Centre Number	Candidate Number	Name			

## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS General Certificate of Education Advanced Level

BIOLOGY 9700/05

Paper 5 Planning, Analysis and Evaluation

For Examination from 2007

Specimen Paper (version 2)

Candidates answer on the Question Paper.

1 hour 15 minutes

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 pencil for any diagrams, graphs or rough working. Do not use staples, paper clips, highlighters, glue or correction fluid.

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.

**1 (a)** The apparatus shown in Fig.1.1 can be used to measure the rate of production of oxygen by a photosynthesising aquatic plant.

For Examiner's Use

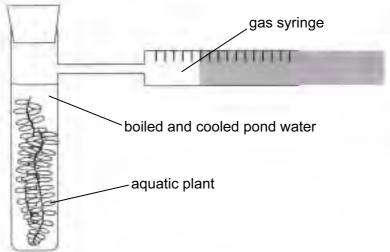


Fig. 1.1

This apparatus was used to investigate the relationship between carbon dioxide concentration and the rate of photosynthesis.

The concentration of hydrogen carbonate ions in a solution is directly proportional to the concentration of carbon dioxide available to aquatic plants.

(a)	(i)	State the aim of the investigation as a hypothesis.
	(ii)	[1] Identify the independent and dependent variables in this investigation.
		independent variable
		dependent variable [2]
(b)		scribe how the independent variable might be varied and the dependent variable asured.
		[5]

© UCLES 2007 9700/5/SP07 final

(c)	List four key variables. For each explain how it might be controlled.
	1
	2
	3
	4
	·
	[5]
(d)	Suggest why using boiled and cooled pond water to make the test solutions might improve the reliability of the results.
	[1]
(e)	State <b>one</b> piece of information required to assess the risks of your method.
	[1]
	[Total: 14]

For Examiner's Use 2 Rice is often grown with its roots submerged in water. Barley is a crop that is quickly killed by such conditions. Respiration rate of root cells can be measured as rate of production of carbon dioxide.

For Examiner's Use

In an investigation into the rate of respiration in rice and barley root cells, the data shown in Table 2.1 were obtained.

Table 2.1

	rate of production of carbon dioxide /mmol g <sup>-1</sup>						
	rice root cells	rice root cells	barley root cells	barley root cells			
	with oxygen	without oxygen	with oxygen	without oxygen			
raw data	4.2	5.6	11.1	3.3			
	4.7	5.7	9.3	3.3			
	4.1	5.2	12.3	2.9			
	5.1	5.4	11.6	4.1			
	5.2	6.7	11.7	2.8			
	3.9	5.1	12.4	3.5			
	4.3	5.8	11.5	3.6			
	4.1	5.5	11.4	3.3			
mean	4.5	5.6	11.4	3.4			
standard deviation	0.49	0.49	0.96	0.41			
standard error	0.17	0.18	0.34				

(a) (i) Use the formula below to calculate the standard error for barley root cells without oxygen. Write your answer in Table 2.1.

o s		Key
$S_M = \frac{S}{\sqrt{n}}$	$S_M$	standard error
VII	S	standard deviation
	n	sample number

[1]

(ii)	State what the standard deviations and standard error tell you about the reliability of the results of this investigation.
	[2]

© UCLES 2007 9700/5/SP07 final

(iii) Use the grid to plot a bar chart of the mean results for this investigation, including confidence limit error bars. [4] (b) Explain the difference in the rates of respiration in the sets of seeds used in this investigation.

[Total: 10]

For

Examiner's Use 3 A solution of hormone Y, thought to be a growth hormone, was made by dissolving a known mass of hormone Y in 10 cm<sup>3</sup> of distilled water. This was added to samples from a culture of animal calls containing 3 000 000 cells per mm<sup>3</sup>

For Examiner's Use

25 mm<sup>3</sup> of the hormone **Y** solution was added to a sample to create an experimental culture of animal cells.

25 mm<sup>3</sup> of distilled water was added to a sample to create a control culture of animal cells After three days the number of cells per mm<sup>3</sup> of culture was measured.

Table 3.1 shows the results of this investigation.

Table 3.1

sample number	1	2	3	4	5	6	7	8	9	10	mean
				million	s of ce	lls per	mm <sup>3</sup> c	of cultu	re		
experimental cell culture treatment	7.5	8.1	7.6	6.2	7.5	7.8	8.9	6.5	7.9	7.3	7.5
control cell culture treatment	5.6	7.5	8.2	6.7	3.5	6.5	5.9	3.7	5.8	8.4	6.2

	(a)	A student correctly	/ calculated the	percentage increase	in each	culture as	follows
--	-----	---------------------	------------------	---------------------	---------	------------	---------

experimental, 
$$\frac{(7.5-3)}{3} \times 100 = 151\%$$

control, 
$$\frac{(6.2-3)}{3} \times 100 = 106\%$$

Calculate the percentage increase of the experimental culture over the control culture. Show your working in the space below.

(b) State the extent to which the results support the hypothesis:

The hormone promotes growth in cell cultures.

[Total: 8]

[2]