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Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

2681482990

BIOLOGY **0970/61**

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 Sugars are a source of energy in the diet.

A student wanted to estimate the concentration of glucose in an energy drink (**D**).

Step 1 Three test-tubes were labelled **A**, **B** and **C**.

Step 2 Three different concentrations of glucose solution were prepared as shown in Table 1.1.

(a) (i) Complete Table 1.1 by calculating and writing in the volume of 4% glucose solution used in test-tube **B**.

Table 1.1

test-tube	volume of 4% glucose solution / cm^3	volume of distilled water / cm^3	percentage concentration of glucose solution
A	10.0	0.0	4
B		5.0	2
C	2.5	7.5	1

[1]

Step 3 5 cm^3 of Benedict's solution was added to each of the glucose solutions in test-tubes **A**, **B** and **C**. Each test-tube was gently shaken for 3 seconds to mix the contents.

Step 4 5 cm^3 of Benedict's solution was added to test-tube **D** which contained 10 cm^3 of energy drink **D**. The test-tube was gently shaken for 3 seconds to mix the contents.

Step 5 Hot water was put into a beaker that was used as a water-bath.

Step 6 The temperature of the hot water in the water-bath (initial temperature) was measured.

Step 7 Test-tube **A** was put into the water-bath and a stop-clock was started.

Step 8 Test-tube **A** was observed and the stop-clock was stopped when the contents of the test-tube **first** changed colour.

Step 9 Test-tube **A** was removed from the water-bath.

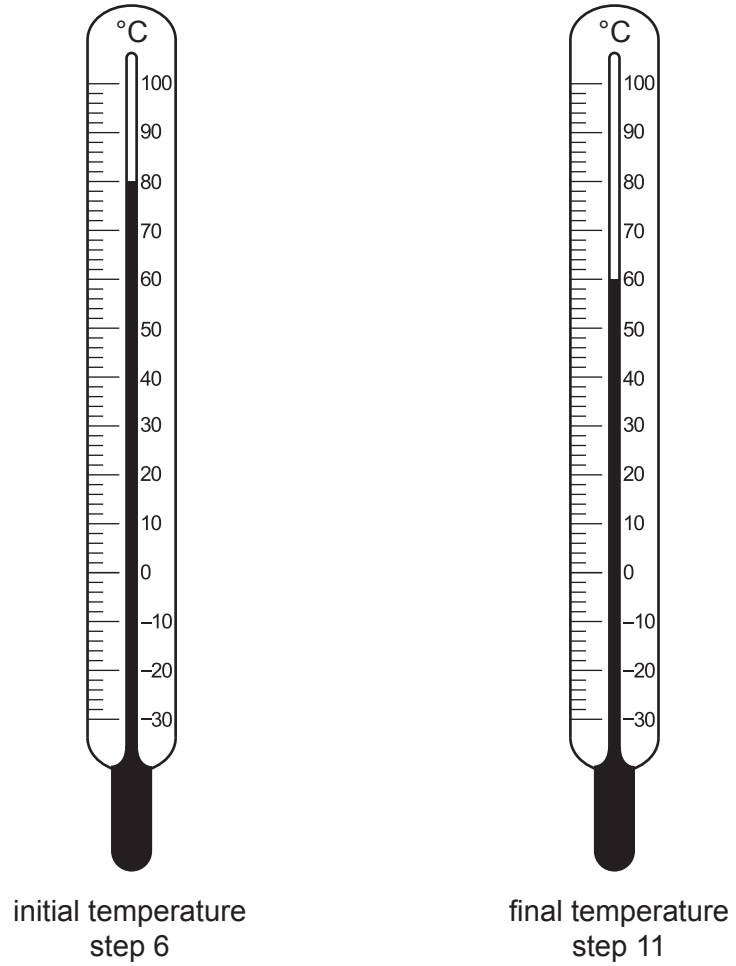
Step 10 Steps 7, 8 and 9 were repeated with test-tubes **B**, **C** and **D**.

Step 11 The final temperature of the water in the water-bath was measured at the end of the investigation.

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(ii) Fig. 1.1 shows the appearance of the thermometer in step 6 and in step 11.



initial temperature
step 6

final temperature
step 11

Fig. 1.1

Record the temperatures shown in Fig. 1.1 in Table 1.2.

Table 1.2

step 6 initial temperature / °C	step 11 final temperature / °C

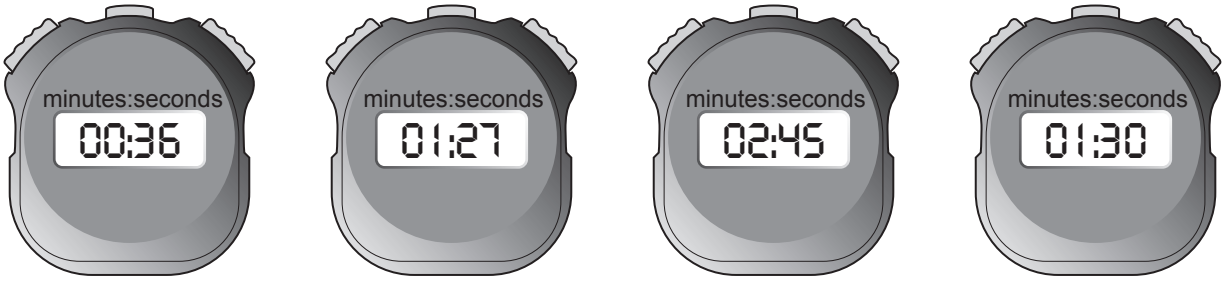
[1]

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(iii) Fig. 1.2 shows the stop-clock readings for each test-tube in step 8.



test-tube **A** test-tube **B** test-tube **C** test-tube **D**

Fig. 1.2

Convert the times shown in Fig. 1.2 to seconds.

Prepare a table and record these times in your table.

[3]

(iv) Estimate the concentration of glucose in energy drink **D** using the information in Table 1.1 and the results in your table in **1(a)(iii)**.

.....% [1]

(v) Explain how you estimated the concentration of glucose in energy drink **D** in **1(a)(iv)**.

.....

.....

..... [1]

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(b) Fig. 1.1 and Table 1.2 may indicate that there is a source of error in this investigation.

(i) Identify the possible source of error **and** suggest **one** way the method could be improved to reduce this error.

source of error .....

.....

improvement .....

.....

.....
[2]

(ii) Explain how the error identified in **1(b)(i)** could affect the results and the estimation of the concentration of glucose in energy drink **D**.

.....

.....

..... [1]

(c) (i) State **two** variables that were kept constant in the investigation in **1(a)**.

1 .....

2 .....
[2]

(ii) State **one** reason why the student should wear eye protection when carrying out this investigation.

.....

.....

..... [1]

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(d) Barley grains are used in the food industry as a source of sugars. Barley grains contain starch. Starch can be broken down into sugars by enzymes.

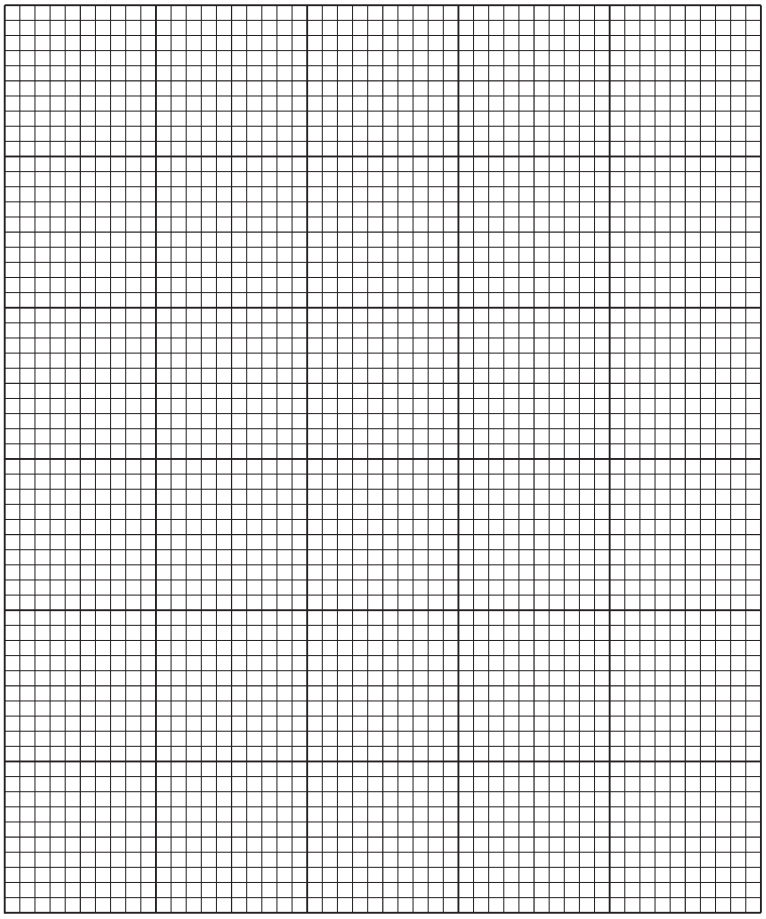
Students made a starch suspension from barley grains to investigate the breakdown of starch by enzymes. The starch suspension contained 100 g of starch. They mixed the starch suspension with enzymes and recorded the mass of starch remaining in the mixture at different times.

The results are shown in Table 1.3.

Table 1.3

time / minutes	mass of starch remaining / g
0	100
5	58
10	40
20	32
40	28

(i) Plot a line graph on the grid of the data in Table 1.3.



[4]

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(ii) Describe the trend shown in your graph.

.....

.....

..... [1]

(iii) Estimate the mass of starch remaining at 15 minutes.

Show on your graph how you obtained your answer.

..... g
[2]

(iv) Calculate the rate of starch breakdown in the first five minutes using the information in Table 1.3 or your graph.

..... g per minute [1]

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(e) Plan an investigation to determine the effect of temperature on the breakdown of starch by enzymes.

.....

.....

.....

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.....

.....

..... [6]

[Total: 27]

2 **(a)** Human reproduction involves a male gamete (sperm) and a female gamete (ovum).

Fig. 2.1 is a photomicrograph of a single ovum and many sperm cells during fertilisation.

Line **AB** represents the diameter of the ovum.

Line **CD** represents the length of one sperm cell.

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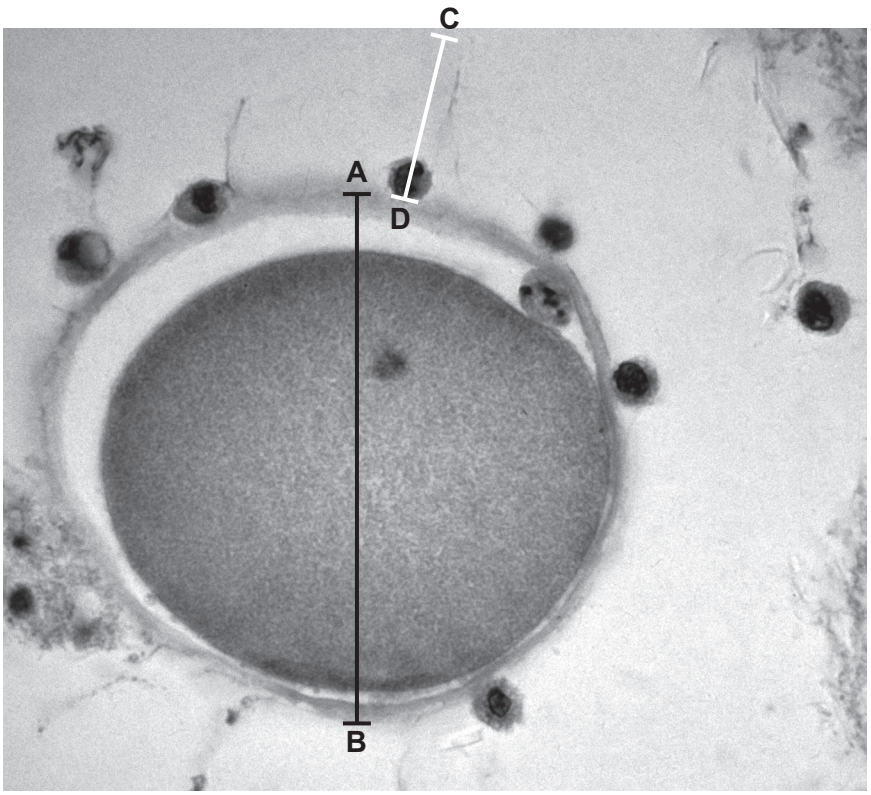


Fig. 2.1

(i) Measure the lengths of lines **AB** and **CD** on Fig. 2.1. Include the unit.

length of line **AB** ..... length of line **CD** ..... [1]

(ii) The actual diameter of the ovum is 0.10 mm.

Calculate the magnification of the ovum in Fig. 2.1 using the formula:

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ on Fig. 2.1}}{\text{actual diameter of ovum}}$$

..... [1]

(iii) Calculate the actual length of the sperm cell using the magnification you calculated in **2(a)(ii)** and the formula:

$$\text{magnification} = \frac{\text{length of line } \mathbf{CD} \text{ on Fig. 2.1}}{\text{actual length of sperm cell}}$$

Give your answer to two decimal places.

..... mm
[3]

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(b) Fig. 2.2 is a different photomicrograph of an ovum and one sperm cell.

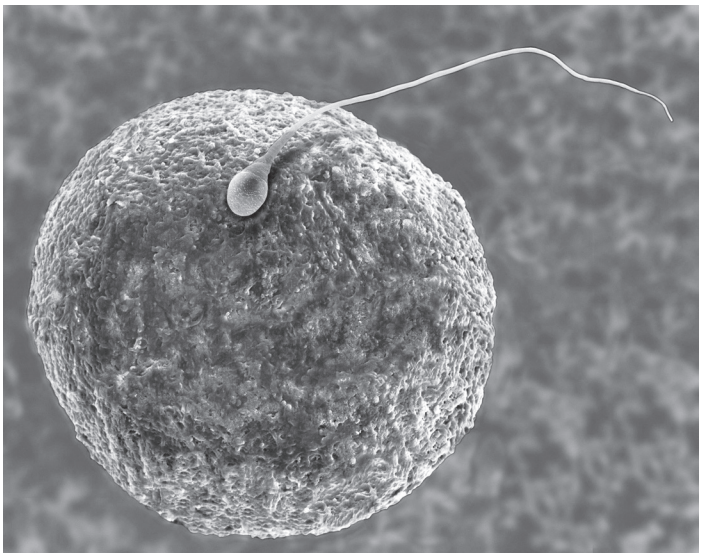


Fig. 2.2

(i) Make a large drawing of the ovum and the sperm cell shown in Fig. 2.2.

Label the ovum on your drawing.

[5]

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(ii) State **three** visible differences between the ovum and the sperm cell that can be seen in Fig. 2.2.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

[Total: 13]

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