Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **October/November 2016**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

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 or graphs.
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.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **9** printed pages and **3** blank pages.

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CAMBRIDGE International Examinations

1 Catalase is an enzyme found in plant and animal cells. It catalyses the breakdown of hydrogen peroxide to form water and oxygen.

$$\underset{2H_2O_2}{\text{hydrogen peroxide}} \xrightarrow{\text{catalase}} \underset{2H_2O \;+\; O_2}{\text{water + oxygen}}$$

Students investigated the effect of surface area on the breakdown of hydrogen peroxide by catalase.

They used potato as a source of catalase. They varied the surface area of the potato and measured the volume of oxygen gas produced by the break down of the hydrogen peroxide.

Step 1 Three potato sticks, of the same diameter, were placed next to each other on a white tile.

Each potato stick was cut to exactly 4 cm in length.

Step 2 One of the potato sticks was cut into eight equal pieces as shown in Fig. 1.1.

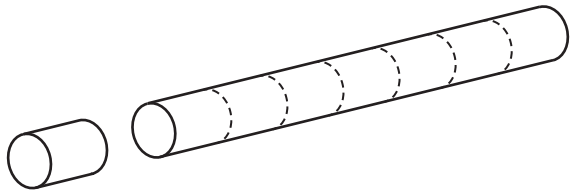

Fig. 1.1

Step 3 Step 2 was repeated with another potato stick. The last potato stick was left whole.

Step 4 A 25 cm^3 measuring cylinder was submerged in a tub of water and allowed to fill with water. The measuring cylinder was turned upside down keeping the open end under the water in the tub as shown in Fig. 1.2.

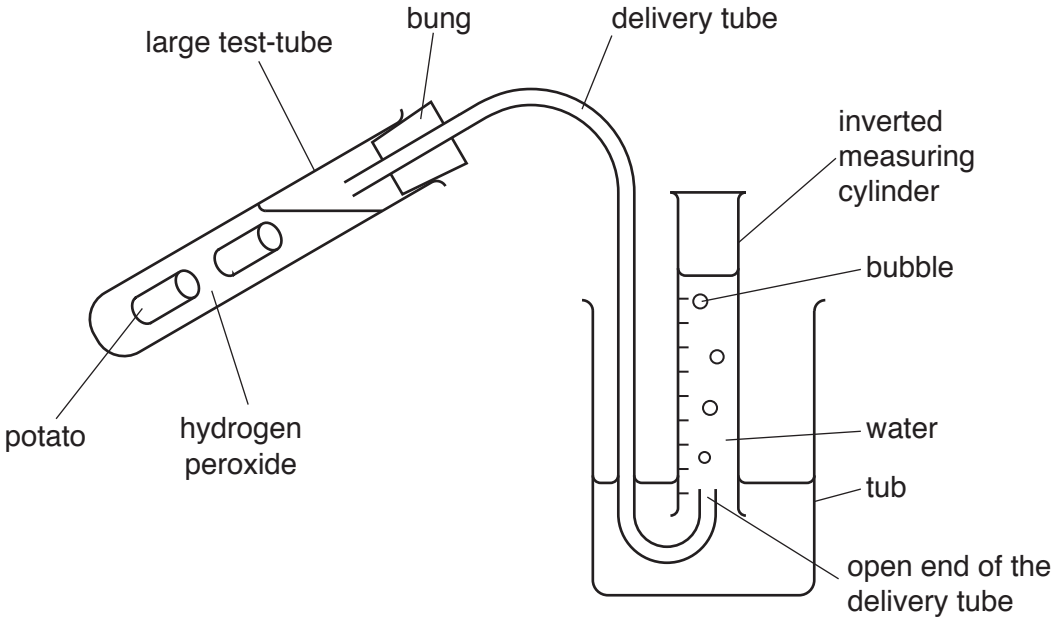

Fig. 1.2

A practice experiment was carried out using one of the potato sticks that had been cut into eight pieces.

Step 5 The open end of the delivery tube was placed into the inverted measuring cylinder in the tub of water.

Step 6 A syringe was used to add 20 cm^3 of hydrogen peroxide to a large test-tube.

Step 7 All eight pieces of potato were added to the large test-tube and the delivery tube bung was immediately placed into the large test-tube.

Step 8 A timer was started and the large test-tube was shaken every 30 seconds for three minutes.

Step 9 The volume of oxygen gas collected in the measuring cylinder for the practice experiment was recorded as 2.5 cm^3.

Step 10 The contents of the large test-tube were discarded. The large test-tube was rinsed with distilled water before being reused.

Step 11 Steps 4 to 8 were repeated with the remaining whole potato stick. The volume of oxygen gas collected is shown in Fig. 1.3.

Step 12 Steps 4 to 8 were repeated using the remaining potato stick that had been cut into eight pieces. The volume of oxygen gas collected is shown in Fig. 1.3.

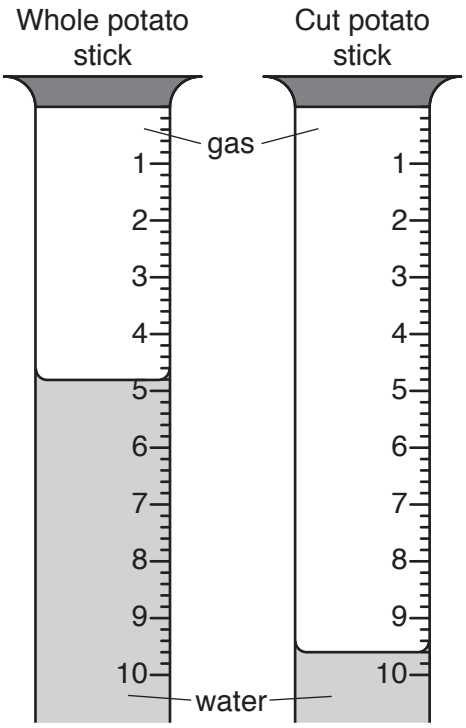

Fig. 1.3

Step 13 Read the volume of oxygen gas collected in the two measuring cylinders shown in Fig. 1.3 and record the results in your table in **1(a)**.

(a) Prepare a table to record the results shown in Fig. 1.3. Complete the table by entering the results.

[4]

(b) **(i)** The students measured the volume of oxygen gas produced in three minutes. Calculate the rate of oxygen gas production for each of the values in your table. Give your answer in cm^3 per minute.

Show your working.

whole potato stick ..... cm^3 per minute

cut potato stick ..... cm^3 per minute
[2]

(ii) Describe the effect on the surface area of the potato of cutting the potato stick into eight pieces.

.....

.....[1]

(iii) Describe **and** explain, using the results from **(b)(i)**, the effect of surface area on the volume of oxygen gas produced.

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.....

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.....[3]

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(c) The student used a 25 cm^3 measuring cylinder to collect the gas in their practice experiment. The practice volume of oxygen gas recorded was 2.5 cm^3. Suggest why the student then chose to use a 10 cm^3 measuring cylinder for the rest of their investigation.

.....

.....

.....[1]

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

1 .....

2 .....
[2]

(e) Identify **two** sources of error in this method and suggest an improvement for each error.

error .....

.....

improvement .....

.....

.....

error .....

.....

improvement .....

.....

.....
[4]

(f) Hydrogen peroxide breaks down slowly without catalase enzyme being present.

Describe a suitable control for this investigation.

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.....[2]

(g) Another student wanted to investigate the amount of catalase present in different food plants.

Describe a method the student could use to carry out this investigation.

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.....[5]

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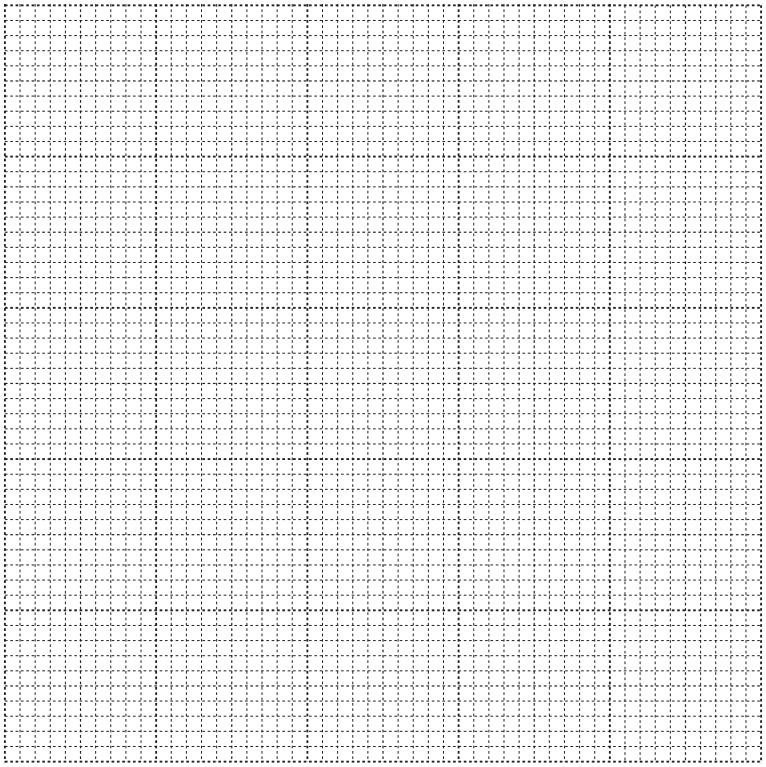
(h) Table 1.1 shows the volume of oxygen produced when the student carried out the experiment for three different food plants.

Table 1.1

food plant	volume of oxygen produced / cm^3
A	9.2
B	0.8
C	6.7

Plot a graph of the data from Table 1.1 on the grid.



[4]

(i) Describe how the student could test food prepared from these plants for the presence of reducing sugars.

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.....

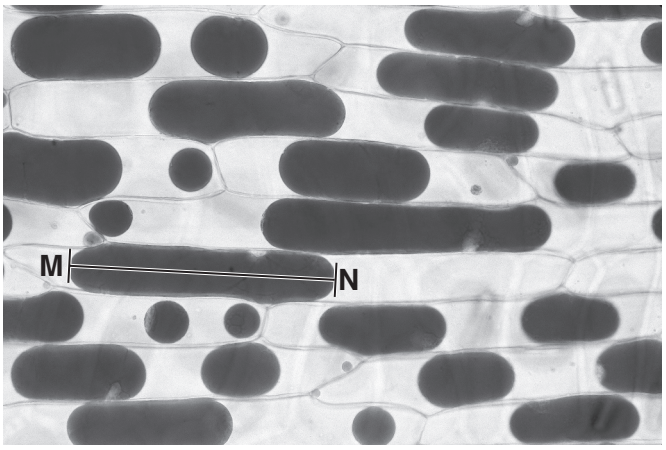
.....

.....[3]

[Total: 31]

2 Fig. 2.1 shows red onion cells, viewed through a microscope, that have been immersed in a strong salt solution.

In a red onion cell the dark red pigment is located in the vacuole of the cell.



magnification ×50

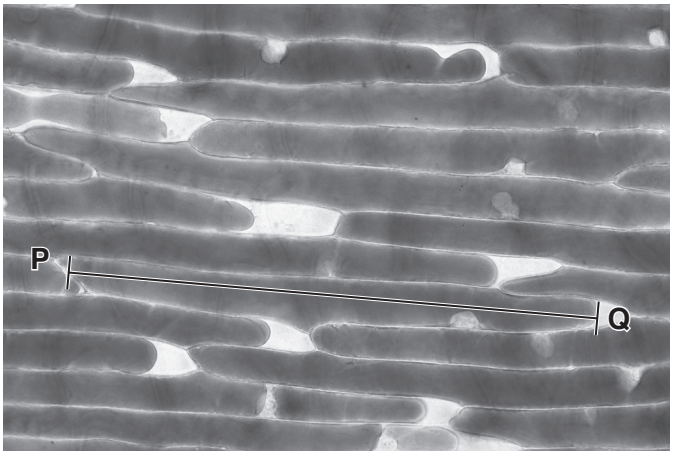
Fig. 2.1

(a) **(i)** Make a large drawing of **three** of the cells shown in Fig. 2.1.

On **one** of the cells label the vacuole.

[5]

Fig. 2.2 shows red onion cells, viewed through a microscope, that have been immersed in a weak salt solution.



magnification ×50

Fig. 2.2

(ii) Measure the observed maximum length of the vacuole shown by the line **MN** on Fig. 2.1.

..... mm

Measure the observed maximum length of the vacuole shown by the line **PQ** on Fig. 2.2.

..... mm

Calculate the percentage increase in the length of the vacuole.

Show your working and give your answer to the nearest whole number.

.....
[3]

(b) State **one** visible similarity between the cells in Fig. 2.1 and the cells in Fig. 2.2.

.....

.....[1]

[Total: 9]

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