

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS General Certificate of Education Advanced Level

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CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

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				
Total				

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1

www.PapaCambridge.com Fig. 1.1 shows a simple apparatus used by a student to measure the rate of respiration yeast Saccharomyces cerevisiae.

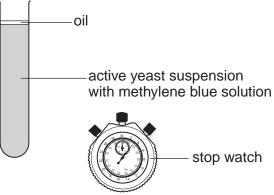


Fig. 1.1

Active yeast suspension is a pale cream colour. It is prepared by mixing dry yeast, glucose and water and leaving for 1 hour at 30 °C. The methylene blue solution acts as an electron acceptor and becomes colourless when reduced.

(a) (i)	State how the dependent variable is measured in this experiment.
	[1]
(ii)	Explain why the layer of oil is needed.
	[1]
(iii)	Outline how the student could use this apparatus to find the optimum temperature for the respiration of yeast.

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In a further investigation, the student tested the ability of yeast to use different sugars. Active yeast suspensions were mixed with 2% solutions of six different sugars. The yeast was allowed to metabolise the sugars at its optimum temperature and the carbon dioxide released was collected for a 10 minute period.

Table 1.1 shows the student's results.

Table 1.1

	volume of carbon dioxide in 10 mins/cm ³										
	monosaccharides disaccharides										
glucose fructose galactose (glu) (fru) (gal)						sucrose maltose lacte (glu + fru) (glu + glu) (glu +					
1	2.0	1	5.0	1	0.1	1	3.0	1	1.4	1	0.3
2	2.2	2	3.8	2	0.3	2	2.6	2	1.7	2	0.4
3	2.4	3	4.6	3	0.2	3	3.6	3	1.3	3	0.6
mean	2.2	mean	4.5	mean	0.2	mean	3.1	mean	1.5	mean	0.4

(b)	Suggest an explanation for these results.
	[3]

[0]

Based on these observations, the student made a hypothesis:

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

www.PapaCambridge.com 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 mm³ calculated.

Table 1.2

	num		tose ells per r	mm ³		num		cose ells per i	mm ³	
	count 1	count 2	count 3	count 4	mean	count 1	count 2	count 3	count 4	mean
sample 1	52	75	62	56		53	55	48	54	
sample 2	58	66	71	46	62	45	52	51	52	51
sample 3	65	61	68	64		53	53	42	54	

The student then calculated the standard error for these results.

= 8.11 = 8 cellsThe standard deviation for fructose

= 2.30 = 2 cellsThe standard error for fructose

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

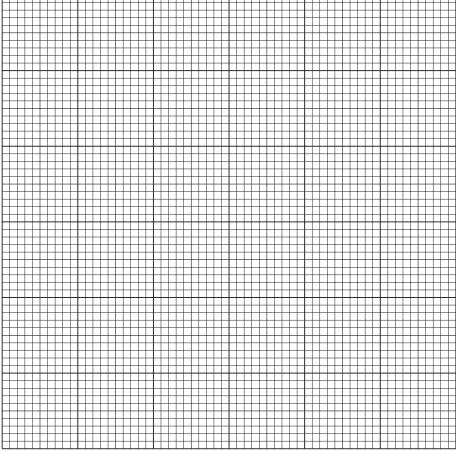
(c) (i) Complete the calculation to find the value of S_M for glucose.

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

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

	$S_M = \dots [S]$
(ii)	State what standard deviation shows.
	rol

(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 glue Include error bars.



[3]

(iv)	State whether the data support the hypothesis. Give a reason for your answer.
	[1]

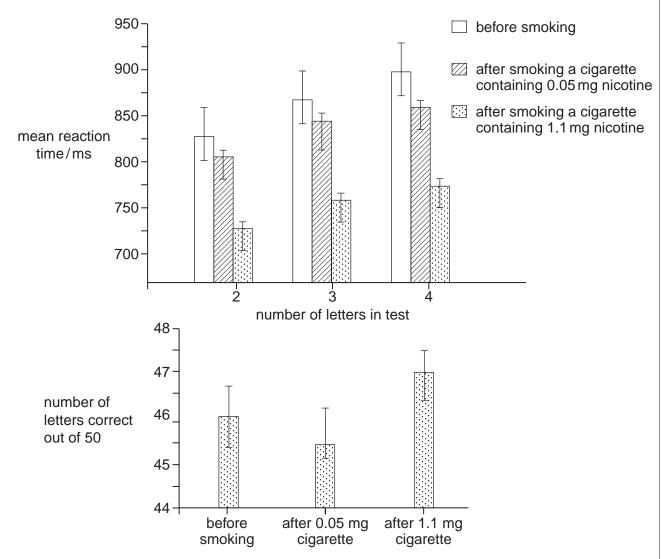
[Total: 21]

- www.papaCambridge.com 2 In an investigation on the effects of nicotine, 20 regular smokers completed a member of nicotine, 20 regular smokers completed and 20 regula 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.



www.PapaCambridge.com Identify the independent and the dependent variable in this investigation. independent variable dependent variable..... 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.

[Total: 9]

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