

GCSE 2004

November Series



Mark Scheme

Mathematics A (3301)

Paper 2I

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 2I

1(a)	1 student = 360/30	M1	
	Any 2 of 72, 108, 36, 84, 60	A1	
	2 correct sectors $\pm 2^\circ$	B1	
	Fully correct with at least 4 labels	B1	
(b)	$6/30 \times 100$	M1	$72/360 \times 100$ oe
	20	A1	
2(a)	13.44	B1	
	16.15 - 13.44	M1	oe M0 for 13.44 – 16.15
	2 hrs 31 minutes	A1	SC2 for 2.71, 2 hours 71 mins, 3hrs 11 mins
(b)	3 and 15/60	B1	3.25 195/60 oe
	$280 \div$ their 3.25	M1	
	86.1 or 86.2 (86.15...)	A1	SC1 for 88.8 to 89, 1.4... SC2 for 86
3	1700×130	M1	221000
	$75000 + 1700 \times 130$	DM1	296000
	$350000 -$ their 296000	DM1	Dep on both M1s, completing the method
	54000	A1	
4(a)	(4, 2.5) or (x4, y2.5)	B2	B1 for each B1 if wrong way
(b)	$\frac{1}{2} \times 2 \times 3$	M1	
	3 cm ²	A1	
(c)	Correct 2 triangles to 2mm accuracy	B2	B1 if triangles correct orientation but not touching along common side
			B1 any 2 congruent triangles B1 any isosceles triangle
5(a)	287 to 291	B1	
(b)	(9.7 to 9.9) x 5	M1	
	48.5 to 49.5	A1	SC1 for 50
(c)	3.8 to 4.2 cm from P	B1	
	Angle 128° to 132°	B1	

6(a)	$75x, 75 \times x, P = 75x$	B1	oe B0 for $x75$ mark answer on answer line throughout this question
(b)(i)	$2x$	B1	oe B0 for $x2$
(ii)	$2x50$ or $100x$	B1	oe B0 for $x100$ only penalise once for x in front of number in (a) and (b)
(c)(i)	$40y$ or $y40$ or $y \times 40$ or 3×60	B1	oe
	$40y + 3 \times 60$ or $y40 + 3 \times 60$	B1	oe $40y + 180$
(c)(ii)	$40y + 3 \times 60 = 460$	M1	oe $y + 4.5 = 11.5$
	$40y = 460 - 180$	DM1	$y = 11.5 - 4.5$
	7	A1	

7(a)	2 5	B2	B1 for each
(b)	11	B1	
(c)	83 and 86	M1	$3n - 1 = 85$ SC1 for 83 or 86
	No term between these	A1	n not a whole number, SC2 for 3 is not a factor of 86, or 86 is not a multiple of 3

8	$8 \times \frac{3}{5}$	M1	
	$4\frac{4}{5}$	A1	$24/5$ ($8 \times 3/5 = 24/5 = 4\frac{4}{5}$ tins M1, A0, A0)
	5	A1	Must be no incorrect working

9	Greatest 25.5(0)	B1	25.499 or 25.49 recurring
	Least 24.5(0)	B1	B1 if both wrong way

10(a)	Always even	B1	
(b)	Could be either odd or even	B1	

11(a)	$2\pi 5$	M1	$\pi 10$
	31.4.....	A1	
(b)	$250 = \pi r^2 h$	M1	
	$250 \div 25\pi = h$	A1	
	$h = 3.2$ or $3.18(\dots\dots)$	A1	3.19 A0

12(a)	$(3 \times 0) + 4 \times 4 + 5 \times 4 + 6 \times 9 + 7 \times 8 + 8 \times 5$	M1	
	Their 186/30	DM1	
	6.2	A1	
(b)(i)	15 th and 16 th value in F5/S3 box	M1	Accept cum.freq. as evidence of working 0,1, 5, 13, 21, (30) (30 ÷ 6 = 5 is M0) List 23333444444444555....
	5	A1	
(b)(ii)	Most pupils in bottom section of table or No pupils with higher grade in Spanish than in French	B1	oe No incorrect statements

13(a)	$20 = 4x$	M1	$\frac{20}{4} = x$
	5	A1	
(b)	$y + 5 \times 3 = 9 \times 3$	M1	$y/3 = 9 - 5$, $y/3 = 9 + 5$, ($3y + 15 = 27$ is M0)
	12	A1	
(c)	$4z - 4 = 2z + 6$	M1	$2z - 2 = z + 3$
	$2z = 10$	A1	$2z - z = 3 + 2$
	5	A1	

14(a)	-1.079625....	B1	
(b)	-1.08	B1ft	only ft if (a) given to > 3sf

15(a)	$372 - 350$ (22)	M1	$372/350 \times 100$ (=106.28)
	$22/350 \times 100$	M1	Their 106.28 - 100
	6.29	A1	Accept 6.3 or 6.286(.....)
(b)	$2576 = 92\%$	M1	0.92 seen B1
	$1\% = 28$	A1	$2576 \div 0.92$ M1
	2800	A1	

16(a)	$160^2 + 75^2$ (25600 + 5625)	M1	
	31225	A1	
	176.7.....	A1	
	177 or 180	B1	Independent mark. Award for any value seen or implied by a calculation greater than 3sf that is rounded to 3sf or 2sf
(b)	$\tan\theta = 160/75$	M2	$\sin\theta = 160/\text{their(a)}$ $\cos\theta = 75/\text{their(a)}$ M1 for fraction wrong way.
	62.7° to 65.4°	A1	

17(a)	Each has a 90°	B1	oe
	ABD = BDE or BDC	B1	ADB = BED
(b)	$BE/5 = \frac{3}{4}$	M1	$5 \tan 36.9$ or $5/\tan 53.1$
	3.75	A1	

18(a)	7.56×10^{-3}	B1	
(b)	$4\pi 6400^2$	M1	
	514718540.4	A1	5144----- to 5149-----
	$5(.147\dots) \times 10^8$	A1	With no working SC2 5E08, 5^{08} , (5^8 gets 0) Accept 5.1, 5.15×10^8

19(a)	4 correct values	B1	red 0.4, blue 0.6 3 times
(b)	0.4^2 or 0.6^2	B1	
	$0.4^2 + \text{their } 0.6^2$	M1	
	0.52	A1	

20(a)	Intercept = 9	B1	ie Identifying that 9 is the constant term in the equation
	Gradient = $-9/3 = -3$	M1	Any attempt at gradient $\pm 9/\pm 3$
	$y = -3x + 9$	A1	Accept equivalent forms. NB $y = 3x + 9$ is B1, M1, A0
(b)	Substitute $x = 6$ into their equation	M1	Or recognise that y -step from 0 to 3 is the same as 3 to 6 eg sight of 9. M1 can be implied by answer only
	-9	A1	
21	$4x + 1 + 2(x + 5) = 20$	M1	
	$x = 1.5$	A1	
	$A = 7$	B1ft	or their $(2x) + 4$