



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Advanced Level

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**BIOLOGY**

**9700/53**

Paper 5 Planning, Analysis and Evaluation

**October/November 2010**

**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	
<b>Total</b>	

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







Based on these observations, the student made a hypothesis:

**The yeast will form more cells when provided with fructose than with glucose.**

Table 1.2 shows the results of counting cell samples from the active yeast suspension that had been supplied with fructose or glucose and left at the optimum temperature for 30 minutes. Three samples were taken from each suspension and the cells counted using a microscope slide with a grid. Four counts were made from each sample and the number of cells per  $\text{mm}^3$  calculated.

**Table 1.2**

	fructose number of cells per $\text{mm}^3$				mean	glucose number of cells per $\text{mm}^3$				mean
	count 1	count 2	count 3	count 4		count 1	count 2	count 3	count 4	
sample 1	52	75	62	56	62	53	55	48	54	51
sample 2	58	66	71	46		45	52	51	52	
sample 3	65	61	68	64		53	53	42	54	

The student then calculated the standard error for these results.

The standard deviation for fructose = 8.11 = 8 cells

The standard error for fructose = 2.30 = 2 cells

The formula for standard error is:  $S_M = \frac{s}{\sqrt{n}}$   $s$  = standard deviation  
 $n$  = number of samples

(c) (i) Complete the calculation to find the value of  $S_M$  for glucose.

Show your working. State your answer to the nearest whole cell.

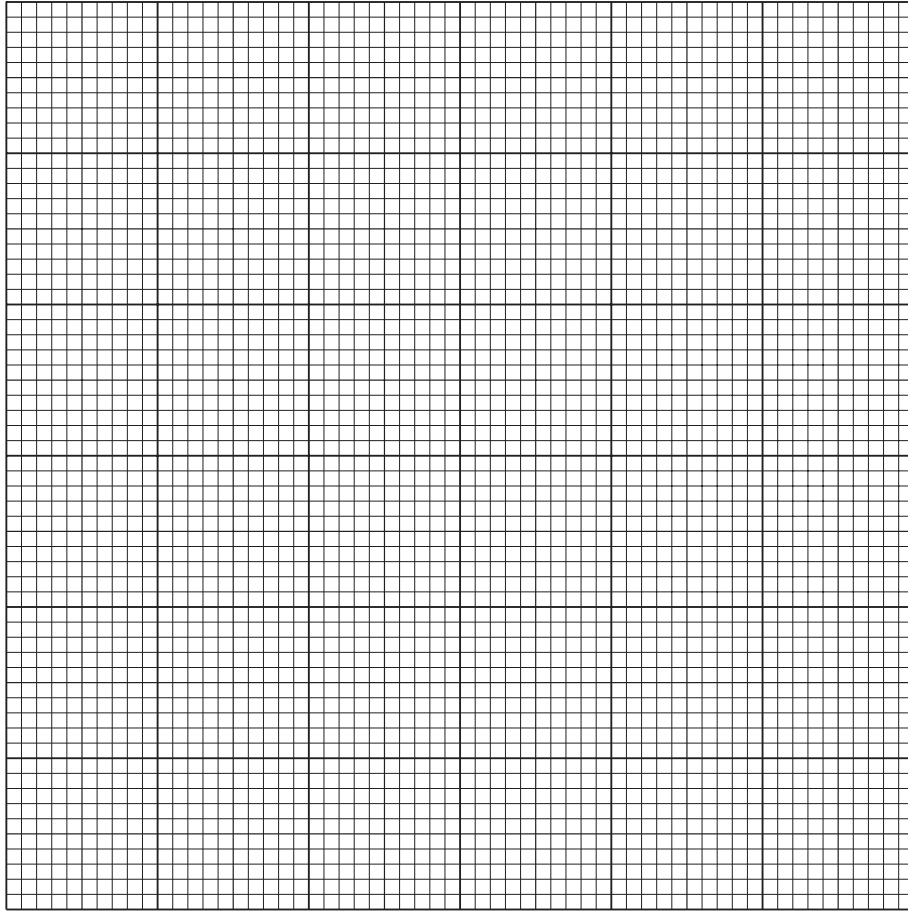
$$S_M = \frac{4}{\sqrt{\quad}}$$

$$S_M = \dots\dots\dots[3]$$

(ii) State what standard deviation shows.

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

- (iii) Use the grid to plot the data in Table 1.2 to show the difference in the population size of yeast supplied with fructose and yeast supplied with glucose. Include error bars.



[3]

- (iv) State whether the data support the hypothesis. Give a reason for your answer.

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

[Total: 21]

- 2 In an investigation on the effects of nicotine, 20 regular smokers completed a memory test. Their reaction time after smoking various amounts of nicotine was measured. The following procedure was used:

- the participants did not smoke for 12 hours before the test
- the participants took a memory test
- the participants smoked a cigarette containing 0.05 mg of nicotine
- the participants took a memory test
- the participants smoked a cigarette containing 1.1 mg of nicotine
- the participants took a memory test.

The memory test consisted of:

- a random set of two, three or four letters was shown on a computer screen for 250 ms
- after 1000 ms a single letter was shown for 250 ms
- the participant pressed a 'yes button' if the letter was present in the original set or a 'no button' if it was not present
- the time taken to respond was recorded as the reaction time.

Fig. 2.1 shows the results of these investigations.

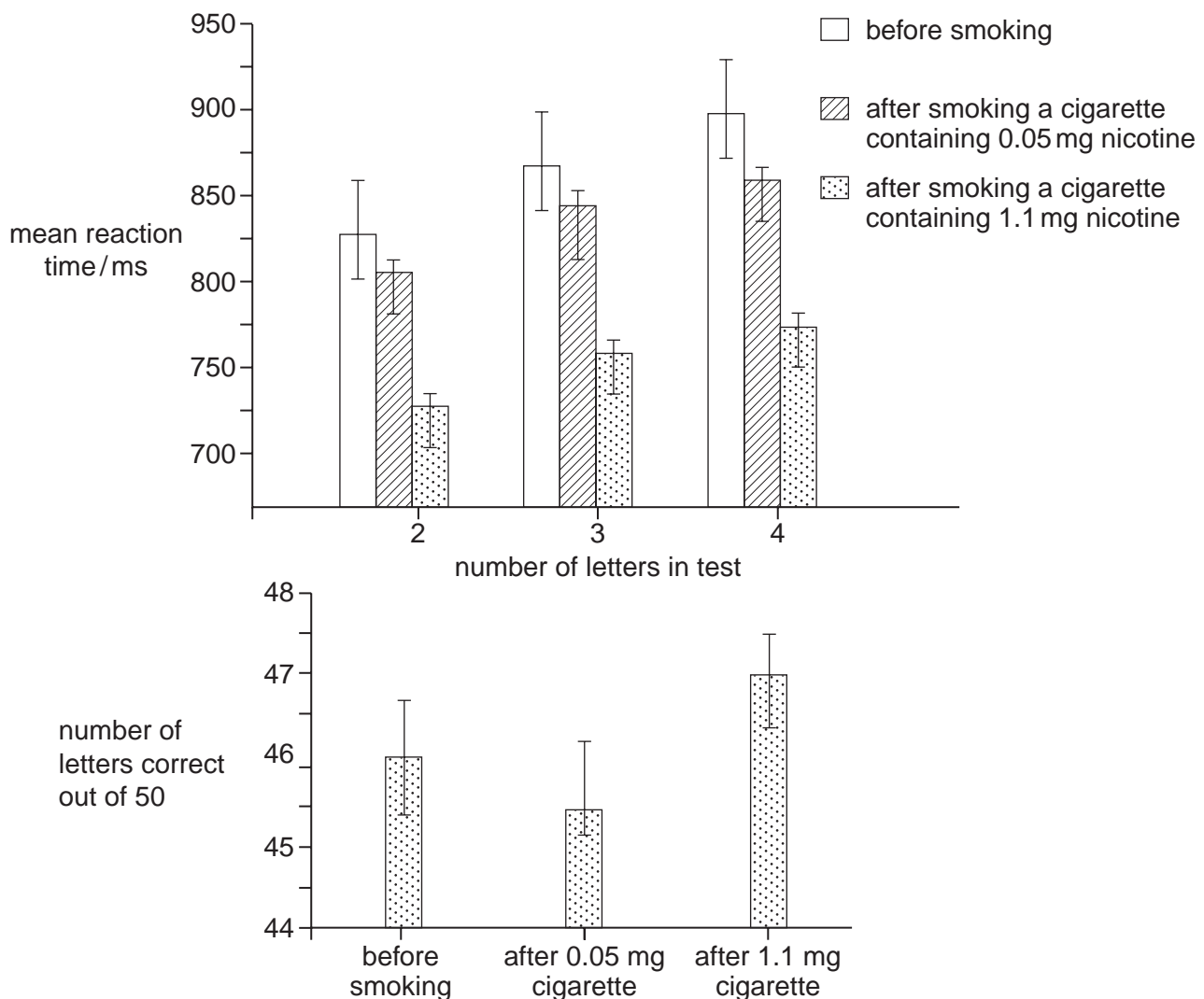
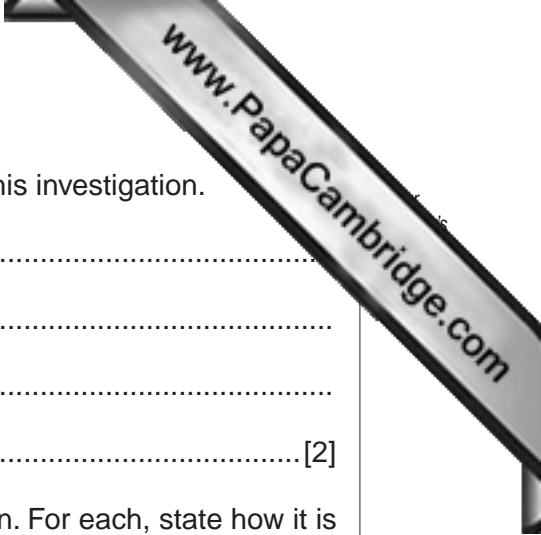


Fig. 2.1



(a) (i) Identify the independent and the dependent variable in this investigation.

*independent variable* .....

.....

*dependent variable*.....

.....[2]

(ii) State two variables that are controlled in this investigation. For each, state how it is controlled.

*variable 1* .....

.....

.....

.....

*variable 2* .....

.....

.....

.....[4]

(b) The investigators concluded

**An increase in nicotine decreases reaction time and improves accuracy of the memory test.**

State how the results

(i) support this conclusion

.....

.....

.....

(ii) do not support this conclusion.

.....

.....

.....[3]

[Total: 9]

