Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

6449151017

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **May/June 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 A student investigated the effect of temperature on the rate of respiration in yeast cells.

When yeast cells respire they release carbon dioxide gas.

The student used this method:

Step 1 Fill a syringe with 15 cm^3 of yeast suspension.

Step 2 Gently lower the syringe into the measuring cylinder, as shown in Fig. 1.1.

Step 3 Fill the measuring cylinder with **hot** water. Ensure that the water level in the measuring cylinder is above the syringe nozzle.

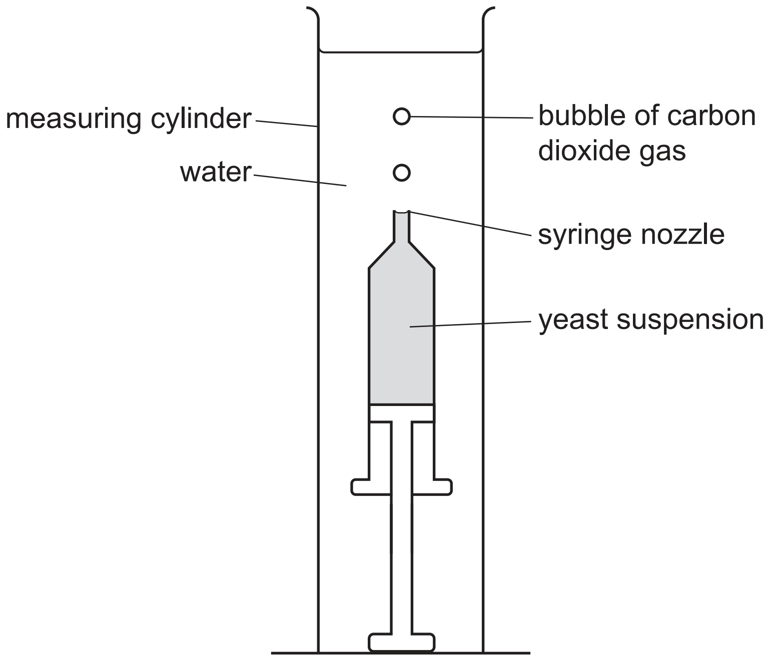

Fig. 1.1

Step 4 Measure the temperature of the water in the measuring cylinder.

Step 5 Start the stop-clock and wait for two minutes.

Step 6 After two minutes, reset the stop-clock to zero.

Step 7 Start the stop-clock again and count the number of bubbles produced by the yeast suspension in **three** minutes.

Step 8 Pour the hot water in the measuring cylinder into the waste container. The syringe containing the yeast suspension should remain in the measuring cylinder.

Step 9 Fill the measuring cylinder with **cold** water. Ensure that the water level in the measuring cylinder is above the syringe nozzle.

Step 10 Repeat steps 4 to 7.

Fig. 1.2 shows the thermometer during step 4 and step 10.

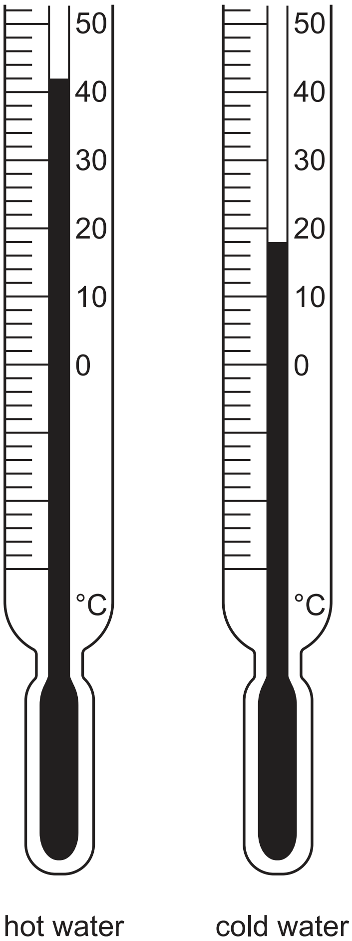

Fig. 1.2

Fig. 1.3 shows the number of bubbles the student counted in three minutes in step 7 and step 10.

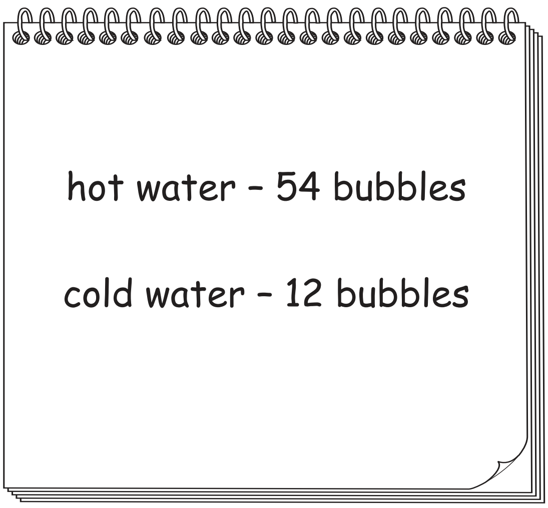

Fig. 1.3

(a) **(i)** Prepare a table for the results and record the temperatures shown in Fig. 1.2 and the results shown in Fig. 1.3.

[3]

(ii) State a conclusion for the results.

....

....

.... [1]

(iii) Using the results, calculate the rate of bubble production in bubbles per minute for the yeast suspension in hot water and in cold water.

rate of bubble production in hot water .... bubbles per minute

rate of bubble production in cold water .... bubbles per minute
[1]

(iv) State the independent variable in this investigation.

....

.... [1]

(v) State **two** variables that were kept constant in this investigation.

1 ....

....

2 ....

....
[2]

(vi) Suggest why the yeast suspension was left for two minutes in step 5 before starting to count the number of bubbles.

....

....

.... [1]

(vii) Suggest why counting bubbles is **not** the most accurate method of determining the rate of respiration in yeast.

....

....

.... [1]

(b) Measuring the volume of a gas is more accurate than counting bubbles. Using a gas syringe is one method of collecting a volume of gas.

Fig. 1.4 shows part of the apparatus that can be used to measure the volume of a gas by a **different** method.

Complete the diagram in Fig. 1.4 by drawing and labelling the **two** pieces of apparatus that are missing.

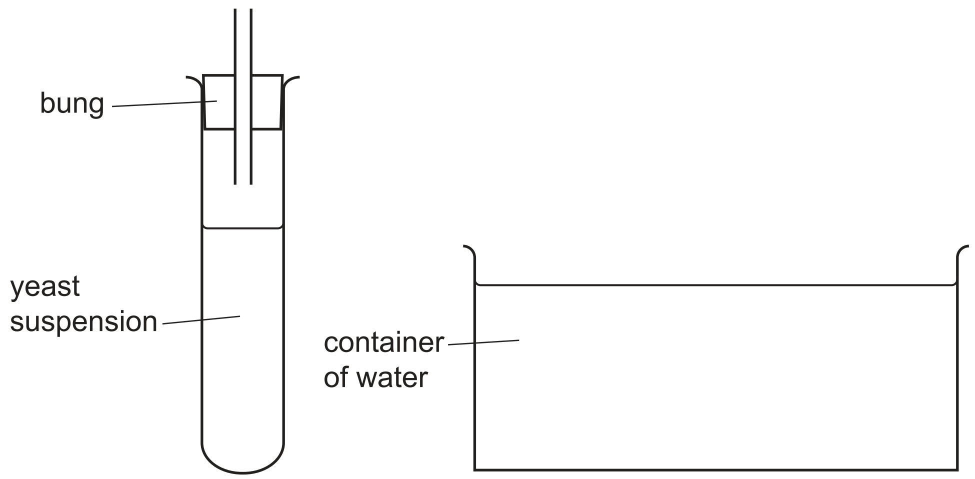

Fig. 1.4

[2]

(c) Yeast can respire reducing sugars.

Describe the method you would use to test a substance for the presence of reducing sugars.

....

....

....

....

.... [2]

(d) Bread is made from flour, water and yeast which are mixed to form a dough.

Fig. 1.5 shows a person making bread.

Fig. 1.5

The carbon dioxide gas produced by yeast causes the volume of the dough to increase.

Sodium chloride (salt) is often added to dough when making bread. The sodium chloride affects the rate at which the yeast respire.

Plan an investigation to determine the effect of the mass of sodium chloride on the volume of dough.

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.... [6]

[Total: 20]

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2 Fig. 2.1 is a photograph of a cross-section of a root from a carrot plant, *Daucus carota*.

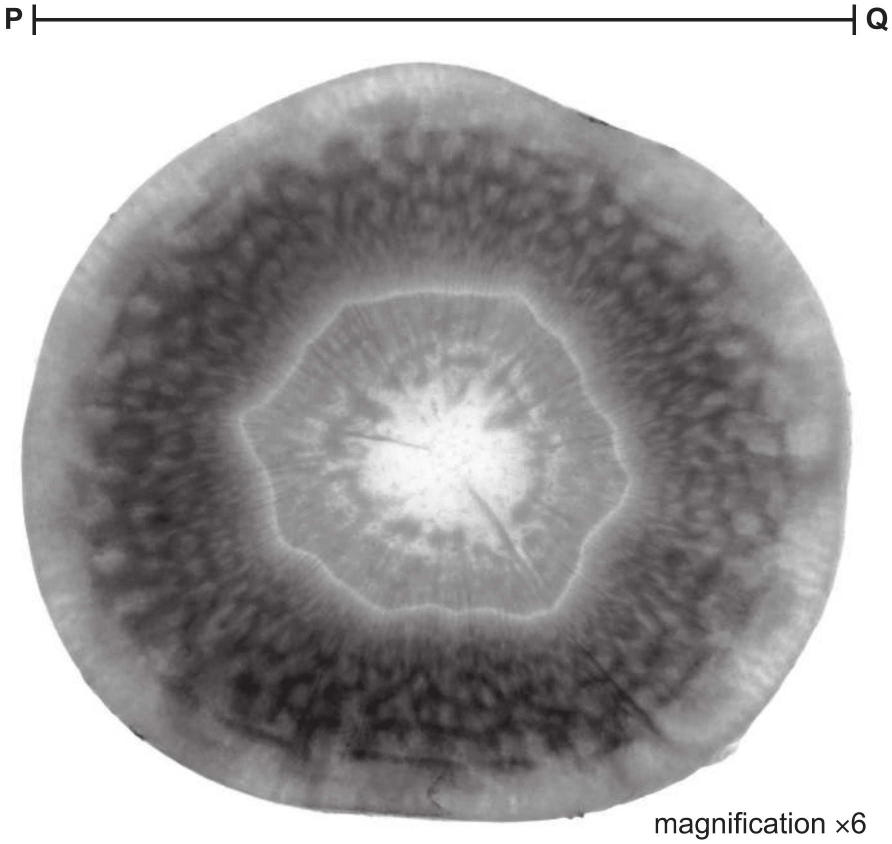


Fig. 2.1

(a) **(i)** Draw a large diagram of the carrot root cross-section that shows the layers visible in Fig. 2.1.

[4]

(ii) Line **PQ** on Fig. 2.1 represents the diameter of the carrot root cross-section.

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

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

Calculate the actual diameter of the carrot root cross-section using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ} \text{ in Fig. 2.1}}{\text{actual diameter of the carrot root cross-section}}$$

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

Space for working.

.... mm
[3]

(b) A student investigated the effect of the concentration of a salt solution on the mass of carrot cubes. The student used this method:

- Carrots were cut into cubes. Each side of the cube was 1 cm in length.
- The initial mass of each carrot cube was measured and recorded.
- Each carrot cube was put into a different concentration of salt solution.
- The carrot cubes were left in the salt solutions for one hour.
- After one hour, the carrot cubes were removed from the salt solution and dried with a paper towel.
- The final mass of each carrot cube was measured and recorded.

(i) State the dependent variable in the investigation described in **2(b)**.

....

.... [1]

(ii) State **two** variables that were kept constant in this investigation.

1 ....

2 ....
[2]

(iii) Explain why it was important to dry the carrot cubes before measuring the final mass.

....

....

.... [1]

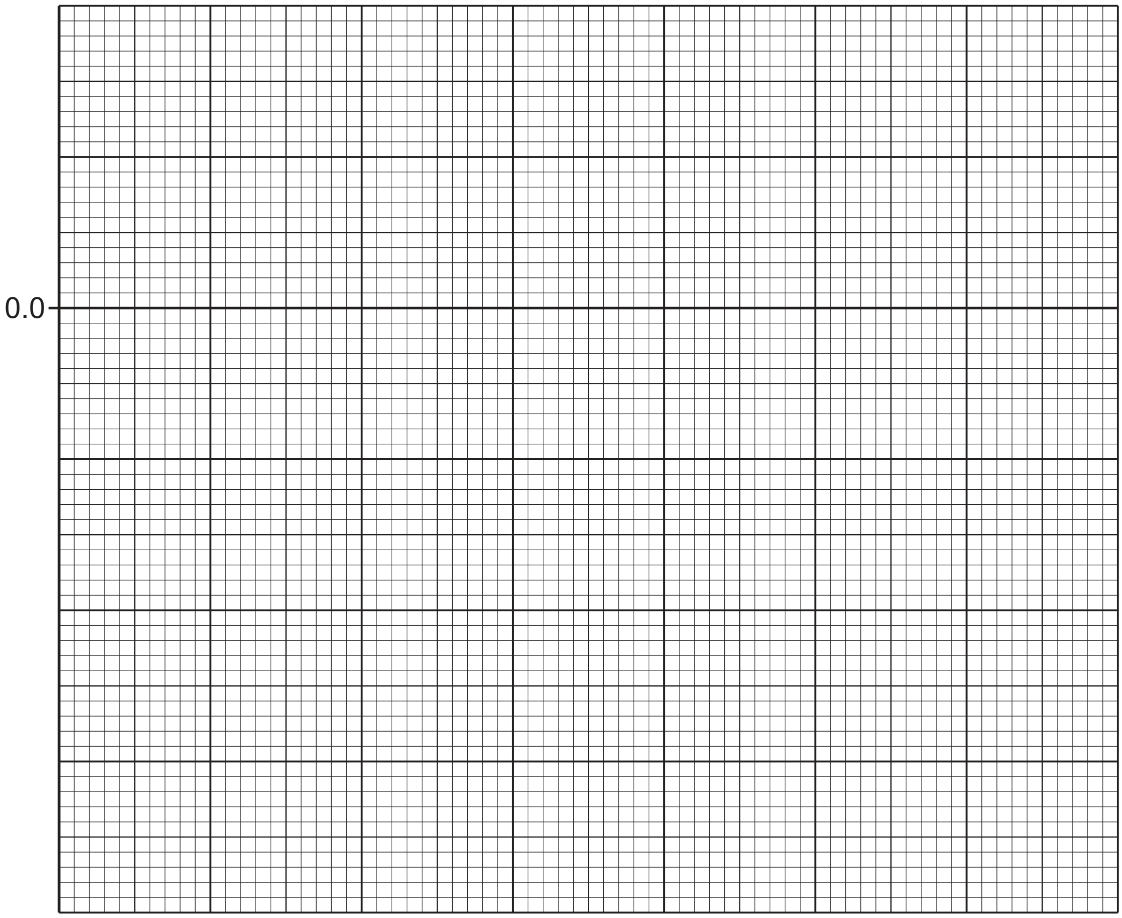
The results of the investigation are shown in Table 2.1.

Table 2.1

concentration of salt solution / mol per dm^3	initial mass of carrot cube / g	final mass of carrot cube / g	change in mass / g
0.0	0.97	1.04	0.07
0.2	0.98	0.99	0.01
0.4	0.96	0.90	–0.06
0.6	0.98	0.86	–0.12
0.8	0.99	0.84	–0.15
1.0	0.95	0.79	–0.16
1.2	0.96	0.80	–0.16

(iv) Using the data in Table 2.1, plot a line graph on the grid to show the effect of concentration of salt solution on the change in mass of the carrot cubes.

One axis has been started for you.



[4]

(v) Using your graph, estimate the concentration of salt solution at which there is no change in the mass of the carrot cube.

Show on the graph how you obtained your estimate.

.... mol per dm^3
[2]

(vi) Using the information in Table 2.1, calculate the **percentage** change in mass of the carrot cube that was placed in the 0.4 mol per dm^3 salt solution.

Space for working.

.... %
[2]

(vii) The student did not repeat the investigation and only collected one set of results.

Explain why it is better to collect several sets of results.

....

....

.... [1]

[Total: 20]

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