



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

CANDIDATE  
NAME

CENTRE  
NUMBER

--	--	--	--	--	--

CANDIDATE  
NUMBER

--	--	--	--	--



**BIOLOGY**

**5090/06**

Paper 6 Alternative to Practical

**October/November 2007**

**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 in the spaces provided on the Question Paper.  
You may use a soft pencil for any diagrams, graphs or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.  
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.

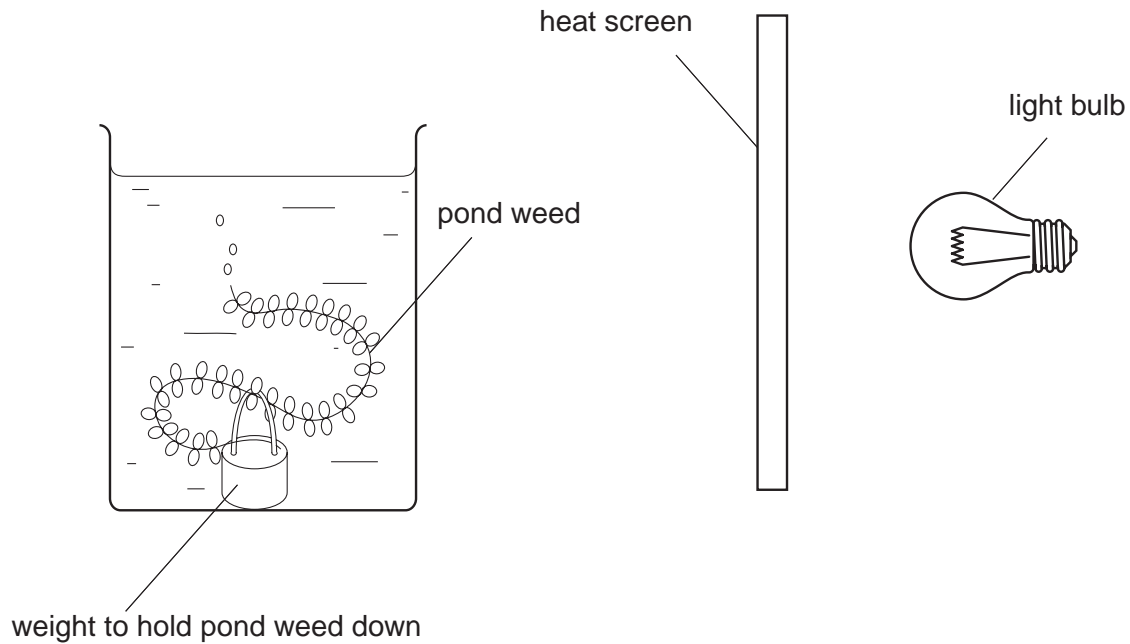
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
<b>Total</b>	

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



- 1 Fig.1.1 shows a simple apparatus to investigate the rate of photosynthesis by counting bubbles that are given off by a piece of pond weed.



**Fig. 1.1**

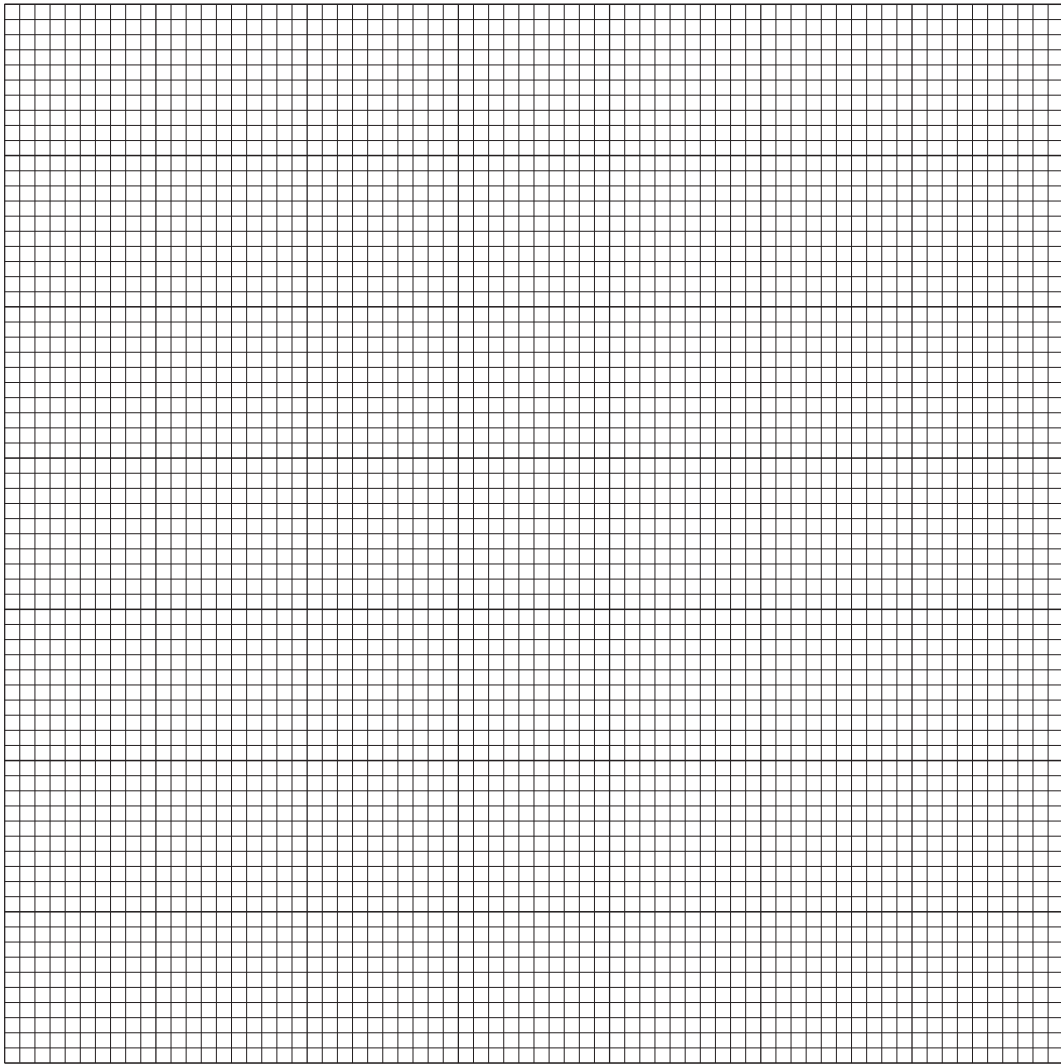
- the bubbles given off in one minute were counted
- the light intensity was then changed
- after waiting 5 minutes the new rate was counted, and so on

The results of one experiment are given in Table 1.1

**Table 1.1**

light intensity / arbitrary units	rate of photosynthesis / bubbles per minute
2	4
3	7
4	10
5	12
7	13
9	14
10	14
13	14

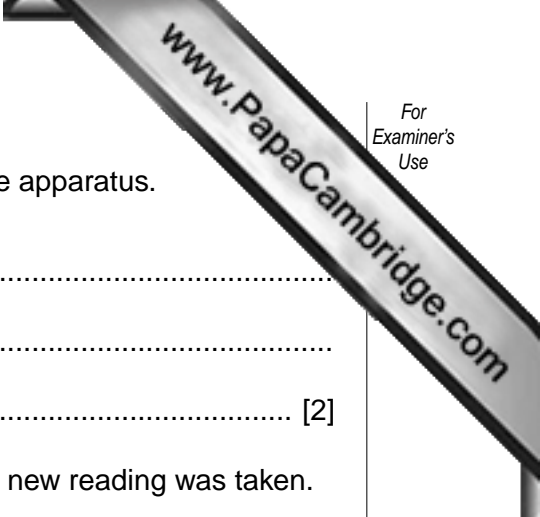
(a) (i) On the grid below construct a graph from the information in Table 1.1.



[4]

(ii) Explain why the rate of photosynthesis did not increase as the light intensity increased from 9 to 13 arbitrary units.

.....  
.....  
..... [2]



**(b) (i)** Explain why it is necessary to have the heat screen in the apparatus.

.....  
.....  
..... [2]

**(ii)** State why there was a waiting time of 5 minutes before a new reading was taken.

.....  
..... [1]

**(iii)** Suggest two ways by which the light intensity could be increased in the experiment.

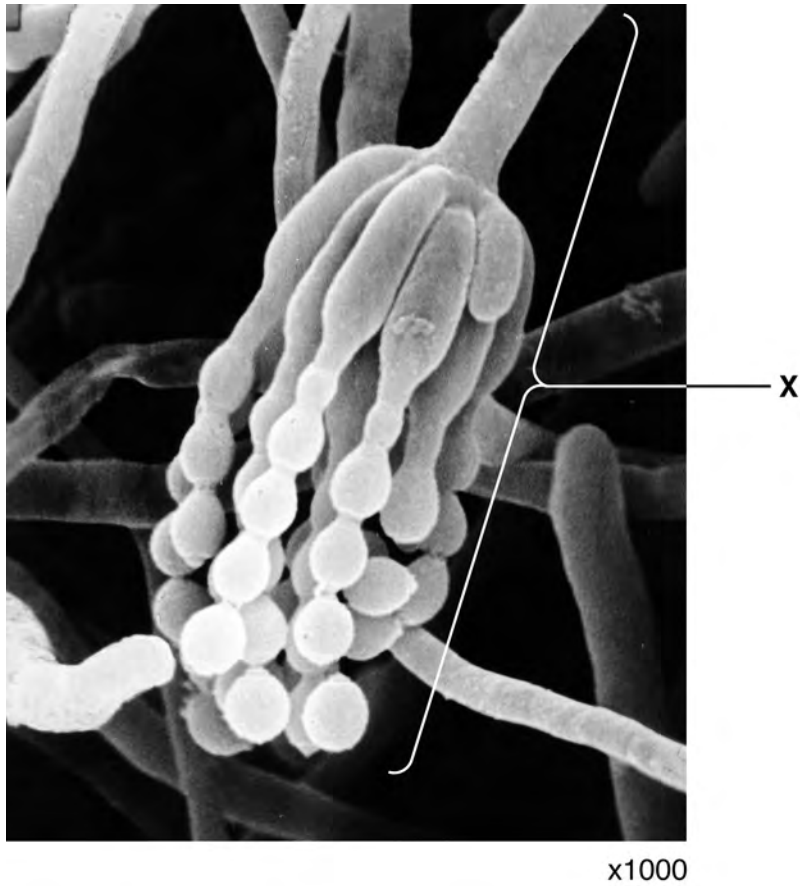
- 1. ....
- 2. .... [2]

**(iv)** Suggest 4 ways in which the experiment could be made more accurate and reliable.

- 1. ....
- 2. ....
- 3. ....
- 4. .... [3]

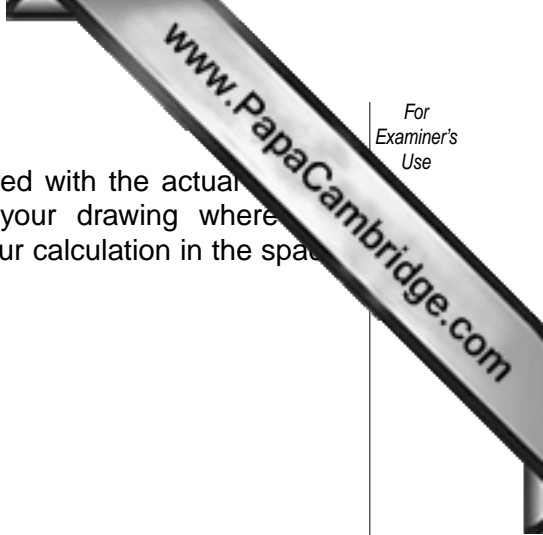
[Total: 14]

- 2 Fig. 2.1 is a photomicrograph of part of the fungus *Penicillium* that is reproducing asexually.



**Fig. 2.1**

- (a) (i) Make a large drawing of the structure labelled 'X'.  
Labels are not required.



(ii) Calculate the magnification of your drawing as compared with the actual size of the specimen that was photographed. Indicate on your drawing where the measurement was taken. Show clearly the stages of your calculation in the space below.

magnification = ..... [4]

Assume that:

- you are provided with a 10% solution of the antibiotic, penicillin, that is produced by this fungus
- you have some Petri dishes containing a culture medium on which bacteria are growing, forming a cloudy layer
- when the bacteria are killed by the penicillin a clear area shows on the plate
- the usual laboratory instruments are also available.

(b) Make an outline plan of an investigation to determine the minimum concentration of this penicillin needed to kill the bacteria.

.....

.....

.....

.....

.....

.....

.....

.....

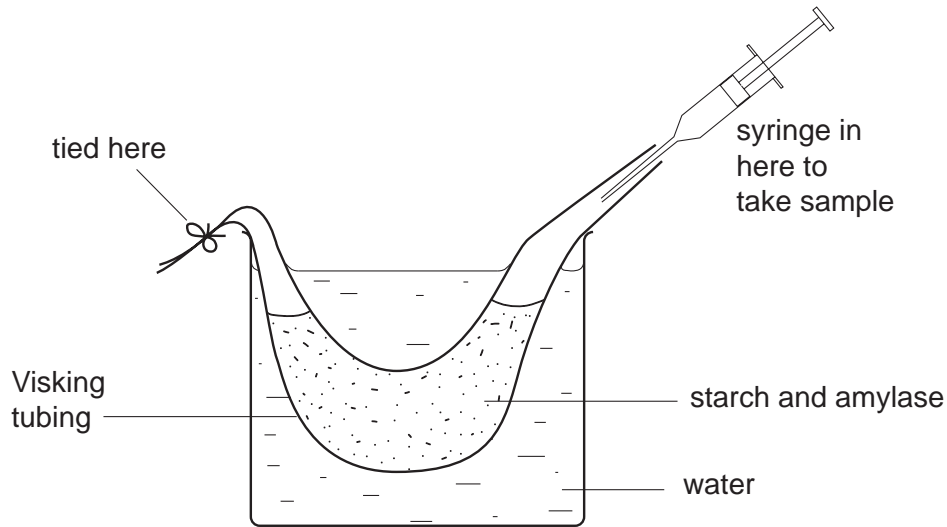
.....

.....

..... [4]

[Total: 11]

- 3 Fig. 3.1 shows a beaker of water in which is suspended an open-ended piece of tubing, a partially permeable membrane.



**Fig. 3.1**

- the Visking tubing contains a mixture of 0.5% starch suspension and a 1% solution of amylase
  - the water in the beaker is at approximately 40 °C
  - when the experiment was set up it was confirmed that there was no reducing sugar in the water
  - a blunt-ended syringe could be inserted into the open end of the Visking tubing to obtain a sample of the contents
  - samples were taken and tested for starch and for reducing sugar
  - the liquid in the beaker was also tested in the same way
- (a) (i) Complete Table 3.1 to suggest the observed results (not the conclusions) of the tests indicated.

**Table 3.1**

time/min	solution in Visking tubing		liquid in beaker	
	starch test	reducing sugar test	starch test	reducing sugar test
<b>0</b>				
<b>2</b>				
<b>4</b>				
<b>10</b>				

- (ii) Suggest how you could be sure that the reaction between the amylase and starch was complete.

..... [1]

- (iii) Explain how this apparatus can be taken to represent a model of some aspects of the digestive processes in the gut.

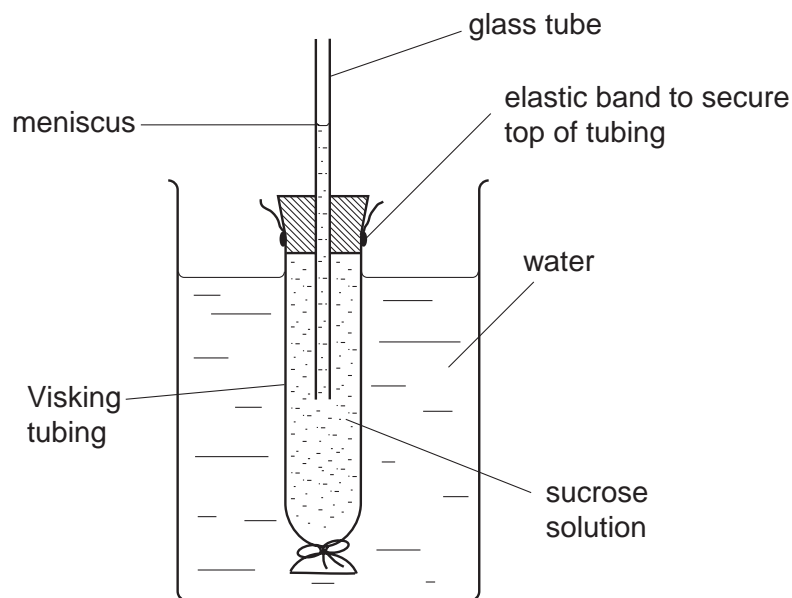
.....

.....

.....

..... [2]

- (b) In another experiment, Visking tubing was set up as shown in Fig. 3.2.



**Fig. 3.2.**

- the bottom of the Visking tubing was securely tied to prevent leakage in or out
- the tubing was completely filled with a solution of sucrose
- the top of the tubing was securely tied to a bung through which passed a glass tube
- the apparatus was allowed to settle until the meniscus of the sucrose solution was visible above the bung.



(i) Suggest what might be observed after 20 – 30 minutes.

.....

(ii) Explain how, and why, this occurred.

.....

.....

.....

..... [3]

(c) With reference to the substances used and the results of both these experiments, explain why Visking tubing is described as partially permeable.

.....

.....

.....

..... [3]

[Total: 15]





---

*Copyright Acknowledgements:*

Question 2      Fig. 2.1 © E. GUEHO / SCIENCE PHOTO LIBRARY.

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.