



General Certificate of Secondary Education

Mathematics 3301 *Specification A*

Intermediate Tier Paper 2

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.

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.
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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.

Paper 2I

1a	9.16(...)	B1	9.2
1b	74.1	B1	74.09, 74.088, 74.08, 74
1c	$374 \div 189$	M1	
	£1.98	A1	Accept 1.97; and £2 with working

2a	$2 \times 7 + 3 \times 5 - 20$	M1	
	9	A1	
2b	$20 + 5$ or $7 + 4 \times 5$	M1	27
	25	A1	SC2 count a child as an adult then £20 5 people so get a family ticket

3a	$x + 5$ penalise once	B1	Allow $x = x + 5$
3b	$x - 2$ incorrect letter	B1	$Ali + 2 = x$ is B0
3c	$2x$ consistently used	B1	accept $x \times 2$, $2 \times x$, $x + x$ but not x^2
3d	$2x = 180$	M1	$x - 32.5 = 57.5$
	90	A1	Allow embedded solutions but if contradicted then M1 only

4a	-24 to -23	B1	
4b	-58.5 to -57.5	B1	SC1 if both positive and numerically correct

5a	$360 - (125 + 75 + 50)$	M1	110, $125 + 75 + 50$, 250
	180 - their 110 on diagram	M1	$180 - (360 - \text{their } 250)$
	70	A1	
5b	$360/6$	M1	120 seen, $720/6$
	60	A1	
6a	Doesn't start at (0,0), starts at 300	B1	£600 is 3 times as high as £400 oe £500 is 4 times higher than £350 or twice £400
6bi	No, 45 year old has wage above median	B1	...is highest wage; ...well above middle wage; oe; median is £370; listing in order vertically with misreads is ok; but median = £350 is B0
6bii	No, mode is still £370	B1	no, no other value equal to it no, 3 equal values for this mode oe

7	A, D, B	B3	B1 each answer
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8	$100 \div 60$ or $80 \div 50$	M1	1.66 or 1.6
	$100/60 \times 60$ or $80/50 \times 60$	DM1	100 min or 96 min
	Their $(100 - 96)$ or reversed	DM1	
	4	A1	

9	$\Sigma(\text{goals} \times \text{games})$	M1	Σ at least 3 multiplications,
	Their $84 \div 15$	DM1	\div by 14, 16 with working
	5.6	A1	

10	$\frac{8}{20}$ or $\frac{5}{20}$	M1	oe must be same denominator, 0.4 or 0.25 SC1 for denominators of 20
	$\frac{13}{20}$	A1	oe 0.65 , 65%

11	Graph passing through (0,-1)	B1	1 correct point plotted or worked eg (0,-1) (1,2) (2,5) (3,8) (4,11) (5,14)
	Graph with a gradient of 3	B1	2 further correct points plotted or worked
	Line passing from (0,-1) to (5,14) with no errors	B1	freehand line to $\frac{1}{2}$ sq accuracy

12a	Any 90° rotation	B1	Allow wrong length of flagpole
	90° anticlockwise about (0,0)	B2	B1 90° clockwise about (0,0)
12b	Correct position	B2	(1,0) (1,-2) (1,-3) (2,-2) (2,-3) Reflected in $x = 1$ B1, Reflected in $y = c$ B1
12c	Correct position	B2	(0,1) (1,1) (2,1) (3,1) (3,0) (2,0) B1 if rotated 90° anticlockwise about (0,2) B1 if rotated 90° clockwise about (2,0)

No labels or label incorrectly allow if correct, in each part

No flagpole, ignore labelling but correct position -1 each time

13a	$-10 + 1.8 \times 3.7$	M1	$-10 + 6.66$
	-3.34	A1	3.34 as answer no working M1 A0
13bi	$7x - x = 6 + 3$	M1	Allow one error ie $7x + x = 6 + 3$ or $7x - x = 6 - 3$
	$6x = 9$	A1	
	1.5	A1ft	ft if M1 awarded eg $x = 9/8$ or $x = \frac{1}{2}$
13bii	$17 - y = 3 \times 4.5$	M1	$17 \div 3 - y \div 3 = 4.5$
	$17 - 3 \times 4.5$ or $3 \times 4.5 - 17$	DM1	$3 \times (17 \div 3 - 4.5)$ or $3 \times (4.5 - 17 \div 3)$
	3.5	A1ft	ft on one M awarded and only one error
13biii	$2z - 6 = 5 - 3z$	M1	$z - 3 = 2.5 - 1.5z$ no errors
	$2z + 3z = 5 + 6$	M1	$z + 1.5z = 2.5 + 3$ allow 1 error, otherwise must be correct rearrangement
	2.2	A1	SC2 $z = 8/5$ from $2z - 3 = 5 - 3z$

Allow embedded solutions but if contradicted then M marks only

14	$75\% = 180$	M1	Use of multiplier 0.75 B1
	$1\% = 180 \div 75 = 2.4$	A1	$180 \div 0.75$ M1
	240	A1	

15a	$35600 \div 5$	M1	
	7120	A1	28480 SC1
15b	$36200 - 35600$	M1	$36200/35600 \times 100$
	$\text{Their } 600 \div 35600 \times 100$	DM1	$\text{Their } 36200/35600 \times 100 - 100$
	1.69 or $1.68(539\dots)$	A1	

16a	$8x - 4 + 3x + 18$	M1	Allow one error
	$11x + 14$	A1	Fw that does not contradict is not penalised but fw such as $= 25x$ do not award A1
16b	$4x^2 - 2x^3$	B2	B1 each term fw such as $= 2x^5$ only give B1 $4x^2 - 2x^2 = 2x^2$ is B1, $4x^2 - 2x^2 = 6x^4$ is B0

17a	$2n$ or $2n^{\text{th}}$	B1	oe accept $2 \times n$, $n \times 2$, $n + n$ but not n^2 allow x for n but no other letter, unless they explain it
17b	$n + 1$ or $n^{\text{th}} + 1$	B1	oe

18a	40×0.4	M1	
	16	A1	
18b	$30 \div 80$	M1	
	Plot at (80,0.375)	A1	Point on graph within $\frac{1}{2}$ square 2 marks
18c	Yes(implied) plus reference to 20 (out of 80) or probability should be 0.25 or $\frac{1}{4}$	B1	

19	Use of multiplier 1.04	B1	Eg $3000 \times 1.04 = 3120$
	3000×1.04^5	M1	must use sensible multiplier 1.4, 1.004 etc for M1
	3649.96	A1	Accept 3650 if M1 awarded. 649.96 only B1, M1, A0
	Or		
	Adding 4% per annum for 5 years	M1	Must have £3120 as first answer and show working for at least 4 years
	At least 2 more years correct	A1	Values are 3244.8(0), 3374.59(2) 3509.58 or 3509.57(568)
	3649.96 or 3649.95	A1	Must be exact but accept £3650 if M1A1 awarded. If values rounded to nearest penny values are 3120.00, 3244.80, 3374.59, 3509.57, 3649.95 649.96 only M1, A1, A0

20	Sight of digits 5925, 593, 59 or 6	M1	
	Correct form 5.925×10^9	A1	
	Rounded to 5.93, 5.9 or 6×10^9	B1ft	ft their value if ≥ 4 sf if rounded to 3,2 or 1 sf answer need not be in standard form for this mark eg 5,900,000,000 M1A0B1

21a	B, D, A	B3	B1 each answer
21b	Only in 1st and 3rd quadrants	B1	B0 for a straight line
	Correct curvature at (0,0)	B1	Gradient flattens at (0,0) SC1 any cubic

22a	Plots at correct position	B2	B1 for each plot to $\frac{1}{2}$ sq accuracy
22b	99.5 to 100.5	B1	

23a	$BC^2 = 19^2 - 9^2 (=280)$	M1	$x^2 + 9^2 = 19^2$
	$BC = \sqrt{280}$	DM1	For squaring, subtracting and evidence of square rooting
	$BC = 17$ or $16.7(\dots)$	A1	17 with no working gets 3
23b	Sight of tangent	M1	
	$\tan x = \frac{11}{24}$ or Angle = $\tan^{-1}(11 \div 24)$	DM1	$\tan^{-1}(0.458\dots)$ M2 for any complete correct method Sin = $11/\sqrt{697}$ or $11/26.4$ Cos = $24/\sqrt{697}$ or $24/26.4$
	25 or $24.6(\dots)$	A1	25 with no working gets 3 Radians 0.43 gradians 27.35 Penalise on first occurrence only.

24	Breaks problem into sum of lines and (semi)circles	M1	
	Length of Lines $4.1 + 5.9 + 4.7 + 2.9 (=17.6)$	A1	SC 17.6 only B1
	Use of $2\pi r \div 2$	DM1	or $\pi d \div 2$ but must use with numbers
	Length of semi circles $0.9\pi + 0.6\pi + 0.7\pi$ ($6.9(11\dots)$)	A1	2.8, 1.9, 2.2
	$24.5(\dots)$	A1ft	ft on 1 arithmetical or 'reading from scale' error and both M's awarded.

$4.1 = 2.9 + 0.6 + 0.6$, $5.9 = 0.6 + 0.6 + 2.9 + 1.8$, $4.7 = 2.9 + 1.8$, $2.9 = 2.9$