



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Advanced Level

CANDIDATE  
NAME

CENTRE  
NUMBER

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NUMBER

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**BIOLOGY**

**9700/51**

Paper 5 Planning, Analysis and Evaluation

**October/November 2009**

**1 hour 15 minutes**

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 a 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 **7** printed pages and **5** blank pages.





1 An investigation into the effect of temperature on the rate of the light-dependent stage of photosynthesis was carried out using isolated chloroplasts. Samples of chloroplasts suspended in buffer were mixed with a coloured electron acceptor and exposed to light. The colour changes from blue to colourless as electrons are taken up by the electron acceptor.

(a) (i) Sketch a graph to predict the results of the investigation.



[2]

(ii) Identify two key variables that must be controlled in this investigation. For each explain how it might be controlled.

1.....  
.....  
.....

2.....  
.....  
..... [4]

(iii) Outline a procedure to find the rate of reaction for this investigation.

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

(b) In a further investigation, small quantities of ADP and inorganic phosphate were added to the isolated chloroplasts before testing.

Suggest an hypothesis being tested by this further investigation.

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

[Total: 9]

[Turn over

- 2 A solution of substance **Y**, thought to be a growth hormone, was made by dissolving a known mass of **Y** in  $10\text{ cm}^3$  of distilled water. This solution was added to samples from a culture of animal cells containing  $3000\text{ cells per mm}^3$ .

- $25\text{ mm}^3$  of solution **Y** was added to a cell sample.
- $25\text{ mm}^3$  of distilled water was added to another cell sample.

After four days the number of cells per  $\text{mm}^3$  of each culture was estimated using a microscope slide with a counting grid.

- (a) Identify and explain the purpose of the control experiment used in this investigation.

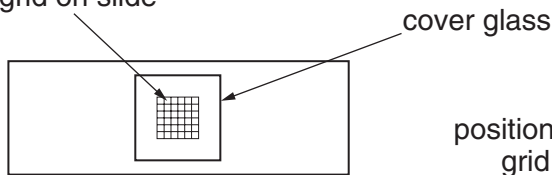
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..... [2]

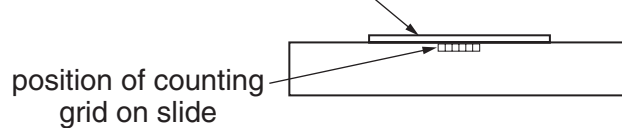
- (b) Fig. 2.1 shows a top view of a microscope slide with a counting grid. Fig. 2.2 shows a vertical section through the microscope slide and grid. Fig. 2.3 shows the detail of part of the grid viewed through a microscope.

position of counting  
grid on slide

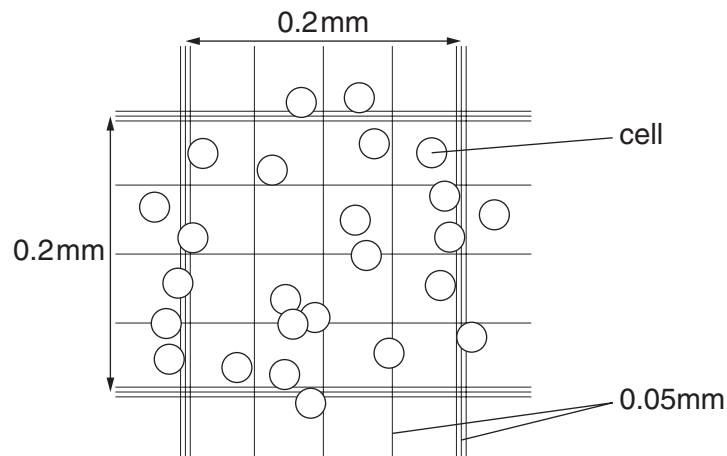


**Fig. 2.1**

cover glass on sample  
of  $0.1\text{ mm}$  depth



**Fig. 2.2**



**Fig. 2.3**



(d) The student's hypothesis for the investigation was:

Substance Y promotes growth in animal cell cultures.

(i) Identify evidence from the results that supports this hypothesis.

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(ii) Identify evidence from the results that does **not** support this hypothesis.

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..... [4]

[Total: 12]

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**QUESTION 3 STARTS ON PAGE 8**

3 (a) Polychlorinated biphenyls (PCBs) are persistent organic pollutants. Their use has been banned in many countries. The effects of these pollutants on male fertility has been investigated by many scientists.

(i) One group of studies on fish indicates that some of these pollutants decrease the size of the testes in relation to body mass.

Suggest a procedure by which the relative size of the testes of fish might be estimated.

.....  
.....  
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.....  
.....[3]

(ii) Name a statistical test that is suitable for determining if the decrease in the relative size of the testes is significant.

Explain your choice.

test .....

explanation ..... [2]

(iii) Suggest one way in which the decrease in relative size of the testes may lower fertility of fish.

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









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