UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5712302866

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	
Total	

This document consists of **7** printed pages and **1** blank page.

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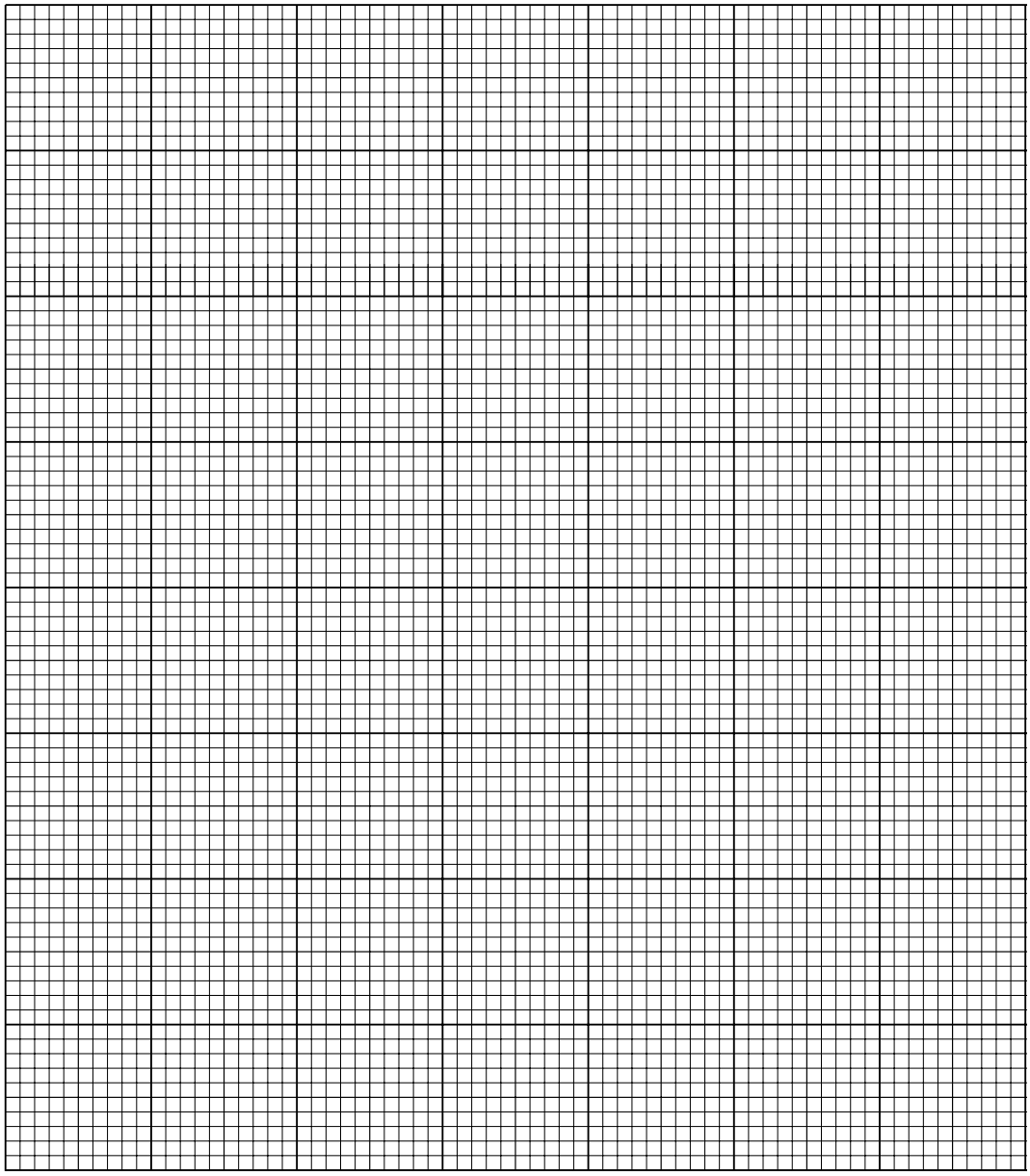
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1 **(a)** 100 pods (n=100) from an inbred variety of bean were collected and the number of seeds in each pod counted. Table 1.1 shows the results of this investigation.

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]



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(ii) Complete Table 1.2 by calculating n, three values for fx and ∑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	∑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]

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2 Fig. 2.1 shows a type of respirometer.

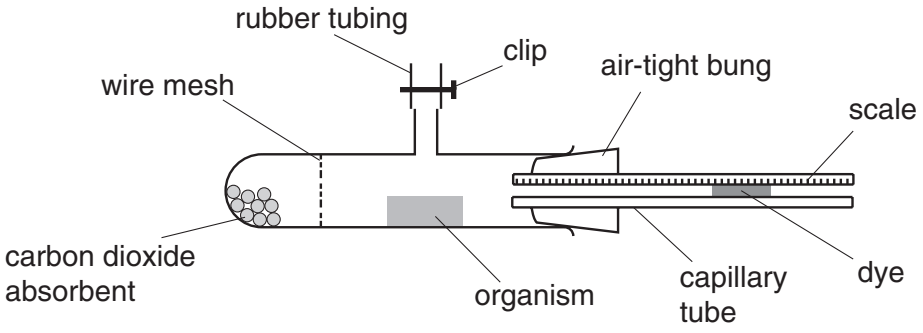


Fig. 2.1

(a) (i) Using this apparatus, plan an investigation to compare the respiration rate of small invertebrates and germinating seeds.

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.....[10]

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(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]

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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.

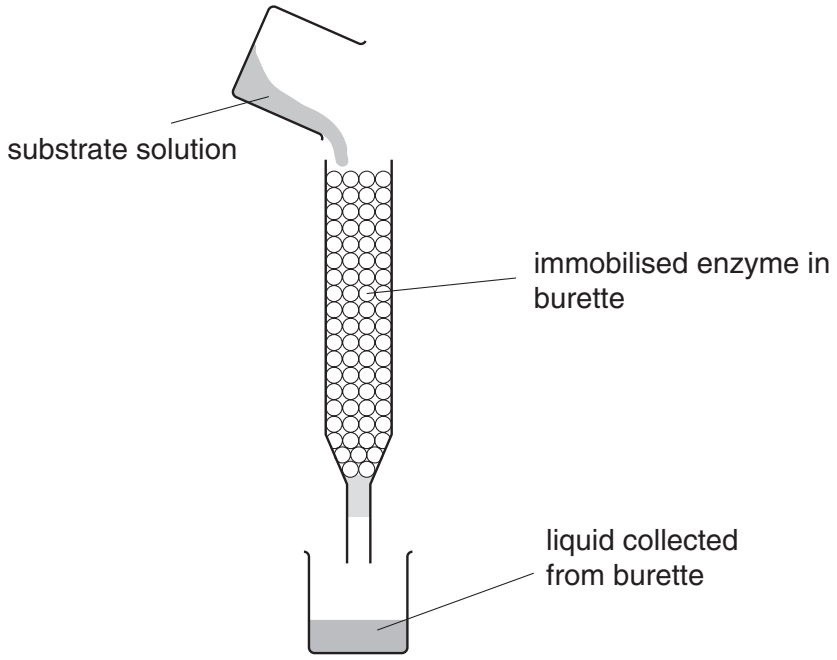


Fig. 3.1

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^{-3}		0.4 / gdm^{-3}		0.2 / gdm^{-3}		0.4 / gdm^{-3}	
	substrate concentration / gdm^{-3}				product concentration / gdm^{-3}			
	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

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(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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