Cambridge Assessment International Education

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9872552436

BIOLOGY **0610/52**

Paper 5 Practical Test **May/June 2025**

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	
3	
Total	

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1 You are going to investigate the effect of the concentration of salt solutions on osmosis in potato tissue.

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)(ii).

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

You are going to use three different concentrations of salt solution.

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

(a) (i) Decide the volumes of salt solution **S** and distilled water **W** you need 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** you will use to make the 0.5 mol per dm^3 salt 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]

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 discs of potato for this investigation and one extra potato disc for Question **1(b)**. Leave the extra potato disc on the white tile.

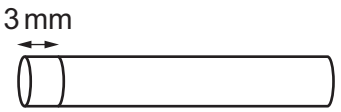
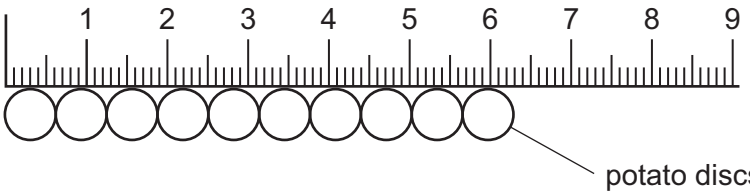


Fig. 1.1

Step 4 Place 10 potato discs in a line on the white tile. Place the ruler at the start of the line so you can measure the total length of the line of potato discs, as shown in Fig. 1.2.



not to scale

Fig. 1.2

Step 5 Measure the total length of the 10 potato discs and record this value in your table in **1(a)(ii)**.

Step 6 Put the 10 potato discs from step 5 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.

Continue with the rest of the questions while you are waiting.

Step 9 After 20 minutes, pour the salt solution from beaker **S1** into the beaker labelled **waste**.

Step 10 Put the 10 potato discs from beaker **S1** onto the white tile and line them up as shown in Fig. 1.2.

Step 11 Measure the final total length of the 10 potato discs and record this value in your table in **1(a)(ii)**.

Step 12 Pour the salt solution from beaker **S2** into the waste beaker and repeat step 10 and step 11.

Step 13 Pour the salt solution from beaker **S3** into the waste beaker and repeat step 10 and step 11.

(ii) Prepare a table and record your results. Include the final concentrations of the salt solutions in your table.

[4]

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

beaker **S1** .....

beaker **S2** .....

beaker **S3** .....

[1]

(iv) State a conclusion for your results.

.....

.....

..... [1]

(v) State the dependent variable in this investigation.

..... [1]

(vi) Identify **one** source of error in this investigation.

.....

.....

..... [1]

(vii) Describe **one** safety precaution you took when preparing the potato discs.

.....

..... [1]

(b) Put a few drops of iodine solution onto the potato disc that you kept from step 3.

Record the final colour of the iodine solution on the potato disc and state a conclusion for this test.

final colour .....

conclusion .....

[1]

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(c) Fig. 1.3 shows a leaf from a potato plant.

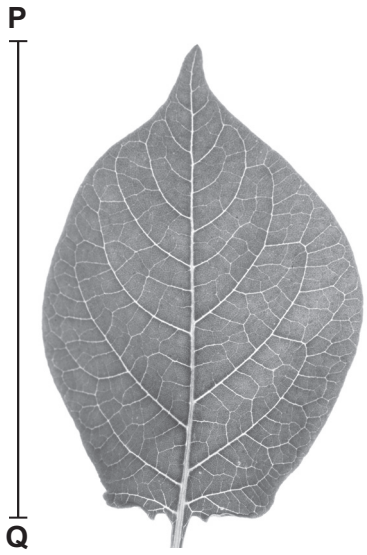

Fig. 1.3

(i) Draw a large diagram of the leaf shown in Fig. 1.3.

[4]

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(ii) Line **PQ** represents the length of the leaf in Fig. 1.3.

Measure the length of line **PQ** in Fig. 1.3.

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. 1.3.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ} \text{ in Fig. 1.3}}{\text{actual length of the leaf}}$$

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

Space for working.

.....

[3]

(iii) Fig. 1.4 shows a leaf from a tomato plant. The tomato leaf is narrower than the potato leaf shown in Fig. 1.3.

Fig. 1.4

Compare the leaves shown in Fig. 1.3 and in Fig. 1.4.

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.

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.

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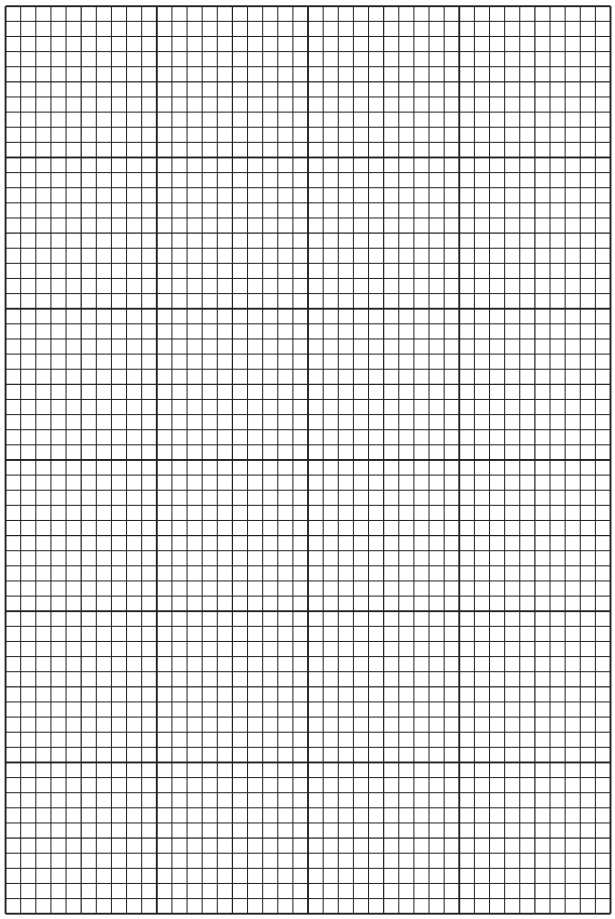
(i) Plot a line graph on the grid of the data in Table 2.1.



[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]

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(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.

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.....

..... [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.

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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