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Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			



BIOLOGY **0970/62**

Paper 6 Alternative to Practical **May/June 2020**

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. Blank pages are indicated.

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1 A student investigated the effect of temperature on diffusion. Dialysis tubing was used to represent a cell membrane. Cell membranes are partially permeable.

Step 1 One test-tube was labelled **C** and another test-tube was labelled **H**. The student drew a small **X** on the outside of each test-tube as shown in Fig. 1.1.

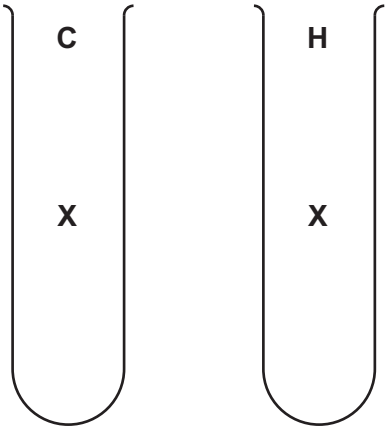


Fig. 1.1

Step 2 The student was given two pieces of dialysis tubing. A knot was tied at one end of each piece of dialysis tubing to form two bags.

Step 3 Starch suspension was put into each dialysis tubing bag until each bag was approximately three-quarters full.

Step 4 One of the dialysis tubing bags containing starch suspension was put into test-tube **C**. The open end of the dialysis tubing was folded over the top of the test-tube. It was secured with an elastic band as shown in Fig. 1.2.

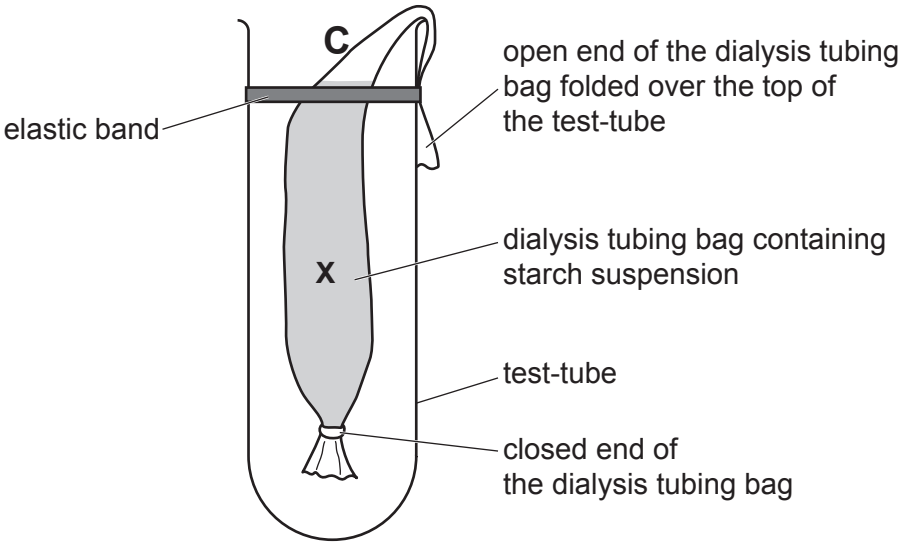


Fig. 1.2

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Step 5 Step 4 was repeated with the other dialysis tubing bag and test-tube **H**.

Step 6 Cold water was added to test-tube **C** until it reached the level of the elastic band.

Step 7 Hot water was added to test-tube **H** until it reached the level of the elastic band.

Step 8 The temperatures of the water in test-tube **C** and test-tube **H** were measured.

The temperatures are shown on the sections of thermometers in Fig. 1.3.

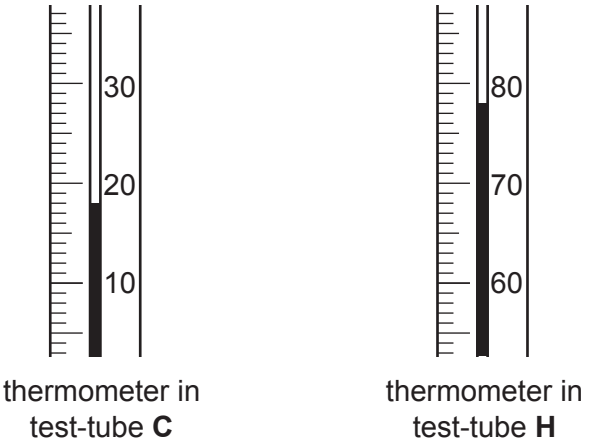


Fig. 1.3

Step 9 1 cm^3 of iodine solution was added to the water in each test-tube.

Step 10 A stop-clock was started.

Step 11 The student observed the **X** on each test-tube by looking through the dialysis tubing bags as shown in Fig. 1.4.

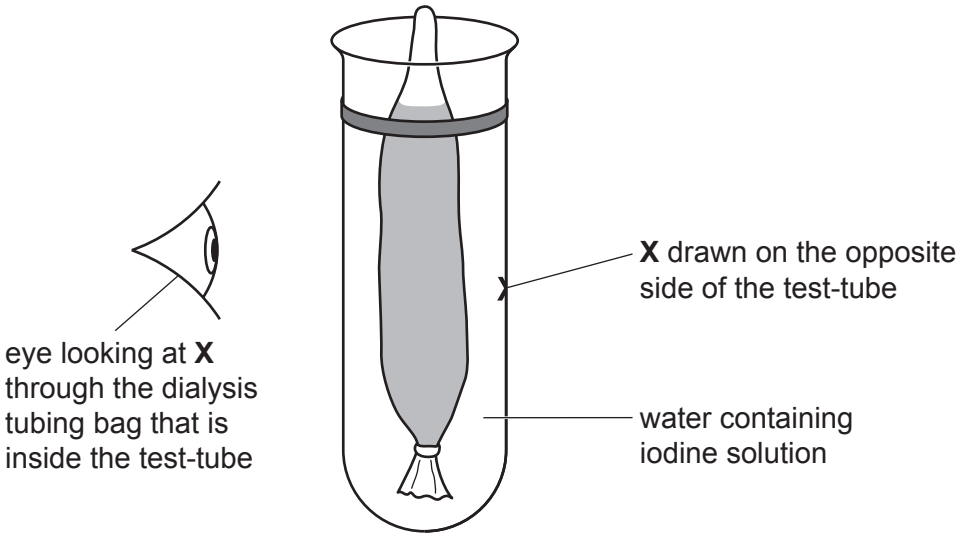


Fig. 1.4

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Step 12 The student continued to observe the **X** until the contents of the dialysis tubing bag became blue-black in colour. At this point the **X** was no longer visible.
The student recorded the time taken for the **X** to stop being visible in each test-tube.

The student's results are shown in Fig. 1.5.

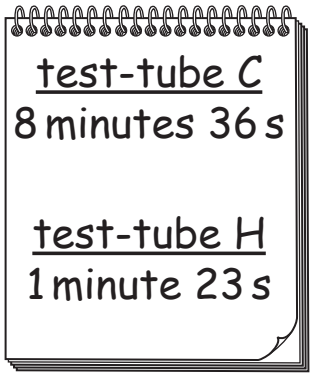


Fig. 1.5

(a) (i) Prepare a table to record the temperatures shown in Fig. 1.3 and the results shown in Fig. 1.5.

The times shown in Fig. 1.5 should be converted to seconds.

[3]

(ii) State a conclusion for this investigation.

.....

.....

..... [1]

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(iii) Identify the variable that was changed by the student (independent variable) in this investigation.

..... [1]

(iv) The student observed that the liquid inside the dialysis tubing bag turned blue-black in colour during the investigation. The liquid in the test-tube surrounding the dialysis tubing bag remained brown.

State what can be concluded about the ability of the starch molecules to move through the dialysis tubing.

State the evidence to support your conclusion.

conclusion .....

.....

evidence .....

.....

.....

[2]

(v) Identify **one** possible source of error in this investigation and suggest **one** additional piece of apparatus that could be used to reduce the effect of this error.

error .....

.....

.....

apparatus .....

.....

.....

[2]

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(b) (i) Amylase is an enzyme that breaks down starch to form reducing sugars.

Describe how you could test for the presence of reducing sugars.

Include the result of a positive test.

method .....

.....

.....

.....

.....

result .....

[3]

(ii) Plan an investigation to determine the effect of different concentrations of amylase on the breakdown of starch.

.....

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.....

.....

..... [6]

[Total: 18]

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2 A student investigated the effect of different concentrations of sugar solution on osmosis in potato sticks.

The student used this method:

- cut six potato sticks
- measure the initial mass of each potato stick
- place each potato stick in a different concentration of sugar solution
- leave the potato sticks in the sugar solutions for one hour
- after one hour remove the potato sticks and measure the final mass of each potato stick.

(a) (i) All of the potato sticks were left in the sugar solutions for the same length of time.

State **two** other variables that the student should have kept constant during their investigation.

1 .....

2 .....
[2]

(ii) Identify the variable that was measured (dependent variable) in this investigation.

..... [1]

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(b) The results of the investigation are shown in Table 2.1.

Table 2.1

concentration of sugar solution / mol per dm^3	initial mass of potato stick / g	final mass of potato stick / g	percentage change in mass
0.0	2.14	2.18	1.87
0.2	1.90	1.91	0.53
0.4	2.32	2.30	–0.86
0.6	2.25	2.21	–1.78
0.8	2.08	2.03	
1.0	2.16	2.10	–2.78

(i) Calculate the percentage change in mass for the potato stick that was placed in the 0.8 mol per dm^3 sugar solution.

Give your answer to **two** decimal places.

Space for working.

.....%
[2]

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(ii) Plot a line graph on the grid to show the data in Table 2.1. One axis has been started for you.



[4]

(iii) State the concentration of the sugar solution at which your graph shows there would be no change in the mass of the potato stick.

..... mol per dm^3 [1]

(iv) The student wanted to obtain a more accurate value for the concentration of the sugar solution at which there would be no change in the mass of the potato stick.

Suggest further investigative work that the student should carry out.

.....

.....

.....

.....

..... [2]

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(c) Fig. 2.1 is a photomicrograph showing cells from a potato.

The structures visible within the cells are starch grains.

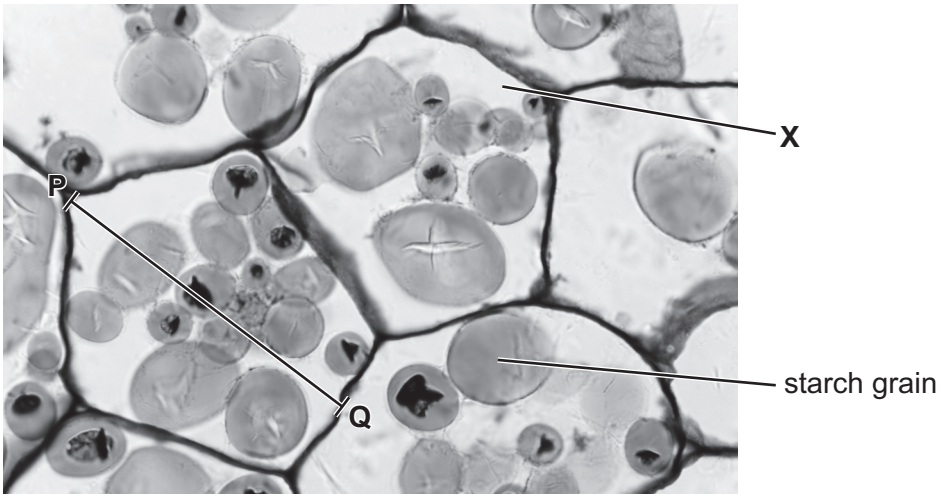


Fig. 2.1

(i) Draw a large diagram of the cell labelled **X**. Do not label your diagram.

[4]

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(ii) Measure the length of line **PQ** on Fig. 2.1. Include the unit.

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

The actual length of the potato cell at line **PQ** is 0.14 mm.

Calculate the magnification of the potato cell using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ}}{\text{actual length of the potato cell}}$$

Give your answer to the nearest whole number.

Space for working.

.....
[3]

(iii) A student measured the actual lengths of five of the starch grains present in one potato cell. The results are shown in Table 2.2.

Table 2.2

length of starch grain / mm
0.052
0.048
0.025
0.023
0.017

Calculate the average length of the starch grains.

..... mm [1]

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(d) Potato cells release carbon dioxide during respiration.

State the name of an indicator which could be used to test for the presence of carbon dioxide and give the result of a positive test.

indicator .....

result .....
[2]

[Total: 22]

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