

Centre Number						Candidate Number				
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For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	



General Certificate of Education  
Advanced Subsidiary Examination  
June 2014

# Statistics

# SS1B

## Unit Statistics 1B

Thursday 22 May 2014 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.
- Unit Statistics 1B has a **written paper only**.

### Advice

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- You do not necessarily need to use all the space provided.



J U N 1 4 S S 1 B 0 1





**2 (a)** Tim rings the church bell in his village every Sunday morning. The time that he spends ringing the bell may be modelled by a normal distribution with mean 7.5 minutes and standard deviation 1.6 minutes.

Determine the probability that, on a particular Sunday morning, the time that Tim spends ringing the bell is:

- (i) at most 10 minutes;
- (ii) more than 6 minutes;
- (iii) between 5 minutes and 10 minutes.

**[6 marks]**

**(b)** June rings the same church bell for weekday weddings. The time that she spends, in minutes, ringing the bell may be modelled by the distribution  $N(\mu, 2.4^2)$ .

Given that 80 per cent of the times that she spends ringing the bell are less than 15 minutes, find the value of  $\mu$ .

**[4 marks]**

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QUESTION  
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QUESTION  
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**5** As part of a study of charity shops in a small market town, two such shops,  $X$  and  $Y$ , were each asked to provide details of its takings on 12 randomly selected days.

The table shows, for each of the 12 days, the day's takings, £ $x$ , of charity shop  $X$  and the day's takings, £ $y$ , of charity shop  $Y$ .

Day	A	B	C	D	E	F	G	H	I	J	K	L
$x$	46	57	39	116	62	77	41	61	15	53	68	61
$y$	78	102	66	214	98	72	98	134	21	67	95	83

**(a) (i)** Calculate the value of the product moment correlation coefficient between  $x$  and  $y$ . **[3 marks]**

**(ii)** Interpret your value in the context of this question. **[2 marks]**

**(b)** Complete the scatter diagram shown on the opposite page. **[2 marks]**

**(c)** The investigator realised subsequently that one of the 12 selected days was a particularly popular town market day and another was a day on which the weather was extremely severe.

Identify **each** of these days giving a reason for each choice. **[3 marks]**

**(d)** Removing the two days described in part **(c)** from the data gives the following information.

$$S_{xx} = 1292.5 \quad S_{yy} = 3850.1 \quad S_{xy} = 407.5$$

**(i)** Use this information to recalculate the value of the product moment correlation coefficient between  $x$  and  $y$ .

**(ii)** Hence revise, as necessary, your interpretation in part **(a)(ii)**. **[3 marks]**

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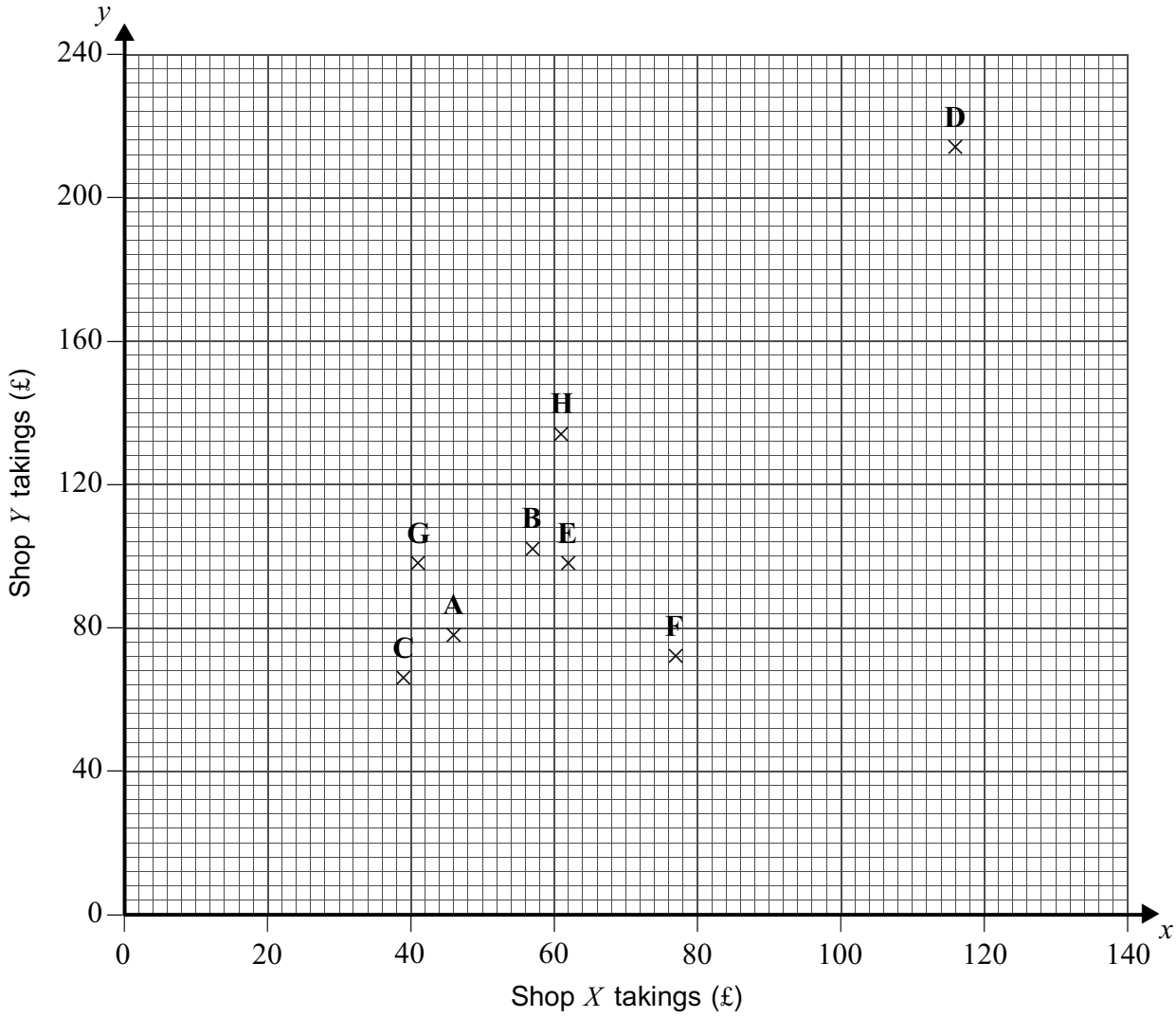
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Charity Shops



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**6** The probability that an online order from a supermarket chain has at least one item missing when delivered is 0.06.

Online orders are 'incomplete' if they contain substitute items and/or have at least one item missing when delivered. The probability that an order is incomplete is 0.15.

**(a)** Calculate the probability that exactly 2 out of a random sample of 26 online orders have at least one item missing when delivered.

**[3 marks]**

**(b)** Determine the probability that the number of incomplete orders in a random sample of 50 online orders is:

- (i)** fewer than 10;
- (ii)** more than 5;
- (iii)** more than 6 but fewer than 12.

**[6 marks]**

**(c)** Farokh, the manager of one of the supermarket's stores, examines 50 randomly selected online orders from each of a random sample of 100 of the store's customers. He records, for each of the 50 orders, the number,  $x$ , that were incomplete.

His summarised results, correct to three significant figures, for the 100 customers selected are

$$\bar{x} = 4.33 \quad \text{and} \quad s^2 = 3.94$$

Use this information to compare the performance of the store managed by Farokh with that of the supermarket chain as a whole.

**[5 marks]**

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7 For the year 2014, the table below summarises the weights,  $x$  kilograms, of a random sample of 160 women residing in a particular city who are aged between 18 years and 25 years.

Weight ( $x$ kg)	Number of women
35–40	4
40–45	9
45–50	12
50–55	16
55–60	24
60–65	28
65–70	24
70–75	17
75–80	12
80–85	7
85–90	4
90–95	2
95–100	1
<b>Total</b>	<b>160</b>

- (a) Calculate estimates of the mean and the standard deviation of these 160 weights. **[4 marks]**
- (b) (i) Construct a 98% confidence interval for the mean weight of women residing in the city who are aged between 18 years and 25 years. **[5 marks]**
- (ii) Hence comment on a claim that the mean weight of women residing in the city who are aged between 18 years and 25 years has increased from that of 61.7 kg in 1965. **[2 marks]**

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**END OF QUESTIONS**



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