Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	6	8	3	/	0	1	Signature	

Paper Reference(s)

6683/01

Edexcel GCE

Statistics S1

Advanced/Advanced Subsidiary

Tuesday 17 January 2012 – Morning

Time: 1 hour 30 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
Total	

Materials required for examination
Mathematical Formulae (Pink)

Items included with question papers
Nil

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation or symbolic differentiation/integration, or have retrievable mathematical formulae stored in them.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions.
You must write your answer to each question in the space following the question.
Values from the statistical tables should be quoted in full. When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.
Full marks may be obtained for answers to ALL questions.
The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 7 questions in this question paper. The total mark for this paper is 75.
There are 24 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You should show sufficient working to make your methods clear to the Examiner.
Answers without working may not gain full credit.

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1. The histogram in Figure 1 shows the time, to the nearest minute, that a random sample of 100 motorists were delayed by roadworks on a stretch of motorway.

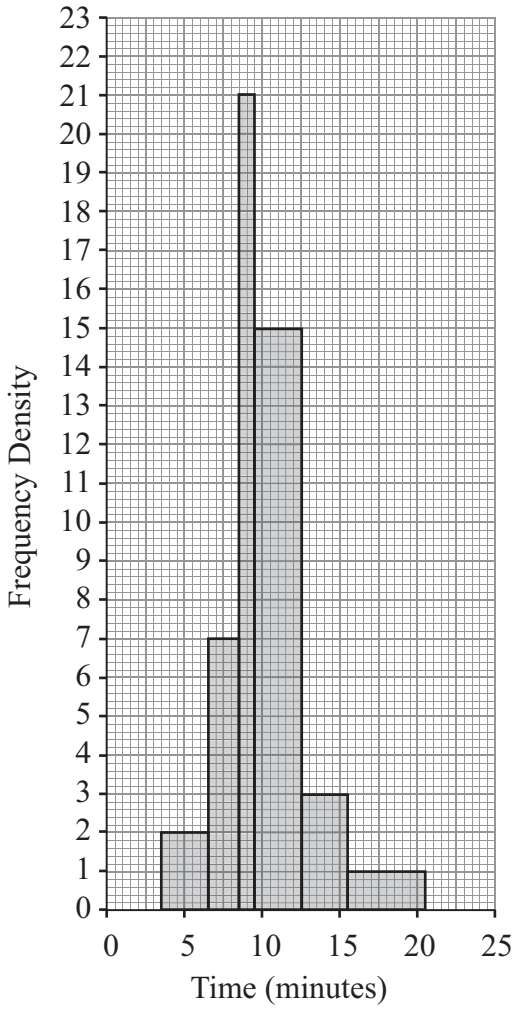

Figure 1

(a) Complete the table.

Delay (minutes)	Number of motorists
4 – 6	6
7 – 8	
9	21
10 – 12	45
13 – 15	9
16 – 20	

(2)

(b) Estimate the number of motorists who were delayed between 8.5 and 13.5 minutes by the roadworks.

(2)

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Question 1 continued

(Total 4 marks)

Q1

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2. (a) State in words the relationship between two events R and S when $\mathrm{P}(R \cap S) = 0$

(1)

The events A and B are independent with $\mathrm{P}(A) = \frac{1}{4}$ and $\mathrm{P}(A \cup B) = \frac{2}{3}$

Find

(b) $\mathrm{P}(B)$

(4)

(c) $\mathrm{P}(A' \cap B)$

(2)

(d) $\mathrm{P}(B' \mid A)$

(2)

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Question 2 continued

Q2

(Total 9 marks)

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3. The discrete random variable X can take only the values 2, 3, 4 or 6. For these values the probability distribution function is given by

x	2	3	4	6
$P(X = x)$	$\frac{5}{21}$	$\frac{2k}{21}$	$\frac{7}{21}$	$\frac{k}{21}$

where k is a positive integer.

(a) Show that $k = 3$

(2)

Find

(b) F(3)

(1)

(c) E(X)

(2)

(d) E(X^2)

(2)

(e) Var($7X - 5$)

(4)

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Question 3 continued

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Question 3 continued

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Question 3 continued

(Total 11 marks)

Q3

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4. The marks, x, of 45 students randomly selected from those students who sat a mathematics examination are shown in the stem and leaf diagram below.

Mark		Totals
3	6 9 9	(3)
4	0 1 2 2 3 4	(6)
4	5 6 6 6 8	(5)
5	0 2 3 3 4 4	(6)
5	5 5 6 7 7 9	(6)
6	0 0 0 0 1 3 4 4 4	(9)
6	5 5 6 7 8 9	(6)
7	1 2 3 3	(4)

Key	(3|6 means 36)

(a) Write down the modal mark of these students.

(1)

(b) Find the values of the lower quartile, the median and the upper quartile.

(3)

For these students $\sum x = 2497$ and $\sum x^2 = 143\ 369$

(c) Find the mean and the standard deviation of the marks of these students.

(3)

(d) Describe the skewness of the marks of these students, giving a reason for your answer.

(2)

The mean and standard deviation of the marks of all the students who sat the examination were 55 and 10 respectively. The examiners decided that the total mark of each student should be scaled by subtracting 5 marks and then reducing the mark by a further 10 %.

(e) Find the mean and standard deviation of the scaled marks of all the students.

(4)

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Question 4 continued

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Question 4 continued

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Question 4 continued

Q4

(Total 13 marks)

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5. The age, t years, and weight, w grams, of each of 10 coins were recorded. These data are summarised below.

$$\sum t^2 = 2688 \quad \sum tw = 1760.62 \quad \sum t = 158 \quad \sum w = 111.75 \quad S_{ww} = 0.16$$

(a) Find S_{tt} and S_{tw} for these data.

(3)

(b) Calculate, to 3 significant figures, the product moment correlation coefficient between t and w.

(2)

(c) Find the equation of the regression line of w on t in the form $w = a + bt$

(4)

(d) State, with a reason, which variable is the explanatory variable.

(2)

(e) Using this model, estimate
(i) the weight of a coin which is 5 years old,
(ii) the effect of an increase of 4 years in age on the weight of a coin.

(2)

It was discovered that a coin in the original sample, which was 5 years old and weighed 20 grams, was a fake.

(f) State, without any further calculations, whether the exclusion of this coin would increase or decrease the value of the product moment correlation coefficient. Give a reason for your answer.

(2)

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Question 5 continued

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Question 5 continued

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Question 5 continued

(Total 15 marks)

Q5

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6. The following shows the results of a survey on the types of exercise taken by a group of 100 people.

65 run
48 swim
60 cycle
40 run and swim
30 swim and cycle
35 run and cycle
25 do all three

(a) Draw a Venn Diagram to represent these data.

(4)

Find the probability that a randomly selected person from the survey

(b) takes none of these types of exercise,

(2)

(c) swims but does not run,

(2)

(d) takes at least two of these types of exercise.

(2)

Jason is one of the above group.
Given that Jason runs,

(e) find the probability that he swims but does not cycle.

(3)

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Question 6 continued

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Question 6 continued

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Question 6 continued

(Total 13 marks)

Q6

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7. A manufacturer fills jars with coffee. The weight of coffee, W grams, in a jar can be modelled by a normal distribution with mean 232 grams and standard deviation 5 grams.

(a) Find $P(W < 224)$.

(3)

(b) Find the value of w such that $P(232 < W < w) = 0.20$

(4)

Two jars of coffee are selected at random.

(c) Find the probability that only one of the jars contains between 232 grams and w grams of coffee.

(3)

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Question 7 continued

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Question 7 continued

Q7

(Total 10 marks)

TOTAL FOR PAPER: 75 MARKS

END

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