

Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

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 2012

Mathematics
Unit Statistics 1B

MS/SS1B

Statistics
Unit Statistics 1B

Friday 18 May 2012 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 2 M S / S S 1 B 0 1

- 2 Katy works as a clerical assistant for a small company. Each morning, she collects the company's post from a secure box in the nearby Royal Mail sorting office.

Katy's supervisor asks her to keep a daily record of the number of letters that she collects.

Her records for a period of 175 days are summarised in the table.

Daily number of letters (x)	Number of days (f)
0–9	5
10–19	16
20	23
21	27
22	31
23	34
24	16
25–29	10
30–34	5
35–39	3
40–49	4
50 or more	1
Total	175

- (a) For these data:
- (i) state the modal value; (1 mark)
 - (ii) determine values for the median and the interquartile range. (3 marks)
- (b) The most letters that Katy collected on any of the 175 days was 54. Calculate estimates of the mean and the standard deviation of the daily number of letters collected by Katy. (4 marks)
- (c) During the same period, a total of 280 letters was also delivered to the company by private courier firms.

Calculate an estimate of the mean daily number of **all** letters received by the company during the 175 days. (2 marks)



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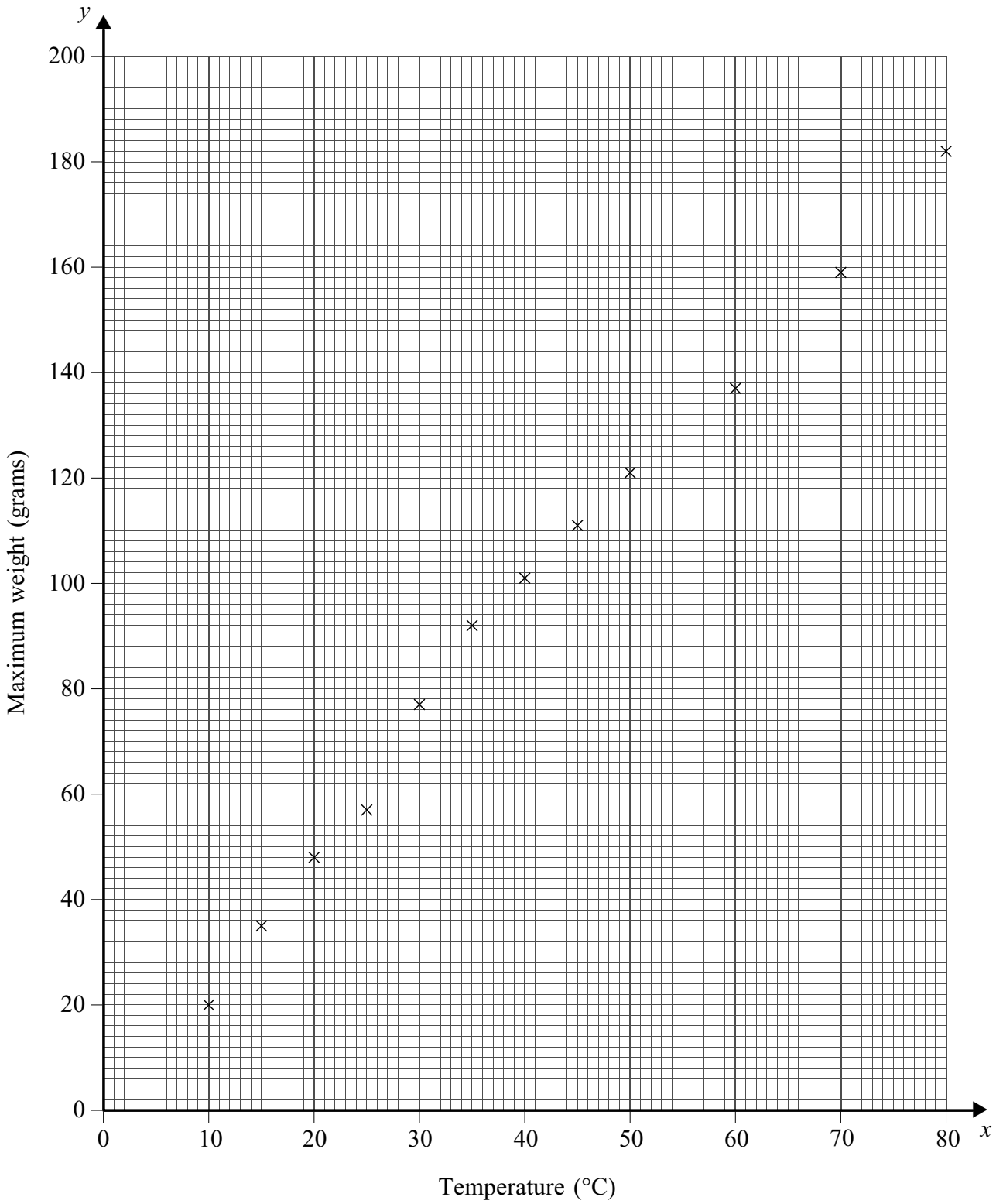
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Temperatures and Maximum Weights



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- 4** A survey of the 640 properties on an estate was undertaken. Part of the information collected related to the number of bedrooms and the number of toilets in each property.

This information is shown in the table.

		Number of toilets				Total
		1	2	3	4 or more	
Number of bedrooms	1	46	14	0	0	60
	2	24	67	23	0	114
	3	7	72	99	16	194
	4	0	19	123	48	190
	5 or more	0	0	11	71	82
Total		77	172	256	135	640

- (a)** A property on the estate is selected at random.

Find, giving your answer to three decimal places, the probability that the property has:

- (i)** exactly 3 bedrooms; *(1 mark)*
- (ii)** at least 2 toilets; *(2 marks)*
- (iii)** exactly 3 bedrooms and at least 2 toilets; *(2 marks)*
- (iv)** at most 3 bedrooms, given that it has exactly 2 toilets. *(3 marks)*
- (b)** Use relevant answers from part **(a)** to show that the number of toilets is **not** independent of the number of bedrooms. *(2 marks)*
- (c)** Three properties are selected at random from those on the estate which have exactly 3 bedrooms.

Calculate the probability that one property has 2 toilets, one has 3 toilets and the other has at least 4 toilets. Give your answer to three decimal places. *(4 marks)*



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- 6 A bin contains a very large number of paper clips of different colours. The proportion of each colour is shown in the table.

Colour	White	Yellow	Green	Blue	Red	Purple
Proportion	0.15	0.15	0.20	0.15	0.22	0.13

- (a) Packets are filled from the bin. Each filled packet contains exactly 30 paper clips which may be considered to be a random sample.

Use binomial distributions to determine the probability that a filled packet contains:

- (i) exactly 2 purple paper clips; (3 marks)
- (ii) a **total** of more than 10 red or purple paper clips; (3 marks)
- (iii) at least 5 but at most 10 green paper clips. (3 marks)
- (b) Jumbo packets are also filled from the bin. Each filled jumbo packet contains exactly 100 paper clips.

- (i) Assuming that the number of paper clips in a jumbo packet may be considered to be a random sample, calculate the mean and the variance of the number of **red** paper clips in a filled jumbo packet. (2 marks)
- (ii) It is claimed that the proportion of red paper clips in the bin is greater than 0.22 and that jumbo packets do not contain random samples of paper clips.

An analysis of the number of red paper clips in each of a random sample of 50 filled jumbo packets resulted in a mean of 22.1 and a standard deviation of 4.17.

Comment, with numerical justification, on **each** of the two claims. (3 marks)

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7 The volume of bleach in a 5-litre bottle may be modelled by a random variable with a standard deviation of 75 millilitres.

The volume, in litres, of bleach in each of a random sample of 36 such bottles was measured. The 36 measurements resulted in a **total** volume of 181.80 litres and exactly 8 bottles contained less than 5 litres.

(a) Construct a 98% confidence interval for the mean volume of bleach in a 5-litre bottle. *(5 marks)*

(b) It is claimed that the mean volume of bleach in a 5-litre bottle exceeds 5 litres and also that fewer than 10 per cent of such bottles contain less than 5 litres.

Comment, with numerical justification, on **each** of these two claims. *(3 marks)*

(c) State, with justification, whether you made use of the Central Limit Theorem in constructing the confidence interval in part **(a)**. *(1 mark)*

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END OF QUESTIONS



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