

Mark Scheme (Results)

Summer 2013

GCSE Mathematics (2MB01) Higher
5MB2H (Non Calculator) Paper 01

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NOTES ON MARKING PRINCIPLES

- 1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- 2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- 3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- 4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- 5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- 6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:
 - i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.
 - ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.
 - iii) *organise information clearly and coherently, using specialist vocabulary when appropriate.*
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the “correct” answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme

M1 – method mark

A1 – accuracy mark

B1 – Working mark

C1 – communication mark

QWC – quality of written communication

oe – or equivalent

cao – correct answer only

ft – follow through

sc – special case

dep – dependent (on a previous mark or conclusion)

indep – independent

isw – ignore subsequent working

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Question		Working	Answer	Mark	Notes
1			42	3	M1 for correct method to find 20% of 35 (=7) M1 for correct method to increase 35 by 20% A1 cao
2	(a)		$5a + 3b$	2	M1 for partial simplification $5a$ or $+3b$ A1 cao
	(b)		$5m + 10$	1	B1 cao
	(c)		a^9	1	B1 cao

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Question	Working	Answer	Mark	Notes
5	$250 \div 100 = 2.5$ $300 \div 50 = 6$ $600 \div 120 = 5$ $60 \div 15 = 4$	40	3	M1 for $250 \div 100$ or $300 \div 50$ or $600 \div 120$ or $60 \div 15$ M1 for $250 \div 100$ and $16 \times '2.5'$ or 2.5 oe seen and $16 \times '2.5'$ A1 cao SC M2 ($16+16+16 \div 2$) oe A1 cao SC M2 ($250 \div \frac{100}{16}$) oe A1 cao

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Question	Working	Answer	Mark	Notes														
6	<table border="1" data-bbox="409 280 770 363"> <tr> <td>x</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>y</td> <td>-5</td> <td>-3</td> <td>-1</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table> <p data-bbox="788 304 835 331">OR</p> <p data-bbox="409 384 770 451">Using $y = mx + c$, gradient = 2, y intercept = - 1</p>	x	-2	-1	0	1	2	3	y	-5	-3	-1	1	3	5	Line $y = 2x - 1$ drawn	3	<p data-bbox="1413 228 1621 255">(Table of values)</p> <p data-bbox="1413 268 2002 335">M1 for at least 2 correct attempts to find points by substituting values of x</p> <p data-bbox="1413 347 2029 414">M1 (dep) ft for plotting at least 2 of their points (any points plotted from their table must be correct)</p> <p data-bbox="1413 427 1935 454">A1 for correct line between $x = - 2$ and $x = 3$</p> <p data-bbox="1413 499 1653 526">(No table of values)</p> <p data-bbox="1413 539 1980 606">M2 for at least 2 correct points (and no incorrect points) plotted OR line segment</p> <p data-bbox="1413 619 2018 686">of $y = 2x - 1$ drawn (ignore any additional incorrect segments)</p> <p data-bbox="1413 699 2029 766">(M1 for at least 3 correct points with no more than 2 incorrect points)</p> <p data-bbox="1413 778 1935 805">A1 for correct line between $x = - 2$ and $x = 3$</p> <p data-bbox="1413 850 1644 877">(Use of $y = mx + c$)</p> <p data-bbox="1413 890 1980 957">M2 line segment of $y = 2x - 1$ drawn (ignore any additional incorrect segments)</p> <p data-bbox="1413 970 2029 1037">(M1 for line drawn with gradient of 2 OR line drawn with y intercept of - 1 and a positive gradient)</p> <p data-bbox="1413 1050 1935 1077">A1 for correct line between $x = - 2$ and $x = 3$</p>
x	-2	-1	0	1	2	3												
y	-5	-3	-1	1	3	5												

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Question		Working	Answer	Mark	Notes
7			90	3	M1 for one division (eg $60 \div 10$), may be implied by correct number of marks on the diagram or correct number on one edge of diagram or eg 6×10 , or by two of 6, 5 and 3 seen M1 for $(60 \div 10) \times (50 \div 10) \times (30 \div 10)$ A1 cao OR M1 for $10 \times 10 \times 10$ or $60 \times 50 \times 30$ M1 for $(60 \times 50 \times 30) \div (10 \times 10 \times 10)$ A1 cao
8		$4.5 \times 2 + 3 \times 2 = 15$ or $4 \times 3 + 2 \times 1.5 = 15$ or $4 \times 4.5 - 2 \times 1.5 = 15$	7	4	M1 for a correct method to calculate at least one area using correct dimensions M1 for a complete method to find the total area (can be implied by 15) M1 for “15” $\div 2.25$ (=6.66...) or 2.25×6 (=13.5) or 2.25×7 (=15.75) or repeated addition to within 2.25 of “15” C1 (dep on at least 1 method mark) for 7 packs clearly identified and supported by their calculations
9		$\frac{1}{2} \times 5 \times 12 \times 10 =$	300	2	M1 for $\frac{1}{2} \times 5 \times 12 (\times 10)$ oe A1 cao

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Question		Working	Answer	Mark	Notes
10			36	4	M1 for $360 \div 5 (=72)$ or $(2 \times 5 - 4) \times 90 (=540)$ or $(5-2) \times 180 (=540)$ M1(dep) for $180 - "72" (=108)$ or $540 \div 5 (=108)$ (could be marked on the diagram) M1 for complete method to find angle HAB $(360 - 2 \times "108") \div 2$ oe or angle $EAH +$ angle HCD $540 - ("108" + "108" + (360 - "108"))$ oe or angle EAF $720 - ("108" \times 4) \div 2$ oe A1 cao
11			32.5	3	M1 for $45 \div 30 (=1.5)$ or 1hr 30 min seen or for $20 \div 40 (=0.5$ or 30min) M1 (dep) for $(45 + 20) \div ("1.5" + "0.5")$ A1 cao
12		$(x + 5)^2 = x^2 + 10x + 25$ $(x - 5)^2 = x^2 - 10x + 25$ $x^2 + 10x + 25 - (x^2 - 10x + 25) =$ OR $(x + 5)^2 - (x - 5)^2 = ((x + 5) + (x - 5))((x + 5) - (x - 5))$ $= 2x \times 10$	20x	2	M1 for expansion of one bracket with 3 out of 4 terms correct with correct signs or all 4 terms correct ignoring any sign errors A1 cao OR M1 for $((x + 5) + (x - 5))((x + 5) - (x - 5))$ A1 cao

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Question	Working	Answer	Mark	Notes
13	<p>$OAC = OBC = 90$ (<u>tangent is perpendicular to the radius</u>) $AOB = 360 - 90 - 90 - 36 = 144$ (<u>angles in a quadrilateral add up to 360°</u>) $OBA = (180 - 144) \div 2 = 18$ (<u>angles in a triangle add up to 180° and base angles of isosceles triangle are equal</u>) OR $CAB = CBA = (180 - 36) \div 2 = 72$ (<u>angles in a triangle add up to 180° and base angles of isosceles triangle are equal</u>) $OBA = 90 - 72 = 18$ (<u>tangent is perpendicular to the radius</u>)</p>	18	4	<p>M1 for angle OAC or angle $OBC = 90^\circ$ or angle $AOB = 144^\circ$ or both angles CAB and $CBA = 72^\circ$ or angle BCO or angle $ACO = 18^\circ$ and angle BOC or angle $AOC = 72^\circ$ (these could be marked on the diagram or implied by calculation) M1 for a complete correct method e.g. $90 - \frac{180 - 36}{2}$ or $\frac{1}{2}(180 - (360 - 90 - 90 - 36))$ C1 for one reason (dep on M1) C1 for 18 with full reasons QWC: Reasons clearly laid out with correct geometrical language used</p>
14		2.5, 3, 1	2	<p>M1 for $\frac{0+5}{2}$ or $\frac{3+3}{2}$ or $\frac{2+0}{2}$, can be implied by two correct coordinates in answer A1 cao</p>
15	<p>$x = 0.7505050\dots$ $10x = 7.505050\dots$ $1000x = 750.505050\dots$ $990x = 743$ OR $100x = 75.0505050\dots$ $99x = 74.3$</p>	$\frac{743}{990}$	3	<p>M1 for 0.75050(50....) or 0.7 + 0.050(5050....) M1 (dep) for two recurring decimals that, when subtracted, leave a terminating decimal A1 for $\frac{743}{990}$</p>

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Question		Working	Answer	Mark	Notes
16	(a)		equation	1	B1 for $y = 3x + k$, $k \neq -5$ or any other equivalent form
	(b)		$y = -\frac{1}{3}x + 7$	3	B1 for $-\frac{1}{3}$ or $3m = -1$ oe M1 for $y = -\frac{1}{3}x + c$ or $5 = -\frac{1}{3} \times 6 + c$ or $\frac{y-5}{x-6} = -\frac{1}{3}$ A1 for $y = -\frac{1}{3}x + 7$ oe OR B1 for $x + 3y + k = 0$ or $x + 3y = k$ M1 for $6 + 3 \times 5 + k = 0$ A1 for $x + 3y - 21 = 0$ oe
17	(a)		$\frac{1}{10}$	1	B1 for 0.1 or $\frac{1}{10}$ oe
	(b)		9	2	M1 for $(\sqrt[3]{27})^2$ or $\sqrt[3]{27^2}$ oe or $\sqrt[3]{27} = 3$ A1 cao
	(c)	$\sqrt{75} = \sqrt{25}\sqrt{3}$	$5\sqrt{3}$	2	M1 for $\sqrt{25 \times 3}$ or $\sqrt{25}\sqrt{3}$ oe A1 cao
18		$\frac{2x(x+3)}{(x-5)(x+3)} =$	$\frac{2x}{x-5}$	3	B1 for $2x(x+3)$ B1 for $(x-5)(x+3)$ oe B1 cao

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:

Angles: $\pm 5^\circ$

Measurements of length: ± 5 mm

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Question	Modifications	Notes
2	MLP only: (a) letter a changed to letter <i>e</i> and b changed to <i>f</i> . (c) <i>a</i> changed to <i>y</i> .	M1 for partial simplification $5e$ or $+3f$ A1 cao B1 cao for y^9
6	2cm grid top row of grid remove d	
7	Models as well as diagram provided	
9	Models as well as diagram provided	
12	MLP only: x changed to y	
14	Models as well as diagram provided. Line LN joined	

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