Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

BIOLOGY **0610/62**

Paper 6 Alternative to Practical **May/June 2015**

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 Hydrogen peroxide is produced by metabolism in most cells and is toxic in high concentration. Cells contain the enzyme catalase to break down the hydrogen peroxide.
Fig. 1.1 shows this reaction.

$$\text{hydrogen peroxide} \xrightarrow{\text{catalase}} \text{water} + \text{oxygen}$$

Fig. 1.1

Some students investigated the activity of catalase found in leaves. Two different sized pieces of leaf were placed into hydrogen peroxide solution and the time taken for the pieces of leaf to rise was recorded.

- A ruler was used to measure a distance of 40 mm from the bottom of **three** containers and a line drawn on the containers.
- Hydrogen peroxide solution was poured into each container until it reached the line at 40 mm.
- A ruler and scissors were used to cut **three** pieces of leaf, each measuring 10 mm × 10 mm, from leaves of the same species.
- A 1 cm length of metal wire was bent into a U-shape. A piece of leaf was placed into the U-shape and the wire pinched to hold the leaf in place as shown in Fig. 1.2.

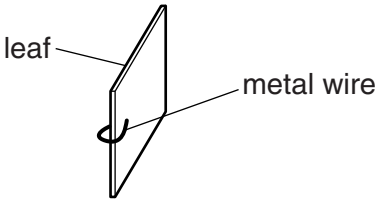


Fig. 1.2

- One piece of leaf was placed in the hydrogen peroxide solution in each of the containers and pushed gently with forceps to make it sink.
- The leaves were observed and a timer was used to measure the time taken for each piece of leaf to rise from the bottom of the container to the surface of the hydrogen peroxide solution.
- Forceps were used to remove the pieces of leaf from each container.
- The experiment was then repeated using three pieces of leaf cut to a size of 15 mm × 15 mm from leaves of the same species as previously used.

Fig. 1.3 shows the times for each set of leaves.

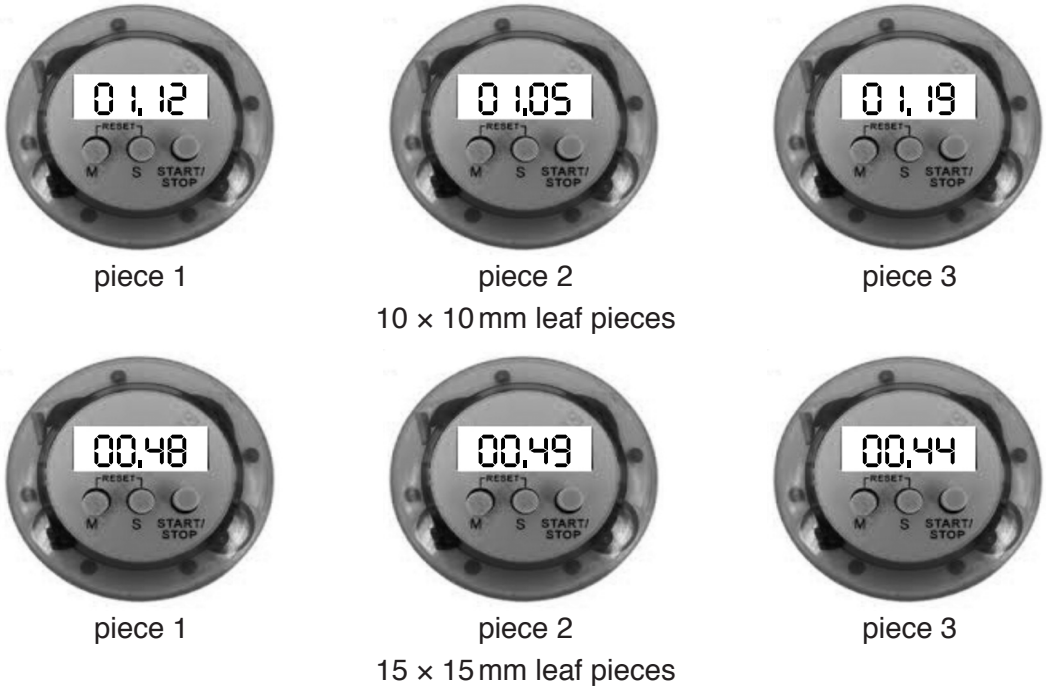


Fig. 1.3

(a) **(i)** Prepare a table to record the results shown in Fig. 1.3.

Record the times taken for the leaf pieces to rise into this table.

[4]

(ii) Calculate the mean time taken for each size of leaf piece to reach the surface.
Show your working.

10 mm × 10 mm .....

15 mm × 15 mm .....[1]

(iii) Describe the effect of the size of leaf piece on the time taken to rise to the surface.

.....

.....

.....[1]

(b) Fig. 1.4 shows the students' observations of the pieces of leaf.

10 x 10	Many small bubbles formed on the leaf at first and then some large bubbles. There were more at the edge. Then the leaf tipped and started to rise.
15 x 15	This was the same as the first set of leaves, but the bubbles seemed to start quicker.

Fig. 1.4

Use the information you have been given and the observations in Fig. 1.4 to explain why the leaf pieces rose to the surface.

.....

.....

.....

.....

.....[2]

(c) Predict, with reasons, the effect of using a piece of leaf 20 mm × 20 mm on the time taken to rise to the surface.

.....

.....

.....

.....

.....[2]

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

variable .....[1]

(ii) State **one** source of error in the method used in this investigation.
Describe how to improve the method to decrease the effect of this error.

error.....

improvement .....

.....

.....
[2]

(iii) Describe a control experiment for this investigation.

.....

.....

.....

.....

.....[2]

(iv) State one hazard (danger to the students) in this investigation and describe one safety precaution the students should take to reduce this hazard.

hazard .....

safety precaution .....

.....

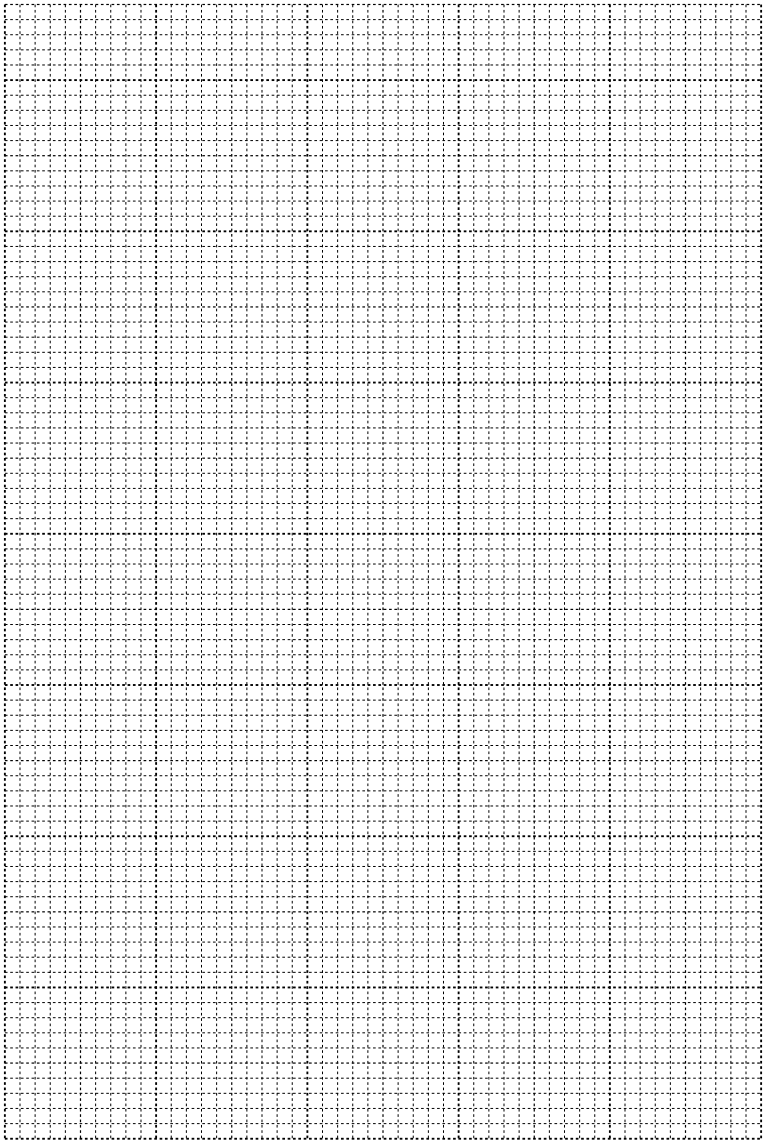
.....
[2]

(e) The students used the same method to investigate the catalase activity in pieces of leaf of four different species, **W**, **X**, **Y** and **Z**. Each piece of leaf was the same size.
Fig. 1.5 shows their results.

species	average time / s
W	290
X	130
Y	170
Z	50

Fig. 1.5

(i) Plot a bar chart of the data shown in Fig. 1.5.



[4]

(ii) Describe the results and suggest what the students could conclude from this investigation.

.....

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.....

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.....

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.....[3]

[Total: 24]

2 Fig. 2.1 shows cells in the growing part of a root as seen using a microscope.

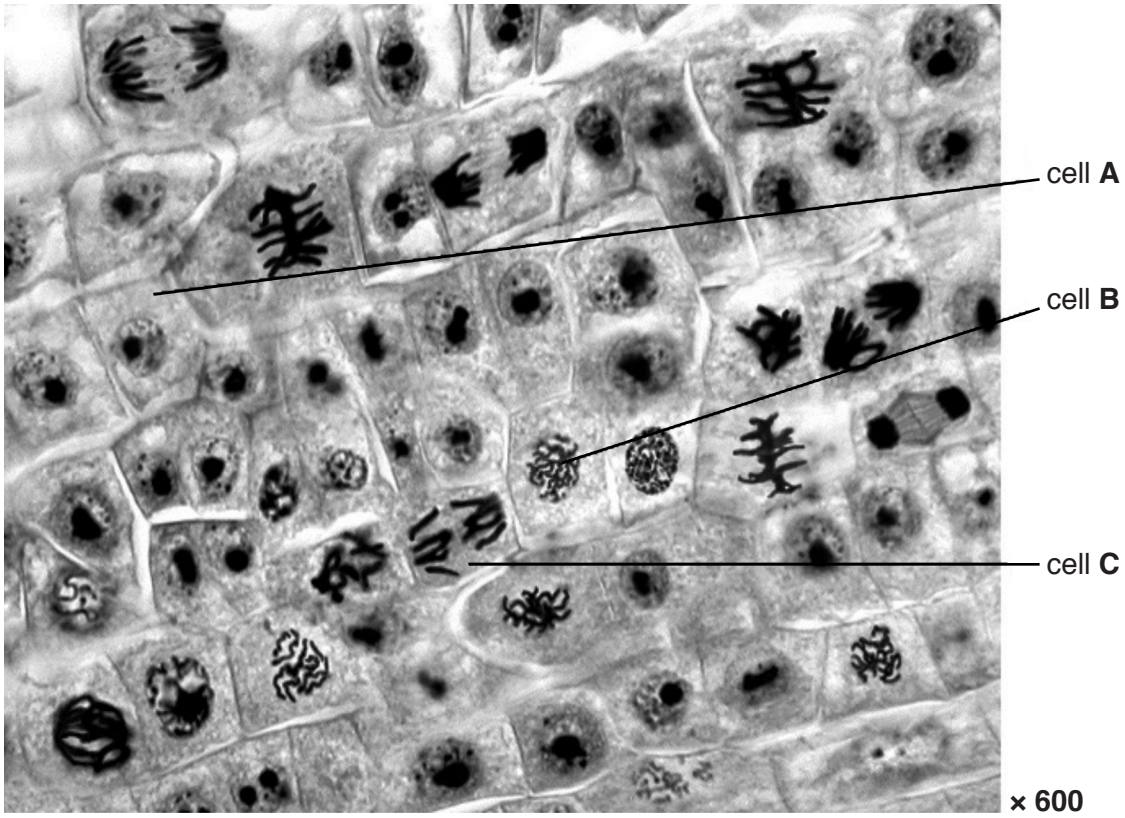

Fig. 2.1

(a) **(i)** Count and record the total number of cells in Fig. 2.1. Do **not** include any cells that are only partly visible.

.....[1]

(ii) Chromosomes can be seen in cells that are undergoing mitosis. There are 18 of these cells in Fig. 2.1.

Calculate the percentage of the cells that are undergoing mitosis in Fig. 2.1.
Show your working. Give your answer to the nearest whole number.

..... % [2]

(b) State two ways, visible in Fig. 2.1, in which the cell labelled **B** is different from the cell labelled **A**.

1 .....

.....

2 .....

.....
[2]

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(c) Fig. 2.2 is a magnified view of cell **C** in Fig. 2.1.

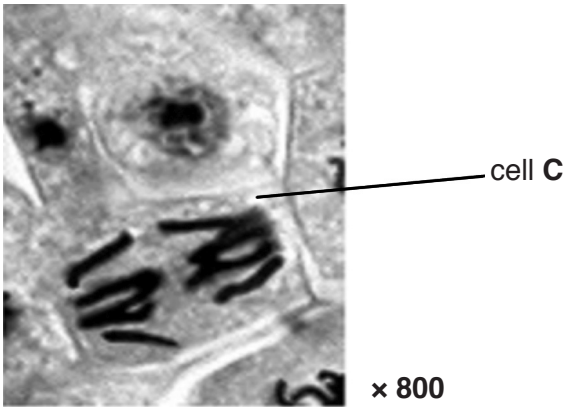

Fig. 2.2

(i) Make a large drawing of the cell labelled **C** to show:

- the cell wall
- the chromosomes.

Label a chromosome.

[5]

(ii) Measure the length of cell **C** on Fig. 2.2 and record your result. **Include the unit**.
Draw a line on Fig. 2.2 to show where you have made your measurement.

length of cell **C** .....[2]

(iii) Calculate the actual length of the cell.
Show your working. Give your answer to the nearest whole number.

size of cell .....mm [2]

(d) Cancer in the bronchus can be caused by smoking. When cancer develops, mitosis in cells becomes uncontrolled, forming tumours.
Fig. 2.3 shows cancer in the wall of a bronchus as seen using a microscope.

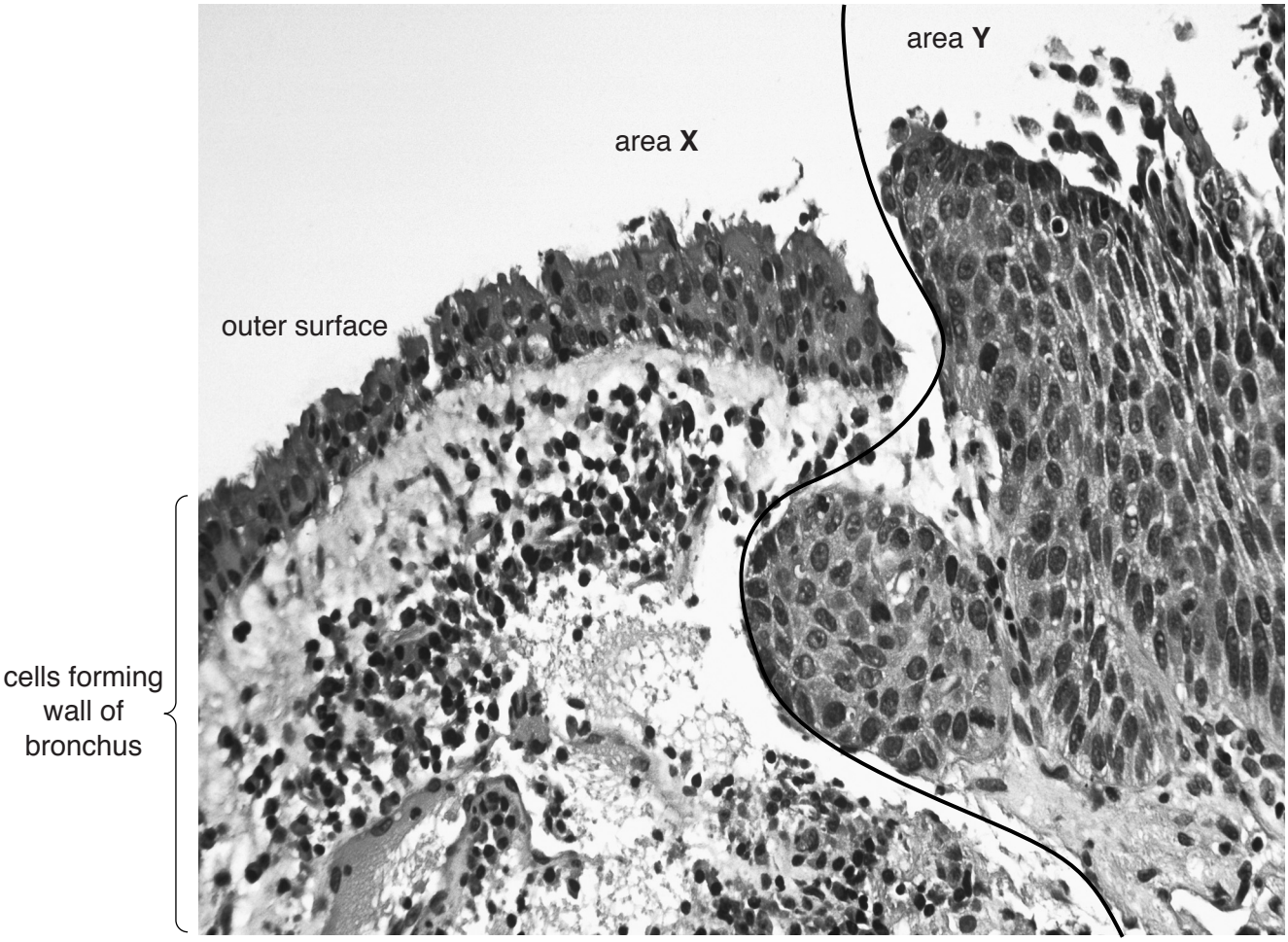

Fig. 2.3

Describe **two** features, visible in Fig. 2.3, that suggest that area **X** is healthy and area **Y** is cancerous.

1 .....

.....

.....

2 .....

.....

.....[2]

[Total: 16]

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