

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Education
Advanced Level Examination
June 2010

Mathematics

MS2B

Unit Statistics 2B

Friday 18 June 2010 1.30 pm to 3.00 pm

For this paper you must have:

- the blue AQA booklet of formulae and statistical tables.
- You may use a graphics calculator.

Time allowed

- 1 hour 30 minutes

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Write the question part reference (eg (a), (b)(i) etc) in the left-hand margin.
- You must answer the questions in the spaces provided. Do not write outside the box around each page.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- The **final** answer to questions requiring the use of tables or calculators should normally be given to three significant figures.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 75.

Advice

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	



J U N 1 0 M S 2 B 0 1

Answer **all** questions in the spaces provided.

1

Judith, the village postmistress, believes that, since moving the post office counter into the local pharmacy, the mean daily number of customers that she serves has increased from 79.

In order to investigate her belief, she counts the number of customers that she serves on 12 randomly selected days, with the following results.

88 81 84 89 90 77 72 80 82 81 75 85

Stating a necessary distributional assumption, test Judith's belief at the 5% level of significance. (9 marks)

QUESTION
PART
REFERENCE



QUESTION
PART
REFERENCE

Turn over ►



0 3

2

It is claimed that a new drug is effective in the prevention of sickness in holiday-makers. A sample of 100 holiday-makers was surveyed, with the following results.

	Sickness	No sickness	Total
Drug taken	24	56	80
No drug taken	11	9	20
Total	35	65	100

Assuming that the 100 holiday-makers are a random sample, use a χ^2 test, at the 5% level of significance, to investigate the claim. (8 marks)

QUESTION
PART
REFERENCE



QUESTION
PART
REFERENCE

Turn over ►



0 5

$$f(x) = \begin{cases} k & -3k \leq x \leq k \\ 0 & \text{otherwise} \end{cases}$$

QUESTION
PART
REFERENCE

Turn over ►



4

The error, X °C, made in measuring a patient's temperature at a local doctors' surgery may be modelled by a normal distribution with mean μ and standard deviation σ .

The errors, x °C, made in measuring the temperature of each of a random sample of 10 patients are summarised below.

$$\sum x = 0.35 \quad \text{and} \quad \sum (x - \bar{x})^2 = 0.12705$$

Construct a 99% confidence interval for μ , giving the limits to three decimal places.
(5 marks)

QUESTION
PART
REFERENCE



QUESTION
PART
REFERENCE

Turn over ►



[illegible]

QUESTION
PART
REFERENCE

[illegible]

- 6 (a)** The number of strokes, R , taken by the members of Duffers Golf Club to complete the first hole may be modelled by the following discrete probability distribution.

r	≤ 2	3	4	5	6	7	8	≥ 9
$P(R = r)$	0	0.1	0.2	0.3	0.25	0.1	0.05	0

- (i) Determine the probability that a member, selected at random, takes at least 5 strokes to complete the first hole. (1 mark)
- (ii) Calculate $E(R)$. (2 marks)
- (iii) Show that $\text{Var}(R) = 1.66$. (4 marks)
- (b)** The number of strokes, S , taken by the members of Duffers Golf Club to complete the second hole may be modelled by the following discrete probability distribution.

s	≤ 2	3	4	5	6	7	8	≥ 9
$P(S = s)$	0	0.15	0.4	0.3	0.1	0.03	0.02	0

Assuming that R and S are independent:

- (i) show that $P(R + S \leq 8) = 0.24$; (5 marks)
- (ii) calculate the probability that, when 5 members are selected at random, at least 4 of them complete the first two holes in fewer than 9 strokes; (3 marks)
- (iii) calculate $P(R = 4 \mid R + S \leq 8)$. (3 marks)

QUESTION
PART
REFERENCE



[illegible]

[illegible]

[illegible]

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$$f(x) = \begin{cases} \frac{1}{2} & 0 \leq x \leq 1 \\ \frac{1}{18}(x-4)^2 & 1 \leq x \leq 4 \\ 0 & \text{otherwise} \end{cases}$$

- $$F(x) = 1 + \frac{1}{54}(x - 4)^3$$

(ii) Hence evaluate q to three decimal places. (1 mark)

QUESTION	PART	REFERENCE
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[illegible]

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[illegible]