



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark scheme November 2003

GCSE

Mathematics A

Paper 1: Higher

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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 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 in the standardising 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 at 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 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 $\frac{1}{4}$ consistently through the paper, then penalise the first occurrence 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.

1(a)	5	B1	
(b)	3×25 or 5×15 $3 \times 5 \times 5$ or 3×5^2	M1 A1	(1), 3, 5 on answer line scores M1 condone $1 \times 3 \times 5 \times 5$
2(a)	$4n + 1$ or $5 + 4(n-1)$	B2	B1 for $4n + c$ or $n4 + 1$ B0 for $n4 + c$ further work, ignore iff numerical term further work, deduct B1 iff incorrect algebra
(b)	$(201 - 1)$ or $4n + 1 = 201$ $201 \div 4$ $4n = 200$ $(n =)50$ $(n =)50$	M1 M1 A1	ft their (a) for M marks (<u>not</u> for $n+4$) Accept reasonable attempt at complete build up method for M2
3(a)(i)	$153/300$ or $51/100$ or 0.51 or 51%	B1	
(ii)	Fair and full comparison (between predicted and actual) e.g. any two of $3/6$ of 300 ($=150$) is close to 153 $2/6$ of 300 ($=100$) is close to 98 $1/6$ of 300 ($=50$) is close to 49	B2	B1 Fair and incomplete comparison e.g. comparison for red only Must be a numerical comparison Answer must be 'yes'
(b)	Not enough trials oe	B1	accept reason based on 'chance'
4(a)	80×1.75 140	M1 A1	accept 80×1.45 and 80×105
(b)	$\{190 - (\text{their } 140)\} \div (2.25 - 1.75)$ 100	M1 A1ft.	Or $(\text{their } 50) \div 0.5$ allow $(\text{their } 50)$ in 30 minutes ft from their (a)
5	1 st arc crossing AD , capable of being used in 60° construction 2 nd arc from 'correct' point crossing 1 st arc Angle of 60° ($\pm 2^\circ$)	M1 M1dep A1	
	'B' correctly marked	B1	Need not be labelled ... only award if first M1 earned
	Complete construction for perp. from 'B' to AD (i.e. all arcs) 'C' correct ($\pm 2^\circ$)	M1 A1	 Need not be labelled

6(a)	2500 × 0.1 or 250 oe 2750 × 0.1 or 275 oe 3025	M1 M1 A1	or 2500 × 1.1 or 2750 or 2750 × 1.1 M2 for 2500 × 1.1 ² SC1 500 or 3000 SC2 525
(b)	1320 ÷ 110 (their 12) × 100 1200	M1 M1dep A1	M2 for 1320 ÷ 1.1

7(a)	$2x^2 - 5x - 3$	B2	B1 for $2x^2 - 6x + x - 3$ (any 3 out of 4 correct) or $2x^2 \pm ?x - 3$ or $2x^2 - 5x \pm ?$
(b)	$(x - 8)(x + 1)$	B2	B1 for $(x \pm 8)(x \pm 1)$
8	$15x + 9y = 39$ <u>or</u> $25x + 15y = 65$ <u>and</u> <u>and</u> $15x + 25y = 15$ $9x + 15y = 9$ $16y = -24$ <u>or</u> $16x = 56$ $y = -1.5$ <u>or</u> $x = 3.5$ $x = 3.5$ <u>and</u> $y = -1.5$	M1 M1 A1 A1	allow a total of 1 error in <u>either</u> 1 st <u>or</u> 2 nd M mark accept $x = 56/16$ and $y = -24/16$ SC1 for correct ans. with no working or using T&I

9(a)	$BD/15 = 2/3$ $BD = 10$	M1 A1	Or equivalent eg. $BD = 2/3 \times 15$
(b)	Correct use of Pythagoras $BC = 8$ $\sin y = 8/10$	M1 A1f.t. A1f.t.	f.t. with their BD if $BD > 6$ for this M mark

10	Correct region indicated	B3	Award marks dependant upon number of lines drawn correctly and extent of shading
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11(a)	$OP^2 = 3^2 + 1^2$	M1	
(i)	$OP = \sqrt{10}$	A1	
(ii)	$x^2 + y^2 = 10$	B1f.t.	
(b)(i)	90°	B1	
(ii)	$1/3$	B1	
(iii)	-3	B1f.t.	f.t. from their gradient for OP
(iv)	$T = (0,10)$ $y = -3x +$ (their 'T') $y = -3x + 10$	B1f.t. M1 A1	f.t. from their gradient for PT (accept $T = 10$) f.t. if gradient $PT \neq$ gradient OP Or equivalent

12(a)	13	B1	
(i)			
(ii)	1	B1	
(b)	$3^x = 3^{-3}$ $x = -3$	M1 A1	M1 for writing $1/27$ as a power of 3, correctly allow embedded answer
(c)	$4^y = 4^{1\frac{1}{2}}$ $y = 1\frac{1}{2}$	M1 A1	M1 for $4^y = 8$ allow embedded answer

13(a)	Using frequency densities Correct frequency densities Height & widths plotted correctly	M1 A1 B1	At least 2 correct <u>Look for consistent use of 'key'</u> 4 out of 5 correct ... look for evidence on graph $\pm \frac{1}{2}$ square for their vertical scale
(b)	Good attempt to 'halve' the area 735 minutes	M1 A1	Or halving the frequency + attempt at calculation (could be a cum. freq. calculation)

14	Test the data using: $h = kt$, $h = kt^2$ or $h = kt^3$	M1	must find a value of 'k'
	Test one of the laws to reach a correct conclusion	A1	If $h = kt^2$ is the first one tested (correctly) then award A2
	Test a second law to reach a correct conclusion	A1	
	Select $h = kt^2$	A1	Conclusion must be stated No working ... no marks

15(a)	100	B1	Allow angles marked clearly on the diagram
(i)	130	B1	
(ii)			
(b)(i)	$9x + 3x = 180$ $x = 15$	M1 A1	allow subst. of $x = 15$ as long as opp. angles of cyc. (answer given) quad. clearly used Allow angles marked clearly on the diagram
(ii)	angle DAC ($2x$) = 30° angle $DCA = 15^\circ$ angle $DEA = 15^\circ$ angle $EAD = 120^\circ$	B1f.t. B1f.t. B1	

16(a)	$9 + 3\sqrt{7} + 3\sqrt{7} + 7$	M1	Allow one error for M1
(i)	$16 + 6\sqrt{7}$	A1	
(ii)	Substitution of their $(16 + 6\sqrt{7})$ and $(3 + \sqrt{7})$ in LHS of equation and simplifying Correct simplification to give 0	M1 A1	Allow one error in simplification for M1 Could use 'formula' or complete the square. (answer given)
(b)	$3 - \sqrt{7}$	B1	

17	$2/5 \times p = 4/15$ $p = 4/15 \div 2/5$ $(1 - \text{their } p) \times 3/5$ $1/5$	M1 M1 M1 A1	$p = 2/3$ scores 2 $p \neq 4/15$ or $11/15$
18	Graph A is $y = (x - 3)^2$ Graph B is $y = (x + 3)^2$ Graph C is $y = -x^2$ Graph D is $y = 3 - x^2$	B1 B1 B1 B1	
19	Numerator = $(x + 4)(x - 4)$ Denominator = $(3x - 2)(x - 4)$ = $(3x - 2)(x + 4)$ Answer = $(x - 4) / (3x - 2)$	B1 M1 A1 A1	or $3x^2 + 12x - 2x - 8$ or $3x^2 - 2x + 12x - 8$
20(a)	Vol large cone = $1/3 \times \pi \times 12^2 \times 10$ or Vol small cone = $1/3 \times \pi \times 6^2 \times 5$ Subtraction of cone volumes 480π or 60π Vol frustum = 420π	M1 M1 A1 A1	or Vol frustum = $7/8$ of vol large cone $1/3 \pi 1260$ scores 3 marks altogether allow $\pi 420$
(b)	$1/3 \times \pi \times r^2 \times 35 = \text{their } 420\pi$ $r^2 = 36$ $r = 6$	M1 A1 A1	M1 for equating volumes