



CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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0610/05

For examination from 2020

SPECIMEN PAPER

1 hour 15 minutes

Candidates answer on the question paper.

Additional materials: As listed in the confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.

You may lose marks if you do not show your working or if you do not use appropriate units.

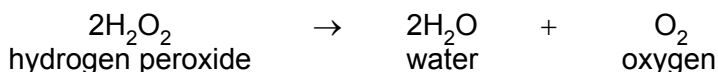
At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

This document consists of **9** printed pages and **1** blank page.

1 You are going to investigate the activity of catalase.

Catalase is an enzyme found in plant and animal tissues. It catalyses the breakdown of hydrogen peroxide into water and oxygen. The activity of this enzyme can be measured by collecting the oxygen produced.



Hydrogen peroxide can irritate the skin and damage the eyes. Use the eye protection and plastic gloves provided.

You will use the apparatus shown in Fig. 1.1 to compare the activity of catalase using pieces of sweet potato of different sizes.

Read through the method below before starting the experiment.

In the space in Question 1(a), prepare a table in which to record your results.

You are provided with a slice of sweet potato and three test-tubes each containing 5 cm³ of hydrogen peroxide solution.

- Remove the outer layer from around the slice of sweet potato.
- Cut **three** cubes from the slice. Each cube should be 10 mm × 10 mm × 10 mm.
- Set up the apparatus as in Fig. 1.1. Make sure the end of the delivery tube is below the level of the water in test-tube **B**.

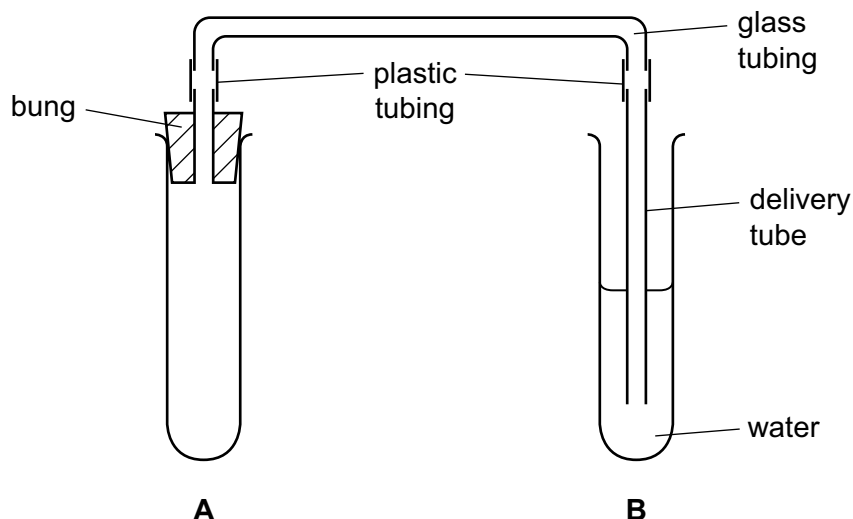


Fig. 1.1

- Remove the bung from test-tube **A**, and place one of your three cubes of sweet potato (cube 1) into this test-tube.
- Empty the contents of one of the test-tubes labelled **hydrogen peroxide** into test-tube **A**.
- Immediately replace the bung in test-tube **A**. Bubbles of gas will begin to appear as soon as the solution makes contact with the cube.
- Begin timing when the first bubble comes out of the delivery tube and count the number of bubbles that escape into the water in test-tube **B** for a period of 1 minute. Record this result in your table at **1(a)**.

- After another minute, measure the height of the foam in test-tube **A**. Record this result.
- Discard the contents of test-tube **A** into the container labelled **waste washings**, and rinse the test-tube with water.
- Take the second cube of sweet potato (cube 2) and cut this into **two** smaller pieces of approximately the same size.
- Put **both** of these pieces from cube 2 into test-tube **A** and repeat the procedure.
- Record your results for cube 2 in your table.
- Discard the contents of test-tube **A** into the container labelled **waste washings**, and rinse the test-tube with water.
- Cut the third cube of sweet potato (cube 3) into **eight** smaller pieces.
- Put **all** eight pieces into test-tube **A** and repeat the procedure.
- Record your results for cube 3 in your table.

(a) Use this space for your table of results.

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

1

2 [2]

(ii) Suggest how you could improve the method you have followed.

.....

.....

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.....

.....

..... [3]

(c) What conclusion can be drawn from your results?

.....

.....

.....

..... [1]

- (d) (i)** Some students were given a hypothesis that said,

"the activity of catalase increases with increasing temperature".

Describe a similar investigation to the one you have carried out in (a) to test this hypothesis. Do **not** carry out this experiment.

..... [6

- (ii) Outline **one** safety precaution that you would need to take when performing your experiment.

..... [1]

[Total: 19]

2 **W1** is a simple leaf from a dicotyledonous plant.

(a) (i) Make a large, labelled drawing of the lower surface of the leaf.

[5]

(ii) Describe **two visible** ways in which the upper surface of **W1** is different from the lower surface.

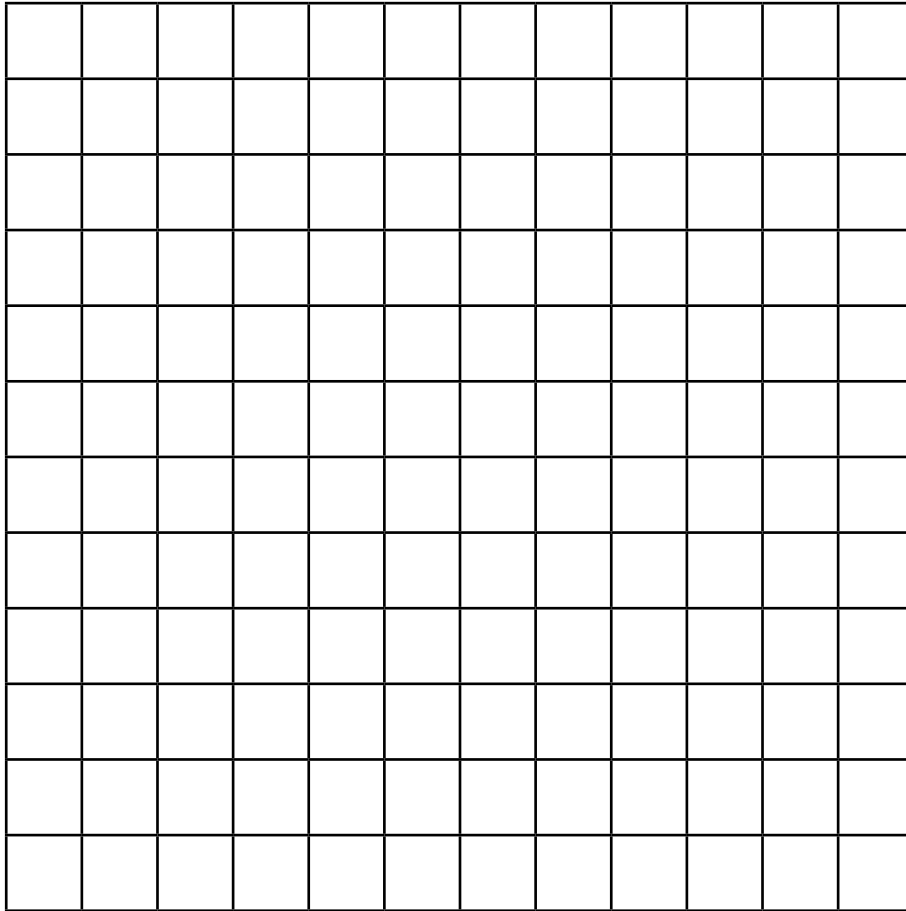
1

.....

2

..... [2]

- (b) Place **W1** on the 1 cm² grid printed below and draw a clear outline to show the edges of the leaf.



- (i) Use your outline to calculate the surface area of the leaf.

..... [1]

- (ii) Describe the method you used to determine the surface area of the leaf.

.....

 [2]

- (c) A student investigated the effect of different wind speeds on the rate of transpiration of some leaves.

The student took five leaves from a tree and weighed each of them on a balance.

Each of the leaves was then hung from a different piece of wire.

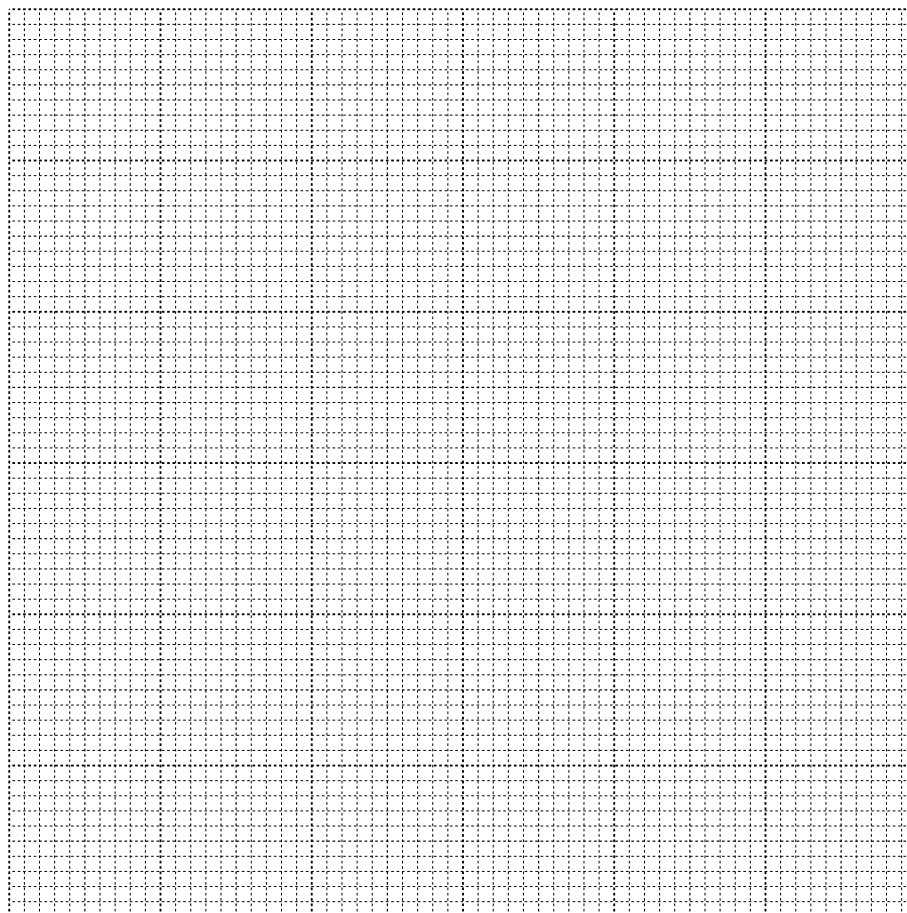
Fans were used to blow air at different speeds over each leaf.

After 12 hours, the student weighed each leaf again. The results are shown in Table 2.1.

Table 2.1

wind speed / m per s	mass of leaf at the start / g	mass of leaf at the end / g	loss in mass / g
0	5.7	3.8	
1	5.3	3.3	
3	5.9	3.7	
6	5.1	2.6	
8	5.3	2.6	

- (i) Calculate the loss in mass for each leaf. Complete Table 2.1. [2]
- (ii) Construct a graph to show the loss in mass against wind speed.



[5]

- (iii) Use your graph to determine the loss in mass at a wind speed of 10 m per s. Show on the graph how you obtained your answer.

..... g [2]

- (iv) A student criticised the results by saying that the loss in mass does not allow for a fair comparison between leaves.

Suggest a more appropriate calculation and explain why it gives a fairer comparison.

.....
.....
.....
..... [2]

[Total: 21]

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