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Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME **Solved by Anubha Roberts**

CENTRE NUMBER | | | | | |

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BIOLOGY **0610/62**

Paper 6 Alternative to Practical **February/March 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.

[Turn over

1 Benedict's solution is used to test for reducing sugars. Glucose is a reducing sugar.
A student estimated the concentration of glucose in a solution.

The student used this method:

Step 1 Label six test-tubes **0.0%**, **0.5%**, **1.0%**, **1.5%**, **2.0%** and **U**.

(a) (i) Complete Table 1.1 by writing in the volumes of 2% glucose solution and distilled water needed to make 4 cm^3 of a 1.5% glucose solution.

Table 1.1

percentage concentration of glucose	volume of 2% glucose solution / cm^3	volume of distilled water / cm^3
0.0	0	4
0.5	1	3
1.0	2	2
1.5	3	1
2.0	4	0

[1]

Step 2 Use a syringe to put the volumes of 2% glucose solution shown in Table 1.1 into the test-tubes labelled **0.5%**, **1.0%**, **1.5%** and **2.0%**.

Step 3 Use the same syringe to put 4 cm^3 of the unknown glucose solution **U** into the test-tube labelled **U**.

Step 4 Use a clean syringe to put the volumes of distilled water shown in Table 1.1 into the test-tubes labelled **0.0%**, **0.5%**, **1.0%**, and **1.5%**.

Step 5 Use a clean syringe to put 4 cm^3 of Benedict's solution into each of the test-tubes labelled **0.0%**, **0.5%**, **1.0%**, **1.5%**, **2.0%** and **U**.

Step 6 Put the test-tubes into a hot water-bath at 80 °C and start the stop-clock.

Step 7 Wait for 5 minutes. Remove all the test-tubes from the water-bath.

Step 8 Record the colour of the liquid in the test-tubes labelled **0.0%**, **0.5%**, **1.0%**, **1.5%**, **2.0%** and **U**.

Fig. 1.1 shows the student's results.

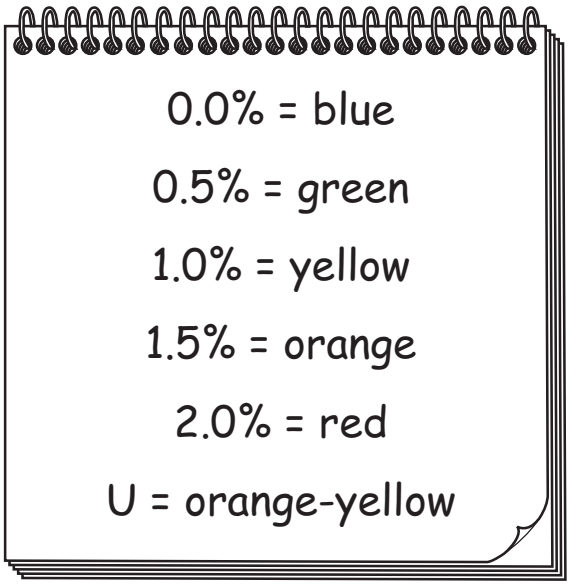


Fig. 1.1

(ii) Prepare a table and record the student's results.

Sample (%) Concentration	Colour change after 5 minutes (min)
0.0	Blue 1
0.5	Green 2
1.0	Yellow 3
1.5	Orange 4
2.0	Red 5
U	Orange-Yellow

[3]

(iii) Use Fig. 1.1 to estimate the percentage concentration of glucose in the unknown glucose solution **U**.

concentration of glucose ..... 1.3 ..... % [1]

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

1 Volume of Benedict's solution

2 Time in water bath.

[2]

(v) Identify the possible source of error present in steps 2 and 3.

State the effect of this error on the results of the investigation.

error Same syringe was used in step 3 after step 2

effect on the results Could effect the color change of solution u. and it can be darker.

[2]

(b) Eggs contain a protein called albumen. Albumen will turn from cloudy to clear when it is digested by pepsin, a protease enzyme.

Plan an investigation to determine the effect of pH on the digestion of albumen by protease.

✓ Independent variable - 3, 5, 7, 9

✓ Dependent variable - Time taken for solution to become clear

✓ Procedure :- Take 4 test tubes

✓ containing same volume of egg protein.

Using buffer maintain 4 pH.

Add Pepsin and incubate at

✓ 35°C. in water bath

Note the time taken for solution to become clear. ✓ Repeat 3 times at each pH. [6]

✓ Use safety gloves to handle hot test tubes.

(c) Describe how to do the emulsion test to show that fat is present in a food sample.

✓ Add ethanol to the sample followed by water.

✓ white colour indicates presence of fat. [2]

[Total: 17]

2 **(a)** Fig. 2.1 is a photograph of a leaf from an oak tree, *Quercus sp*.

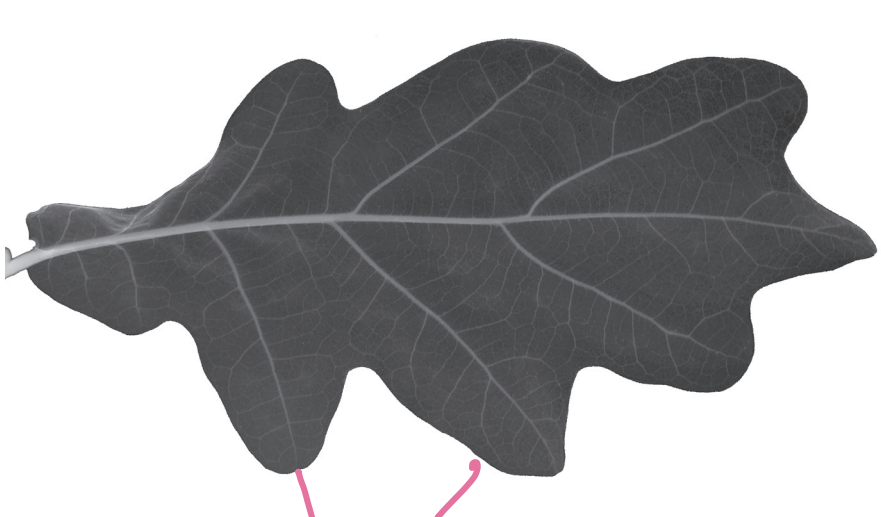
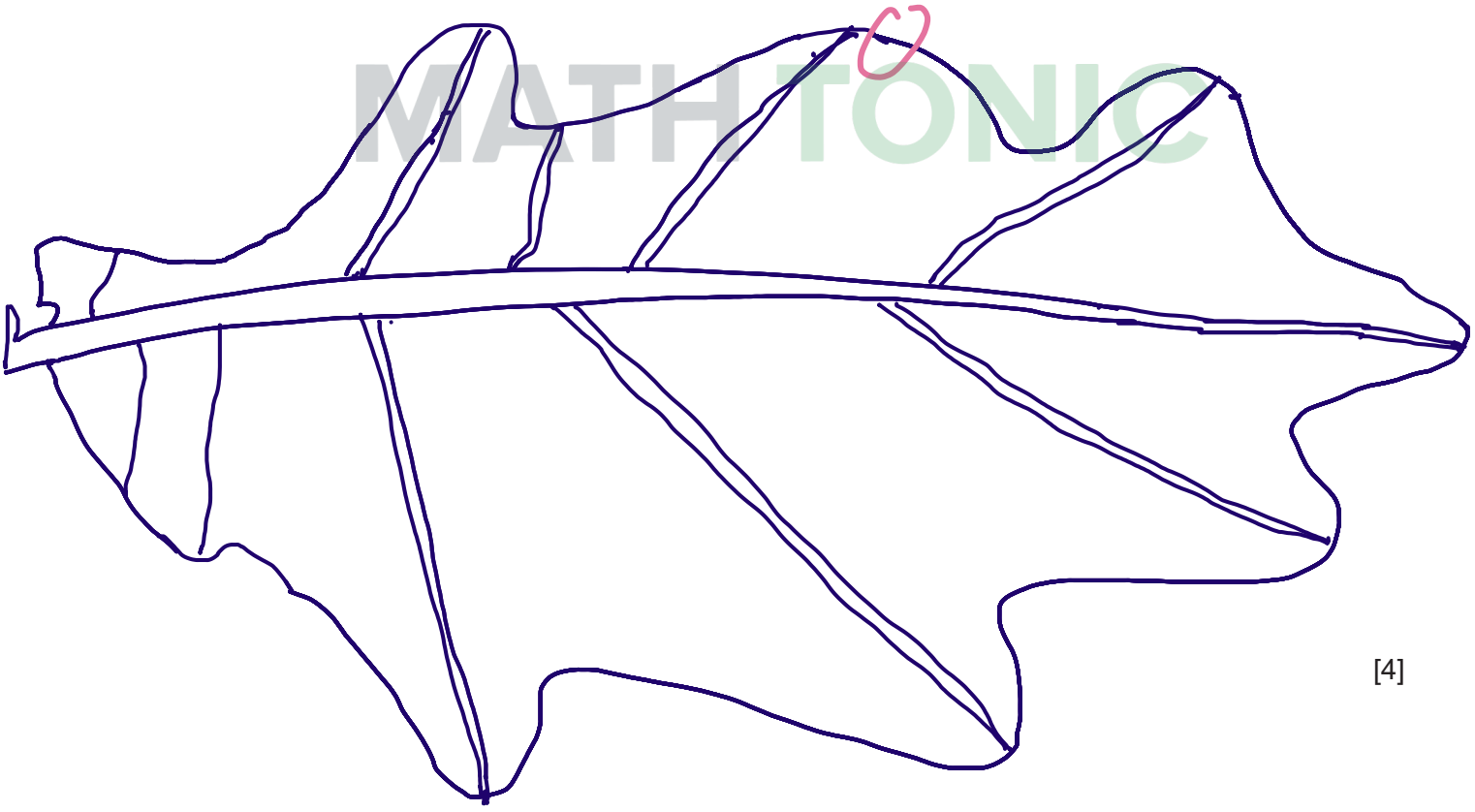


Fig. 2.1

(i) Draw a large diagram of the whole oak leaf shown in Fig. 2.1.



[4]

(ii) Line **PQ** on Fig. 2.1 represents the width of the oak leaf.

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

length of **PQ** ..... 62 ..... mm

Calculate the actual width of the oak leaf using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line PQ in Fig. 2.1}}{\text{actual width of the oak leaf}}$$

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

Space for working.

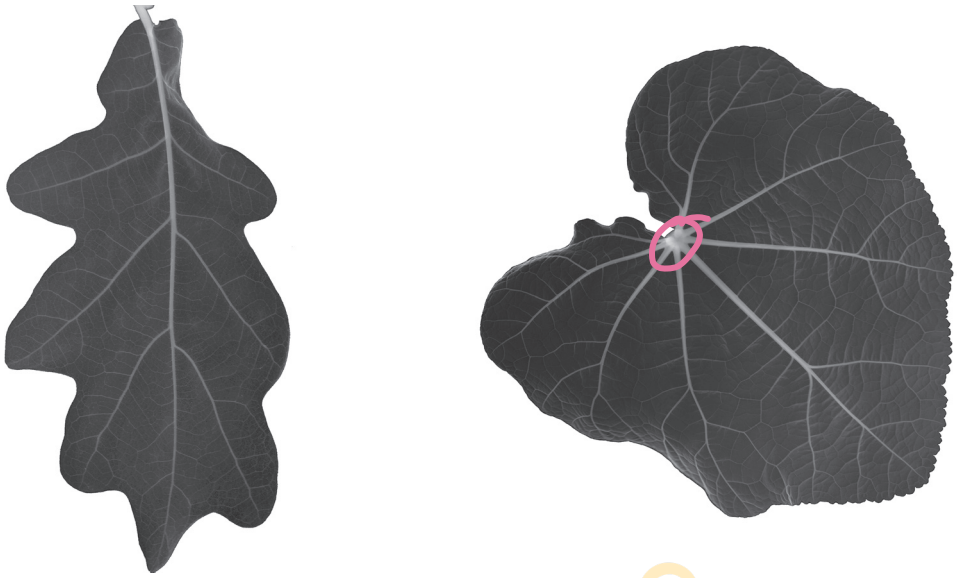
$M = \frac{I}{A}$ $\quad 1.4 = \frac{62}{A}$

$A = 4.4$

..... mm
[3]

(iii) Fig. 2.2 shows photographs of the oak leaf and a hollyhock (*Alcea rosea*) leaf.

The magnification of both photographs is **not** the same.



oak hollyhock

Fig. 2.2

Table 2.1 gives one visible difference between the oak leaf and the hollyhock leaf shown in Fig. 2.2.

Complete Table 2.1 to give **two other** visible differences between the leaves shown in Fig. 2.2.

Do **not** include references to size in your answer.

Table 2.1

difference	oak leaf	hollyhock leaf
1	The oak leaf is longer than it is wide.	The length and width of the hollyhock leaf are similar.
2	leaf area is divided in lobes.	leaf area is intact
3	Veins branching from one main vein.	Veins branching from one common point.

[2]

(b) Students investigated the effect of light intensity on the surface area of leaves of soybean plants.

- 100 soybean seeds were planted in pots and put into the shade (low light).
- 100 soybean seeds were planted in pots and put into full sun.
- The soybean seeds were allowed to germinate and grow for 30 days.
- After 30 days, three of the oldest leaves and three of the youngest leaves were removed from each plant.
- The surface area of each of the removed leaves was measured.

(i) State the dependent variable in this investigation.

Surface area of leaves [1]

(ii) State why the students used a large number of soybean plants.

to get a representative sample and to avoid bias. [1]

(iii) The students estimated the surface area of each leaf using graph paper as shown in Fig. 2.3.

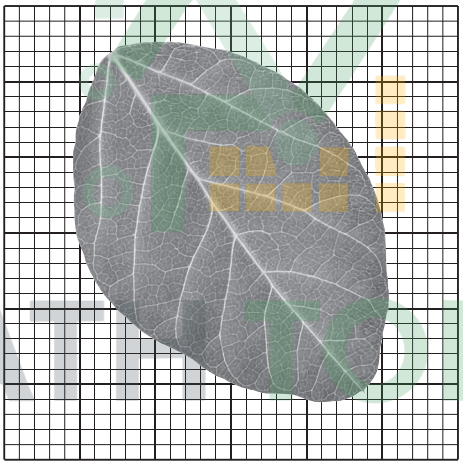


Fig. 2.3

Suggest how the students used the graph paper to measure the surface area of each leaf.

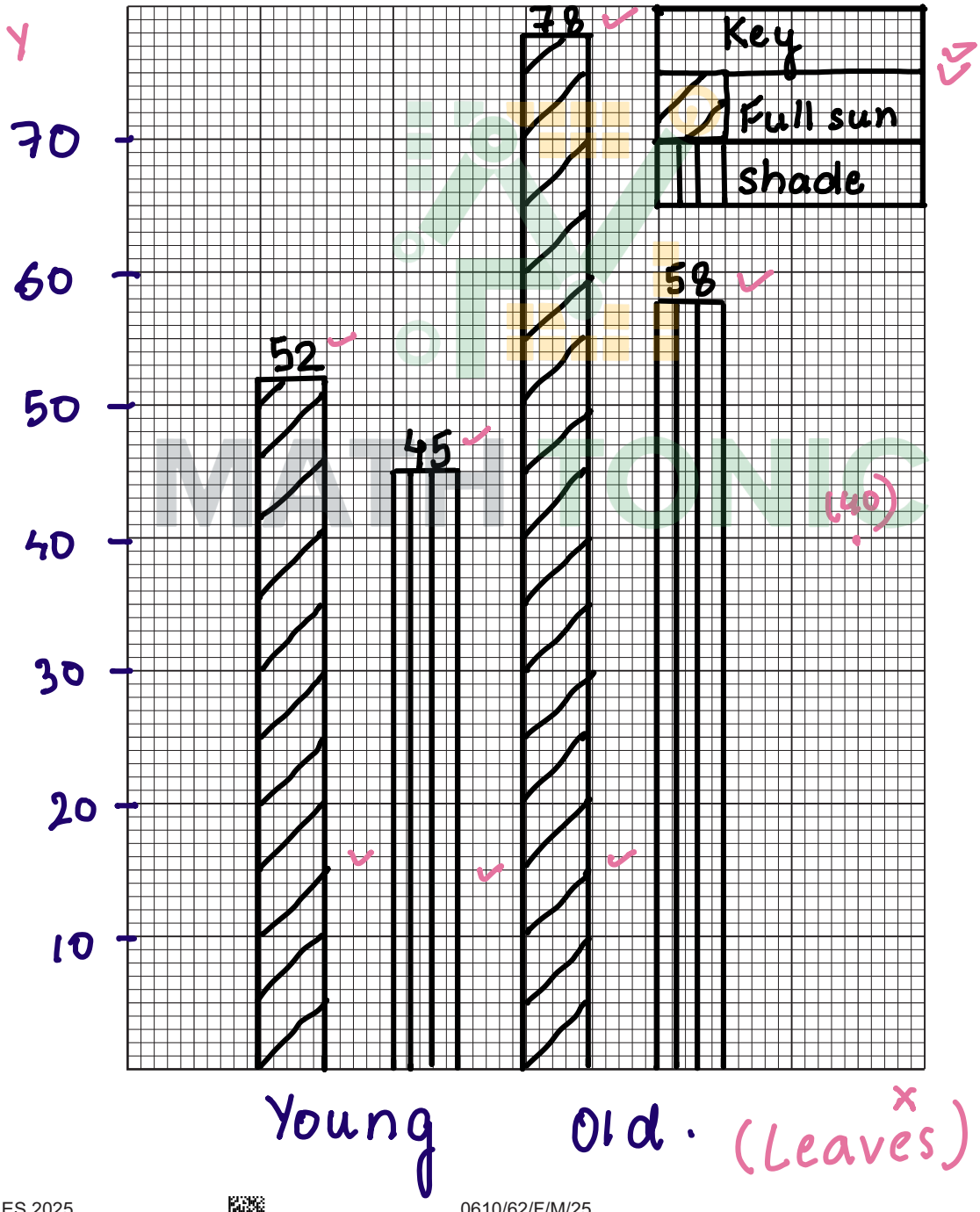
- Counted the number of squares full covered as 1
- Counted the two squares more than partially covered as 1.
- Calculate the area of square and multiply it with total no. of square counted. [2]

(c) The results of the investigation are shown in Table 2.2.

Table 2.2

lighting condition	age of leaves	mean surface area of leaves / cm^2
full sun	young	52
shade	young	45
full sun	old	78
shade	old	58

(i) On the grid, using the data in Table 2.2, plot a bar chart to show the results of the investigation.



[4]

(ii) The students calculated that there was a 15.6% increase in the size of the young leaves when they were grown in full sun compared to in the shade.

Calculate the percentage increase in the surface area of the old leaves that had been grown in full sun conditions compared to the old leaves that had been grown in the shade.

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

$\frac{78-58}{58} \times 100$

$\frac{\text{Final} - \text{Initial}}{\text{Initial}} \times 100$

34·5 ..... % [3]

(iii) State **two** conclusions from this investigation.

1 Mean surface area is greater in full sun than shade.

2 Mean surface area is greater in old leaves than new leaves.

[2]

(d) Hydrogencarbonate indicator is used to test for the presence of carbon dioxide.

An aquatic plant was placed in red hydrogencarbonate indicator and put under bright light. The plant takes in carbon dioxide as it photosynthesises.

State the final colour of the hydrogencarbonate indicator.

Purple ..... [1]

[Total: 23]

Indic

Orange ← Red → Purple

Acidic (Neutral) Alkaline

↑ CO_2 → acidic ↓ CO_2 alkaline

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