

GCSE 2004

November Series



Mark Scheme

Mathematics A (3301)

Paper 1H

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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AQA GCSE Mathematics Specifications A & B

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**
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↘ 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.

Probabililty

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.

Paper 1H

1(a)	200×0.34	M1	
	68	A1	Allow 68/200
(b)	The last one or 0.32	B1	
	Based on the highest number of spins hence more reliable	B1	
2	$(30, 29 \text{ or } 28) \div (4 \times 0.5)$	M1	any two approximations correct
	$(30, 29 \text{ or } 28) \div 2$	DM1	oe
	14, 14.5 or 15 and/or Gemma	A1	
3	Any correctly evaluated counter example with non-prime conclusion. Examples -4 and 5 \Rightarrow 25 and not prime -5 and 6 \Rightarrow 35 and not prime -8 and 9 \Rightarrow 77 and not prime accept any indication of "not prime"	B2	B1 any correctly evaluated <u>trial</u> with <u>no</u> conclusion Examples -3 and 4 \Rightarrow 17 -4 and 5 \Rightarrow 25 -5 and 6 \Rightarrow 35 -6 and 7 \Rightarrow 47 -7 and 8 \Rightarrow 61 -8 and 9 \Rightarrow 77 or incorrectly evaluated trial that gives a counter example with non-prime conclusion
4(a)	4	B1	
(b)	$(32 - 4 - 4 - 5 - 5) (\div 2)$ or 14 or $16 - 4 - 5$	M1	or equivalent
	7	A1	
5(a)	2×14 or 4×7	M1	or 2 <u>and</u> 7 only on answer line
	$2 \times 2 \times 7$	A1	
	$2^2 \times 7$	A1	
(b)	28, 56, 84, ... and 42, 84, ...	M1	or $2 \times 2 \times 3 \times 7$ or $2^2 \times 3 \times 7$
	84	A1	SC 1 for any multiple of 84

6	Any two different valid comparisons eg. lowest <u>or</u> highest scores lower quartiles medians (allow averages) IQR <u>or</u> range (allow spread)	B2	B1 for one valid comparison
7(a)	n^2	B1	
(b)	$n^2 - 3$	B1	allow eg. $n^3 - 3$ following n^3 in part (a)
8(a)	$4x (<) 8$	M1	
	$x < 2$	A1	
(b)	$4x^3 + 20x$	B2	B1 one correct term
(c)(i)	d^5	B1	
(ii)	$1/e^7$ or e^{-7}	B1	
(iii)	$6g^5h^5$	B2	B1 for two out of three of 6, g^5 , h^5 correct
(d)(i)	$(x - 9)(x - 4)$	B2	B1 $(x \pm 9)(x \pm 4)$
(ii)	4 and 9	B1ft	
9(a)	Rotation	B1	
	90° clockwise	B1	must be a single transformation else 0 marks
	Centre (0.2)	B1	
(b)	Trapezium with vertices at(1,1), (1,2), (2,3), (2,1) ± 2 mm	B2	B1 for correct trapezium in any position or 3 points correct or 2 points correct with construction 'rays'
10	Sight of fraction 5/6 or 6/5	M1	oe
	$x = 6 \times 6/5$	M1	oe
	7.2	A1	
11(a)	$x^2 - y^2$	B2	B1 $x^2 + xy - xy - y^2$ (4 terms seen, any 3 correct)
(b)	$(780 + 220)(780 - 220)$	M1	608400 <u>and</u> 48400 earn M1
	560000	A1	
12(a)	12×10^7	M1	or 120000000 or 120 million oe
	1.2×10^8	A1	
(b)	0.75×10^{-3}	M1	or 0.00075
	7.5×10^{-4}	A1	

13(a)	65	B1	
(b)	25	B1	

14	$1000x = 1207.207207\dots$	M1	multiplication by 1000 (Could ignore the 1
	$999x = 1206$	M1	subtraction or $x = 1206/999$ then add back on
	$x = 134/111 = 1^{23}/_{111}$	A1	must cancel fully to earn A1 at the end)

15	$M \propto 1/G$ or $M = k/G$ or $MG = k$	M1	
	$k = 3600$	A1	
	$M^2 = 3600$	M1	
	Hence $M = 60$	A1ft	ft their value of k if first M1 earned

16(a)	4	B1	
(b)	8	B1	

17(a)	$y = 3x - 2$ plotted	M1	must draw correct line
(i)	$x = 2, x = 5$	A2	A1 for each, must be correct answers...no ft. coordinates given ... lose 1 mark
(ii)	$x = 2, x = 5$	B1	must have both solutions (ft answers from part (a) earns 1 mark)
(b)	$x^2 - 4x + 8 = x + 4$	M1	allow <u>one</u> slip in manipulation
	$y = x + 4$	A1	Straight line to be clearly stated

18(a)	Put all (600) names in a hat and draw out 60 of them	B1	or, assign a number to each student, then generate random numbers on a calculator to select the sample allow systematic sampling (correctly described)
(b)	3 from each class	B1	idea of proportion (accept 'the same number from each class')
	description of valid selection method within each class	B1	fair representation of boys and girls

19(a)	$1/6 \times \pi \times 12 \times 12$	M1	
	24π	A1	not $\pi 24$... only penalise notation on the first occasion

(b)	$2 \times \pi \times 12 \times 10$	M1	
	$1/6 \times$ (their)cylinder area	M1	SC 3 marks out of the first 7
	40π	A1	for using $r = 24$ consistently
(c)	(their) $24\pi \times 10$	M1	Answers: 96π , 80π and 960π
	240π	A1ft	
	cm^3	B1	units mark

20	$x = 30 \div 3\sqrt{2}$	M1	
	$(30 \times \sqrt{2}) \div (3 \times 2)$	M1	Attempt to rationalise denominator
	$5\sqrt{2}$	A1	

21(a)	Parallel curve translated up y axis	B1	'2' need not be marked, needs to look symmetrical
(b)	Parallel curve translated in positive direction along x axis	B1	Must 'sit on' x axis and look symmetrical
(c)	Curve through (0,0) nearer to x axis than original	B1	Must look symmetrical

22(a)	correct cosine curve sketch	B1	
(b)(i)	$x = 333^\circ$	B1	
(ii)	$x = 153^\circ, x = 207^\circ$	B2	B1 for each
(iii)	$x = 63^\circ$ or $x = 117^\circ$	B1	(no follow through for a graph which is negative in the first quadrant)
(iv)	$x = 63^\circ$ or $x = 117^\circ$	B1	

23(a)	$(2x - 1)^2 = 4x^2 - 4x + 1$	M1	Attempt to square, condone one error (3/4 terms OK)
	$x^2 + 4x^2 - 4x + 1 = 2$ or $x^2 + (2x - 1)^2 = 2$	M1	ft their expansion ... this mark is for substitution
	$5x^2 - 4x - 1 = 0$	A1	Only allow rearrangement which gives correct equation oe eg. $5x^2 - 4x = 1$ or $5x^2 = 4x + 1$
(b)	$(5x + 1)(x - 1) = 0$ or use of formula	M1	allow <u>one</u> error in formula / sign errors in brackets
	$x = -0.2$ or 1	A1	both solutions <u>alternatively</u> (1, 1) earns A1
	$y = -1.4$ or 1	A1	both solutions and (-0.2, -1.4) earns A1

24(a)	$pq, (1-p)q$ and $(1-p)(1-q)$	B2	-1 eooo (correct prob. in correct place in table)
(b)	$pq + p(1-q) + q(1-p) + (1-p)(1-q)$		
	$pq + p - pq + q - pq + 1 - p - q + pq$	M1	Allow one slip only (since fairly easy expansion)
	total = 1	A1	for correct simplification, clearly shown
(c)	$0.9 \times q = 0.765$	M1	oe Allow any symbol for unknown
	$q = 0.85$	A1	oe eg. 765/900