General Certificate of Education
June 2007
Advanced Subsidiary Examination

MATHEMATICS
Unit Statistics 1A

MS/SS1A/W

AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

STATISTICS
Unit Statistics 1A

Thursday 14 June 2007   1.30 pm to 2.45 pm

For this paper you must have:
- an 8-page answer book
- the **blue** AQA booklet of formulae and statistical tables.

You may use a graphics calculator.

Time allowed: 1 hour 15 minutes

Instructions
- Use blue or black ink or ball-point pen. Pencil should only be used for drawing.
- Write the information required on the front of your answer book. The *Examining Body* for this paper is AQA. The *Paper Reference* is MS/SS1A/W.
- Answer **all** questions.
- Show all necessary working; otherwise marks for method may be lost.
- The **final** answer to questions requiring the use of tables or calculators should normally be given to three significant figures.

Information
- The maximum mark for this paper is 60.
- The marks for questions are shown in brackets.
- Unit Statistics 1A has a **written paper and coursework**.

Advice
- Unless stated otherwise, you may quote formulae, without proof, from the booklet.

MS/SS1A/W

Answer **all** questions.

1 The table shows the length, in centimetres, and maximum diameter, in centimetres, of each of 10 honeydew melons selected at random from those on display at a market stall.

Length	24	25	19	28	27	21	35	23	32	26
Maximum diameter	18	14	16	11	13	14	12	16	15	14

(a) Calculate the value of the product moment correlation coefficient. *(3 marks)*

(b) Interpret your value in the context of this question. *(2 marks)*

2 The British and Irish Lions 2005 rugby squad contained 50 players. The nationalities and playing positions of these players are shown in the table.

		Nationality			
		English	**Welsh**	**Scottish**	**Irish**
Playing position	**Forward**	14	5	2	6
	Back	8	7	2	6

(a) A player was selected at random from the squad for a radio interview. Calculate the probability that the player was:

(i) English; *(2 marks)*

(ii) Irish, given that the player was a back; *(2 marks)*

(iii) a forward, given that the player was not Scottish. *(2 marks)*

(b) Four players were selected at random from the squad to visit a school. Calculate the probability that all four players were English. *(3 marks)*

3 Payton has a pay-as-you-go internet account. To save money, he reads his e-mail messages just after 6 pm each day. The probability that he has no e-mail messages to read at this time is 0.45, and the number of e-mail messages he receives is independent from day to day.

(a) Calculate the probability that Payton has no e-mail messages to read on exactly 3 days during a 7-day period. *(3 marks)*

(b) Determine the probability that, during June (30 days), Payton has no e-mail messages to read:

   (i) on fewer than 15 days; *(2 marks)*

   (ii) on more than 10 days; *(2 marks)*

   (iii) on at least 12 but at most 18 days. *(3 marks)*

4 A library allows each member to have up to 15 books on loan at any one time.

The table shows the numbers of books currently on loan to a random sample of 95 members of the library.

Number of books on loan	0	1	2	3	4	5–9	10–14	15
Number of members	4	13	24	17	15	11	5	6

(a) For these data:

   (i) state values for the mode and range; *(2 marks)*

   (ii) determine values for the median and interquartile range; *(4 marks)*

   (iii) calculate estimates of the mean and standard deviation. *(4 marks)*

(b) Making reference to your answers to part (a), give a reason for preferring:

   (i) the median and interquartile range to the mean and standard deviation for summarising the given data; *(1 mark)*

   (ii) the mean and standard deviation to the mode and range for summarising the given data. *(1 mark)*

Turn over for the next question

Turn over ▶

5 Bob, a gardener, measures the time taken, y minutes, for 60 grams of weedkiller pellets to dissolve in 10 litres of water at different set temperatures, $x\,°C$. His results are shown in the table.

x	16	20	24	28	32	36	40	44	48	52	56
y	4.7	4.3	3.8	3.5	3.0	2.7	2.4	2.0	1.8	1.6	1.1

   (a) Calculate the equation of the least squares regression line $y = a + bx$. *(4 marks)*

   (b) (i) Interpret, in the context of this question, your value for b. *(2 marks)*

        (ii) Explain why no sensible practical interpretation can be given for your value of a. *(2 marks)*

6 (a) The length, X centimetres, of adult male eels in a river may be assumed to be normally distributed with a mean of 38 and a standard deviation of 5.

      Determine:

      (i) $P(X < 40)$; *(2 marks)*

      (ii) $P(30 < X < 40)$; *(3 marks)*

      (iii) the length exceeded by 75% of adult male eels in the river. *(4 marks)*

   (b) A sample of 40 adult female eels was taken at random from the river and the length of each eel was measured.

      The mean and standard deviation of these lengths were found to be 107 cm and 19.1 cm respectively.

      (i) Construct a 98% confidence interval for the mean length of adult female eels in the river. *(4 marks)*

      (ii) Hence comment on a claim that, in this river, the average length of adult female eels is more than $2\frac{1}{2}$ times that of adult male eels. *(3 marks)*

END OF QUESTIONS