Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/62**

Paper 6 Alternative to Practical **May/June 2025**

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 the concentration of salt solutions on osmosis in potato tissue.

The student used three different concentrations of salt solution and potato tissue that had been cut into cylinders.

(a) (i) Using the information in Table 1.1, decide the volumes of **S** and **W** needed to make 50 cm^3 of a 0.5 mol per dm^3 salt solution.

Complete Table 1.1 by writing in the volumes of **S** and **W** needed to make the 0.5 mol per dm^3 salt solution.

View solution

Table 1.1

beaker	volume of 1.0 mol per dm^3 salt solution **S** / cm^3	volume of distilled water **W** / cm^3	final concentration of salt solution / mol per dm^3
S1	50	0	1.0
S2	.....	.....	0.5
S3	0	50	0.0

[1]

The student used this method:

Step 1 Label three beakers **S1**, **S2** and **S3**.

Step 2 Use the volumes of 1.0 mol per dm^3 salt solution **S** and distilled water **W** shown in Table 1.1 to make the salt solutions in beakers **S1**, **S2** and **S3**.

Step 3 Put the potato cylinders onto a white tile and cut each potato cylinder into 3 mm discs, as shown in Fig. 1.1. You will need 30 potato discs.

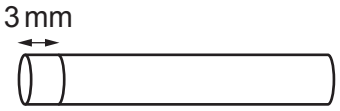

Fig. 1.1

Step 4 Place 10 potato discs in a line next to a ruler, as shown in Fig. 1.2.

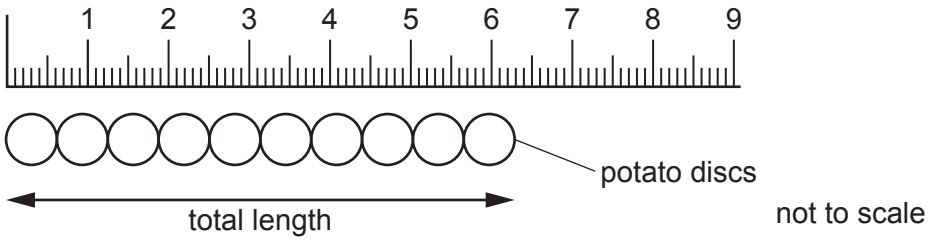

Fig. 1.2

Step 5 Measure the total length of the 10 potato discs.

Step 6 Put the 10 potato discs into beaker **S1**.

Step 7 Repeat step 4 to step 6 with the other potato discs and the salt solutions in beakers **S2** and **S3**.

Step 8 Start the stop-clock and leave the potato discs in the beakers of salt solution for 20 minutes.

Step 9 Remove the 10 potato discs from beaker **S1** and put them onto the white tile, line them up along the ruler, as shown in Fig. 1.2.

Step 10 Measure the final total length of the 10 potato discs.

Step 11 Repeat step 9 and step 10 with the potato discs in beaker **S2** and beaker **S3**.

Fig. 1.3 shows the notes the student recorded about the results.

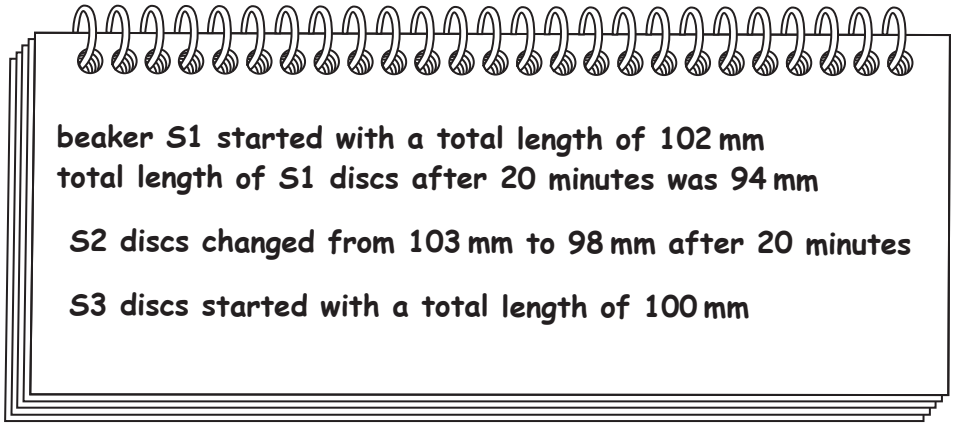

Fig. 1.3

Fig. 1.4 is a diagram showing the actual size of the 10 potato discs from beaker **S3** after 20 minutes.



Fig. 1.4

(ii) Measure the total length of the 10 potato discs **in Fig. 1.4**.

S3 total length ..... mm [1]

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(iii) Prepare a table and record the results shown in Fig. 1.3 and your measurement in **1(a)(ii)**.

Include the final concentrations of the salt solutions in your table.

[3]

(iv) Calculate the **change** in total length of the 10 potato discs in each beaker.

beaker **S1** ..... mm

beaker **S2** ..... mm

beaker **S3** ..... mm

[1]

(v) State a conclusion for the results of this investigation.

.....

.....

..... [1]

(vi) State the dependent variable in this investigation.

..... [1]

(vii) Suggest why the student used 10 potato discs instead of 1 potato disc in each salt solution.

.....

.....

..... [1]

(viii) Describe **one** safety precaution the student should take when preparing the potato discs.

.....

..... [1]

(b) The student added a few drops of a yellow-brown solution to test one of the potato discs.

View solution

The solution changed to a blue-black colour.

Identify the solution added and state a conclusion for this test.

solution .....

conclusion .....

[1]

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(c) Fig. 1.5 shows a leaf from a potato plant.

View solution

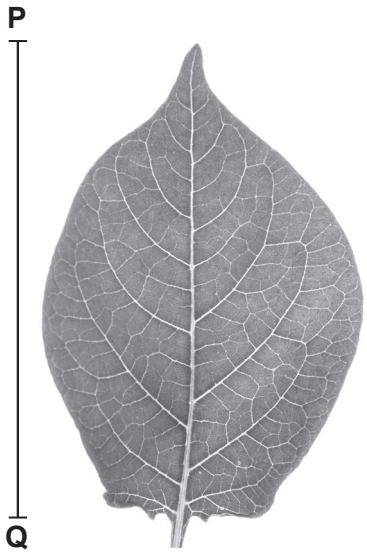

Fig. 1.5

(i) Draw a large diagram of the leaf shown in Fig. 1.5.

[4]

(ii) Line **PQ** represents the length of the leaf in Fig. 1.5.

View solution

Measure the length of line **PQ** in Fig. 1.5.

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

The actual length of the leaf is 39 mm.

Using your measurement and the formula, calculate the magnification of the leaf in Fig. 1.5.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ} \text{ in Fig. 1.5}}{\text{actual length of the leaf}}$$

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

Space for working.

.....

[3]

(iii) Fig. 1.6 shows a leaf from a tomato plant. The tomato leaf is narrower than the potato leaf shown in Fig. 1.5.

View solution



Fig. 1.6

Compare the leaves shown in Fig. 1.5 and in Fig. 1.6.

Describe **one** visible difference, other than size, and **one** visible similarity.

difference .....

.....

similarity .....

.....

[2]

[Total: 20]

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2 **(a)** The enzyme pectinase is used in the production of apple juice.

In an experiment, a student investigated the production of apple juice using five different concentrations of pectinase solution.

View solution

For each concentration, the student:

- put 100 g of crushed apple into a beaker
- added 10 cm^3 of the pectinase solution to the crushed apple
- left the crushed apple and enzyme mixture for 30 minutes at 40 °C
- filtered the apple juice from the mixture
- measured the volume of apple juice produced.

(i) The temperature was maintained at 40 °C.

Describe how the student could maintain the crushed apple and enzyme mixture at a constant temperature.

.....

.....

..... [1]

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

View solution

1 .....

.....

2 .....

.....

[2]

(b) The results of this investigation are shown in Table 2.1.

Table 2.1

percentage concentration of the pectinase solution	volume of apple juice produced / cm^3
0.1	4
0.2	6
0.4	12
0.8	22
1.6	22

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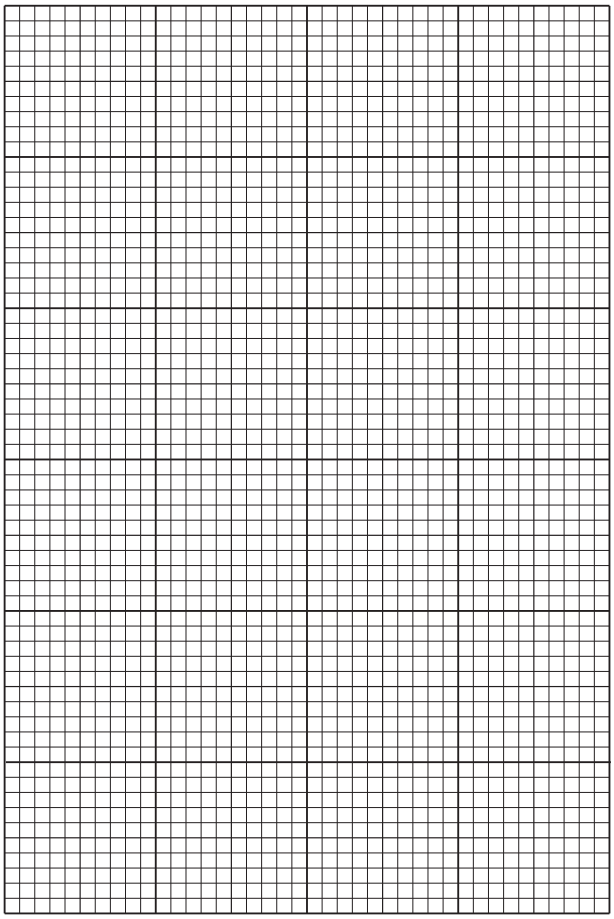
(i) Plot a line graph on the grid of the data in Table 2.1.

View solution



[4]

(ii) Use your graph to estimate the volume of apple juice produced with a 0.5% pectinase solution.

Show on your graph how you obtained your answer.

..... cm^3
[2]

(iii) Describe the effect of pectinase solution concentration on apple juice production.

.....

.....

..... [1]

(iv) Pectinase is used to produce apple juice commercially.

Suggest what extra data would be required to determine if a 0.8% pectinase solution is the optimum concentration for the production of apple juice.

.....

.....

..... [1]

(v) Draw and label the apparatus the student could use to filter **and** measure the volume of apple juice produced.

[3]

[Total: 14]

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3 Hydrogencarbonate indicator can be used to determine the concentration of carbon dioxide in a solution. The table shows the colour of the indicator at different concentrations of carbon dioxide.

View solution

carbon dioxide concentration	hydrogencarbonate indicator colour
high	yellow
medium	red
low	purple

Aquatic plants photosynthesise and use up carbon dioxide when in the light. Aquatic plants respire and produce carbon dioxide in the light and in the dark.

When the carbon dioxide produced is equal to carbon dioxide used, hydrogencarbonate indicator is red.

Using an aquatic plant, plan an investigation to determine the light intensity at which the rate of photosynthesis is equal to the rate of respiration.

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..... [6]

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