

# Silver Level S1

## Question paper

<b>Level</b>	A Level
<b>Exam Board</b>	Edexcel GCE
<b>Subject</b>	Mathematics
<b>Module</b>	Statistics 1
<b>Difficulty Level</b>	Silver Level S1
<b>Booklet</b>	Question paper

**Time Allowed:** 90 minutes

**Score:** /75

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E
>68	61	55	49	43	<38

1. A personnel manager wants to find out if a test carried out during an employee’s interview and a skills assessment at the end of basic training is a guide to performance after working for the company for one year.

The table below shows the results of the interview test of 10 employees and their performance after one year.

Employee	A	B	C	D	E	F	G	H	I	J
Interview test, $x$ %	65	71	79	77	85	78	85	90	81	62
Performance after one year, $y$ %	65	74	82	64	87	78	61	65	79	69

[You may use  $\sum x^2 = 60\,475$ ,  $\sum y^2 = 53\,122$ ,  $\sum xy = 56\,076$  ]

- (a) Showing your working clearly, calculate the product moment correlation coefficient between the interview test and the performance after one year.

(5)

The product moment correlation coefficient between the skills assessment and the performance after one year is  $-0.156$  to 3 significant figures.

- (b) Use your answer to part (a) to comment on whether or not the interview test and skills assessment are a guide to the performance after one year. Give clear reasons for your answers.

(2)

January 2008

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2. The marks of a group of female students in a statistics test are summarised in Figure 1.

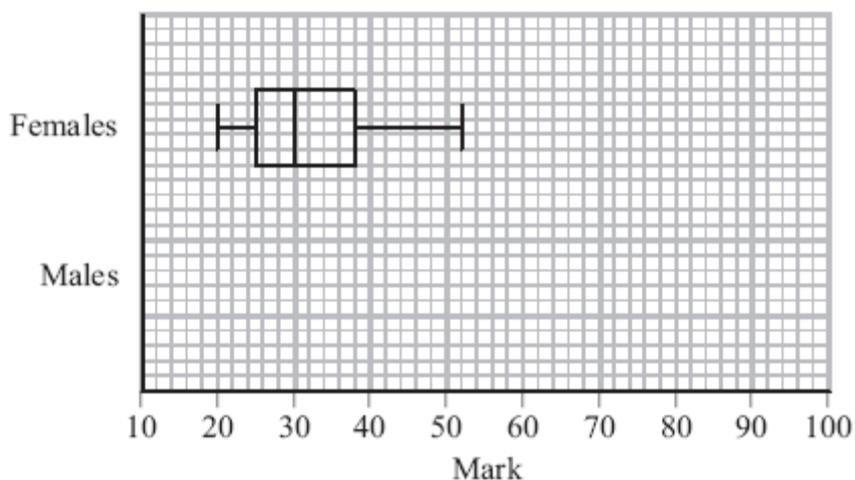


Figure 1

- (a) Write down the mark which is exceeded by 75% of the female students.

(1)

The marks of a group of male students in the same statistics test are summarised by the stem and leaf diagram below.

Mark	(2 6 means 26)	Totals
1	4	(1)
2	6	(1)
3	4 4 7	(3)
4	0 6 6 7 7 8	(6)
5	0 0 1 1 1 3 6 7 7	(9)
6	2 2 3 3 3 8	(6)
7	0 0 8	(3)
8	5	(1)
9	0	(1)

- (b) Find the median and interquartile range of the marks of the male students.

(3)

An outlier is a mark that is

either more than  $1.5 \times$  interquartile range above the upper quartile

or more than  $1.5 \times$  interquartile range below the lower quartile.

(c) On graph paper draw a box plot to represent the marks of the male students, indicating clearly any outliers.

(5)

(d) Compare and contrast the marks of the male and the female students.

(2)

May 2013

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3. On a randomly chosen day the probability that Bill travels to school by car, by bicycle or on foot is  $\frac{1}{2}$ ,  $\frac{1}{6}$  and  $\frac{1}{3}$  respectively. The probability of being late when using these methods of travel is  $\frac{1}{5}$ ,  $\frac{2}{5}$  and  $\frac{1}{10}$  respectively.

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

(3)

(b) Find the probability that on a randomly chosen day

(i) Bill travels by foot and is late,

(ii) Bill is not late.

(4)

(c) Given that Bill is late, find the probability that he did not travel on foot.

(4)

May 2009

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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)
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(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)

**January 2012**

5. On a randomly chosen day, each of the 32 students in a class recorded the time,  $t$  minutes to the nearest minute, they spent on their homework. The data for the class is summarised in the following table.

Time, $t$	Number of students
10 – 19	2
20 – 29	4
30 – 39	8
40 – 49	11
50 – 69	5
70 – 79	2

- (a) Use interpolation to estimate the value of the median.

(2)

Given that

$$\sum t = 1414 \quad \text{and} \quad \sum t^2 = 69\,378,$$

- (b) find the mean and the standard deviation of the times spent by the students on their homework.

(3)

- (c) Comment on the skewness of the distribution of the times spent by the students on their homework. Give a reason for your answer.

(2)

**January 2011**

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6. A travel agent sells flights to different destinations from *Beerow* airport. The distance  $d$ , measured in 100 km, of the destination from the airport and the fare  $f$  are recorded for a random sample of 6 destinations.

Destination	$A$	$B$	$C$	$D$	$E$	$F$
$d$	2.2	4.0	6.0	2.5	8.0	5.0
$f$	18	20	25	23	32	28

[You may use  $\sum d^2 = 152.09$        $\sum f^2 = 3686$        $\sum fd = 723.1$ ]

- (a) On graph paper, draw a scatter diagram to illustrate this information. (2)
- (b) Explain why a linear regression model may be appropriate to describe the relationship between  $f$  and  $d$ . (1)
- (c) Calculate  $S_{dd}$  and  $S_{fd}$ . (4)
- (d) Calculate the equation of the regression line of  $f$  on  $d$  giving your answer in the form  $f = a + bd$ . (4)
- (e) Give an interpretation of the value of  $b$ . (1)

Jane is planning her holiday and wishes to fly from *Beerow* airport to a destination  $t$  km away. A rival travel agent charges 5p per km.

- (f) Find the range of values of  $t$  for which the first travel agent is cheaper than the rival. (2)

**May 2010**

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7. Given that

$$P(A) = 0.35, P(B) = 0.45 \text{ and } P(A \cap B) = 0.13,$$

find

(a)  $P(A \cup B)$ , (2)

(b)  $P(A' | B')$ . (2)

The event  $C$  has  $P(C) = 0.20$ .

The events  $A$  and  $C$  are mutually exclusive and the events  $B$  and  $C$  are independent.

(c) Find  $P(B \cap C)$ . (2)

(d) Draw a Venn diagram to illustrate the events  $A$ ,  $B$  and  $C$  and the probabilities for each region. (4)

(e) Find  $P([B \cup C]')$ . (2)

**January 2013**

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**TOTAL FOR PAPER: 75 MARKS**

**END**