ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme June 2003

GCSE

Statistics

3311

Higher

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Registered address: Addleshaw Booth & Co., Sovereign House, PO Box 8, Sovereign Street, Leeds LS1 1HQ
Kathleen Tattersall: *Director General*

Notes for Examiners

In general if a response is fully correct then it is sufficient to tick the final answer and put the mark for that part in the margin. Parts not attempted or totally incorrect must have 0 for that part in the margin. Negative marks must not be used.

Errors **must** be underlined or ringed.

Responses that are partly correct will generally be awarded marks for method or partial working. In that case the following should appear in the margin to indicate what the mark(s) has been awarded for. These are detailed in the mark scheme.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
M dep or **DM**	A method mark dependent on a previous method mark being awarded.
B dep or **DB**	A mark that can only be awarded if a previous independent mark has been awarded.
ft	Follow through marks. Marks awarded following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.

Within the script the following notations can be used to explain the decision further. These should appear next to the place in the script where the error or omission is made.

ft or ✓	Follow through marks. Wrong working should not be penalised more than once so that positive achievement later in the question can be recognised.
✗	An answer that does not follow through from previous working.
MR or **MC**	Misread or miscopy. Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up

	to a maximum of 2 marks are penalised. The method marks can still be awarded.
fw	Further work. Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.
Choice	When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.
wnr	Work not replaced. Erased or crossed out work that is still legible can be marked.
wr	Work replaced. Erased or crossed out work that has been replaced is not awarded marks.
^	Work incomplete or method missing.
allow	In general decisions should support the candidate. If an examiner feels that work is worthy of a mark then it can be allowed.
BOD	Benefit of the doubt should only be given in cases where evidence is not secure. For example overwriting numbers. It should not be used to avoid making a decision. Examiners are expected to make decisions based on the scheme.
seen or ✓	Every page containing working should be annotated to show it has been considered.
From page 23 ↘	Marks transferred from another part of the paper. Candidates often make a mistake in their original work and do the question on the back page or another page with some space. The part marks should be credited there **within the script** and the marks transferred to the margin by the printed question.
Wrong method	Candidates sometimes obtain the correct answer via a completely wrong method. If an examiner is sure that this is the case then the method mark should not be awarded and subsequently the accuracy mark cannot be awarded. This notation should also be used when candidates 'fiddle' algebra to demonstrate a given result.
pa	Premature approximation. Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise at the standardisation meeting.

Unusual responses
Very occasionally situations may occur which are not covered by the above notations. In these rare cases examiners should write brief comments in the script to explain their decision, such as ignore, irrelevant etc.

Blank answer spaces and blank pages
Blank answer spaces should be crossed through to show that they have been seen. Blank pages at the end of a paper should also be crossed through to indicate that they have been seen. Any working on these pages must be marked.

Diagrams
Diagrams that have working on them should be treated like normal responses and marked with same notations as above. If the diagram is written on but the correct response is within the answer space the work within the answer space should be marked and the diagram ticked to indicate that the examiner has seen it. Working on diagrams that contradicts work within the answer space is **not** to be considered as choice but as working.

Responses which appear to come from incorrect methods.
Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised as directed as the standardising meeting.

Questions which ask candidates to show working
Instructions on marking will be given at the standardising meeting but usually marks are not be awarded to candidates who show no working

Questions which do not ask candidates to show working
As a general principle a correct response is awarded full marks.

Probability
Answers should be written as fractions, decimals or percentages. If a candidate uses an incorrect notation such as '1 out of 4' for $^1/_4$ consistently through the paper, then penalise the first occurence but allow any following answers. Ratio is not acceptable as incorrect notation.

Recording Marks
Part marks for a question should be shown in the margin at the side of the work. The totals should be shown in the oval either at the end of each question or after each double page. These marks should be transferred to the appropriate box on the front of the paper. The grand total for the paper should also be shown in the appropriate box on the front of the paper. This total should agree with the total of the part marks within the paper.

Checkers at the board will first check that the part marks agree with the ringed totals, either at the end of each question or after each double page. They will then check that these marks have been transferred correctly and finally that the total on the front cover is correct. Papers that contain clerical errors may be returned to examiners.

Tier H

1(a)	(i) 41 years	B1	41 or 71 accept
	(ii) Women live longer	B1	
(b)	Improvements in health care o.e.	B1	
(c)	(i) At age 1, live 3 years longer	B1	Accept live longer
	(ii) High proportion of deaths at birth	B1	Not follow through, not specific illnesses
	Total	5	

2(a)	£ 52,000	B1	
(b)	(i) $\frac{588600}{9}$ = £65,400	M1 A1	An attempt at total ÷ 9
	(ii) Influenced by extremes	B1	Mention 129500 acceptable
(c)	(i) Continuous	B1	
	(ii) Discrete	B1	
	(iii) Qualitative	B1	
(d)	(i) Number population	B1	Or a list implied
	Fraction i.e. 1 in 10 or 40	B1	B2 for drawing names from hat
	Random selection described	B1	B1 for sample fraction Systematic sample possible B2
	(ii) non random : biased	B1	See end of document
	Non representative i.e. maybe all of one type e.g. teachers	B1	
	Total	12	

3(a)	$\frac{35}{360}\times 100$ = 9.72%	M1 A1	Accept 1 d.p. but not 9.73
(b)	Angle 70° or 19% or 19.4%	B1	May be on diagram and accept 70%
	$\frac{70}{360}\times 468$ = 91	M1 A1	89 without method – 0 89 with working – M1 A0
(c)	$\sqrt{\frac{825}{468}}$	M1	Or $\sqrt{\frac{468}{825}}$
	$\times 4$	DM1	4÷
	= 5.31	A1	
	Total	8	

4(a)	$\frac{5}{56}$	B1	Or 9% or 0.09
(b)	$\frac{13}{56}$	B1	23% or 0.023
(c)	$\frac{5}{13}$	B1 B1	Must be a probability 38% or 0.38
(d)	$\frac{13}{56}$	M1	
	$x\frac{12}{55}$	M1	$\frac{12}{55} = 0.218$
	$0.0506 \left(=\frac{39}{770}\right)$	A1	
	Total	7	

5(a)	Stem	B1	
	Leaves	B1	
	Order	B1	
(b)	Median = 72	B1	
	Lower quartile = 68	B1	Accept: 68 68.25 68.25 (Must be consistent pairs)
	Upper quartile = 76	B1	75 75.25 75.75 Special case if quartiles correctly paired but reversed SC1
(c)	(i) 8	B1 √	
	(ii) $1.5 \times IQR (=12)$	B1	Or clearly explained in words but 1.5 MUST be included
	68 – 12 = 56 hence outlier	DB1 √	
(d)	Median	B1	f.t. their (b)
	Quartiles	B1	f.t. their (b)
	Outliers	B1	
	Whiskers and box	B1	Special case if all plots wrong but box plot structure correct with 4 points SC1
(e)	(i) Rank 2: 4, 3, 8, 5, 7, 2, 1, 6	B1	
	Rank 1: consistent 2, 5.5, 3, 7, 4, 8, 1, 5.5	B1	If no tied rank correction = B0
	d	M1	Dependent upon attempt to rank
	Sum d^2 (84.5)	M1	
	Sub in formula	M1	

	-0.006	A1	
	(ii) No relationship	B1	Follow through their answer but must be in context of question
	Total	20	

6(a)	Range = 0.074	B1	
(b)	Correct plots	B1 B1 √	
(c)	Range OK	B1	
	Mean increasing	B1	
	Total	5	

7 (a)	Mean = 120.3	B1	Accept 120
	Attempt at sum x^2 (145625)	M1	$\sum(x - \mu)^2 = 904.1$
	Correct substitution	M1	÷ by 10 and square root
	= 9.51	A1	Accept 9.5
(b)	155 - 120	B1	2 or 3×9.3 M1
	÷9.3	M1	+120 B1
	3.76	A1	138.6 147.9 A1
	>3 so unlikely	A1	Must be a conclusion e.g<155 A1
(c)	Second set last longer	B1	
	And greater consistency	B1	
	Total	10	

8(a)	Allocation of a number on a dice to a doctor	B1	
(b)	Sensible attempt at allocation of random numbers	B1	
	Clearly defined and correct allocation	B1	
	Random selection	DB1	Dependent on first B1 of part (b)
	Total	4	

9(a)	Freq / cw (for at least 2 different class widths)	M1	
	2.4, 3.3, 4.4 etc (2 different class widths)	A1	
	All correct	A1	
	Correct width	A1	

	Correct height	A1 √	
(b)	Positive	B1	
(c)	Median and IQR skewed OR Mean and SD uses all data	B1	
	Total	7	

10 (a)	Total deaths/total population = $\frac{1839}{102(000)}$	M1	
	18.0 (29)	A1	A supported 18 M1 A1, 1.8% M1 A0
(b)	Crude death rate for one age band 18.52 etc	M1	
	× population	M1	
	Summed 16284.05	M1	
	total population 260+237 … = 955	M1	Dependent upon first M1
	Standardised death rate = $\frac{16284}{955}$	M1	
	= 17.0(5)	A1	Accept 17
(c)	Standardised death rate, it allows comparison between areas	B1	Takes into account age distribution
	Total	9	

11 (a)	0.7×25	M1	
	= 17.5	A1	
(b)	0.7×0.3	M1	
	$\times 2$	M1	
	= 0.42	A1	
(c)	(i) All six alternatives and no extras	B1	
	(ii) $0.3^2 \times 0.7^2$	M1	
	$\times 6$ (their (c) (i))	M1	
	0.2646	A1	Accept 0.265
	Total	9	

12(a)	Year divided into three or shape of graph	B1	
(b)	Mean of appropriate 3	M1	
	35	A1	

	36	A1	
(c)	Sum of differences $\div 3$	M1	
	3.4 or – 3.4 or better	A1	
(d)	Correct horizontal plot	B1	
	Correct vertical plot	B1√	
(e)	Read from correct position on graph	M1	"39"
	Add seasonal variation	M1	"- 3.4"
	Answer	A1	"35.6" follow through from their (c) and their (e) (i)
	Total	11	

13(a)	V^2, 100, 400 etc	B1	
	Correct plots	B2	One error B1, 2 or more errors B0 Follow through their values (Omission is an error)
(b)	Through double mean point	M1	
	and between (4900, 220) and (4900, 230)	A1	
(c)	Their intercept (approx '30')	B1	
(d)	Correct values on triangle	B1	
	Attempt at gradient	M1	
	approx 0.038 to 0.04	A1	If outside this range, check working
(e)	R= '30' + '0.039' v^2	B1	
(f)	Sub in their formula	M1	
	Accept 335 to 360	A1	If outside this range, check working
(g)	No. extrapolation	B1	
	Total	13	