

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Education
Advanced Level Examination
January 2012

Statistics

SS04

Unit Statistics 4

Wednesday 25 January 2012 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.
- You do not necessarily need to use all the space provided.

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



J A N 1 2 S S 0 4 0 1

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

1

A gas company claimed that the length of time between a gas leak being reported and an engineer arriving to investigate the report has a mean of 115 minutes. A random sample of these times, in minutes, was

141 85 152 114 150 103 66 234

Using the 5% significance level, test whether there is evidence that the mean time exceeds 115 minutes. Assume that the distribution of times is normal. *(9 marks)*

QUESTION
PART
REFERENCE



QUESTION
PART
REFERENCE

Turn over ►



- 2 (a)** Gemima commutes to work by bicycle. Provided that her tyres are in good condition, the probability of a puncture on her journey between home and work is 0.0025. This probability is independent for each journey. During the last 2 months of 2011, she made 80 journeys between home and work.
- (i) Using a distributional approximation, find the probability that, when Gemima makes 80 journeys between home and work with her tyres in good condition, there will be a puncture on 2 or more journeys. *(4 marks)*
- (ii) In fact, there was a puncture on 2 journeys when Gemima cycled between home and work during the last 2 months of 2011. Comment on the suggestion that she should buy new tyres. *(2 marks)*
- (b)** Simon uses his bicycle every day. When his bicycle chain is worn out, the probability that it will come off during a day's cycling is, independently, 0.32.
- (i) Using a distributional approximation, find the probability that, when Simon's chain is worn out, it will come off on 10 or fewer days out of 60. *(6 marks)*
- (ii) In fact, Simon's chain came off on 3 days during the last 60 days of 2011. Comment on the suggestion that he should buy a new chain. *(2 marks)*

QUESTION
PART
REFERENCE



QUESTION
PART
REFERENCE

Turn over ►



QUESTION
PART
REFERENCE



QUESTION
PART
REFERENCE

Turn over ►



Students at a university were asked to complete a confidential questionnaire when applying for accommodation. The first question was:

Those who answered ‘Yes’ were then asked the next question:

(a) Of the 98 students who answered the first question, 48 answered ‘No’.

(b) Of the 50 students who answered ‘Yes’ to the first question, 25 answered ‘Yes’ to the next question.

Test whether there is evidence, significant at the 5% level, to support the claim that more than 40 per cent of students applying for accommodation who have attempted DIY jobs admit to having used kitchen cutlery instead of the appropriate tools. Use an exact distribution and assume that the sample is random. (6 marks)

(c) Summarise your results in the context of the company's claim. (3 marks)

[illegible]

QUESTION
PART
REFERENCE

Turn over ►



[illegible]

[illegible]

- 4** A travel company operates a service transporting passengers from a harbour on a Danish island to Copenhagen, which is situated on the mainland. A boat takes the passengers from the island to the mainland, where a bus is provided which takes them to Copenhagen.

The duration of the boat journey is normally distributed with mean 74 minutes and standard deviation 4.6 minutes.

The time to transfer passengers and luggage from the boat to the bus is normally distributed with mean 28 minutes and standard deviation 5.3 minutes.

The duration of the bus journey is normally distributed with mean 126 minutes and standard deviation 7.2 minutes.

- (a) (i) Find the distribution of the total journey time from the island to Copenhagen. Assume that the three times which contribute to the total journey time are independent.
- (ii) Find the probability that the total journey time will be more than 4 hours. (6 marks)
- (b) Bergitte uses the service every Saturday. She leaves her home on the island by taxi at 9.45 am to travel to the harbour to catch the boat which leaves at 10.00 am. The time taken by the taxi to drive from Bergitte's home to the harbour is normally distributed with mean 11 minutes and standard deviation 2.9 minutes.
- (i) Find the probability that Bergitte reaches the harbour before 10.00 am. (2 marks)
- (ii) If Bergitte does not reach the harbour before 10.00 am, she must wait for the next service to Copenhagen, which leaves at 2.00 pm.
- Find the mean length of time that it takes Bergitte from leaving home to reaching Copenhagen.
- You may assume that the journey time from the harbour to Copenhagen is the mean of the distribution considered in part (a). (3 marks)
- (iii) What advice would you give to Bergitte? (1 mark)

QUESTION
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[illegible]

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[illegible]

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57 62 74 49 63 65 61 58 79 66 61

- Statement 3. 90% of the times taken by members of the club will be contained in the confidence interval. (5 marks)

QUESTION	PART	REFERENCE
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[illegible]



[illegible]

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QUESTION
PART
REFERENCE**END OF QUESTIONS**

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