Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/62**

Paper 6 Alternative to Practical **October/November 2024**

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 Photosynthesis occurs in chloroplasts. Students investigated the effect of light intensity on the rate of photosynthesis in a chloroplast suspension.

The blue dye DCPIP can be used to investigate photosynthesis. During photosynthesis, the dark-blue colour of the DCPIP changes and gradually disappears so that it becomes colourless.

A chloroplast suspension that is made from spinach leaves has a green colour.

The students used this method:

Step 1 Prepare a chloroplast suspension from fresh spinach leaves.

Step 2 Label one test-tube **A** and another test-tube **B**.

Step 3 Put 1 cm^3 of the green chloroplast suspension into test-tube **A** and into test-tube **B**.

Step 4 Put test-tubes **A** and **B** into an ice-cold water-bath for two minutes.

Step 5 Put 5 cm^3 of the blue **DCPIP** solution into test-tube **A**. Put a test-tube rack 10 cm from a bright light. Put test-tube **A** into the test-tube rack.

Step 6 Turn on the light and start the stop-clock.

Step 7 Measure the time taken for the blue liquid in test-tube **A** to return to a green colour.

Step 8 Reset the stop-clock to zero.

Step 9 Move the test-tube rack so that it is 30 cm from the bright light.

Step 10 Put 5 cm^3 of the blue **DCPIP** solution into test-tube **B**.

Put test-tube **B** into the test-tube rack and start the stop-clock.

Step 11 Measure the time taken for the blue liquid in test-tube **B** to return to a green colour.

The times measured in step 7 and step 11 are shown in Fig. 1.1.



time recorded for test-tube **A**



time recorded for test-tube **B**

Fig. 1.1

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

Convert the times on the stop-clocks in Fig. 1.1 to seconds and record these times in your table.

View solution

[4]

(ii) State a conclusion for the results.

View solution

.....

.....

..... [1]

(iii) State the dependent variable in this investigation.

..... [1]

View solution

(iv) Identify the possible source of error present in step 7 and step 11.

View solution

Suggest an improvement to the method to reduce this error.

error .....

.....

.....

improvement .....

.....

.....

[2]

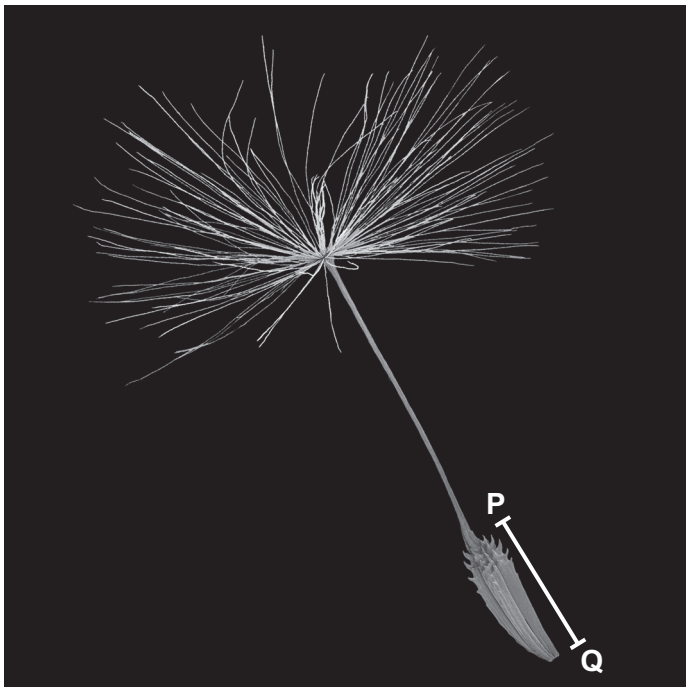
(b) DCPIP can be used in food testing.

View solution

State which substance present in food can be identified using DCPIP.

..... [1]

(c) Fig. 1.2 is a photograph of a seed from a dandelion plant, *Taraxacum officinale*.



magnification ×15

Fig. 1.2

(i) Draw a large diagram of the whole dandelion seed shown in Fig. 1.2.

View solution

[4]

(ii) Line **PQ** in Fig. 1.2 represents the length of the achene of the dandelion seed.

View solution

Measure the length of line **PQ** in Fig. 1.2.

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

Calculate the actual length of the achene, using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ} \text{ in Fig. 1.2}}{\text{actual length of the achene}}$$

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

Space for working.

..... mm

[3]

(d) Fig. 1.3 shows photographs of a dandelion seed and a seed taken from a milk thistle plant, *Silybum marianum*. The magnifications of the photographs are **not** the same.

View solution



dandelion



milk thistle

Fig. 1.3

State **one** similarity and **two** differences, visible in Fig. 1.3, between the two seeds.

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

similarity .....

.....

difference 1 .....

.....

difference 2 .....

.....

[3]

(e) Dandelion roots are used to flavour drinks.

Students tested a sample of a colourless drink for starch and reducing sugar. They found that the drink did **not** contain starch but did contain reducing sugar.

(i) State the expected colour of the iodine solution after it was mixed with a sample of the drink.

..... [1]

(ii) Describe how the students should test the sample of the drink for reducing sugar.

View solution

.....

.....

.....

.....

..... [2]

(f) Some types of weedkiller prevent seeds from germinating.

Plan an investigation to determine the effect of weedkiller concentration on the germination of seeds.

.....

.....

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.....

.....

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.....

.....

..... [6]

[Total: 28]

View solution

2 **(a)** A student investigated the effect of carbon dioxide concentration on the rate of photosynthesis in leaf discs.

As photosynthesis takes place, the leaf discs start to float. Sodium hydrogencarbonate is used as a source of carbon dioxide.

View solution

The student used this method:

- Take 5 leaves from the same plant and use a cork borer to cut 50 leaf discs from the leaves.
- Put 10 leaf discs into a syringe filled with 10 cm^3 of sodium hydrogencarbonate solution.
- Remove the air from the air spaces in the leaves so that the leaf discs sink to the bottom of the syringe.
- Position the syringe 5 cm from a lamp.
- Measure the time taken for at least 5 of the 10 leaf discs to float to the top of the syringe.
- Repeat the method with different concentrations of sodium hydrogencarbonate solution.

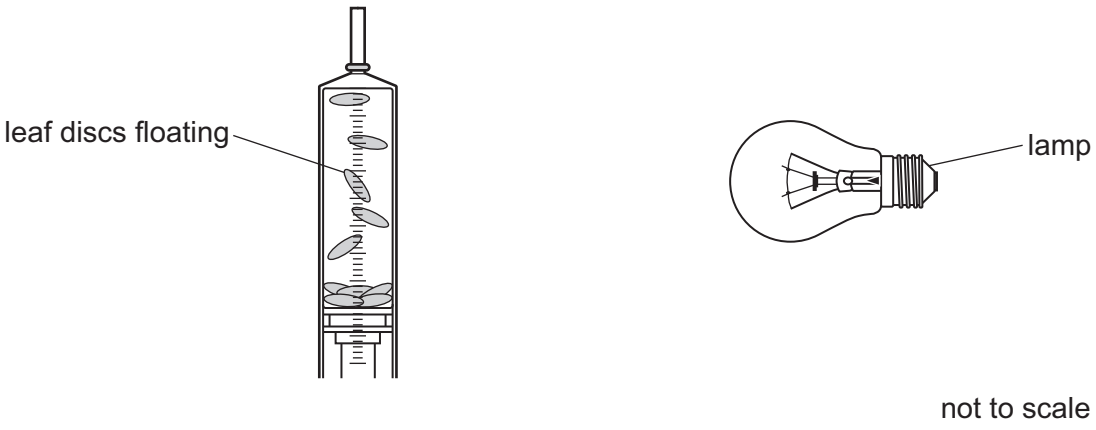


Fig. 2.1

(i) The apparatus the student used is shown in Fig. 2.1.

On Fig. 2.1, draw and label **one** additional piece of apparatus that could be used to reduce the heating effect of the lamp. [1]

(ii) State **two** variables, apart from the temperature, that were kept constant in this investigation.

1 .....

2 .....
[2]

(iii) State the independent variable in this investigation.

..... [1]

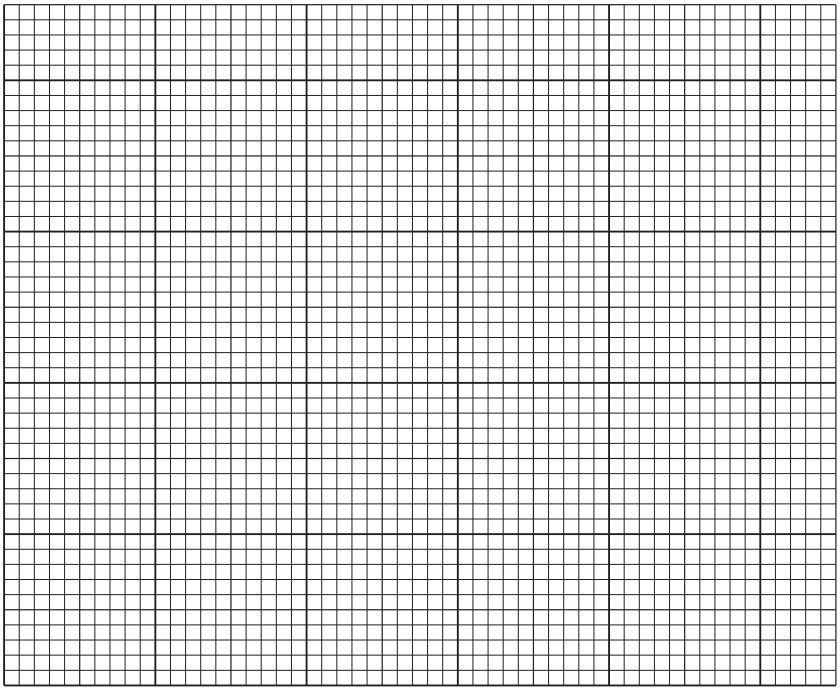
The results of the investigation described in **2(a)** are shown in Table 2.1.

Table 2.1

percentage concentration of sodium hydrogencarbonate solution	time taken for the leaf discs to float / minutes
0.2	20
0.4	17
0.6	14
0.8	10
1.0	7

View solution

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



[4]

(ii) Estimate the sodium hydrogencarbonate concentration at which it took 12 minutes for the leaf discs to float.

View solution

Show **on the graph** how you obtained your estimate.

..... %

[2]

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(iii) Using the information in Table 2.1, calculate the percentage change in the time taken for the leaf discs to float when the sodium hydrogencarbonate concentration is increased from 0.2% to 0.4%.

View solution

Space for working.

..... % [2]

[Total: 12]

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