Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/62**

Paper 6 Alternative to Practical **May/June 2022**

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 temperature on the diffusion of vitamin C.

Vitamin C is an important part of a balanced diet and is found in some fruits and vegetables. When vegetables are boiled in water the vitamin C diffuses out into the surrounding water. A dialysis tubing bag filled with vitamin C solution was used to represent a vegetable.

The blue dye DCPIP was used as an indicator for the presence of vitamin C. High concentrations of vitamin C decolourise DCPIP quickly.

The student used the method described in step 1 to step 14.

Step 1 A syringe was used to fill a dialysis tubing bag with 10 cm^3 of vitamin C solution.

Step 2 The outside of the filled dialysis tubing bag was rinsed by dipping it into a beaker of distilled water.

Step 3 A large test-tube was labelled **hot**. The dialysis tubing bag was put into the large test-tube and secured in place with an elastic band, as shown in Fig. 1.1.

Step 4 Steps 1 to 3 were repeated with a second dialysis tubing bag and a large test-tube labelled **cold**.

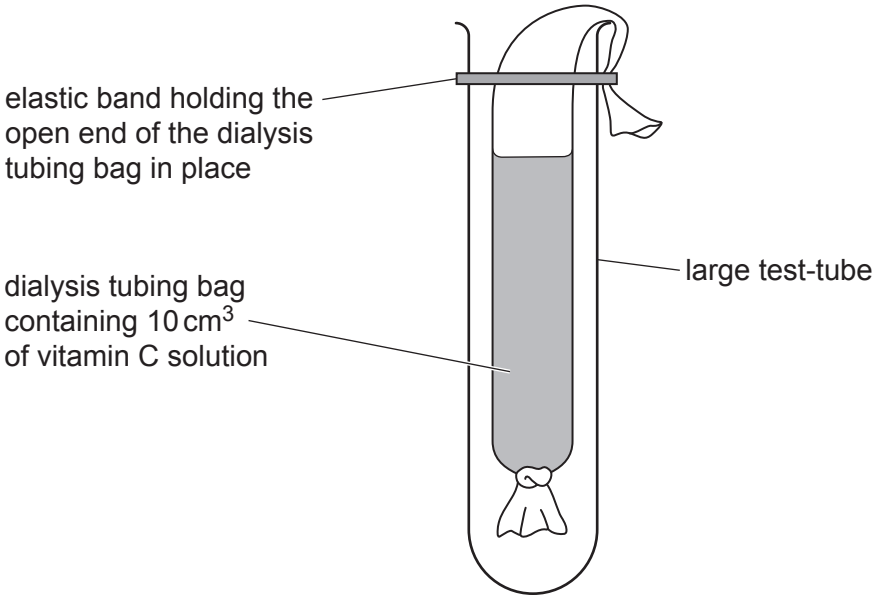

Fig. 1.1

Step 5 The large test-tube labelled **hot** was half-filled with hot water.

Step 6 The large test-tube labelled **cold** was half-filled with cold water.

Step 7 The temperature of the water in the large test-tube labelled **hot** was measured.

Step 8 The temperature of the water in the large test-tube labelled **cold** was measured.

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Fig. 1.2 shows the readings on the thermometer used in step 7 and step 8.

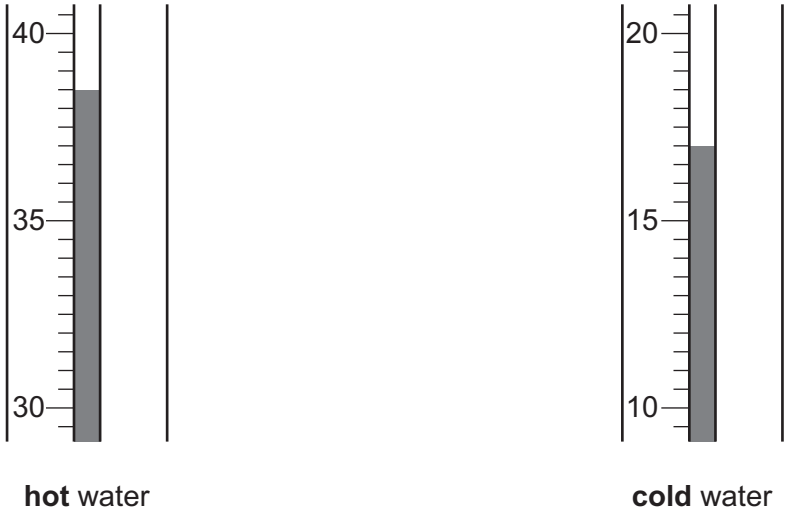

Fig. 1.2

(a) (i) State the temperatures of the hot water and the cold water shown on the thermometers in Fig. 1.2. Include the unit.

View solution

temperature of the **hot** water .....

temperature of the **cold** water .....

[2]

Step 9 The dialysis tubing bags were left in the large test-tubes for 15 minutes.

Step 10 After 15 minutes, the dialysis tubing bags were removed from the large test-tubes and discarded. 1 cm^3 of the liquid remaining in the large test-tube labelled **hot** was put into a clean standard test-tube.

Step 11 A syringe was filled with 10 cm^3 of DCPIP solution.

Step 12 One drop of DCPIP was added to the liquid in the standard test-tube and swirled to mix. After a few seconds the blue colour disappeared.

Step 13 The student continued to add drops of DCPIP until the blue colour remained after mixing.

Step 14 Steps 10 to 13 were repeated with 1 cm^3 of the liquid remaining in the test-tube labelled **cold**.

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The **unused** volumes of DCPIP **remaining** in the syringes are shown in Fig. 1.3.

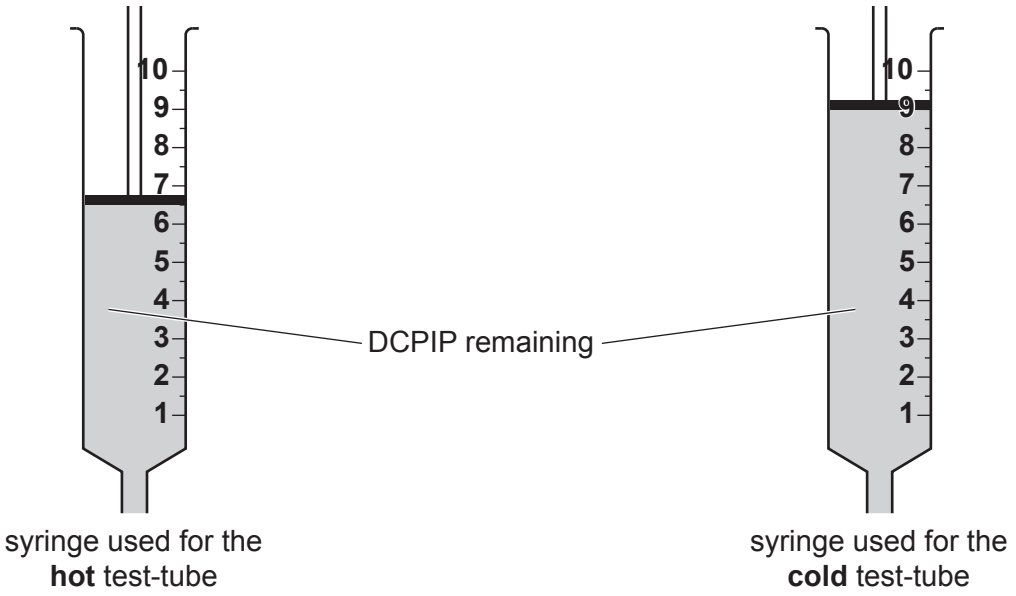

Fig. 1.3

(ii) Record the volumes of the DCPIP remaining in the syringes shown in Fig. 1.3.

syringe used for the **hot** test-tube .....

syringe used for the **cold** test-tube .....

[1]

(iii) Prepare a table to record the volume of DCPIP that has been **used** in each test-tube, in the space provided.

Use your answer in **1(a)(ii)** and the equation to calculate the volume of DCPIP that has been **used** in each test-tube:

volume of DCPIP used = 10 – volume of DCPIP remaining in the syringe

[3]

(iv) State a conclusion for these results.

.....

.....

..... [1]

(v) Suggest why the dialysis tubing bag was rinsed in step 2.

.....

.....

..... [1]

(vi) Identify **one** source of error in step 5 or step 6 and suggest a suitable piece of equipment to overcome this error.

error .....

.....

equipment .....

.....

[2]

(vii) Identify the variable that the student changed (independent variable) and the variable that was measured (dependent variable) in this investigation.

independent variable .....

.....

dependent variable .....

.....

[2]

(viii) Suggest why repeating the procedure several times would improve the investigation.

.....

.....

..... [1]

(b) Dialysis tubing acts as a partially permeable membrane and can be used to represent a model cell to investigate osmosis.

Plan an investigation to find out how different concentrations of sugar solutions affect the movement of water into or out of dialysis tubing.

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..... [6]

[Total: 19]

View solution

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2 Nautiluses are a genus of marine animals that live in shells. Fig. 2.1 is a photograph of a nautilus shell.

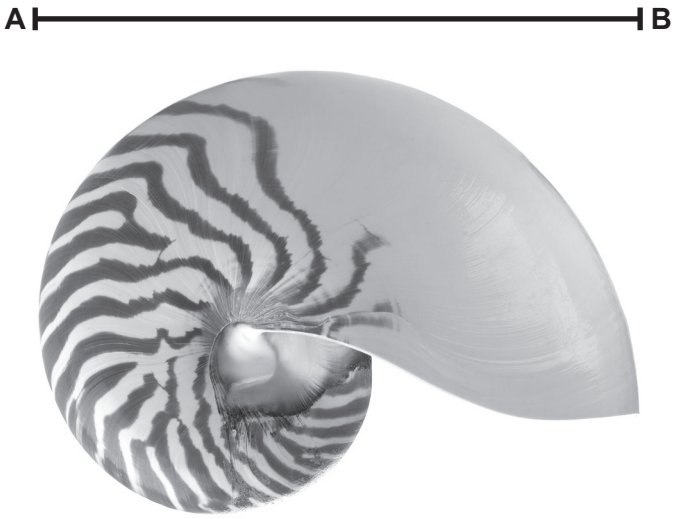


Fig. 2.1

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

View solution

[4]

(ii) Line **AB** represents the width of the nautilus shell.

View solution

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

length of line **AB** in Fig. 2.1 ..... mm

The actual width of the shell is 130 mm.

Calculate the magnification of the shell in Fig. 2.1.

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ in Fig. 2.1}}{\text{actual width of the shell}}$$

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

Space for working.

.....

[3]

(b) Fig. 2.2 shows a fossilised nautilus shell.

View solution



Fig. 2.2

Describe **one** visible similarity and **one** visible difference between the nautilus shell in Fig. 2.1 and the fossilised nautilus shell in Fig. 2.2.

similarity .....

.....

difference .....

.....

[2]

(c) A population of one species of nautilus was studied. The widths of the nautilus shells were measured and recorded.

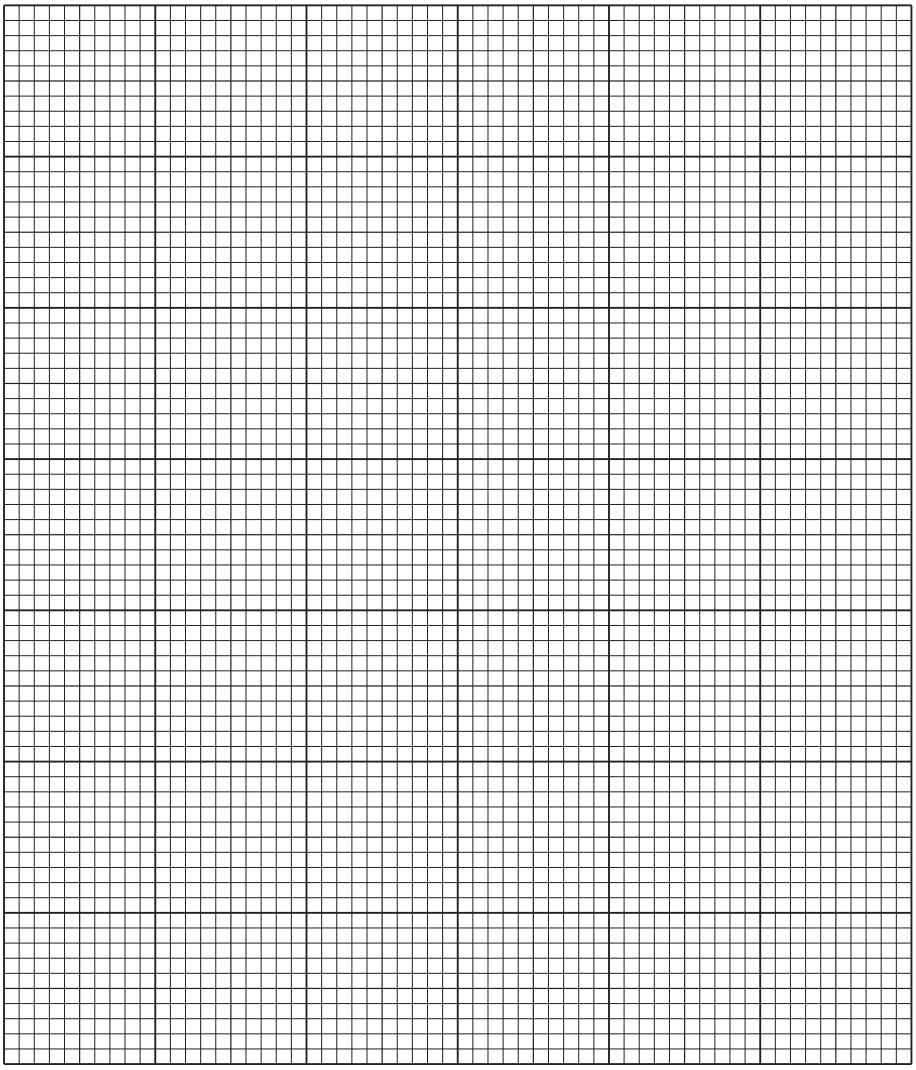
View solution

The results are shown in Table 2.1.

Table 2.1

width of shell / mm	number of shells
101–110	8
111–120	84
121–130	138
131–140	98
141–150	22

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



[4]

(ii) Using the information in your graph, describe the results of this study.

View solution

.....

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..... [2]

(iii) The study measured the width of 350 nautilus shells.

View solution

Suggest why such a large number of shells were measured.

.....

.....

..... [1]

(iv) Using the data in Table 2.1, calculate the percentage of the population of nautiluses that have shells that are wider than 130 mm.

View solution

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

Space for working.

.....%

[3]

(d) The nautilus feeds on fish which are an important source of protein.

View solution

State the name of the test for protein. Give the result of a positive test.

test for protein .....

positive test result .....

[2]

[Total: 21]

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