AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Secondary Education

Statistics 3311/H

Mark Scheme

2005 examination – June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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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 crossed, 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 marks have 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 mark that can only be awarded if a previous method mark has been 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 for correct working 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.

oe   Or equivalent.
Accept answers that are equivalent. eg accept 0.5 instead of $\frac{1}{2}$

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.

Examiners are asked not to use any other abbreviations.

Within the mark scheme other abbreviations may be seen:

-1 eeoo	Deduct 1 mark for each error or omission down to zero.
eg 3.14…	Allow answers which begin 3.14 eg 3.14, 3.142, 3.149.
Use of brackets eg ($x =$)	It is not necessary to see the bracketed work to award the marks.

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 the same notations as above. If a 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, and is not, therefore, penalised.

<u>Responses which appear to come from incorrect methods.</u>
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 at the standardising meeting.

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

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

<u>Probability</u>
Answers should be written as fractions, decimals or percentages. If a candidate uses an incorrect notation such as '1 out of 4' for ¼ consistently throughout the paper, penalise the first occurrence but allow any following answers. Do **not** accept Ratio.

<u>Recording Marks</u>
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.

Examiners are responsible for checking the totalling and transfer of marks although clerical checking may be delegated. Checkers at AQA 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.

Higher Tier

1 (a)	Overlaps at 1500, 2000, 3500, 6000 No place for less than £1000	B1 B1	Any one overlap identified Financial incentives, gifts
(b)	Send out reminders Use another survey method	B1 B1	e.g., face to face interviews, telephone contact etc

2 (a)	29, 44, 56, 51, 38, 25	B1 x 3	-1 each error or omission
(b)	Boys: 48 / 72 x 6 = 4 Girls: 2	M1 A1 A1	A correct expression for either boys or girls

3 (a)	Labels One branch correctly labelled with probabilities Second branch Third branch	B1 B1 B1 B1	
(b)	0.8 x 0.9 = 0.72	M1 A1	
(c)	0.2 x 0.3 +'0.72' = 0.78	M1 M1 A1	
(d)	total x 0.78 = 390 total = 500 Good at French = 500 x 0.72 = 360	M1 A1 M1 A1	72 / 78 M1 A1 x 390 M1 360 A1

4 (a)	Double mean point Line between (0,15) and (0,35)	B1 B1	
(b) (i)	Read from their line £250(000)	B1	Penalise missing thousands once
(ii)	Read from their line £350(000)	B1	
(c)	2200, other point extrapolation	B1	
(d)	Triangle with true values 9700	M1 A1	Evidence of gradient (184 - 20) / (17 - 0) Do not accept 9.7 or 10 without evidence of method
(e)	Two points plotted	B1	
(f)	Chain of supermarkets better for lower floor areas	B1	oe or valid comment on gradients
(g) (i)	Rank 1 1, 2, 3, 4, 5, 6, 7, 8 Rank 2 2, 1, 3.5, 3.5, 5, 6, 8, 7 d 1, 1, 0.5 0.5 0, 0, 1, 1 d² 1, 1, 0.25, 0.25, 0, 0, 1, 1 Sum d² and sub into formula 53 / 56 = 0.946	B1 B1 M1 M1 M1 A1	
(ii)	Strong positive relationship between daily takings and floor area	B1	
(h)	> 188 to < 189 280 to < 281	B1 B1	189 and 281 B1 sc1 = 188 & 281

5 (a)	Cost or number of tracks Length of time	B1 B1	
(b)	Use of mid value Mean = 10830 / 60 = 180.5 Sum of squares = 2 015 100 SD = 31.69779	B1 B1 B1 B1	Accept 31.7 (31.96 implies sum of squares)
(c)	3.6 x 30 Add 135 = 243	M1 M1 A1	

6 (a)	7 / 20	B1	
(b)	Denominator 7 3 / 7	M1 A1	

7 (a)	1999, 2001	B1 B1	
(b) (i)	6900 / 1.15 = £6000	M1 A1	
(ii)	6000 x 1.13 = £6780	M1 A1√	Their (b) (i) x 1.13
(c)	2000	B1	
(d)	3 / 110 x 100 2.73%	M1 M1 A1	

8 (a)	(85.6+125.5+56+36.9) / 4 = 76 & 75.4	M1 A1 A1	
(b)	Correct horizontal plot Correct heights	B1 B1	
(c)	Mean seasonal variation (51 000) Read from correct value on graph (75 000) Add 126 000	B1 B1 M1 A1	

9 (a)	To see the range of answers	B1	See if the questions work
(b)	Number all the population Select a random to start and then take every nth	B1 B1	
(c)	Select a predetermined number and ask people selected by the questioner using quota controls	B1 B1	
(d)	More reliable, better representation	B1	
(e)	Quicker or cheaper	B1	

10 (a)	14 / 300 = 100 / number of fish in lake number of fish = 2143	M1 M1 A1	accept 2140 to 2150
(b)	Capture more fish in either process	B1	

11 (a)	1327 / 28.8 = 4.6%	M1 A1	Accept 46
(b)	Crude unemployment rate for one age group 158 / 1.9 = 8.3% x population 8.3 x 7 (= 58.1) Summed Corrected to a percentage 4.76 %	M1 M1 M1 M1 A1	Or per 1000 Or 47.6 per thousand

Age	Population of town Y (1000's) (P)	Number unemployed (N)	Standard population (S)	N/P	N/P *S
Under 20	1.9	158	7%	83.158	0.58
20 to 24	4.3	230	11%	53.488	0.59
25 to 49	13.1	662	56%	50.534	2.83
50 and over	9.5	277	26%	29.158	0.76
Totals	28.8	1327	100%		**4.76**

12(a)	Cum Freq 3, 3, 11, 29, 51, 78, 96, 114, 120	M1	
	Correct vert plot	A1ft	For attempt at cum freq
	Correct hori plot	B1	For attempt at cum freq
	Correct Steps	B1	For attempt at cum freq
(b)	Median 13	B1	
	24th value = 11	B1	
	96th value = 14	B1	
	IDR = 3	B1 ft	ft depends on cumulative frequency
(c)	Girls did less well on average	B1	In context
	Girls results more spread out	B1	

13 (a)	Correct scale for fd	B1	Height of $200 \leq w < 210$ is 3.5
(b) (i)	10 x 2.2	M1	
	22	A1	
(ii)	10	A1	
(iii)	5	A1	
(c)	Correct fd 0.4, 1.5, 3	B1	
	Correct heights and widths	B1, B1	
(d)	Identify mid value (63)	B1	
	10 / 35 (x 10) = 2.9	M1	
	200 + 2.9	M1	
	202.9	A1	Accept supported 203

14 (a)	Z_A = (114-100) / 10	M1	
	= 1.4	A1	
	Z_B = (114-110) / 2 = 2	A1	
	Apple juice	A1	
(b)	(m - 100) / 10	M1 A1	
	= (m - 110) / 2	M1	
	m = 112.5	A1	