| 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

Monday 16 January 2006 – Morning

Time: 1 hour 30 minutes

| Examiner's use only | | |
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| Team Leader's use only | | |
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| Question Number | Leave Blank |
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**Materials required for examination**
Mathematical Formulae (Green or Lilac)

**Items included with question papers**
Nil

**Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and/or integration. Thus candidates may NOT use calculators such as the Texas Instruments TI 89, TI 92, Casio CFX 9970G, Hewlett Packard HP 48G.**

### 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.
You must write your answer for 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 20 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 must show sufficient working to make your methods clear to the examiner. Answers without working may gain no credit.



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**1.** Over a period of time, the number of people $x$ leaving a hotel each morning was recorded. These data are summarised in the stem and leaf diagram below.

| Number leaving | | | | | | | | 3 \| 2 means 32 | Totals |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 7 | 9 | 9 | | | | | | (3) |
| 3 | 2 | 2 | 3 | 5 | 6 | | | | (5) |
| 4 | 0 | 1 | 4 | 8 | 9 | | | | (5) |
| 5 | 2 | 3 | 3 | 6 | 6 | 6 | 8 | | (7) |
| 6 | 0 | 1 | 4 | 5 | | | | | (4) |
| 7 | 2 | 3 | | | | | | | (2) |
| 8 | 1 | | | | | | | | (1) |

For these data,

(a) write down the mode,

**(1)**

(b) find the values of the three quartiles.

**(3)**

Given that $\Sigma x = 1335$ and $\Sigma x^2 = 71\,801$ find

(c) the mean and the standard deviation of these data.

**(4)**

One measure of skewness is found using

$$\frac{\text{mean} - \text{mode}}{\text{standard deviation}}.$$

(d) Evaluate this measure to show that these data are negatively skewed.

**(2)**

(e) Give two other reasons why these data are negatively skewed.

**(4)**

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**Question 1 continued**

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**Question 1 continued**

**Question 1 continued**

Leave blank

Q1

**(Total 14 marks)**

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**2.** The random variable $X$ has probability distribution

| $x$ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| $P(X=x)$ | 0.10 | $p$ | 0.20 | $q$ | 0.30 |

(a) Given that $E(X) = 3.5$, write down two equations involving $p$ and $q$.

**(3)**

Find

(b) the value of $p$ and the value of $q$,

**(3)**

(c) $\text{Var}(X)$,

**(4)**

(d) $\text{Var}(3 - 2X)$.

**(2)**

Leave blank

**Question 2 continued**

**(Total 12 marks)**

**Q2**

Leave blank

**3.** A manufacturer stores drums of chemicals. During storage, evaporation takes place. A random sample of 10 drums was taken and the time in storage, $x$ weeks, and the evaporation loss, $y$ ml, are shown in the table below.

| $x$ | 3 | 5 | 6 | 8 | 10 | 12 | 13 | 15 | 16 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|
| $y$ | 36 | 50 | 53 | 61 | 69 | 79 | 82 | 90 | 88 | 96 |

(a) On the grid opposite, draw a scatter diagram to represent these data.

**(3)**

(b) Give a reason to support fitting a regression model of the form $y = a + bx$ to these data.

**(1)**

(c) Find, to 2 decimal places, the value of $a$ and the value of $b$.

(You may use $\Sigma x^2 = 1352$, $\Sigma y^2 = 53\,112$ and $\Sigma xy = 8354$.)

**(7)**

(d) Give an interpretation of the value of $b$.

**(1)**

(e) Using your model, predict the amount of evaporation that would take place after

(i) 19 weeks,

(ii) 35 weeks.

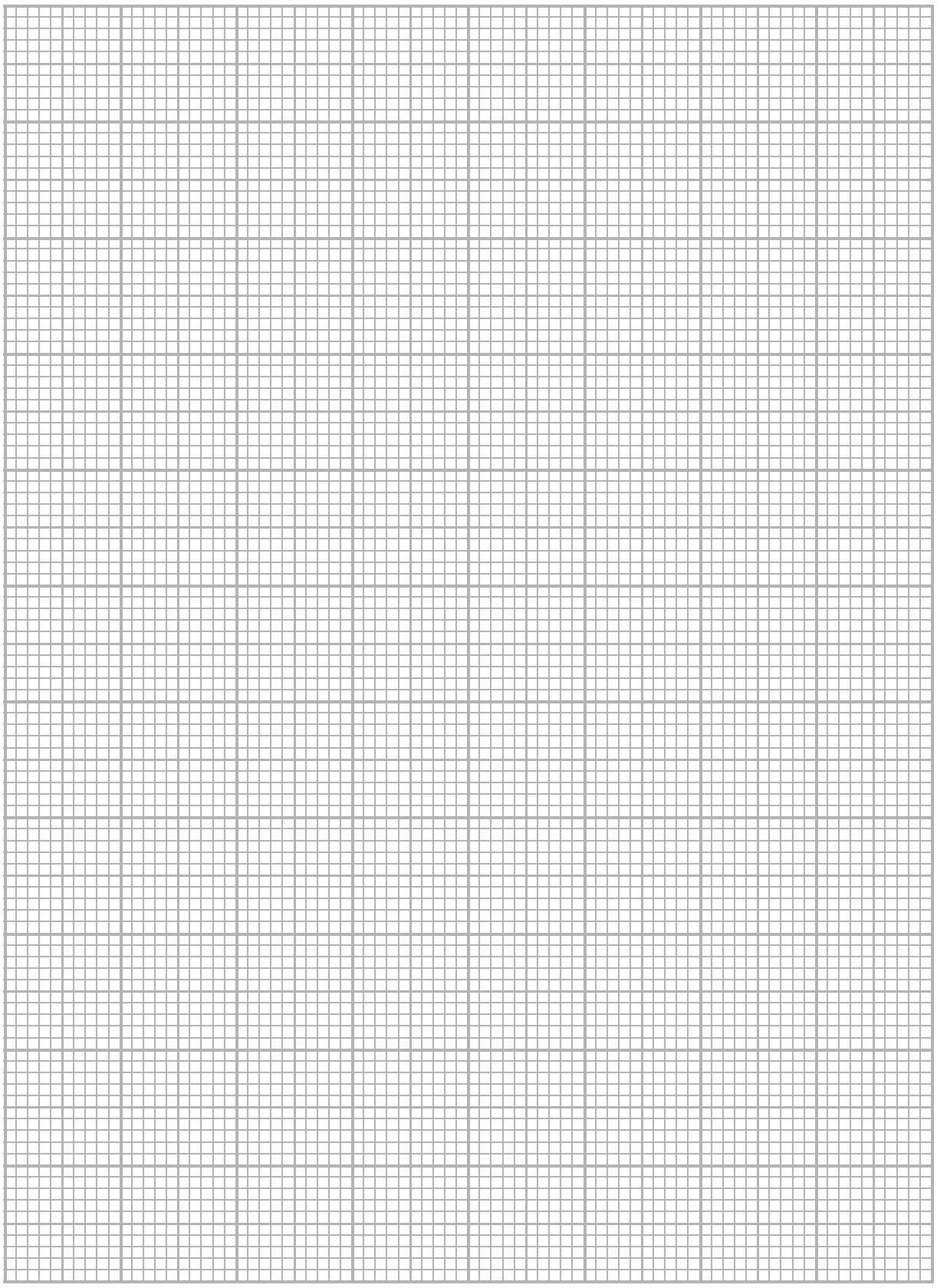
**(2)**

(f) Comment, with a reason, on the reliability of each of your predictions.

**(4)**

Leave blank

**Question 3 continued**



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**Question 3 continued**

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**Question 3 continued**

**(Total 18 marks)**

**Q3**

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**4.** A bag contains 9 blue balls and 3 red balls. A ball is selected at random from the bag and its colour is recorded. The ball is not replaced. A second ball is selected at random and its colour is recorded.

(a) Draw a tree diagram to represent this information.

**(3)**

Find the probability that

(b) the second ball selected is red,

**(2)**

(c) both balls selected are red, given that the second ball selected is red.

**(2)**

Leave blank

**Question 4 continued**

**Q4**

**(Total 7 marks)**

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**5.** (a) Write down two reasons for using statistical models.

**(2)**

(b) Give an example of a random variable that could be modelled by

(i) a normal distribution,

(ii) a discrete uniform distribution.

**(2)**

**Q5**

**(Total 4 marks)**

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**6.** For the events $A$ and $B$,

$$\mathrm{P}(A \cap B') = 0.32, \ \mathrm{P}(A' \cap B) = 0.11 \ \text{ and } \ \mathrm{P}(A \cup B) = 0.65$$

(a) Draw a Venn diagram to illustrate the complete sample space for the events $A$ and $B$.

**(3)**

(b) Write down the value of $\mathrm{P}(A)$ and the value of $\mathrm{P}(B)$.

**(3)**

(c) Find $\mathrm{P}(A \mid B')$.

**(2)**

(d) Determine whether or not $A$ and $B$ are independent.

**(3)**

Leave blank

**Question 6 continued**

**(Total 11 marks)**

**Q6**

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**7.** The heights of a group of athletes are modelled by a normal distribution with mean 180 cm and standard deviation 5.2 cm. The weights of this group of athletes are modelled by a normal distribution with mean 85 kg and standard deviation 7.1 kg.

Find the probability that a randomly chosen athlete,

(a) is taller than 188 cm,

**(3)**

(b) weighs less than 97 kg.

**(2)**

(c) Assuming that for these athletes height and weight are independent, find the probability that a randomly chosen athlete is taller than 188 cm and weighs more than 97 kg.

**(3)**

(d) Comment on the assumption that height and weight are independent.

**(1)**

Leave blank

**Question 7 continued**

Leave blank

**Question 7 continued**

**Q7**

**(Total 9 marks)**

**TOTAL FOR PAPER: 75 MARKS**

**END**