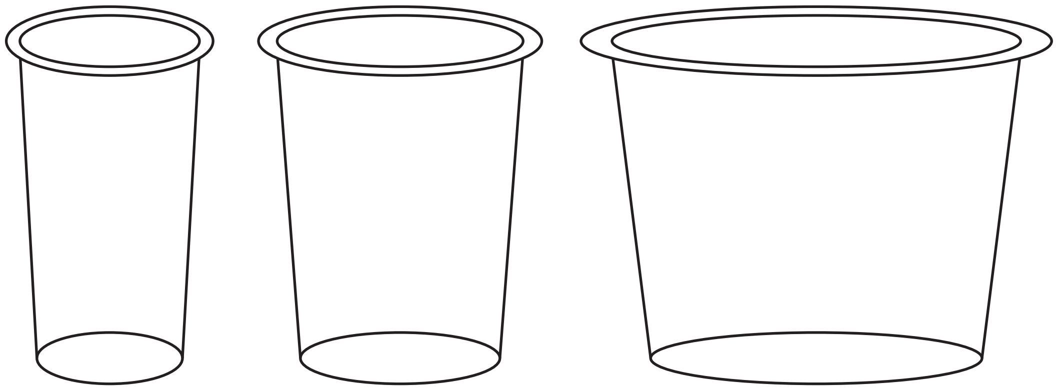

Fig. 1.3

Explain why using different-sized cups caused an error in the results.

....

....

.... [1]

(b) Yeast uses the reducing sugar glucose for respiration. This reaction produces carbon dioxide.

(i) A sample of flour was tested for reducing sugars using the Benedict's test.

State the result of a positive test.

.... [1]

(ii) Identify a hazard when doing the Benedict's test.

....

....

.... [1]

(iii) State the name of a reagent that can be used to test for carbon dioxide.

.... [1]

(iv) Salt (sodium chloride) is usually added to the flour and yeast mixture when making bread but it can reduce the rate of respiration in yeast.

The effect of salt concentration on the volume of carbon dioxide gas produced by yeast is shown in Table 1.1.

Table 1.1

salt concentration / g per dm^3	volume of carbon dioxide gas produced / cm^3 per minute
0	5.3
5	1.9
10	0.3
20	0.0

Calculate the percentage change in the volume of carbon dioxide gas produced from a salt concentration of 0 g per dm^3 to 10 g per dm^3.

Give your answer to **one** decimal place.

Space for working.

.... %
[3]

(c) Humans can use the energy released during respiration to exercise.

Plan an investigation to determine the effect of exercising at different intensities on breathing rate.

....

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.... [6]

[Total: 23]

2 **(a)** Fig. 2.1 is a photomicrograph of two guard cells in the lower epidermis of a leaf.

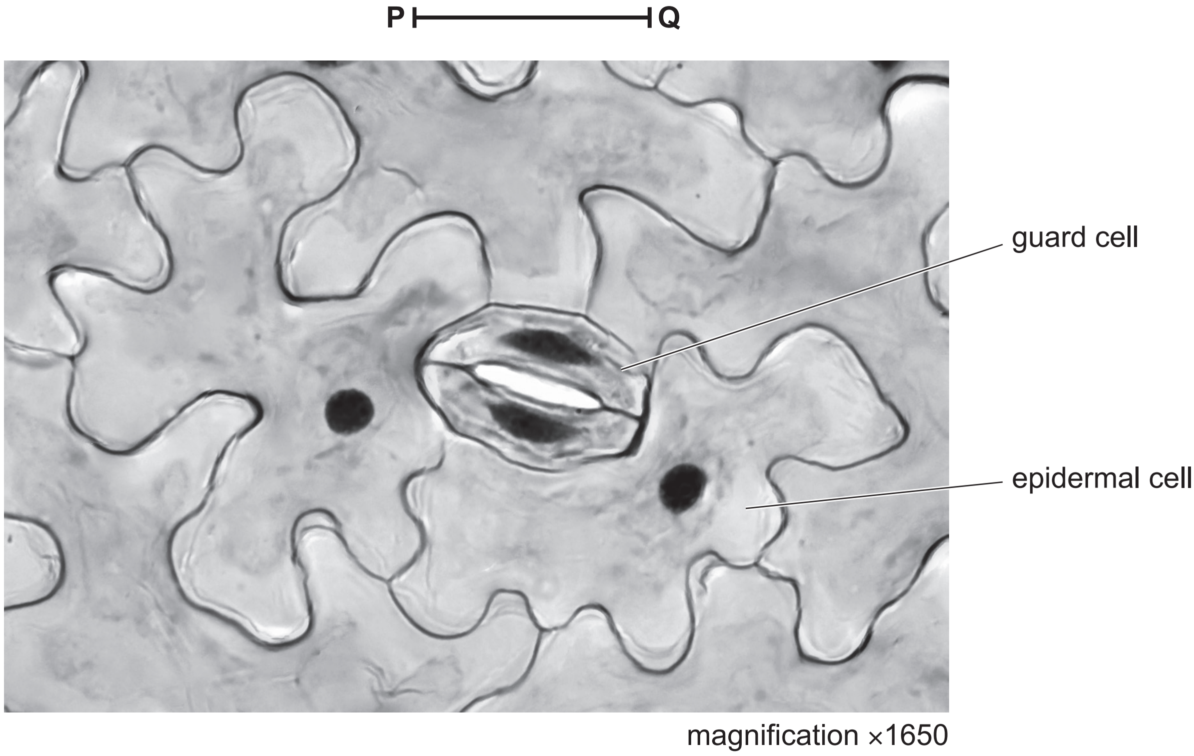

Fig. 2.1

(i) Make a large drawing of the **two** guard cells and the **two** complete epidermal cells shown in Fig. 2.1.

[4]

(ii) Line **PQ** represents the length of the guard cells in Fig. 2.1.

Measure the length of line **PQ** in Fig. 2.1.

length of line **PQ** .... mm

Calculate the actual length of the guard cells using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ}}{\text{actual length of the guard cells}}$$

Give your answer to **two** significant figures.

Space for working.

.... mm
[3]

(b) Transpiration is the loss of water vapour from the leaves of a plant. A student used a potometer to investigate the effect of wind speed on transpiration.

Fig. 2.2 shows part of the apparatus used. The air bubble in the tubing will move towards the leafy shoot because water moves into the stem when water is lost from the leaves.

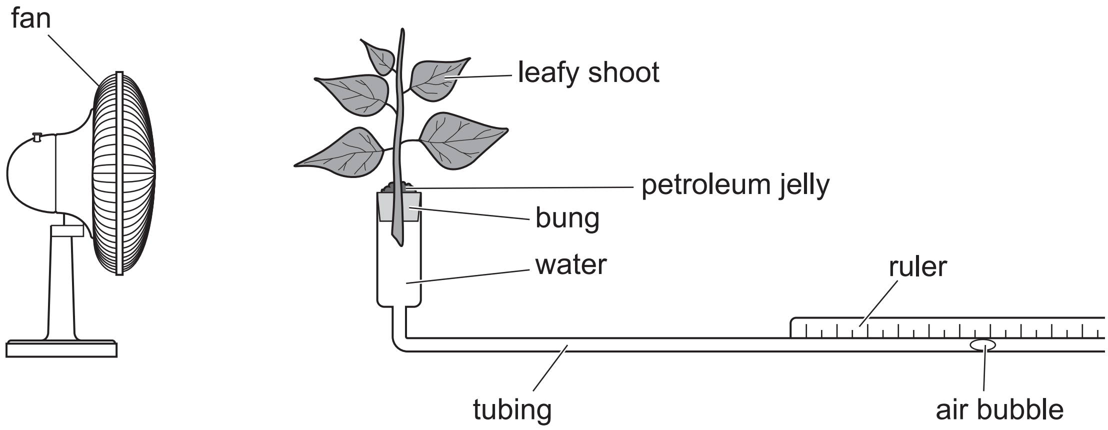

Fig. 2.2

The student used this method:

- Cut a leafy shoot from a plant.
- Place the leafy shoot into the potometer.
- Measure the distance the air bubble moves in five minutes at different wind speeds.
- Maintain the temperature in the room at 25 °C and the relative humidity at 60%.
- Repeat the investigation using five different leafy shoots. Each shoot must have same number of leaves.

(i) State the dependent variable in the investigation.

.... [1]

(ii) State **two** factors that were kept constant in the investigation described in **2(b)**.

1 ....

2 ....

[2]

(iii) Suggest the purpose of the petroleum jelly shown in Fig. 2.2.

....

....

.... [1]

The results are shown in Table 2.1.

Table 2.1

wind speed / km per hour	distance the air bubble moved in five minutes / mm
0	4.5
10	13.0
20	23.0
30	26.5
50	15.5

(iv) Plot a line graph on the grid of the data in Table 2.1.

[4]

(v) Using your graph, estimate the distance the air bubble moved in five minutes when the wind speed was 15 km per hour.

Show on your graph how you obtained your estimate.

.... mm
[2]

[Total: 17]