Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

1752245066

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **May/June 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 **10** printed pages and **2** blank pages.

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1 Metabolic reactions in cells produce toxic chemicals which can be converted to harmless or less toxic chemicals.

Hydrogen peroxide is broken down using the enzyme catalase which is found in most cells.

Fig. 1.1 shows this reaction.

$$\text{hydrogen peroxide } (2H_2O_2) \xrightarrow{\text{catalase}} \text{water and oxygen } (2H_2O + O_2)$$

Fig. 1.1

A student investigated the effect of alcohol (ethanol) on the activity of catalase found in potato, using three pieces of potato cut to the same size.

Fig. 1.2 shows these pieces of potato.

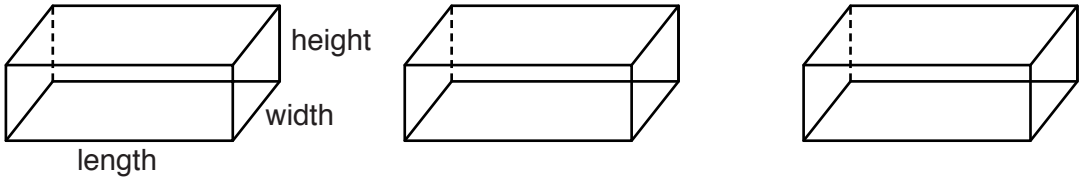

Fig. 1.2

(a) (i) Measure the length, width and height of one of these pieces of potato.

Record your results in Table 1.1.

Table 1.1

length of potato piece /mm	width of potato piece /mm	height of potato piece /mm

[1]

Step 1 The student labelled six test-tubes, **1**, **2**, **3**, **4**, **5**, and **6** and used a syringe to add 10 cm^3 of hydrogen peroxide solution to each of the test-tubes.

Step 2 They cut potato piece **A** to obtain two slices of similar size.

Step 3 The student placed the free end of a delivery tube into a large test-tube containing water.

Step 4 They placed one of the slices of potato piece **A** into the hydrogen peroxide solution in test-tube **1**.

Step 5 The student immediately placed the rubber bung attached to the delivery tube into test-tube **1** and pushed it in as tightly as possible, as shown in Fig. 1.3.

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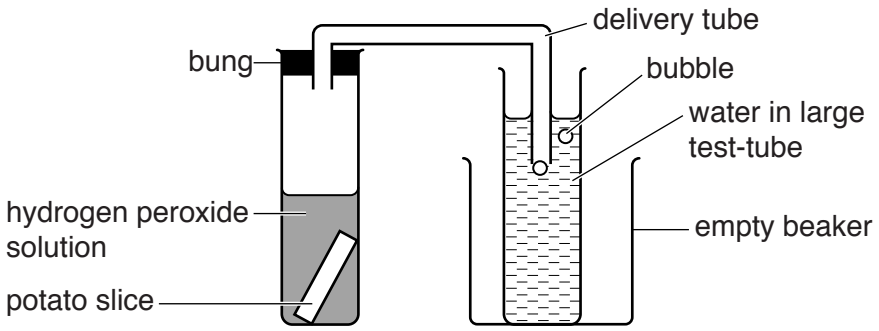

Fig. 1.3

Step 6 They counted the number of bubbles released from the delivery tube in 3 minutes.

Step 7 The student repeated steps **4–6** for the second slice of potato piece **A** using test-tube **2**.

Step 8 They repeated steps **2–7** for potato piece **B** using test-tubes **3** and **4**.

Step 9 They repeated steps **2–7** for potato piece **C** using test-tubes **5** and **6**.

The student used a tally to count the number of bubbles.

Fig. 1.4 shows their tally count.

A1 𝍸	**A2** III
B1 𝍸 𝍸 𝍸 III	**B2** 𝍸 𝍸 I
C1 𝍸 𝍸 II	**C2** 𝍸 𝍸

Fig. 1.4

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(ii) Prepare a table to record the student's results.
Your table should show:

- the numbers of bubbles produced by each slice of potato in 3 minutes
- the mean number of bubbles produced by each of potato piece **A**, **B** and **C**.

Complete your table using the results from Fig. 1.4.

[5]

(b) (i) Suggest why the free end of the delivery tube was placed in the water before adding the potato slice to the hydrogen peroxide solution and connecting the test-tube to the bung of the delivery tube.

.....

.....

.....[1]

(ii) Explain why the bung of the delivery tube must fit tightly into the test-tube.

.....

.....

.....[2]

(c) The pieces of potato that the student used in their investigation were soaked in different concentrations of alcohol for 24 hours.

- Potato piece **A** was soaked in 20% alcohol.
- Potato piece **B** was soaked in 2% alcohol.
- Potato piece **C** was soaked in 10% alcohol.

(i) Suggest the relationship between the number of bubbles and the activity of catalase.

.....

.....

.....[1]

(ii) Compare the activity of catalase in the potato pieces **A**, **B** and **C**.

.....

.....

.....[1]

(iii) Predict the number of bubbles that would be produced in 3 minutes if a piece of potato was soaked in 50% alcohol before being placed in hydrogen peroxide solution.

.....[1]

(d) (i) State **one** variable that has been controlled in the student's investigation.

Describe how this variable was controlled.

variable .....

how it was controlled .....

.....

.....
[2]

(ii) The method of measuring the oxygen gas produced is a source of error.

State **one** reason why this method is a source of error.

.....

.....

Suggest how to improve the method to minimise this error.

.....

.....

.....
[2]

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(iii) Identify the source of error in step **2**. State why this is a source of error.

source of error .....

.....

reason .....

.....

.....

[2]

(iv) Describe a control experiment that the student could carry out for this investigation.

.....

.....

.....

.....

.....[2]

(v) Predict the result expected from the control experiment described in **(iv)**.

.....

.....[1]

(e) State one safety precaution required when ethanol is used in an investigation.

.....

.....

.....[1]

(f) In an investigation into the effects of alcohol on the nervous system, people were asked to carry out a test on their reaction time.

The person being tested looked at a coloured block on a computer screen.
As soon as the colour changed they pressed a button.
The time taken to press the button was recorded by the computer.
This was their reaction time.

Twenty people were tested before and after consuming a drink containing the same concentration of alcohol.

Table 1.2 shows the results of this investigation.

Table 1.2

test person	reaction time before consuming alcohol / milliseconds	reaction time after consuming alcohol / milliseconds
1	272	322
2	310	350
3	225	270
4	243	290
5	240	308
6	264	315
7	201	238
8	262	300
9	225	252
10	235	278
11	225	253
12	247	271
13	226	266
14	194	220
15	206	239
16	309	340
17	223	261
18	243	286
19	270	316
20	180	225
mean	240	

(i) Calculate the mean for the reaction time after consuming alcohol.

Write your answer in Table 1.2. [1]

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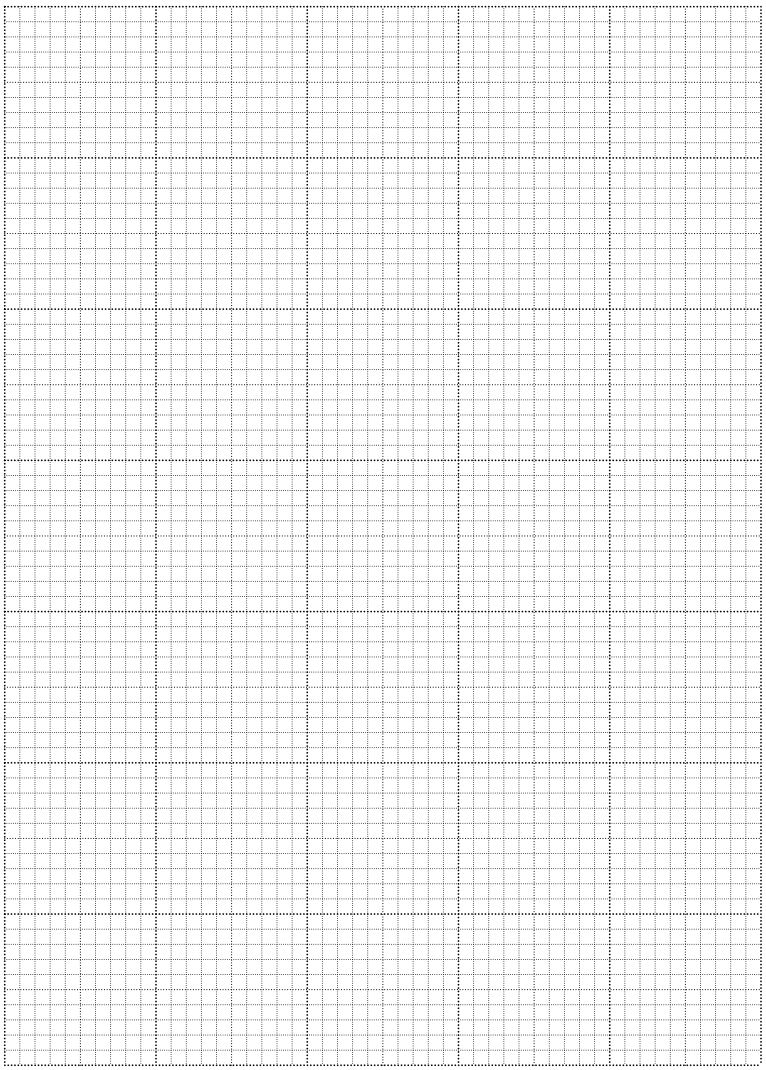
(ii) Plot a bar chart to show the **mean** reaction time of the people tested before and after consuming alcohol.



[3]

(iii) The range of reaction times recorded before consuming alcohol is 180–310 milliseconds.

Use Table 1.2 to identify the range of reaction times recorded after consuming alcohol.

..... milliseconds [1]

[Total: 27]

2 Fig. 2.1 is a photograph of a cross-section of a vascular bundle in a leaf.
Line **AB** shows the length of the vascular bundle.

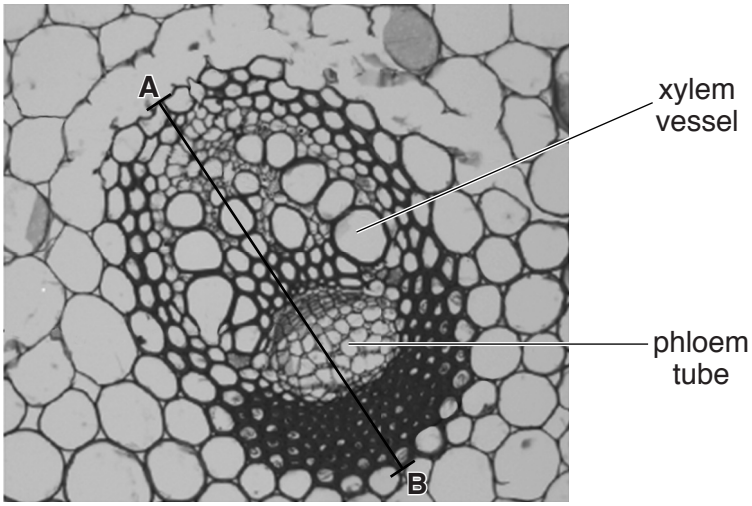


Fig. 2.1

(a) (i) Make a large drawing to show the different regions of the vascular bundle shown in Fig. 2.1.
Do **not** draw any individual cells.
Identify and label on your drawing the position of the xylem vessel as shown in Fig. 2.1.

[5]

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(ii) Measure the length of line **AB** as shown on Fig. 2.1. **Include the unit**.

Length of **AB** .....

Mark on your drawing a line in the same position as **AB**.

Measure the line you have drawn.

Length of line on drawing .....

$$\text{magnification} = \frac{\text{length of line on drawing}}{\text{length of } \mathbf{AB}}$$

Calculate the magnification of your drawing using the information above and your answers.

Show your working.

magnification .....
[3]

(iii) State **one** way **visible** in Fig. 2.1 in which the xylem vessel is different from the phloem tube.

.....

.....

.....[1]

(b) The walls of xylem vessels are supported by a chemical called lignin, which can be stained by a red dye. This makes the xylem vessel walls easily seen when using a microscope.

Use this information to plan how you could find the position of the vascular bundles in a stem.

.....

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.....

.....

.....

.....

.....[4]

[Total: 13]

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