



CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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0610/51

May/June 2020

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential 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.

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [].

For Examiner's Use	
1	
2	
Total	

This document has **12** pages. Blank pages are indicated.

1 Sugars are a source of energy in the diet.

You are going to estimate the concentration of glucose in an energy drink (**D**).

Read all the instructions but DO NOT CARRY THEM OUT until you have drawn a table for your results in the space provided in 1(a)(iii).

You should use the gloves and eye protection provided while you are carrying out the practical work.

Step 1 Label three test-tubes **A**, **B** and **C**.

Step 2 Use the volumes of 4% glucose solution and distilled water shown in Table 1.1 to make three different concentrations of glucose solution in test-tubes **A**, **B** and **C**.

(a) (i) Complete Table 1.1 by calculating and writing in the percentage concentration of glucose solution 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	5.0	
C	2.5	7.5	1

[1]

Step 3 Add 5 cm³ of Benedict's solution to each of the glucose solutions in the test-tubes **A**, **B** and **C**. Shake each test-tube gently for 3 seconds to mix the contents.

Step 4 Add 5 cm³ of Benedict's solution to test-tube **D** which contains 10 cm³ of energy drink **D**. Shake the test-tube gently for 3 seconds to mix the contents.

Step 5 Raise your hand when you are ready for hot water to be put into the beaker labelled **water-bath**.

Step 6 Measure the temperature of the hot water in the water-bath (initial temperature).

(ii) Record the initial temperature in Table 1.2.

Table 1.2

initial temperature/°C	final temperature/°C

[1]

Step 7 Put test-tube **A** into the water-bath and immediately start the stop-clock.

Step 8 Observe test-tube **A** carefully and note the time at which the contents of the test-tube **first** change colour. **This reaction may occur very quickly.**

If there is no colour change after 5 minutes record the time as **>300**.

Record the time taken in seconds for the colour change in the table you have prepared in **1(a)(iii)**.

Step 9 Remove test-tube **A** from the water-bath and put it back into the test-tube rack.

Reset the stop-clock.

Step 10 Repeat steps 7, 8 and 9 with test-tube **B**.

Step 11 Repeat steps 7, 8 and 9 with test-tube **C**.

Step 12 Repeat steps 7, 8 and 9 with test-tube **D**.

Step 13 Measure the final temperature of the water in the water-bath.

Record this temperature in Table 1.2.

(iii) Prepare a table to record your results in the space provided.

[4]

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

..... % [1]

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

.....

.....

..... [1]

(b) 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 your results and the estimation of the concentration of glucose in energy drink **D**.

.....

.....

..... [1]

(c) State **two** variables that were kept constant in this investigation.

1

2

[2]

(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.

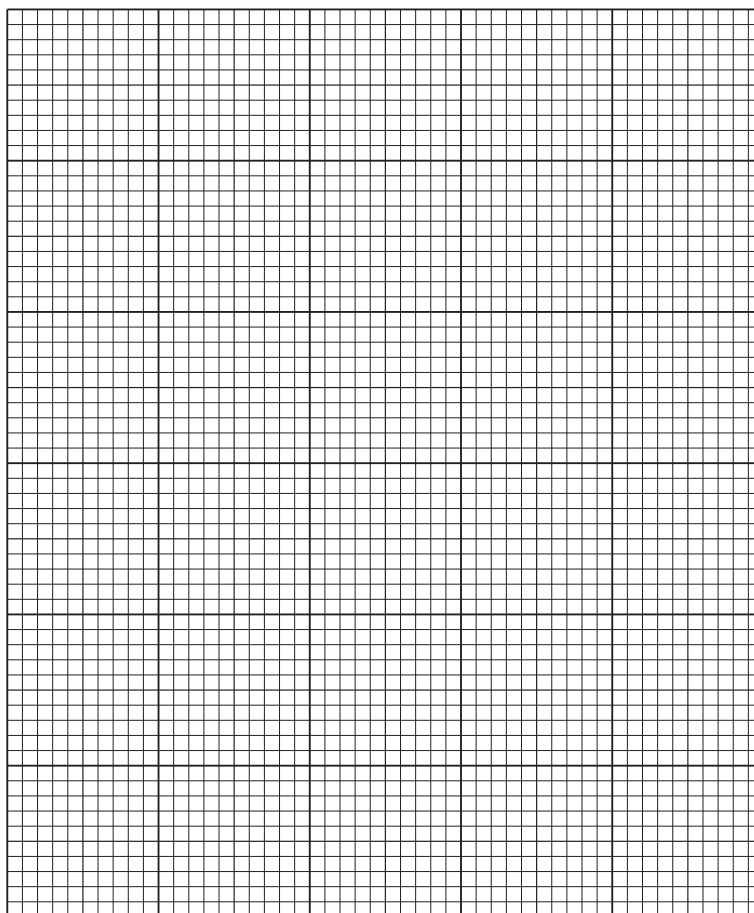
Students made a starch suspension from barley grains to investigate the breakdown of starch by enzymes. The starch suspension contained 100g of starch. They mixed the starch suspension with enzymes and recorded the mass of starch remaining in the mixture at different times.

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]

- (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]

[6]

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.

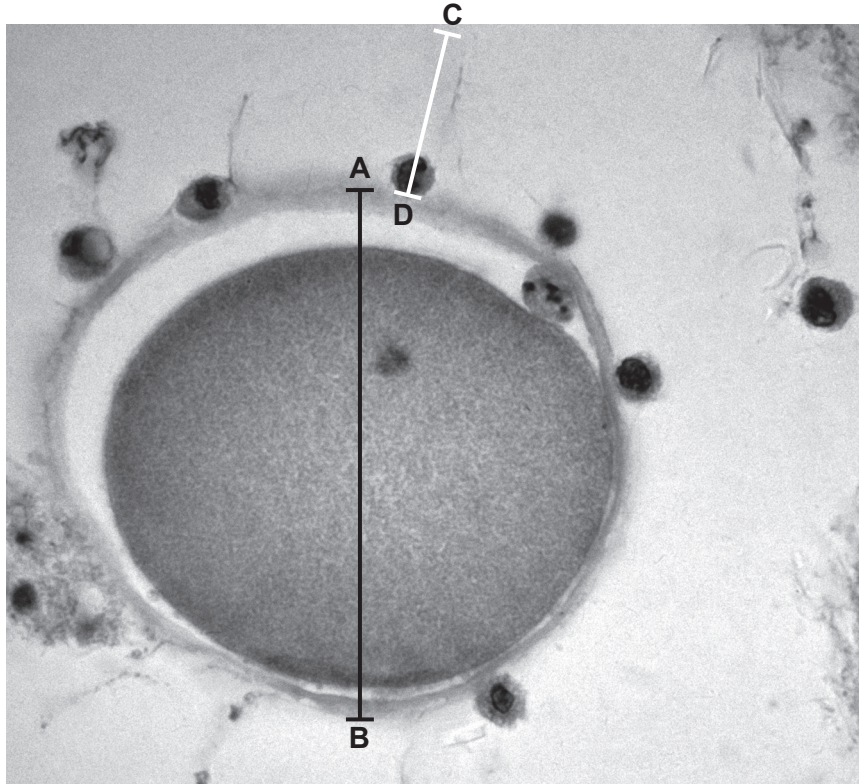


Fig. 2.1

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

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:

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

..... [1]

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

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

Give your answer to two decimal places.

..... mm

[3]

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

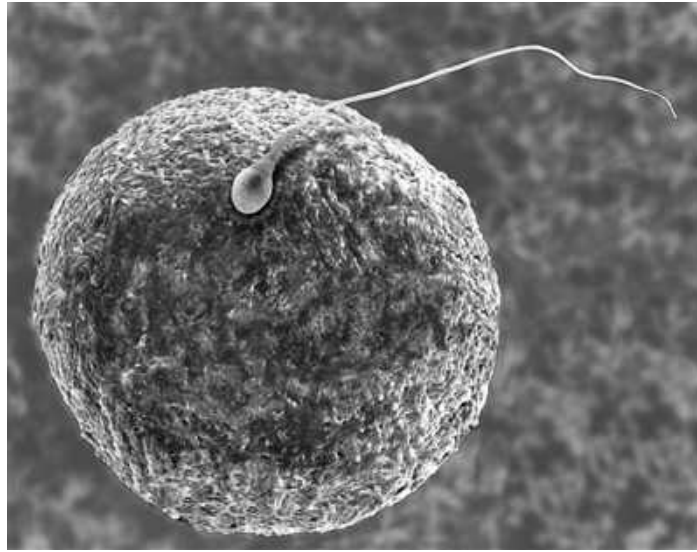


Fig. 2.2

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

- (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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