Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/61**

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 **12** pages. Any blank pages are indicated.

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1 A student investigated the effect of concentration on diffusion.

The student used pieces of agar which contained universal indicator. Universal indicator is green in substances with a neutral pH and red in substances with an acidic pH.

The student placed the pieces of agar into different concentrations of hydrochloric acid solution and measured the time taken for the acid to diffuse to the centre of each piece of agar. At the start of the investigation the agar was green.

The student used this method:

Step 1 Label four test-tubes **0.4**, **0.6**, **0.8**, **1.0**.

Table 1.1 shows the volumes of 1.0 mol per dm^3 hydrochloric acid solution and distilled water used to make the different concentrations of hydrochloric acid solution.

Table 1.1

concentration of hydrochloric acid solution / mol per dm^3	volume of 1.0 mol per dm^3 hydrochloric acid solution / cm^3	volume of distilled water / cm^3
0.4	4	6
0.6	6	4
0.8	8	2
1.0	10	0

Step 2 Use a 10 cm^3 syringe to put the volumes of 1.0 mol per dm^3 hydrochloric acid solution shown in Table 1.1 into the test-tubes labelled **0.4**, **0.6**, **0.8**, **1.0**.

Step 3 Use the 10 cm^3 syringe to put the volumes of distilled water shown in Table 1.1 into the test-tubes labelled **0.4**, **0.6**, **0.8**, **1.0**.

Step 4 A block of agar which measures approximately 1 cm × 2 cm × 2 cm is provided. Use the knife to cut the agar block into four pieces.

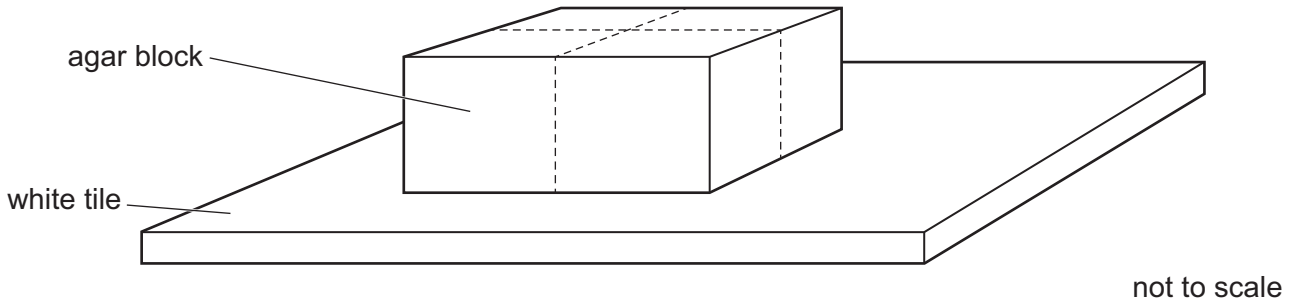

Fig. 1.1

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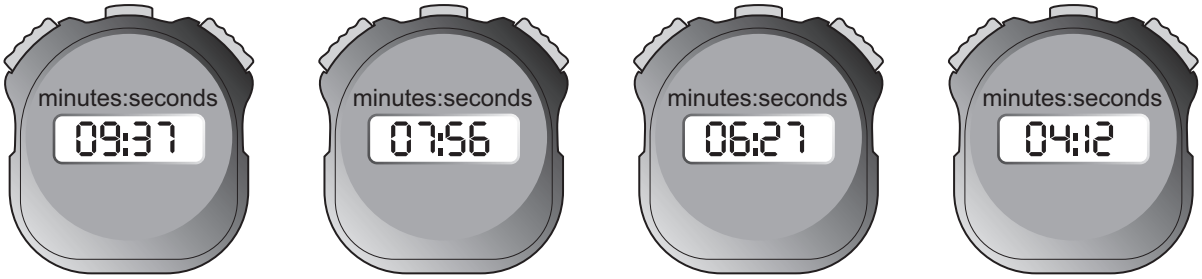
Step 5 Place all the test-tubes into a warm water-bath.

Step 6 Put **one** agar piece into each of the test-tubes and immediately start the stop-clock. Observe the colour of the agar pieces as they change from green to red.

The student recorded the time taken for each piece of agar to become completely red.

The stop-clocks from step 6 are shown in Fig. 1.2.



0.4 **0.6** **0.8** **1.0**

Fig. 1.2

View solution

(a) (i) Prepare a table to record the results of the investigation.

Convert the times on the stop-clocks shown in Fig. 1.2 to seconds and record these times in your table.

[4]

(ii) State a conclusion for the results.

.....

.....

..... [1]

(iii) State the independent and dependent variables in this investigation.

independent variable .....

.....

dependent variable .....

.....

[2]

(iv) Suggest **two** improvements to the method used for this investigation.

1 .....

.....

.....

2 .....

.....

.....

[2]

(v) Identify **two** hazards in this investigation.

.....

.....

..... [1]

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(b) Plan an investigation to determine the effect of temperature on osmosis in potato plant tissue.

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..... [6]

[Total: 16]

View solution

2 **(a)** A student used DCPIP solution to compare the concentration of vitamin C in five solutions.

View solution

The student used this method:

- Put 1 cm^3 of 1% DCPIP solution into a test-tube.
- Use a syringe to add drops of 125 mg per dm^3 vitamin C solution to the test-tube.
- Keep adding drops of vitamin C solution until the DCPIP solution becomes colourless.
- Record the total volume of the 125 mg per dm^3 vitamin C solution added.

This method was repeated with four other concentrations of vitamin C solution.

(i) State the expected colour of the DCPIP solution **before** the vitamin C solution was added.

..... [1]

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

View solution

1 .....

2 .....

[2]

The results of the investigation are shown in Table 2.1.

Table 2.1

concentration of vitamin C / mg per dm^3	total volume of vitamin C solution added / cm^3
125	1.6
250	1.4
500	1.1
750	0.8
1000	0.5

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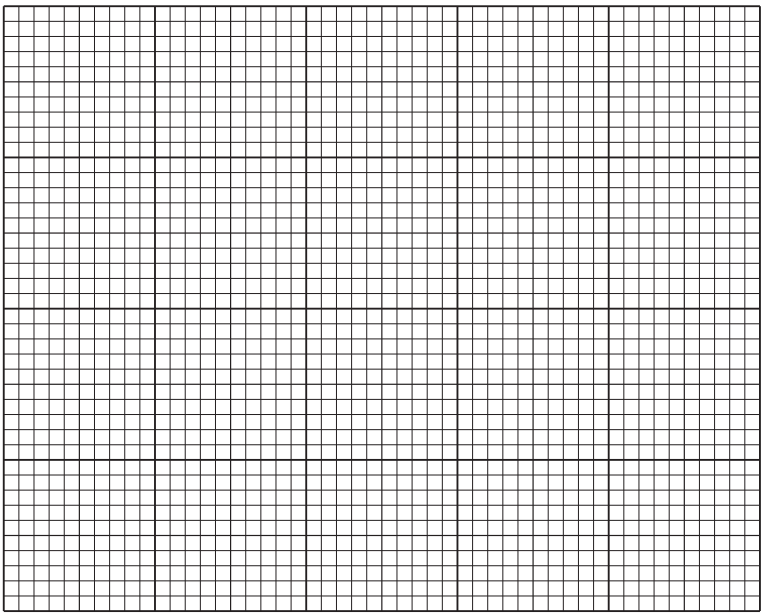
(b) (i) Plot a line graph on the grid of the data in Table 2.1.

View solution



[4]

(ii) The student tested a sample of orange juice.

They found that 1.2 cm^3 of orange juice was needed to react with 1 cm^3 of 1% DCPIP solution.

View solution

Use your graph to estimate the vitamin C concentration of the orange juice.

Show on the graph how you obtained your estimate.

..... mg per dm^3

[2]

(c) The student wanted to investigate the effect of storage on the vitamin C concentration in apple juice.

View solution

Three samples of fresh apple juice and three samples of stored apple juice were tested.

The results are shown in Table 2.2.

Table 2.2

sample	concentration of vitamin C in fresh apple juice / mg per dm^3	concentration of vitamin C in stored apple juice / mg per dm^3
1	281	170
2	276	96
3	272	104

(i) State a conclusion for the data shown in Table 2.2.

.....

.....

..... [1]

(ii) The student decided that the result of one sample shown in Table 2.2 was anomalous.

State what is meant by an anomalous result.

View solution

.....

.....

..... [1]

(iii) Draw a circle around the anomalous result in Table 2.2. [1]

View solution

(iv) Using the data for **sample 3** in Table 2.2, calculate the percentage change in the vitamin C concentration of the apple juice when it is stored.

View solution

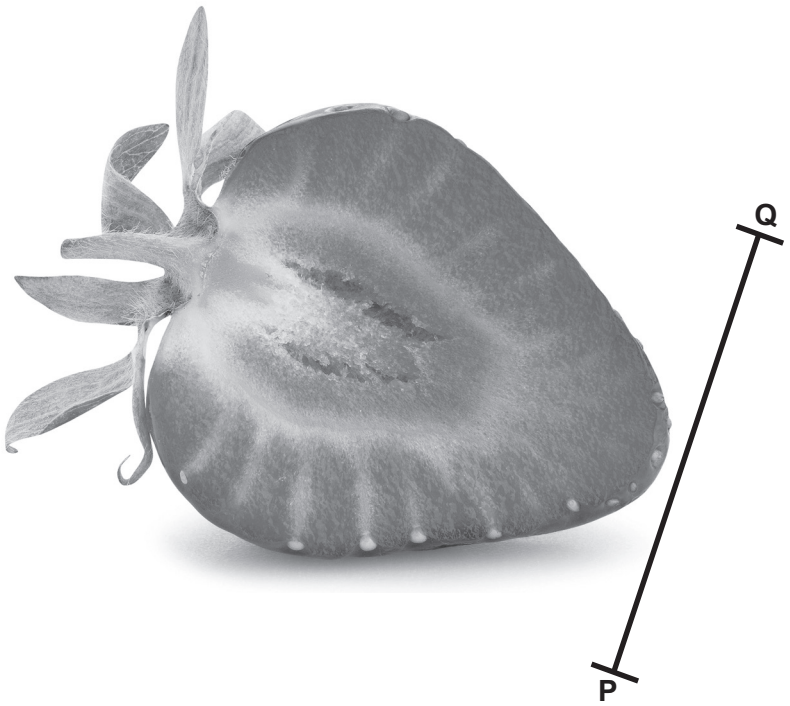
Give your answer to **one** decimal place.

Space for working.

.....% [3]

(d) Fig. 2.1 is a photograph of a fruit from a strawberry plant, *Fragaria ananassa*, that has been cut in half.

View solution



magnification ×1.8

Fig. 2.1

(i) Draw a large diagram of the strawberry fruit shown in Fig. 2.1.

[4]

(ii) Line **PQ** in Fig. 2.1 represents the maximum diameter of the strawberry fruit.

View solution

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

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

Calculate the actual diameter of the strawberry fruit using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line PQ in Fig. 2.1}}{\text{actual diameter of the strawberry fruit}}$$

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

Space for working.

.....mm
[3]

(e) Describe a method the student could use to test a strawberry fruit for reducing sugars.

View solution

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..... [2]

[Total: 24]

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