UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5944630572

BIOLOGY **9700/31**

Advanced Practical Skills 1 **October/November 2010**

2 hours

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 ink.
You may use a pencil for any diagrams, graphs or rough working.
Do **not** use red ink, staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

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.

For Examiner's Use	
1	
2	
Total	

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

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You are reminded that you have only one hour for each question in the practical examination. You should read carefully through the whole of each question and then plan your use of the time to make sure that you finish all of the work that you would like to do.

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You will gain marks for recording your results according to the instructions.

1 Plant cells contain an enzyme, catalase, which catalyses the breakdown of hydrogen peroxide into oxygen and water.

When a piece of potato is dropped into hydrogen peroxide it will sink and then the production of oxygen causes the potato to rise. The more oxygen produced the less time it takes for the potato to rise.

You are required to investigate the independent variable, the surface area to volume ratio of pieces of potato, on the breakdown of hydrogen peroxide. The relationship of pieces of potato of different sizes to their surface area to volume ratio is shown in Fig. 1.1.

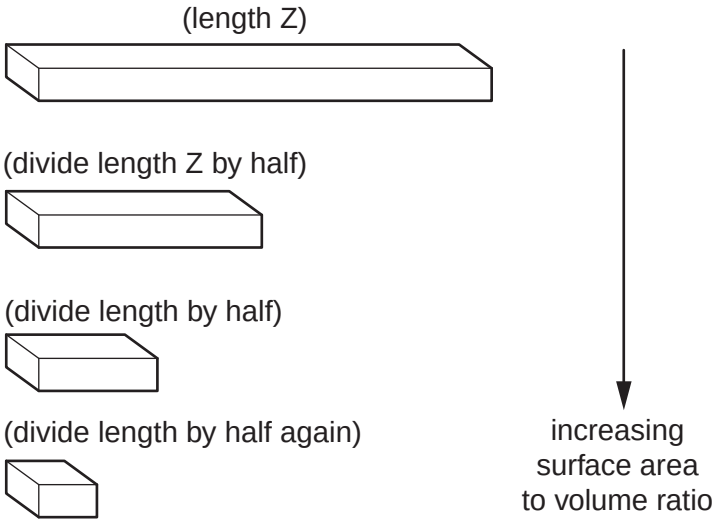


Fig. 1.1

You are provided with

labelled	contents	hazard	volume / cm^3
H	hydrogen peroxide	irritant oxidising substance	200 cm^3

labelled	contents	details	quantity
P	potato pieces	same cross-sectional area	4

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Proceed as follows:

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1. Prepare the pieces of potato as shown in Fig. 1.2.

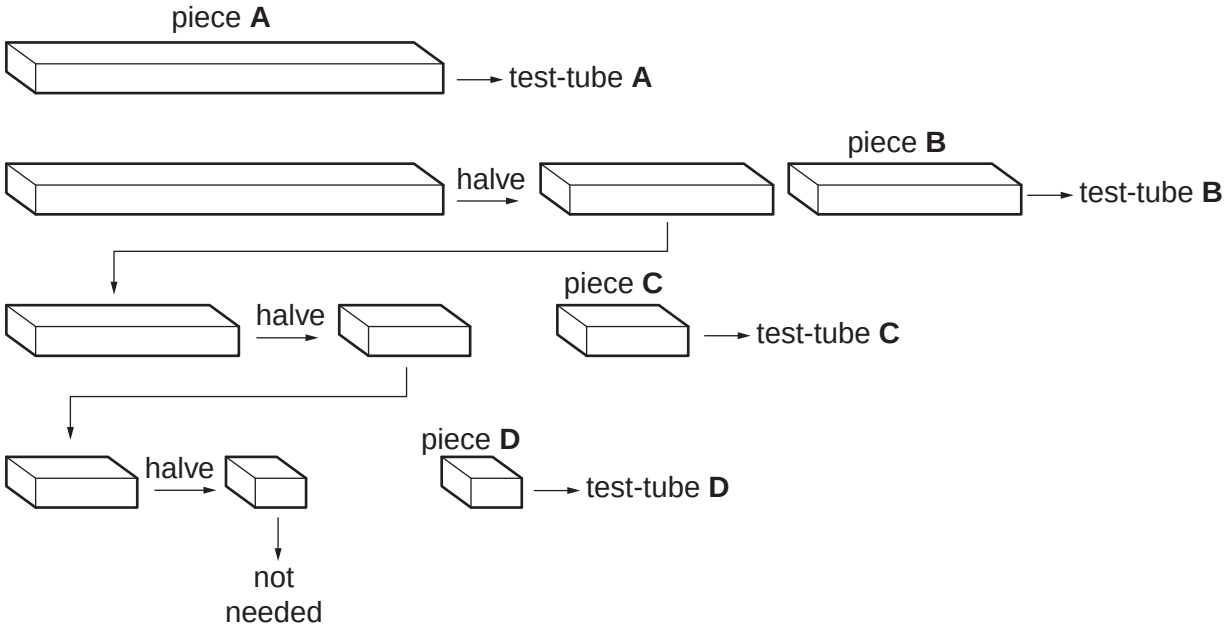


Fig. 1.2

2. Label four test-tubes **A**, **B**, **C** and **D**.

3. Put 25 cm^3 of **H** into test-tube **A**.

4. Put piece **A** onto a paper towel and gently remove any excess water.

5. Put piece **A** into test-tube **A**. Immediately start timing.

6. Record the time taken for piece **A** to rise to the surface.

   Do not touch the test-tube after you have started timing.

   If the piece of potato does not rise after 2 minutes stop timing and record 'more than 2 minutes'. Proceed to the next test.

7. Repeat steps 3 to 6 for one piece of **B**, one piece of **C** and one piece of **D**.

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(a) (i) Prepare the space below and record your results.

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[6]

(ii) Identify **two** significant sources of error in your investigation.

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..... [2]

(iii) Suggest how you would make **three** improvements to this investigation.

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..... [3]

A student investigated the effect of pH on the enzyme in potato tissue. The breakdown of hydrogen peroxide was measured by the release of oxygen.
Fig. 1.3 shows the apparatus used. The student recorded the time for the oxygen released to displace 10 cm^3 of water at five different pH values.

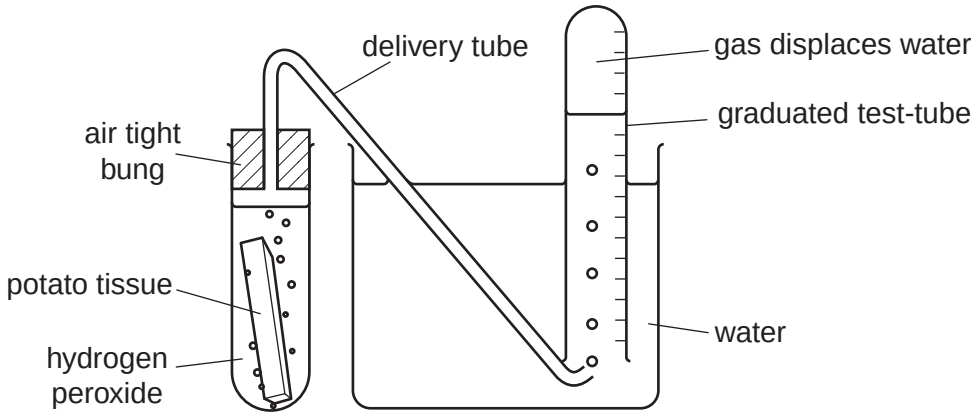


Fig. 1.3

The student's results are shown in Table 1.1.

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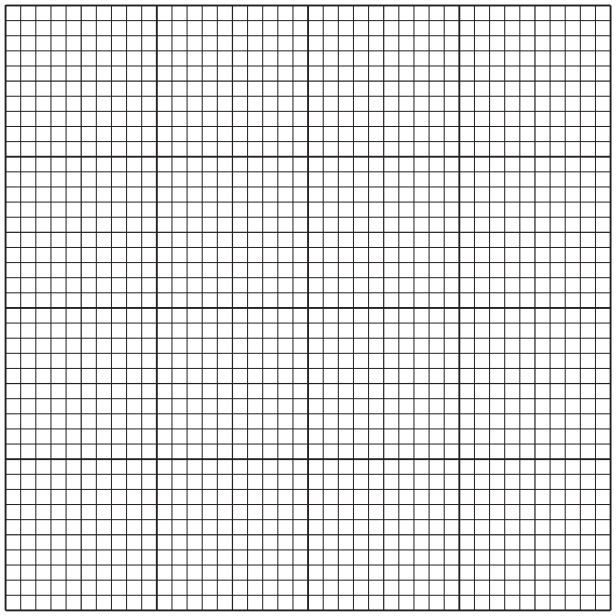
Table 1.1

pH	time to displace 10 cm^3 of water / s					
	trial 1	trial 2	trial 3	trial 4	trial 5	mean
5	17	14	16	14	15	15
6	8	5	15	6	5	6
7	2	10	3	3	4	3
8	8	6	6	17	7	
9	20	16	17	16	16	17

(b) (i) Three of the values in Table 1.1 are anomalous. Draw a circle around each of these values. [1]

(ii) Complete Table 1.1 by calculating the missing value. [1]

(iii) Plot a graph of the data shown in Table 1.1.



[4]

(iv) Explain the relationship between pH and the enzyme catalase shown in the data.

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..... [3]

[Total: 20]

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2 **J1** is a slide of a stained transverse section showing part of a lung of a mammal.

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(a) Make a large, high-power drawing to show details of five of the structures specialised for gas exchange (alveoli). The walls of one alveolus must be touching the walls of at least two other alveoli.

Label where gas exchange takes place.

[5]

Fig. 2.1 is a photomicrograph of a transverse section through a lung from a mammal. The outer layer of the bronchiole and the wall of the blood vessel are labelled.

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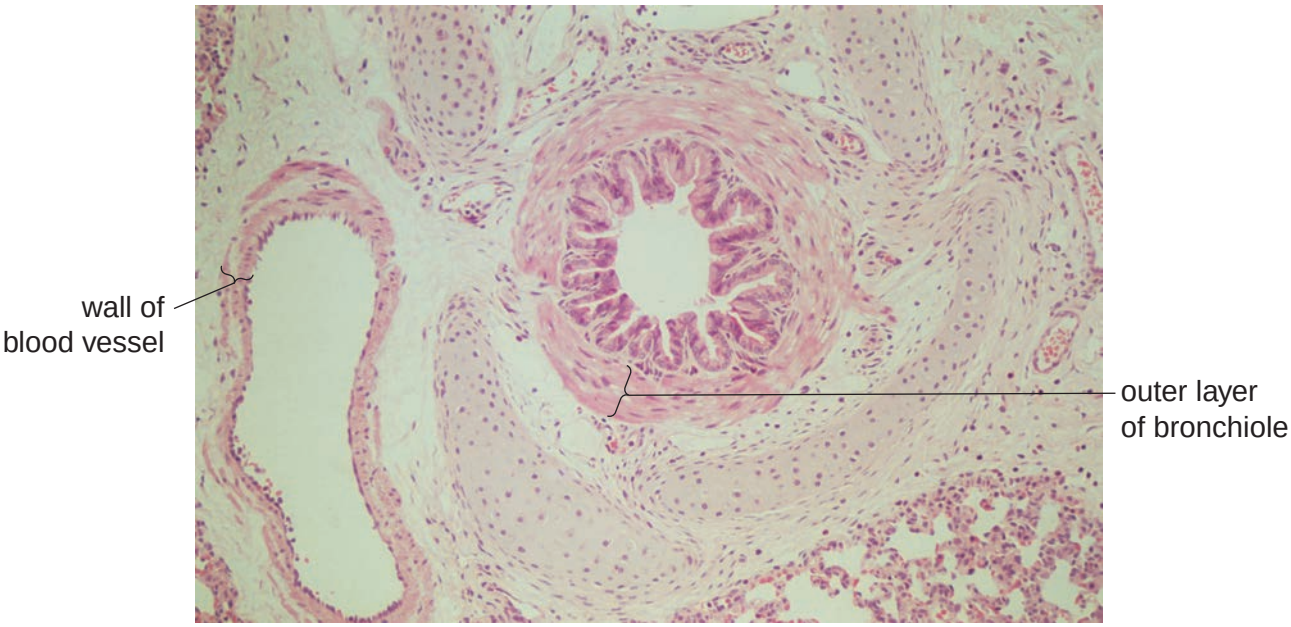


Fig. 2.1

(b) (i) Draw a large plan diagram of the bronchiole shown in Fig. 2.1.

Label the lumen.

[5]

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(ii) Calculate the ratio of the mean thickness of the outer layer of the bronchiole compared to the mean thickness of the wall of the blood vessel shown in Fig. 2.1.

Show clearly on Fig. 2.1 where you measured the thicknesses.

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

[4]

(iii) Prepare the space below so that it is suitable for you to compare the observable features of the bronchiole and blood vessel in the photomicrograph Fig. 2.1.

[6]

[Total: 20]

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