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| Centre Number | | | | | | Candidate Number | | | | |
| Surname | | | | | | | | | | |
| Other Names | | | | | | | | | | |
| Candidate Signature | | | | | | | | | | |

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| For Examiner's Use | |
| Examiner's Initials | |
| Question | Mark |
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| 7 | |
| TOTAL | |



General Certificate of Education
Advanced Level Examination
June 2013

Mathematics

MS03

Unit Statistics 3

Tuesday 18 June 2013 9.00 am to 10.30 am

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 each question in the space provided for that question. If you require extra space, use an AQA supplementary answer book; do **not** use the space provided for a different question.
- 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.
- You do not necessarily need to use all the space provided.



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5 The schedule for an organisation's afternoon meeting is as follows.

| | |
|------------------------|--------------------|
| Session A (Speaker 1) | 2.00 pm to 3.15 pm |
| Session B (Discussion) | 3.15 pm to 3.45 pm |
| Session C (Speaker 2) | 3.45 pm to 5.00 pm |

Records show that:

the duration, X , of Session A has mean 68 minutes and standard deviation 10 minutes;

the duration, Y , of Session B has mean 25 minutes and standard deviation 5 minutes;

the duration, Z , of Session C has mean 73 minutes and standard deviation 15 minutes;

and that:

$$\rho_{XZ} = 0 \quad \rho_{XY} = -0.8 \quad \rho_{YZ} = 0$$

(a) Determine the means and the variances of:

(i) $L = X + Z$; *(2 marks)*

(ii) $M = X + Y$. *(3 marks)*

(b) Assuming that L and M are each normally distributed, determine the probability that:

(i) the total time for the two speaker sessions is less than $2\frac{1}{2}$ hours; *(2 marks)*

(ii) Session C is late in starting. *(3 marks)*

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QUESTION
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ANSWER IN THE SPACES PROVIDED**

