Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/61**

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**.

View solution

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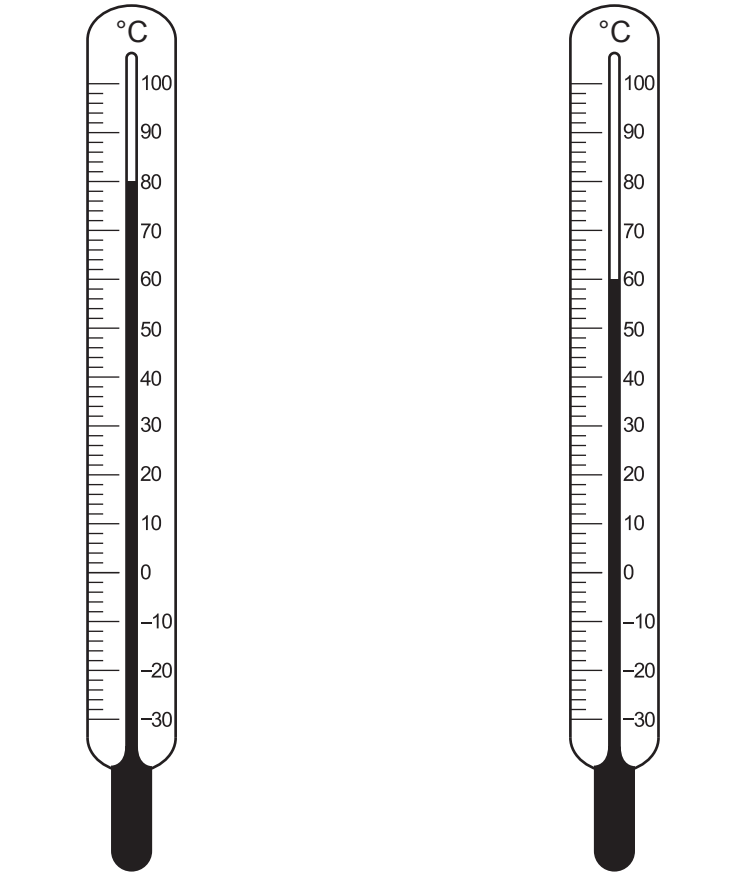
(ii) Fig. 1.1 shows the appearance of the thermometer in step 6 and in step 11.



initial temperature
step 6

final temperature
step 11

Fig. 1.1

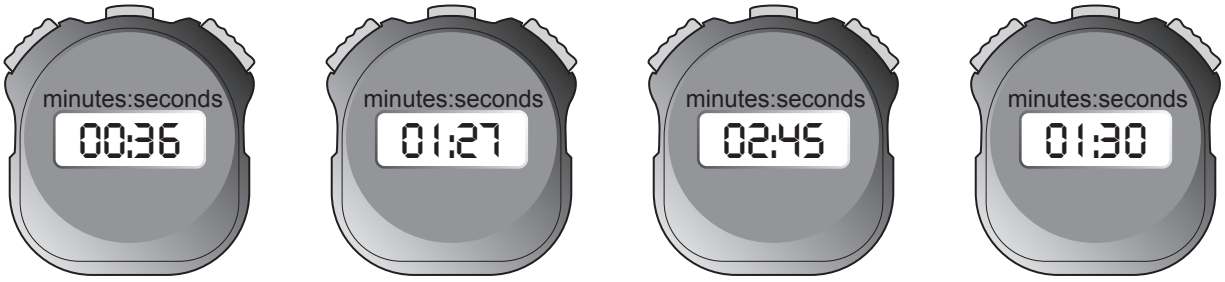
Record the temperatures shown in Fig. 1.1 in Table 1.2.

Table 1.2

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

[1]

(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)**.

View solution

1 .....

2 .....

[2]

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

.....

.....

..... [1]

View solution

(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.

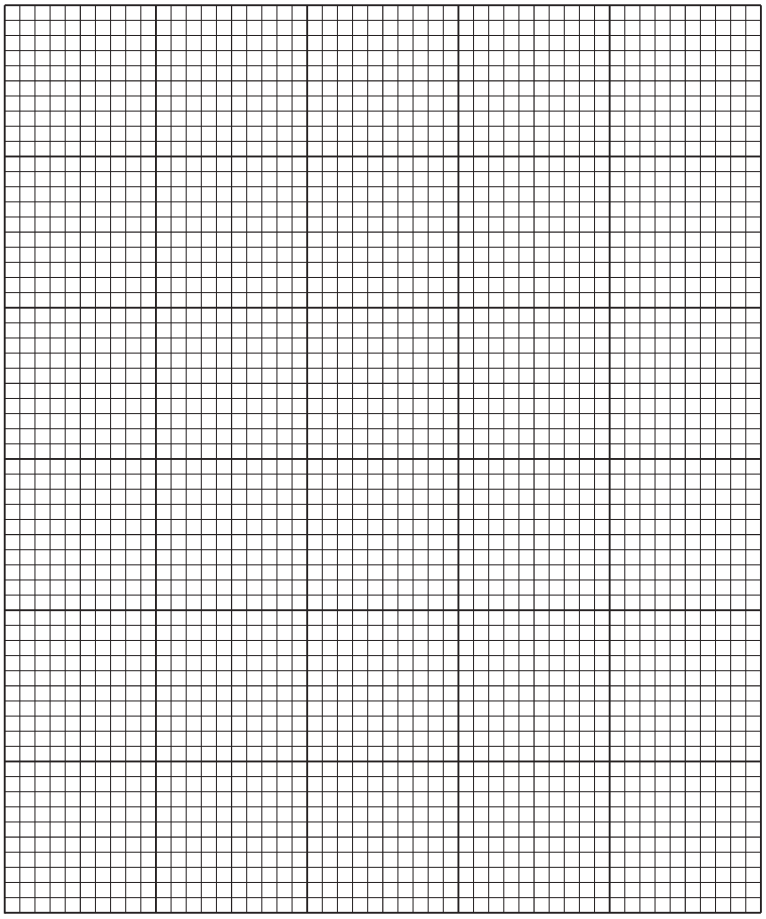
View solution

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.

View solution

.....

.....

..... [1]

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

View solution

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.

View solution

..... 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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.....

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.....

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.....

.....

.....

.....

..... [6]

View solution [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.

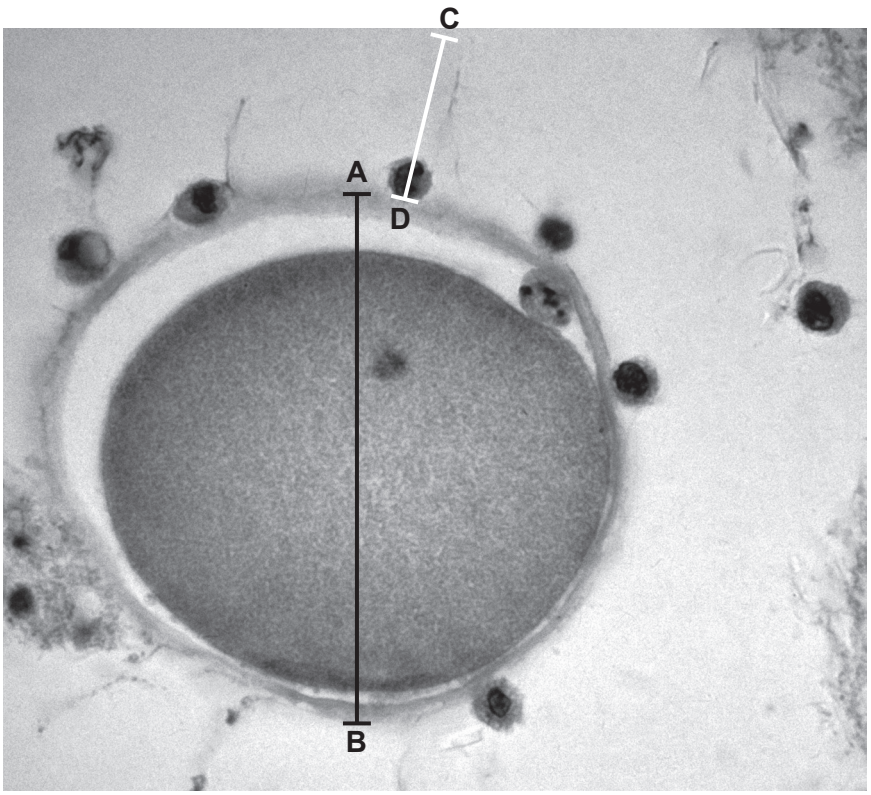

Fig. 2.1

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

View solution

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

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

View solution

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:

View solution

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

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.

View solution

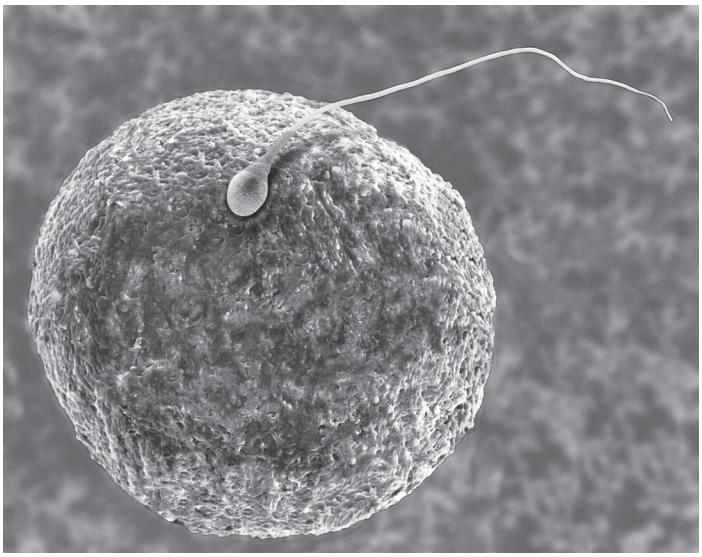

Fig. 2.2

(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]

View solution

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