Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **May/June 2021**

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 Vitamin C is an important component of a balanced diet. Many health drinks contain vitamin C.

A student estimated the concentration of vitamin C in a health drink by comparing it to solutions with known concentrations of vitamin C.

DCPIP is an indicator for vitamin C. When added to a vitamin C solution, the blue DCPIP reacts with vitamin C and becomes colourless. Drops of DCPIP are added to the vitamin C solution until the solution remains blue.

Step 1 The student labelled four beakers **A**, **B**, **C** and **D** and used the information in Table 1.1 to make the vitamin C solutions in the four labelled beakers.

Table 1.1

beaker	volume of 1.00% vitamin C solution / cm^3	volume of water / cm^3	final percentage concentration of vitamin C
A	10	30	0.25
B	20	20	0.50
C	30	10	
D	40	0	1.00

(a) (i) Complete Table 1.1 by calculating the final percentage concentration of vitamin C in beaker **C**.

View solution

..... % [1]

Step 2 A syringe was used to transfer 0.5 cm^3 of the vitamin C solution from beaker **A** into a test-tube labelled **A**.

Step 3 The student filled a dropping pipette with a **1% DCPIP** solution and added one drop at a time to test-tube **A**. The blue colour disappeared as vitamin C reacted with the DCPIP.

The number of drops was counted as they were added to the test-tube.

Step 4 The student stopped adding drops of DCPIP to test-tube **A** when the solution remained blue in colour when a drop was added. The total number of drops of DCPIP added was recorded.

Step 5 The student then repeated steps 2 to 4 using the solutions from beakers **B**, **C** and **D** and test-tubes labelled **B**, **C** and **D**.

Step 6 The student then repeated steps 2 to 5 to obtain a second set of results.

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The student's results are shown in Fig. 1.1.

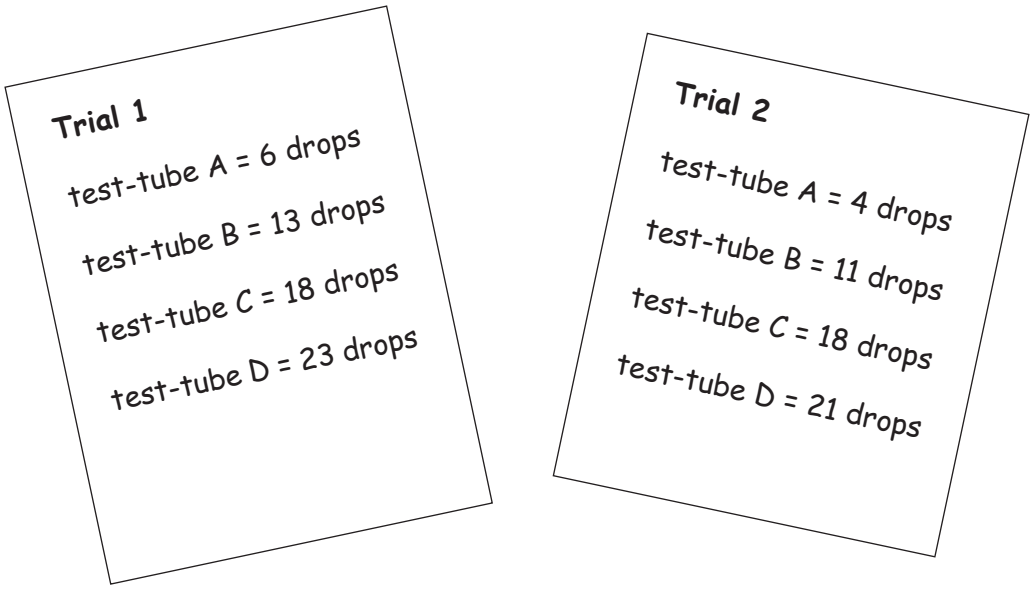

Fig. 1.1

(ii) Prepare a table to record the results shown in Fig. 1.1.

Your table should include the average of the two trials.

[5]

(iii) State a conclusion for the student's results.

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.....

..... [1]

(iv) Suggest why the student repeated the investigation.

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..... [1]

Step 7 The student put 0.5 cm^3 of health drink **H** into a clean test-tube. They then added drops of 1% DCPIP to the test-tube until the solution in the test-tube remained blue.

A total of **10 drops** of DCPIP were added to the sample of health drink **H**.

(v) Estimate the percentage concentration of vitamin C in health drink **H**, using the information in Table 1.1, your table in **1(a)(ii)** and step 7.

..... % [1]

(vi) Suggest **two** improvements to the method that would allow a more precise estimation of the vitamin C concentration in health drink **H**.

1 .....

.....

2 .....

.....
[2]

(vii) Identify **two** variables that were kept constant in this investigation.

1 .....

2 .....
[2]

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(b) Explain why counting the number of drops of DCPIP is not accurate.

View solution

.....

.....

..... [1]

(c) The manufacturers of health drink **H** claim that it also contains protein and glucose.

View solution

Describe how you would test health drink **H** for protein and glucose.

Include the results for a positive test.

protein .....

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glucose .....

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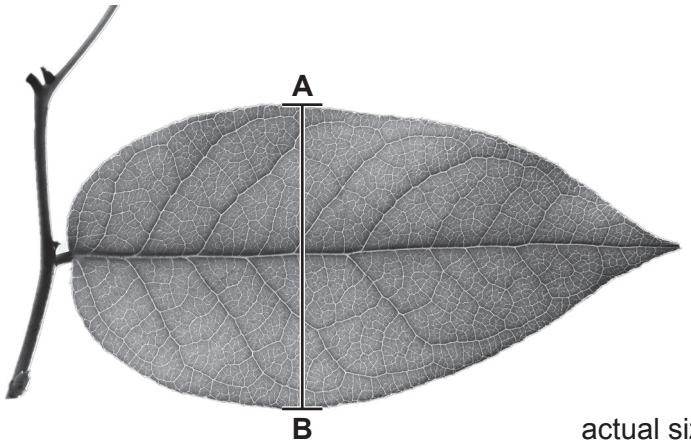
[5]

[Total: 19]

2 **(a)** Fig. 2.1 is a leaf from a plant.

View solution



actual size

Fig. 2.1

(i) Make a large drawing of the leaf in Fig. 2.1.

[4]

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(ii) Measure the length of line **AB** in **Fig. 2.1**. Include the unit.

View solution

length of line **AB** .....

Draw a line on your drawing in **2(a)(i)** to show the position of line **AB**.

Measure this line on your drawing. Include the unit.

length of the line on your drawing .....

Calculate the magnification of your drawing using your measurements and the equation:

$$\text{magnification} = \frac{\text{length of the line on your drawing}}{\text{length of line } \mathbf{AB} \text{ in } \mathbf{Fig.\ 2.1}}$$

.....
[3]

(b) A student used an aquatic plant to investigate the effect of carbon dioxide concentration on the rate of photosynthesis. The production of oxygen gas can be used as an estimate of the rate of photosynthesis.

The student set up the apparatus shown in Fig. 2.2. He counted the number of bubbles produced in 5 minutes. The carbon dioxide concentration in the water around the aquatic plant was 2 mg per dm^3.

He repeated the experiment with five different concentrations of carbon dioxide.

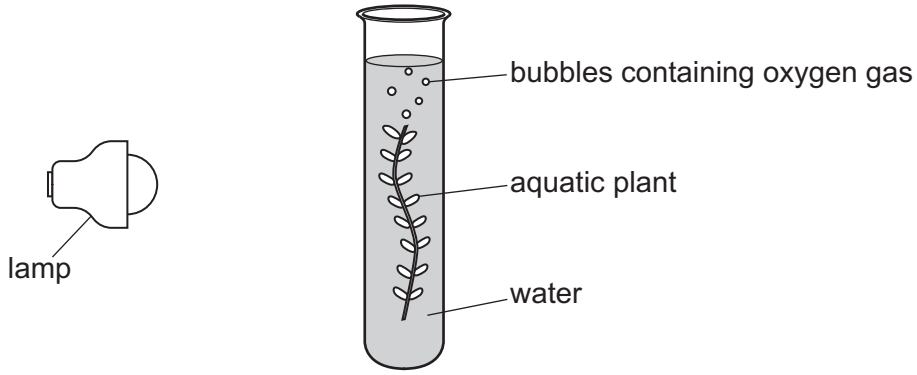

Fig. 2.2

The student's results are shown in Table 2.1.

Table 2.1

carbon dioxide concentration / mg per dm^3	number of bubbles produced in 5 minutes
2	4
4	14
6	20
8	25
10	35
12	35

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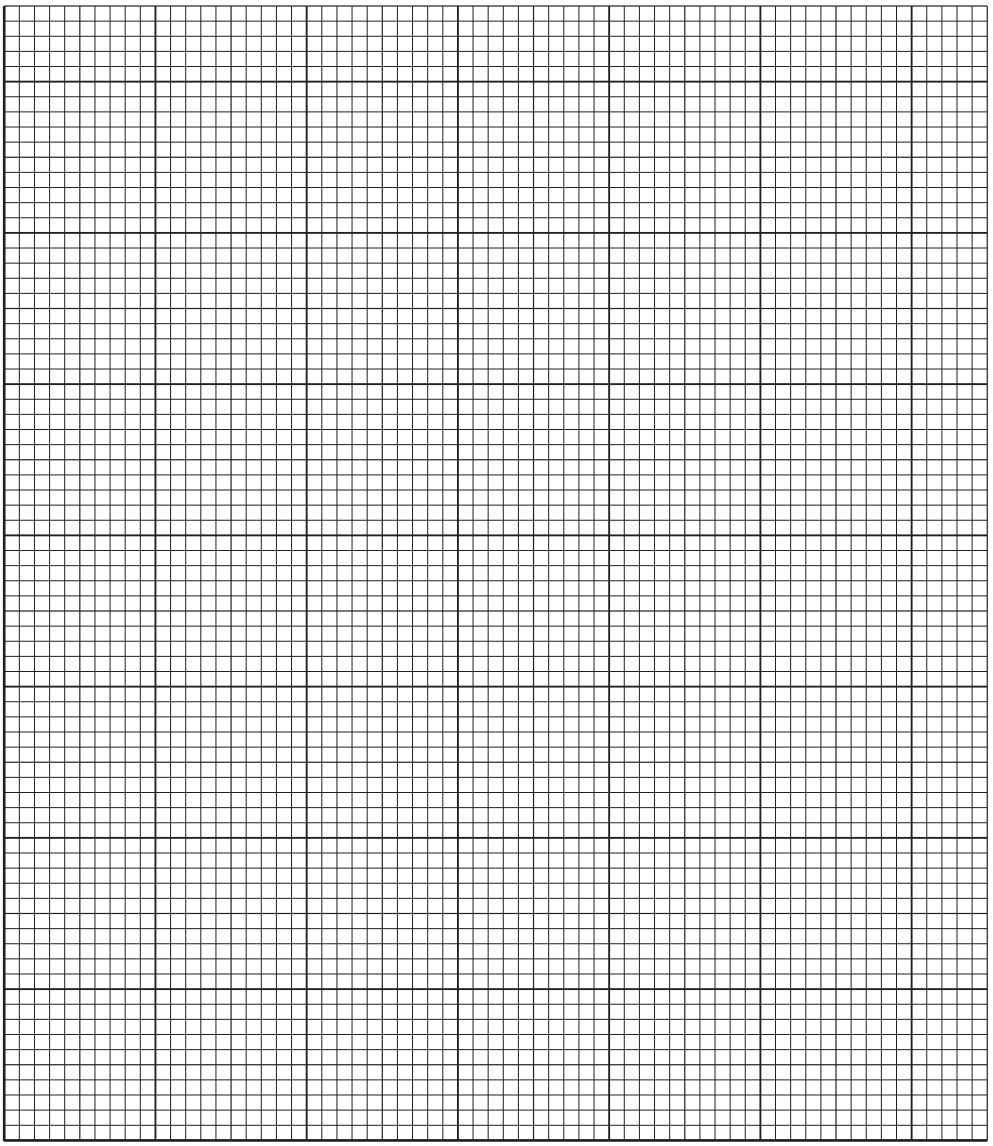
(i) Plot a line graph on the grid of the data in Table 2.1.

View solution



[4]

(ii) Describe the trend shown on your graph in **2(b)(i)**.

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..... [1]

(iii) The rate of photosynthesis can be given as the number of bubbles produced in one minute.

Use the information in Table 2.1 to calculate the rate of photosynthesis at a carbon dioxide concentration of 4 mg per dm^3.

Give your answer to **one** significant figure.

Space for working.

..... bubbles per minute
[2]

(iv) Identify the variable that the student changed in this investigation (the independent variable).

..... [1]

(c) Counting bubbles is not an accurate method for measuring the volume of gas produced by a plant during photosynthesis.

Plan an investigation to determine the effect of light intensity on the rate of photosynthesis. Your plan should include a more accurate method of measuring the volume of gas produced during the reaction.

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[Total: 21]

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View solution

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