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Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

5900900450 1

BIOLOGY **0610/62**

Paper 6 Alternative to Practical **February/March 2023**

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 **16** pages. Any blank pages are indicated.

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1 Potato cells take up methylene blue dye when the potato tissue is placed into the dye solution.

If the dyed potato cells are placed in water the dye will diffuse into the water.

A student investigated the effect of temperature on the diffusion of methylene blue dye from dyed potato cells.

The student used this method:

Step 1 You are provided with a beaker of cold water, a beaker of warm water and a beaker of hot water.

Step 2 Measure the temperature of the water in the beaker of **hot** water.

Step 3 Label one test-tube **C**, one test-tube **W** and one test-tube **H**.

Step 4 Draw a line 9 cm from the base of each test-tube, as shown in Fig. 1.1. Place the three test-tubes in a test-tube rack.

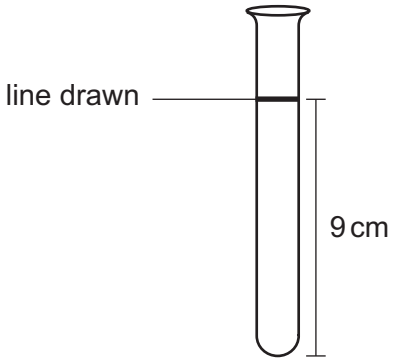

Fig. 1.1

Step 5 Fill test-tube **C** with cold water up to the line drawn in step 4. Put test-tube **C** into the beaker of **cold** water.

Step 6 Fill test-tube **W** with warm water up to the line drawn in step 4. Put test-tube **W** into the beaker of **warm** water.

Step 7 Fill test-tube **H** with hot water up to the line drawn in step 4. Put test-tube **H** into the beaker of **hot** water.

Step 8 You are provided with three potato cylinders. They have been soaked in methylene blue solution and then rinsed.

Place the three potato cylinders on the white tile and cut the three potato cylinders to approximately 2 cm in length.

Step 9 Place one of the potato cylinders from step 8 into each test-tube.

Step 10 Start the stop-clock. Leave the test-tubes for 15 minutes.

Step 11 After 15 minutes, measure the temperature of the water in the beaker of **hot** water again.

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Fig. 1.2 shows part of the thermometer during step 2 and step 11.

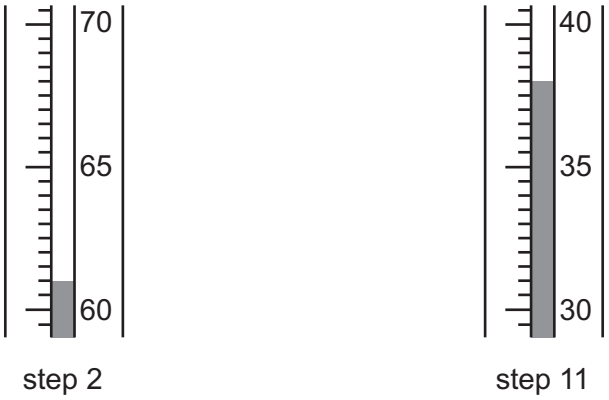

Fig. 1.2

(a) (i) Record the temperatures shown on the thermometer for step 2 and step 11 in Fig. 1.2.

water temperature in the beaker of **hot** water in step 2 ..... °C

water temperature in the beaker of **hot** water in step 11 ..... °C
[2]

Step 12 Remove the test-tubes **C**, **W** and **H** from the beakers and shake all the test-tubes for 10 seconds. Place the test-tubes into the test-tube rack.

Step 13 Observe the intensity of the blue colour of the liquid in test-tubes **C**, **W** and **H**.

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Fig. 1.3 shows the student's notebook with their observations.

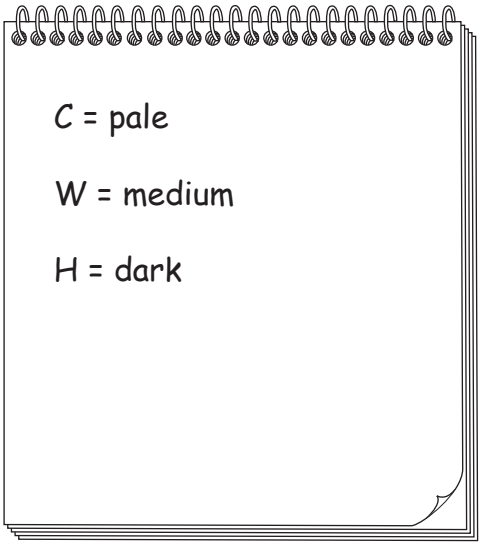

Fig. 1.3

(ii) Prepare a table and record the results shown in Fig. 1.3.

[2]

(iii) State a conclusion for these results.

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.....

..... [1]

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(iv) Identify **one** possible source of error in step 8.

.....

.....

..... [1]

(v) Identify **one** safety hazard in the investigation.

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.....

..... [1]

(vi) The readings on the thermometer in Fig. 1.2 show that the maintenance of the temperature of the water during the investigation was a source of error.

Suggest an improvement to reduce this error.

.....

.....

..... [1]

(vii) The student did **not** repeat the investigation and only collected one set of results.

Explain why it is better to collect several sets of results.

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..... [1]

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(b) A student investigated the effect of surface area on diffusion.

The student used this method:

- Cut four cubes from a potato. Each cube should be a different size.
- Put the potato cubes into a methylene blue solution for 24 hours.
- After 24 hours, remove the potato cubes from the solution and rinse them in cold water.
- Fill four test-tubes with water. Place one potato cube into each test-tube. Leave the test-tubes for 15 minutes.
- Some of the methylene blue dye will diffuse out of the potato cube into the water during the 15 minutes. Shine a light through the water in the test-tube after 15 minutes.
- Measure the percentage of light that is absorbed by the methylene blue dye in the water in each test-tube.
- The higher the concentration of methylene blue dye in the water the greater the percentage of light absorbed.

(i) State the independent variable and the dependent variable in the investigation described in **1(b)**.

independent variable .....

.....

dependent variable .....

.....

[2]

(ii) State **one** variable that was kept constant in the investigation described in **1(b)**.

..... [1]

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(iii) Fig. 1.4 is a graph showing the student's results.

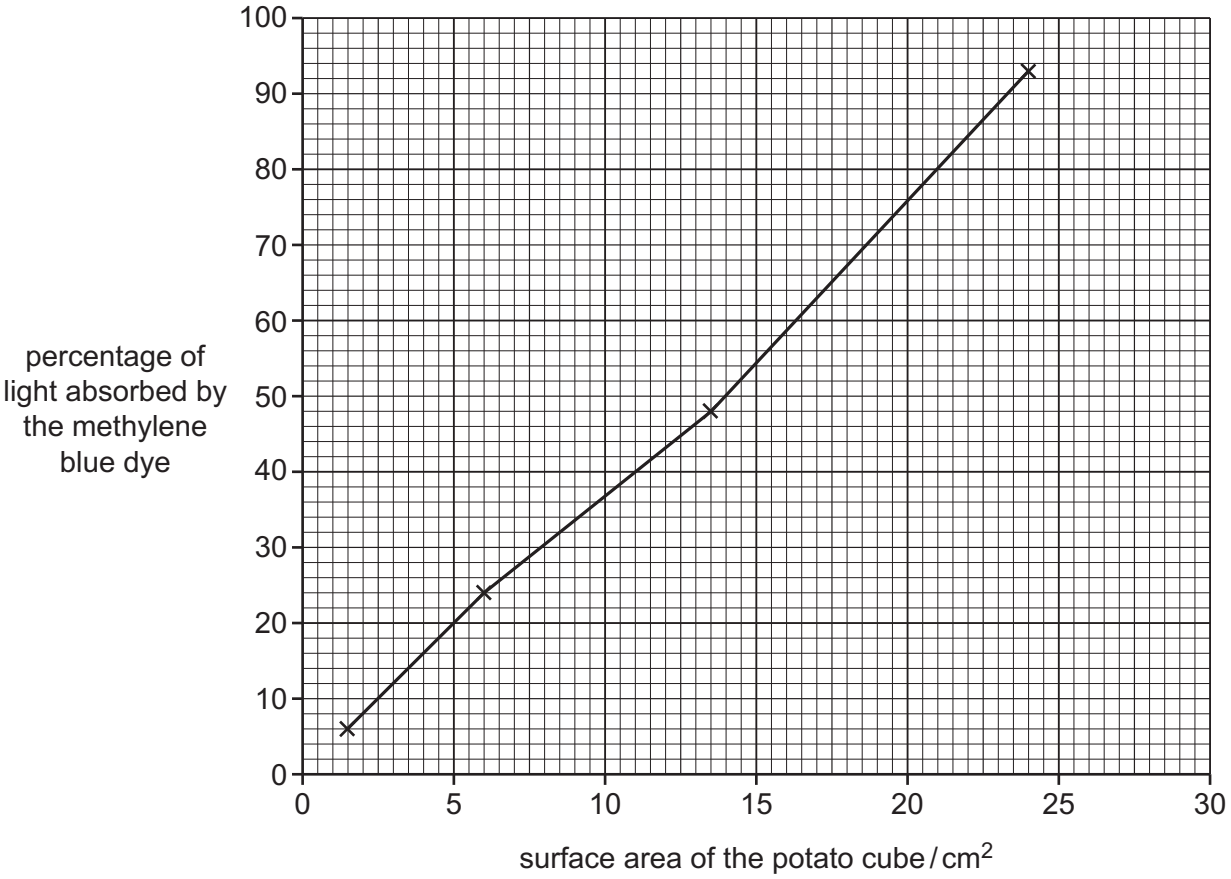

Fig. 1.4

Using Fig. 1.4, estimate the percentage of light absorbed by the methylene blue dye when the surface area of the potato cube is 18 cm^2.

Show on Fig. 1.4 how you obtained your estimate.

..... %
[2]

[Total: 14]

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2 **(a)** A scientist investigated the nutritional content of fruit juice.

(i) State the name of the reagent or solution that would be used to test the fruit juice for starch.

..... [1]

(ii) State the name of the reagent or solution that would be used to test the fruit juice for reducing sugars.

..... [1]

(iii) A sample of fruit juice was tested for protein.

State the result of a positive test.

..... [1]

(b) Fruit juice contains vitamin C.

Plan an investigation to determine the effect of temperature on vitamin C concentration in fruit juice.

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(c) Scientists wanted to find out if drinking beetroot juice lowers blood pressure.

Two groups of men had their systolic blood pressure measured. Group 1 drank 500 cm^3 of beetroot juice and group 2 drank 500 cm^3 of apple juice.

After six hours their systolic blood pressures were measured again.

The results are shown in Table 2.1.

Table 2.1

group	mean systolic blood pressure / mm Hg	
	before drinking	after six hours
1	132.4	127.4
2	131.3	132.1

(i) Using the data in Table 2.1, calculate the percentage change in mean systolic blood pressure for group 1.

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

Space for working.

..... %
[3]

(ii) State **one** factor that was kept constant in the investigation described in **2(c)**.

.....

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..... [1]

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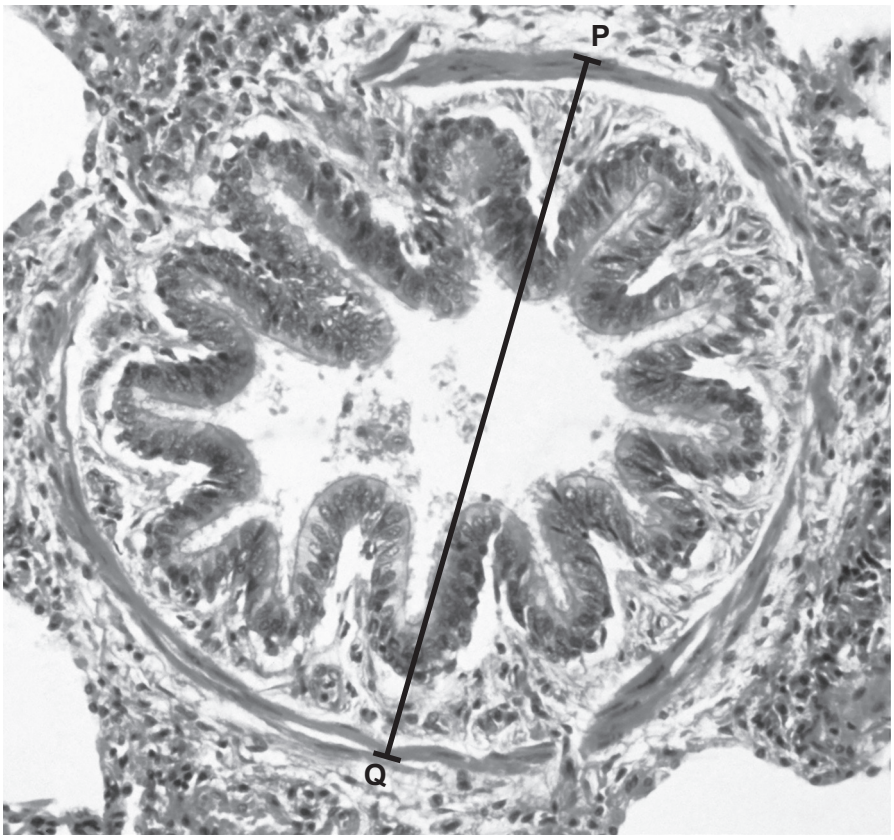
(d) Fig. 2.1 is a photomicrograph of a section through a bronchiole in a human lung.



magnification ×130

Fig. 2.1

(i) Line **PQ** represents the width of the bronchiole.

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

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

Calculate the actual width of the bronchiole using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ}}{\text{actual width of the bronchiole}}$$

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

Space for working.

..... mm
[3]

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(ii) Make a large drawing of the layers of tissue in the bronchiole shown in Fig. 2.1.

Do **not** draw individual cells.

[4]

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(e) A scientist investigated the effect of exercise on breathing rate and heart rate while running.

They measured the percentage increase in breathing rate and heart rate from the resting rates during a four-minute run.

The results are shown in Table 2.2.

Table 2.2

time / s	percentage increase from resting rates	
	breathing rate	heart rate
0	0	0
60	92	21
120	123	40
180	135	59
240	142	77

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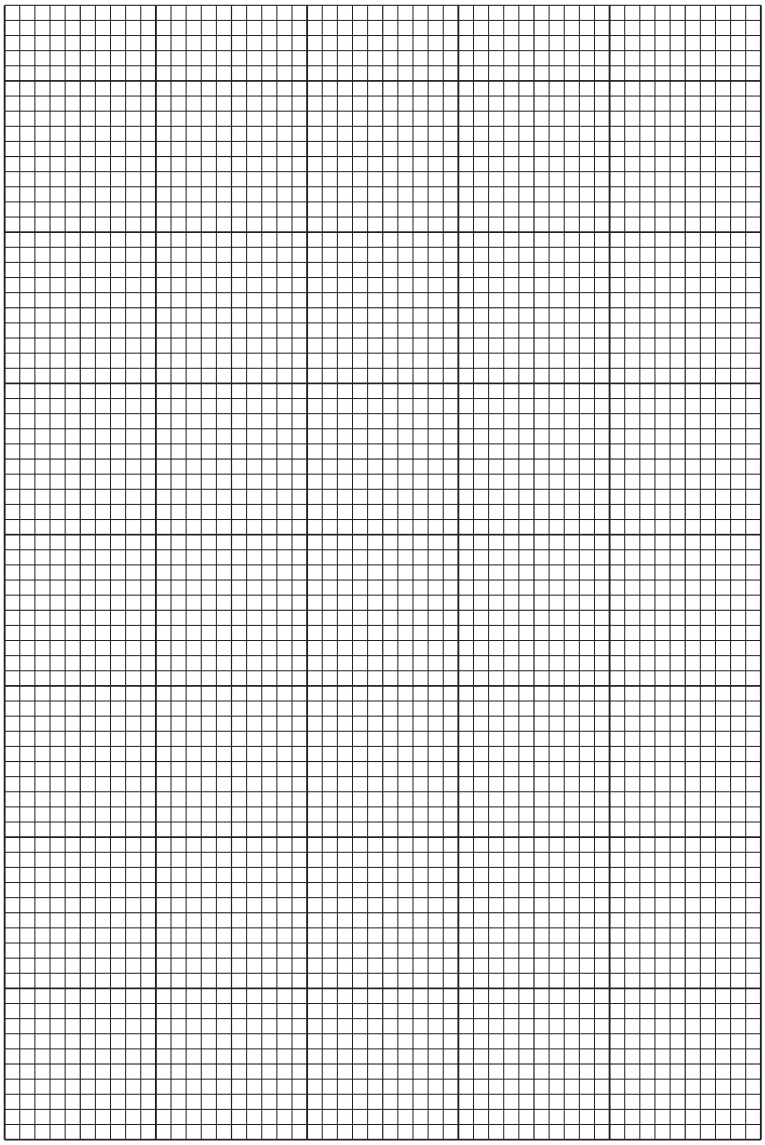
(i) Using all the data in Table 2.2, plot a line graph on the grid of the percentage increase from resting rate against time.

You will need to plot breathing rate and heart rate as **two** separate lines on your graph.

Include a key.



[5]

(ii) State a conclusion for the data shown in your graph.

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..... [1]

[Total: 26]

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