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

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8583396854 6

BIOLOGY **9700/34**

Advanced Practical Skills 2 **October/November 2011**

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 **11** printed pages and **1** blank page.

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You are reminded that you have **only one hour** for each question in the practical examination.

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You should:

- Read carefully through **the whole** of Question 1 and Question 2.
- Plan your use of **the time** to make sure that you finish all of the work that you would like to do.

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

1 The blue-green agar blocks contain an indicator.

The investigation involves placing different sizes of agar blocks into dilute hydrochloric acid. As the acid moves (diffuses) into the agar blocks the indicator loses its blue-green colour.

You are required to investigate the independent variable, surface area to volume ratio of the agar blocks.

You are provided with:

labelled	contents	hazard	details
H	hydrochloric acid	irritant	enough to cover the blocks in the containers provided
A	agar block	irritant	one block containing an indicator

You must not touch the agar blocks with your hands. Use the blunt forceps and paper towel to handle the blocks.
If you get hydrochloric acid on your skin, wash off with cold water.

You are required to prepare four different sizes of agar blocks.

You will require **three** blocks of each size.

You are advised to read steps 1 to 6 before proceeding.

Proceed as follows:

1. Cut the agar block provided into blocks, each 1 cm × 1 cm × 1 cm. Cut the blocks on the white tile or chopping board provided.

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Fig. 1.1 shows how to obtain blocks with a different surface area compared with the blocks in step 1.

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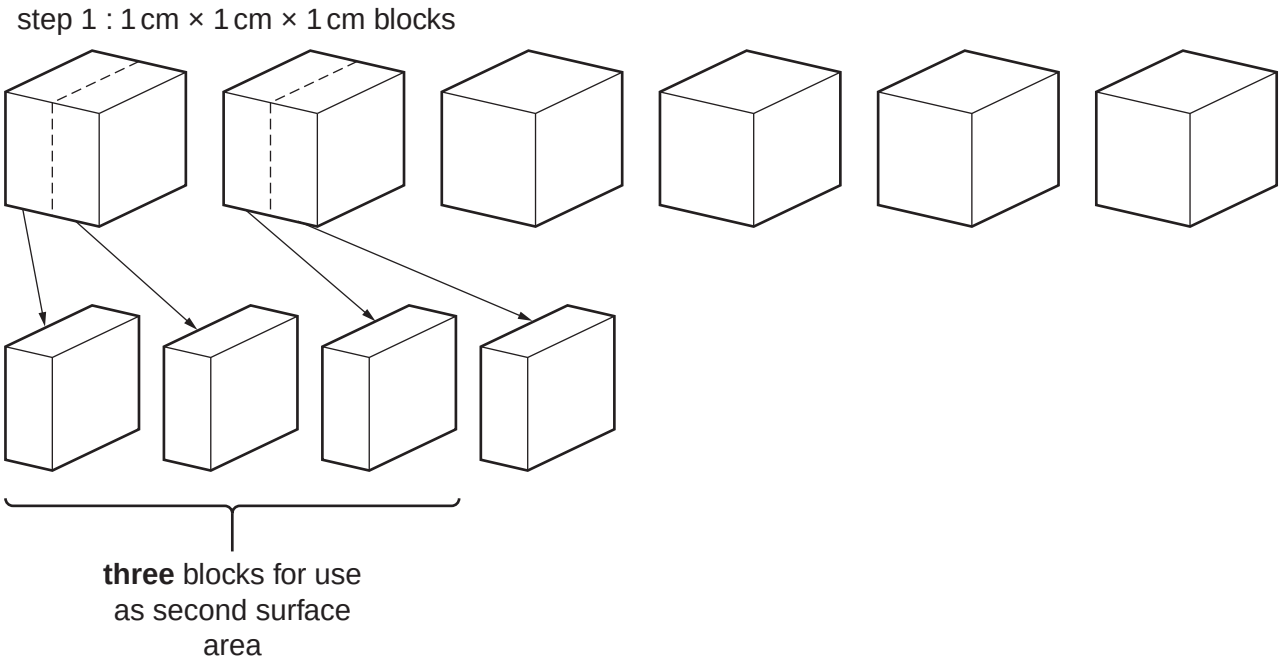


Fig. 1.1

2. Cut two of the 1 cm × 1 cm × 1 cm blocks as shown in Fig. 1.1 to obtain the blocks you need for the next surface area.

You may use the space on Fig. 1.1 to work out how to cut two further sizes of blocks with different surface areas.

3. Cut two further sizes of blocks with different surface areas. You will need **three** blocks of each of the four sizes of block.

4. Put three of each size of block into the beaker or container using blunt forceps.

5. Put **H** into this beaker or container to cover the blocks and start timing.

6. Observe the blocks for the disappearance of the blue-green colour. This is the end-point of the reaction. As soon as you see the green colour disappear record the time taken for each block to reach the end-point. If any block remains blue-green at 15 minutes, record "**more than 15**".

The different sizes of agar blocks have different surface areas and volumes.

(a) (i) Complete Table 1.1.

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Table 1.1

dimensions / cm	**surface area / cm^2**	**volume / cm^3**	**surface area : volume ratio**
1 × 1 × 1	6	1.0	6:1
1 × 1 × 0.5	4	0.5	8:1

[3]

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(ii) Prepare the space below and record your results.

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[5]

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

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.....[2]

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A student investigated the effect of temperature on the rate of breathing in fish. Fish take water in through the mouth and force it over the gills when the mouth closes. Oxygen diffuses from the water into the gills. The gill cover opens to allow the water to leave as shown in Fig. 1.2.

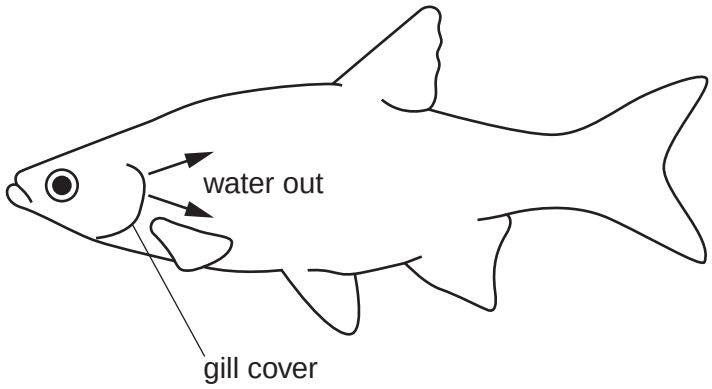


Fig. 1.2

A fish was placed in a bag partly filled with water. The bag, containing the fish, was placed in a large beaker containing water at 5 °C.

The number of times the gill cover opened in one minute was recorded. The bag containing the fish was removed and the temperature of the water in the beaker was raised to 10 °C.

A bag containing a different fish of the same species was then put into the beaker. The number of times the gill cover opened in one minute was counted.

This procedure was repeated using a different fish of the same species for each temperature as shown in Table 1.2. However, the student decided that the temperature would not be increased to above 25 °C as this might damage the fish.

(b) (i) Suggest how you might control **three** of the variables in the student's investigation.

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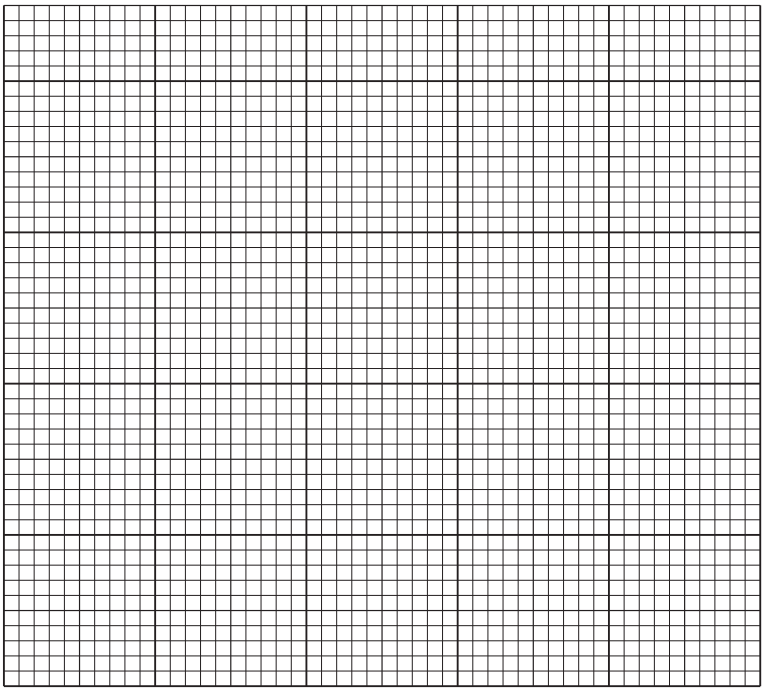
Table 1.2 shows the results of this investigation.

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Table 1.2

temperature / °C	rate of breathing / number min^{-1}
5	4
10	16
15	24
20	31
25	39

(ii) Plot a graph of the data shown in Table 1.2.



[4]

(iii) Describe and explain the effect of the temperature on the rate of breathing in this species of fish.

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.....[3]

[Total: 20]

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Question 2 starts on page 9

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2 **M1** is a slide of a stained transverse section showing part of a tube of a mammal from the gas exchange system.

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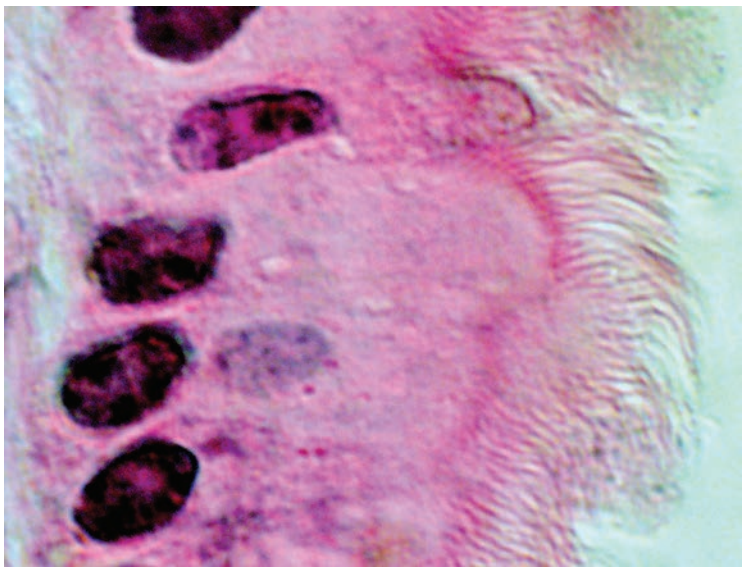
(a) **(i)** Draw a large plan diagram of the whole of the transverse section.

Label the cartilage.

[5]

Fig. 2.1 is a photomicrograph of the transverse section through part of another tube in the gas exchange system.

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magnification × 3300

Fig. 2.1

(ii) Make a large drawing of two adjacent (touching) whole cells and the contents inside the cells.

Label one epithelial cell and one nucleus.

[5]

(iii) State **one** observable feature which would enable these cells to move substances. Describe the use of this feature in the gas exchange system.

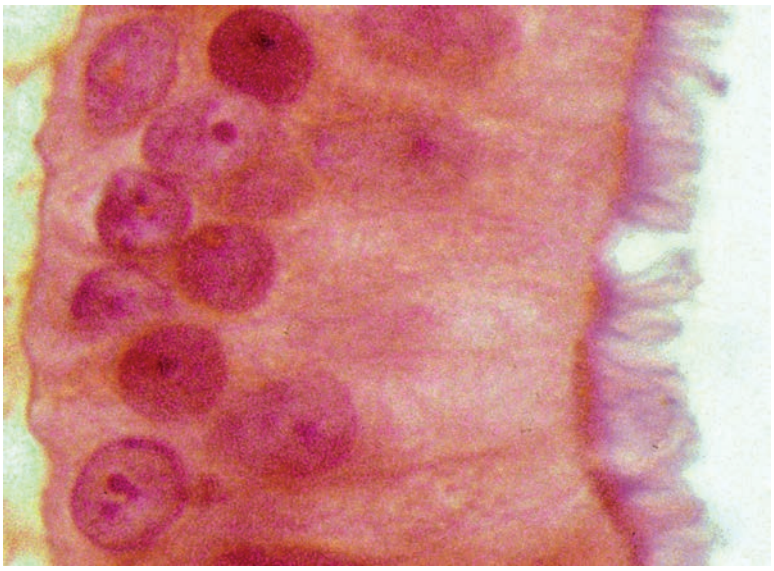
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..... [1]

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Fig. 2.2 is a photomicrograph of the transverse section through part of another tube of the gas exchange system.

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magnification × 3300

Fig. 2.2

(b) (i) Prepare the space below so that it is suitable for you to record **one** observable similarity and **two** observable differences between the specimens in Fig. 2.1 and in Fig. 2.2.

[5]

Question (b)(ii) is on page 12

(ii) Calculate the ratio of the mean length of the epithelial cell to the mean length of the cilia shown in Fig. 2.2.

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

[4]

[Total: 20]

Copyright Acknowledgements:

Question 2, Fig 2.1 Science Photo Library
Question 2, Fig 2.2 Steve Gschmeissner/Science Photo Library

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