Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4769473337769

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **October/November 2023**

1 hour

You must answer on the question paper.

No additional materials are needed.

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 [ ].

This document has **16** pages. Any blank pages are indicated.

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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

A student used bread dough to investigate the effect of temperature on the rate of respiration in yeast. They used this method:

Step 1 Place three test-tubes labelled **C**, **R** and **H** into a test-tube rack.

Step 2 Add 10 cm^3 of water to each of the test-tubes.

Step 3 Place test-tube **C** into a cold water-bath at 5 °C.

Step 4 Place test-tube **R** into a water-bath at 20 °C.

Step 5 Place test-tube **H** into a hot water-bath at 40 °C.

Step 6 Leave the test-tubes in the water-baths for five minutes.

Step 7 Label three transparent cups **C**, **R** and **H**.

Step 8 You are provided with a mixture of flour and yeast. Use a spoon to put some of the flour and yeast mixture into each cup to a depth of approximately 1 cm.

Step 9 Pour the water from test-tube **C** into cup **C**. Use the glass rod to stir the mixture to form a dough.

Step 10 Pour the water from test-tube **R** into cup **R**. Use the glass rod to stir the mixture to form a dough.

Step 11 Pour the water from test-tube **H** into cup **H**. Use the glass rod to stir the mixture to form a dough.

Step 12 Draw a line on each cup to mark the position of the top of the dough, as shown in Fig. 1.2.

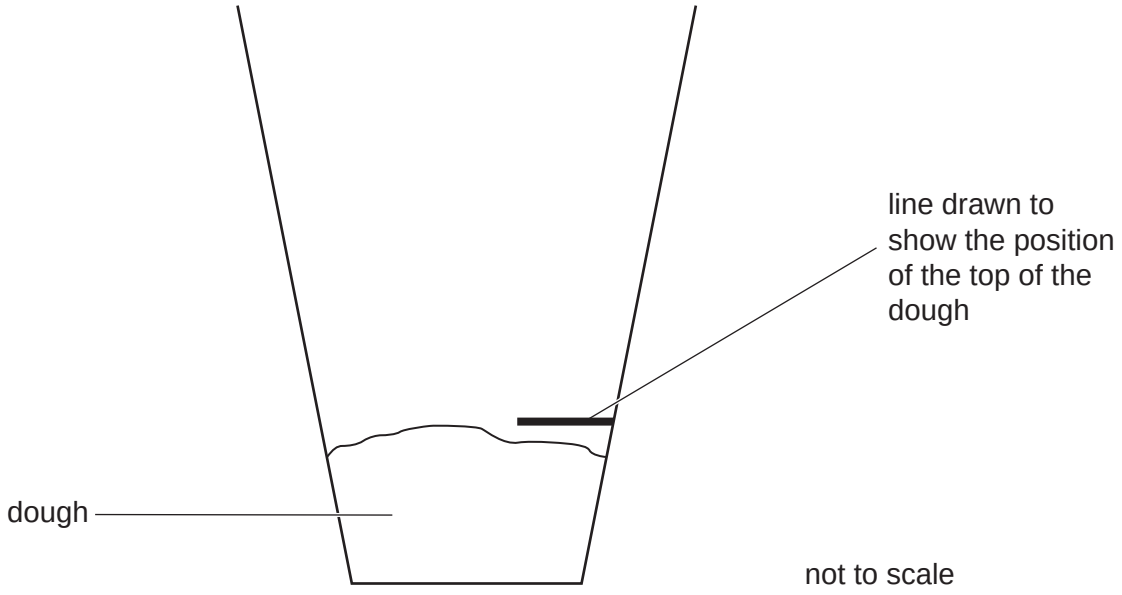

Fig. 1.2

Step 13 Leave the three cups of dough for 20 minutes.

Step 14 After 20 minutes, draw a second line on each cup to mark the new position of the top of the dough.

Fig. 1.3 shows the cups after 20 minutes.

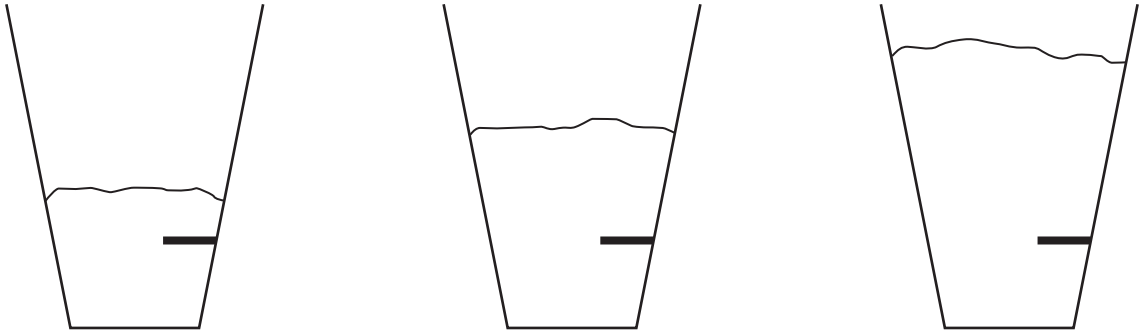

Fig. 1.3

(a) (i) Draw a line on each cup in Fig. 1.3 to show the new position of the top of the dough. [1]

(ii) Measure the change in the height of the dough in each cup in Fig. 1.3.

Prepare a table and record these measurements in your table.

[3]

(iii) State a conclusion for these results.

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..... [1]

(iv) State the independent variable in the investigation.

..... [1]

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

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..... [1]

(vi) State a piece of laboratory equipment that could be used to improve the method in step 8.

..... [1]

(vii) Explain why test-tubes **C**, **R** and **H** were kept in the water-baths for five minutes in step 6.

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(viii) This investigation was done by another student using three cups which had different diameters, as shown in Fig. 1.4.

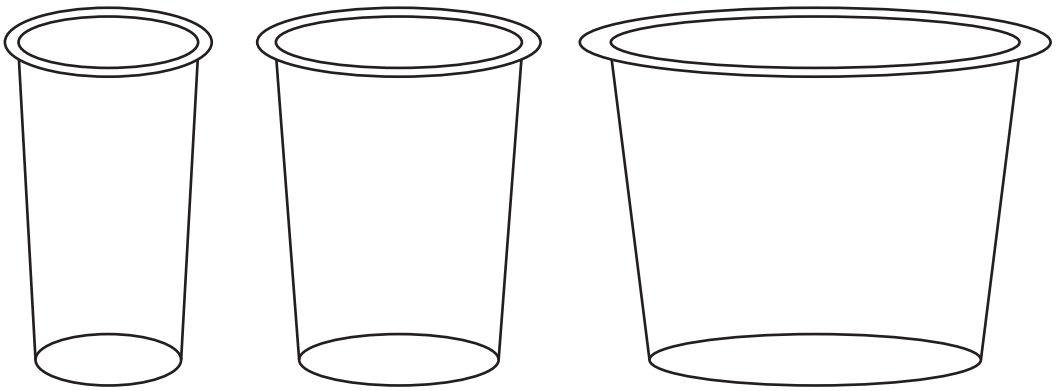

Fig. 1.4

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

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..... [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.

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..... [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: 22]

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

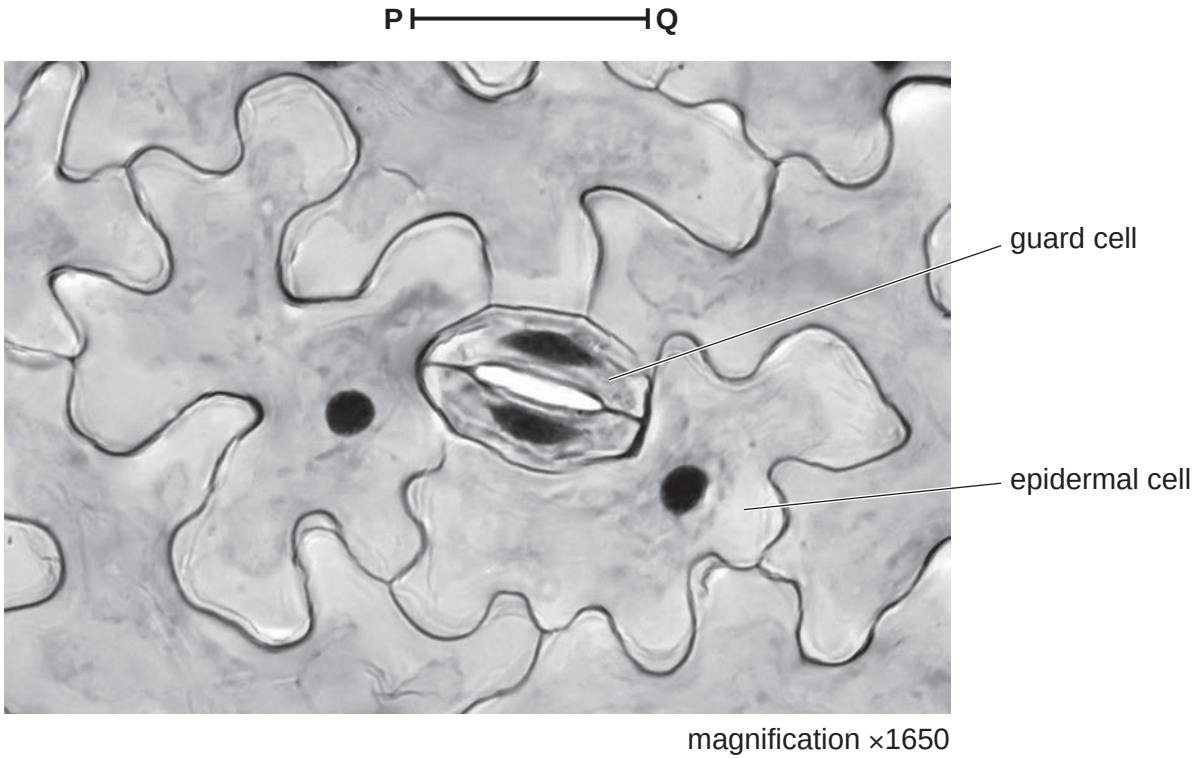

Fig. 2.1

(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.

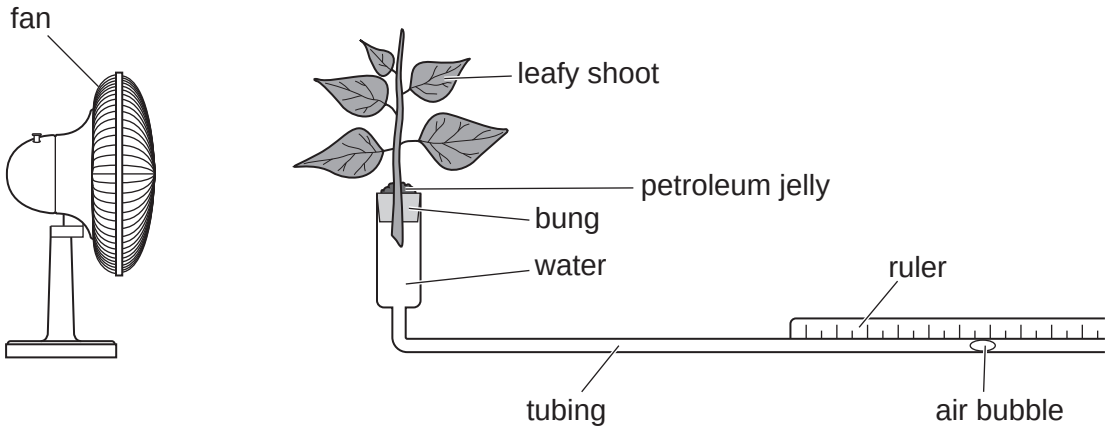

Fig. 2.2

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 the 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.

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..... [1]

(iv) Explain why the student repeated the investigation.

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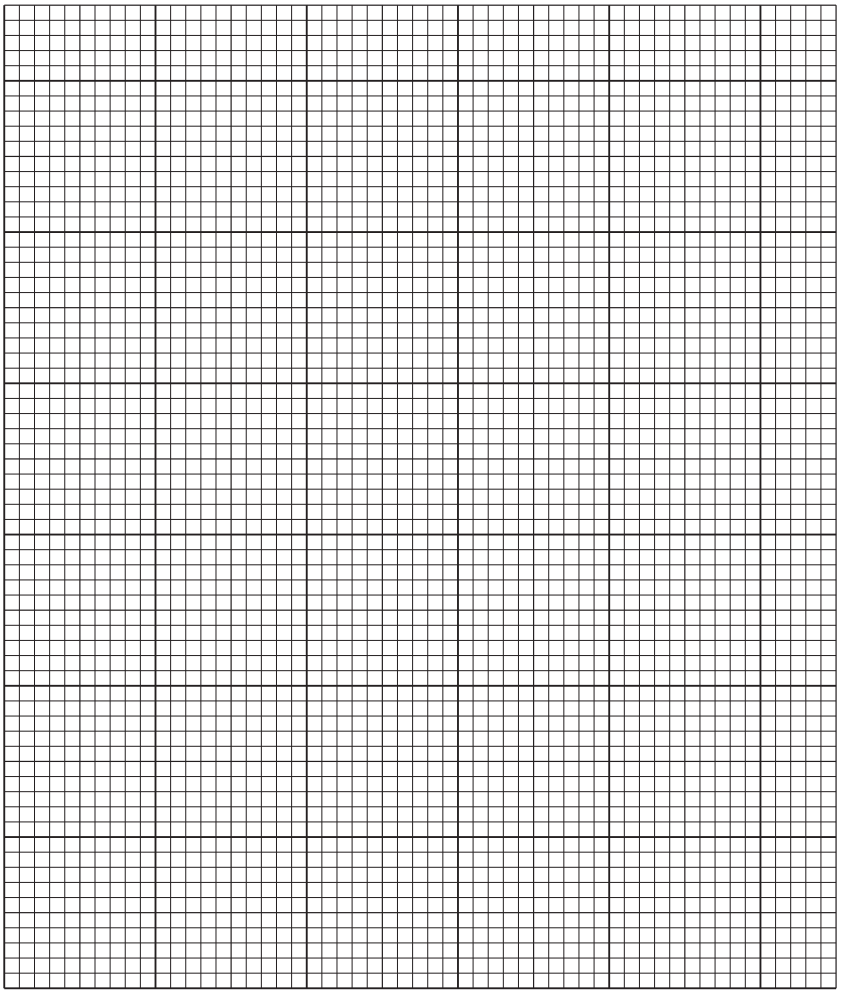
..... [1]

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

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



[4]

(vi) 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: 18]

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