



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Advanced Level

CANDIDATE  
NAME

CENTRE  
NUMBER

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**BIOLOGY**

**9700/05**

Paper 5 Planning, Analysis and Evaluation

**May/June 2007**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

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



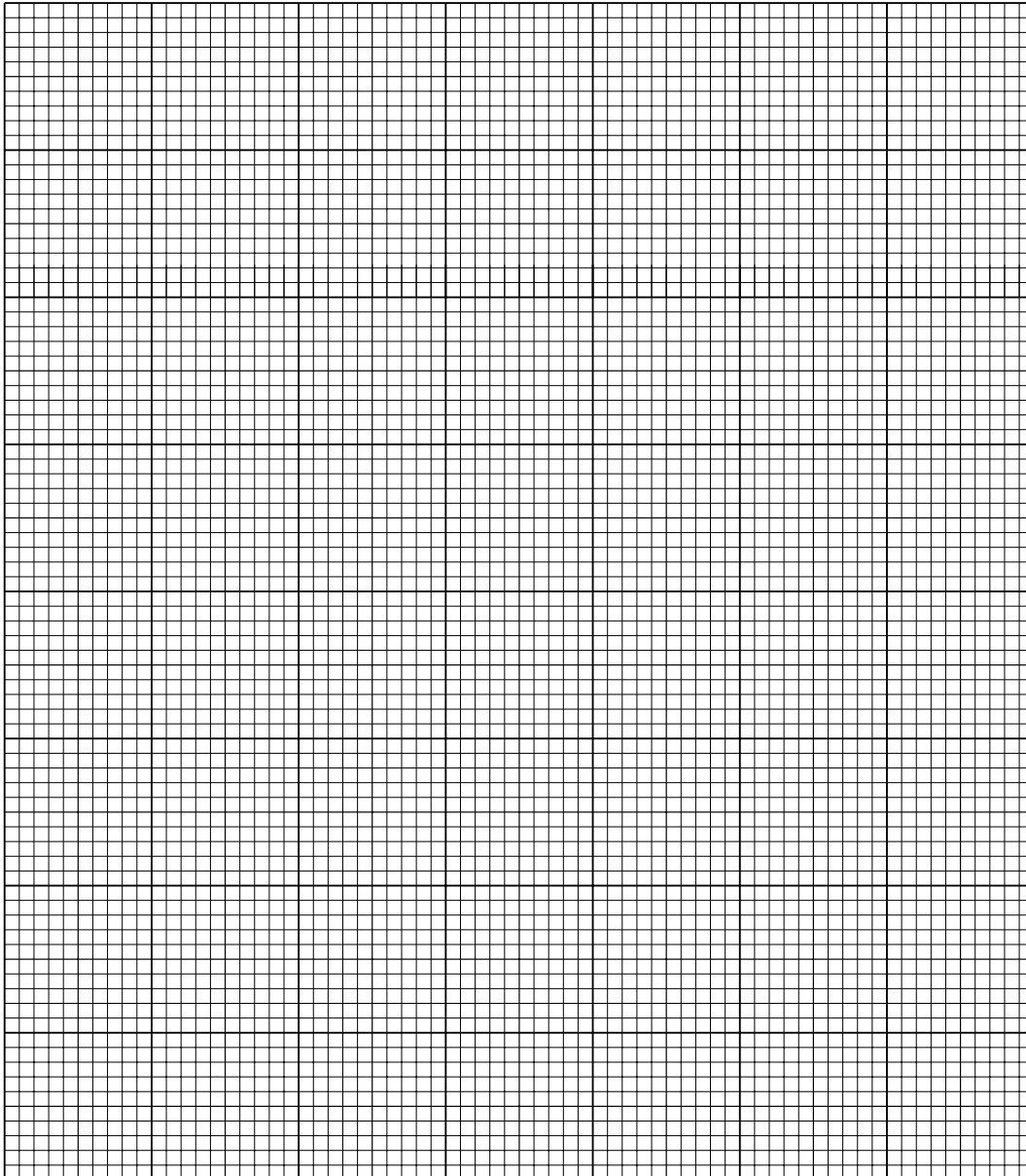
- 1 (a) 100 pods ( $n=100$ ) from an inbred variety of bean were collected and the number of seeds in each pod counted. Table 1.1 shows the results of this investigation.

**Table 1.1**

number of beans per pod ( $x$ )	3	4	5	6	7	8
frequency ( $f$ )	4	18	28	37	8	5

- (i) Plot a frequency histogram of this data.

[3]



- (ii) Complete Table 1.2 by calculating n, three values for fx and  $\sum fx$  and putting the answers in the appropriate spaces on the table.

**Table 1.2**

number of beans per pod (x)	3	4	5	6	7	8	Total
frequency (f)	4	18	28	37	8	5	n = .....
fx	.....	.....	.....	222	56	40	$\sum fx$ = .....

[1]

- (iii) Use the formula to calculate the mean value ( $\bar{x}$ ) of the number of seeds per pod.

$$\bar{x} = \frac{\sum fx}{n}$$

..... [1]

- (iv) A student calculated the standard deviation ( $s$ ) for this data.

The standard deviation,  $s = 1.15$ .

State what the standard deviation tells you about this investigation.

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

- (v) Use the formula to calculate the standard error ( $S_M$ ) for this data.

$$S_M = \frac{s}{\sqrt{n}}$$

..... [1]

- (b) Suggest an explanation to account for the different number of seeds in the pods of plants of the same genotype.

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

[Total : 8]



(ii) Predict the expected result of the investigation.

.....  
Explain your prediction. ....  
.....[2]

(b) The respiratory quotient (RQ) calculated for the invertebrates was 1.0 and for the germinating seeds the RQ was 0.7.

(i) State how an RQ is calculated.

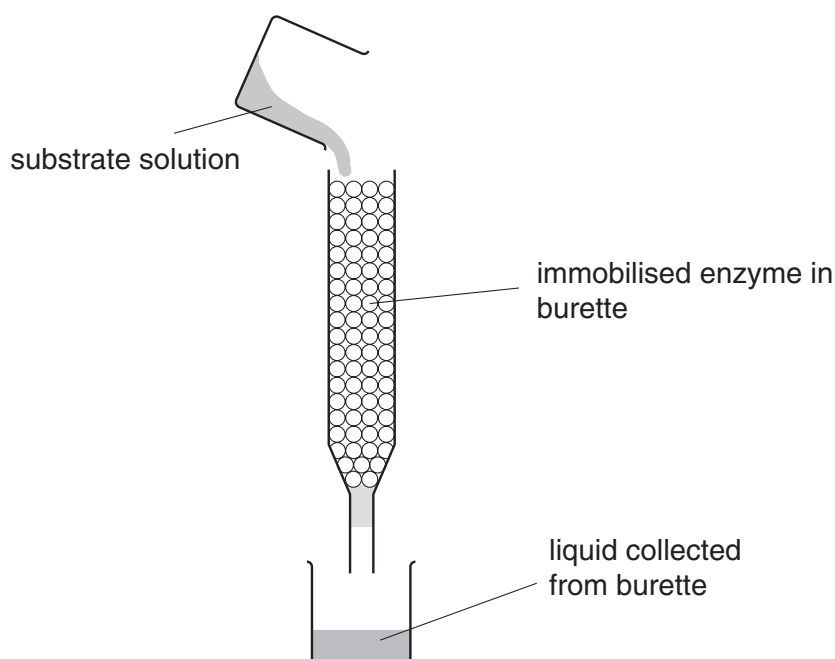
.....  
.....[1]

(ii) State the conclusions that can be drawn about the nature of the respiratory substrate in

invertebrates, .....  
germinating seeds. ....[2]

[Total : 15]

- 3 Fig. 3.1 shows an apparatus used in an investigation using immobilised enzymes. It is **not** expected that you will have done this investigation.



**Fig. 3.1**

A solution of a substrate was poured into a burette containing an enzyme immobilised onto alginate beads. The liquid passing through the burette was collected into a beaker and the concentration of substrate and the concentration of the product measured. Table 3.1 shows the results obtained by five students.

**Table 3.1**

	enzyme concentration				enzyme concentration			
	0.2 / gdm <sup>-3</sup>		0.4 / gdm <sup>-3</sup>		0.2 / gdm <sup>-3</sup>		0.4 / gdm <sup>-3</sup>	
	substrate concentration / gdm <sup>-3</sup>				product concentration / gdm <sup>-3</sup>			
	repeat 1	repeat 2	repeat 1	repeat 2	repeat 1	repeat 2	repeat 1	repeat 2
student A	24	26	14	13	32	33	60	64
student B	25	22	12	12	34	39	60	63
student C	22	23	10	13	35	32	59	61
student D	18	24	11	12	34	33	62	68
student E	25	28	13	18	30	32	65	64

(a) Identify two variables and explain how each might be controlled.

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

(b) On Table 3.1, indicate by placing a circle around the value, **two** results that are anomalous.

Answer this question by placing **two** circles on Table 3.1 on page 6. [2]

(c) A student drew the following conclusion from this investigation:

*Doubling the enzyme concentration doubled the rate of reaction of the enzyme.*

(i) State **one** way in which the evidence in Table 3.1 supports the conclusion.

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

(ii) State two ways in which the reliability of the results might be improved.

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

[Total : 7]

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