

Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Higher (Non-Calculator) Unit 2

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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.
- 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. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should 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 award marks for the quality of written communication (QWC).
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 labelling 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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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.

Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.

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 cancelling 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.

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 (embedded answers).

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)

14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme

M1 – method mark for appropriate method in the context of the question
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	(a)	$5\frac{1}{4}$	1	B1 for $5\frac{1}{4}$ oe
	(b)	12	2	M1 for $(28 \div 7) \times 3$ oe A1 cao
	(c)	4000	2	M1 for 20 or 200 A1 for 4000 – 4040
2	$\begin{array}{cccccc} -2 & -1 & 0 & 1 & 2 & 3 \\ 7 & 5 & 3 & 1 & -1 & -3 \end{array}$	Correct graph	3	<p>(Table of values) M1 for at least 2 correct attempts to find points by substituting values of x M1 (dep) for plotting at least 2 of their points (any points plotted from their table must be correctly plotted) A1 for correct line between $x = -2$ and $x = 3$</p> <p>(No table of values) M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 3 - 2x$ drawn (ignore any additional incorrect segments) (M1 for at least 3 correct points with no more than 2 incorrect points) A1 for correct line between $x = -2$ and $x = 3$</p> <p>(Use of $y = mx + c$) M2 line segment of $y = 3 - 2x$ drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of -2 OR line drawn with y intercept of 3 and a negative gradient) A1 for correct line between $x = -2$ and $x = 3$</p>

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Question	Working	Answer	Mark	Notes
3		270	3	M1 for $9 \div 0.1 (=90)$ or $4.5 \div 1.5 (=3)$ oe M1 for “3” \times “90” oe (=270) A1 cao OR M1 for $4.5 \div 0.1 (=45)$ or $9 \div 1.5 (=6)$ oe M1 for “6” \times “45” oe (=270) A1 cao OR M1 for $9 \times 4.5 (=40.5)$ or $1.5 \times 0.1 (=0.15)$ oe M1 for “40.5” \div “0.15” (=270) oe A1 cao
4		3, 5, 7	2	M1 for at least two consecutive numbers substituted into $2n+1$ or at least two of 3, 5, 7 A1 cao
5		150 cm^3	3	M1 for a complete method to find the volume A1 for 150 B1 (indep) for cm^3
6	$3000 \div 20 = 150$ $150 \div (14+1) = 10$ $10 \div 0.5 = 20$ 20×3.99	79.80	4	M1 for amount of petrol or oil or mixture M1 for use of ratio M1(dep on M1, M1) for total cost of bottles A1 for 79.8(0)

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Question	Working	Answer	Mark	Notes
7	(a)	$5y + 4$	2	M1 for $3 \times y - 3 \times 2$ or $2 \times y + 2 \times 5$ A1 cao
	(b)	w^2	1	B1 cao
	(c)	$5(x + 4)$	1	B1 cao
8	$1.15 \times 2000 (=2300)$ 1.10×2300	2530	3	M1 for a correct method to find the amount at the end of the first year M1(dep) for a correct method to find the amount at the end of the second year A1 cao
9		Italy with reason	3	B1 for 5 miles = 8km oe M1 for change to consistent units from $70 \times r$ with $1.5 \leq r \leq 1.7$ or $130 \times s$ with $0.6 \leq s \leq 0.7$ C1 for Italy identified and 112 kph stated or Italy identified and 81.(25) mph stated oe

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Question	Working	Answer	Mark	Notes
*10		27	4	<p>M1 for $360 \div 5 (=72)$ or $360 \div 8 (=45)$ M1 for '72' – '45' A1 for $x = 27$ C1 (dep on M1) for sum of <u>exterior angles</u> of <u>polygon</u> is <u>360</u> degrees oe OR M1 for $3 \times 180 \div 5 (=108)$ or $6 \times 180 \div 8 (=135)$ M1 for '135' – '108' A1 for $x = 27$ C1 (dep on M1) for sum of <u>interior angles</u> of <u>polygon</u> is <u>$180(n - 2)$</u> oe degrees or <u>angles</u> in a <u>triangle</u> sum to <u>180</u> degrees OR M1 for $360 \div 8 (=45)$ or $3 \times 180 \div 5 (=108)$ M1 for $180 - ('108' + '45')$ A1 for $x = 27$ C1 (dep on M1) for sum of <u>exterior angles</u> of <u>polygon</u> is <u>360</u> degrees oe and <u>angles</u> on a <u>straight line</u> sum to <u>180</u> degrees</p>
11		0.0025 2.5×10^{-2} 2.5×10^2 2500	2	<p>M1 for converting all numbers to same form with at least one conversion correct A1 for fully correct order with correct numbers in any correct form (SC B1 if one number incorrectly placed or all 4 numbers listed in reverse order)</p>
12	(a)	(5, 3, 4)	1	B1 cao
	(b)	point	1	B1 cao

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Question	Working	Answer	Mark	Notes
13		$x^2+10x+22$	4	M1 for $(x+8) - (x+5) (=3)$ or $(x+4) - (x+2) (=2)$ M1 for area of one rectangle eg $(x+2)(x+5) (= x^2+7x+10)$ M1 for complete method to find area e.g. $(x+2)(x+5) + 3(x+4) (= x^2+7x+10 + 3x+12)$ A1 cao
14 (a)		1	1	B1 cao
(b)		$\frac{1}{16}$	2	M1 for two of cube root, square, reciprocal A1 cao
15 (a)		$(y-7)(y+2)$	2	B2 cao (B1 for $(y \pm 7)(y \pm 2)$)
(b)		$\sqrt{5} + 29$	2	M1 expand brackets, with at least 3 correct terms including signs or 4 correct terms ignoring signs eg $2\sqrt{5} \times 3\sqrt{5} - 2\sqrt{5} + 3\sqrt{5} - 1 \times 1$ A1 for $\sqrt{5} + 29$ or $29 + \sqrt{5}$
(c)		$\sqrt{3}$	2	M1 for $\frac{6}{\sqrt{12}} \times \frac{\sqrt{12}}{\sqrt{12}}$ oe or $\sqrt{12} = 2\sqrt{3}$ A1 cao

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Question	Working	Answer	Mark	Notes
16		$y = 2x - 1$	4	M1 for $\left(\frac{6+-2}{2}, \frac{1+5}{2}\right)$ oe M1 for $\frac{-1}{-0.5}$ oe (=2) M1(dep on previous M1) for using $y = '2'x + c$ with their coordinates for the midpoint used correctly to find c A1 for $y = 2x - 1$ oe
*17		proof with reasons	5	M1 for using x oe for AOB or CPB or consistent use of three letter notation M1 for correct use of at least one circle theorem or for extending PR and CA to meet at ' X ' and using triangles OBX and PCX A1 for correct proof C2 for fully correct reasons for each stage of proof (C1 for any relevant circle theorem reason) Possible reasons: <u>Angles in a triangle</u> add up to <u>180°</u> <u>Angles in a quadrilateral</u> (4 sided shape) add up to <u>360°</u> <u>Angles on a straight line</u> add up to <u>180°</u> The <u>tangent</u> to a circle is <u>perpendicular</u> (90°) to the <u>radius</u> (<u>diameter</u>) <u>Tangents</u> from an external <u>point</u> are <u>equal</u> in length. Reasons must be relevant for method shown.

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	Modification	Notes
Q2	Grid has been enlarged.	<p>(Table of values) M1 for at least 2 correct attempts to find points by substituting values of x M1 (dep) for plotting at least 2 of their points (any points plotted from their table must be correctly plotted) A1 for correct line between $x = -2$ and $x = 3$</p> <p>(No table of values) M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 3 - 2x$ drawn (ignore any additional incorrect segments) (M1 for at least 3 correct points with no more than 2 incorrect points) A1 for correct line between $x = -2$ and $x = 3$</p> <p>(Use of $y = mx + c$) M2 line segment of $y = 3 - 2x$ drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of -2 OR line drawn with y intercept of 3 and a negative gradient) A1 for correct line between $x = -2$ and $x = 3$</p>

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Question	Modification	Notes
Q3	Diagram has been enlarged. 9 metres moved to top of diagram 4.5 metres moved to the left of diagram.	M1 for $9 \div 0.1$ (=90) or $4.5 \div 1.5$ (=3) oe M1 for "3" \times "90" oe (=270) A1 cao OR M1 for $4.5 \div 0.1$ (=45) or $9 \div 1.5$ (=6) oe M1 for "6" \times "45" oe (=270) A1 cao OR M1 for 9×4.5 (=40.5) or 1.5×0.1 (=0.15) oe M1 for "40.5" \div "0.15" (=270) oe A1 cao
Q5	Model provided for all candidates. Also a diagram is provided for MLP. Wording added: right-angled before triangular prism.	M1 for a complete method to find the volume A1 for 150 B1 (indep) for cm^3

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Question		Modification	Notes
Q7	(c)	MLP x changed to y .	B1 cao
Q10		Diagram has been enlarged.	M1 for $360 \div 5 (=72)$ or $360 \div 8 (=45)$ M1 for '72' – '45' A1 for $x = 27$ C1 (dep on M1) for sum of <u>exterior angles</u> of <u>polygon</u> is <u>360</u> degrees oe OR M1 for $3 \times 180 \div 5 (=108)$ or $6 \times 180 \div 8 (=135)$ M1 for '135' – '108' A1 for $x = 27$ C1 (dep on M1) for sum of <u>interior angles</u> of <u>polygon</u> is <u>$180(n - 2)$</u> oe degrees or <u>angles</u> in a <u>triangle</u> sum to <u>180</u> degrees OR M1 for $360 \div 8 (=45)$ or $3 \times 180 \div 5 (=108)$ M1 for $180 - ('108' + '45')$ A1 for $x = 27$ C1 (dep on M1) for sum of <u>exterior angles</u> of <u>polygon</u> is <u>360</u> degrees oe and <u>angles</u> on a <u>straight line</u> sum to <u>180</u> degrees
Q12	(a)	Model provided for all candidates. Also enlarged diagram provided for MLP. On the model and diagram the point C is marked in the correct place, with an additional mark either side of the C	B1 cao
Q12	(b)	Question has been changed: "The point C has been marked on the cuboid. Write down the co-ordinates of point C". (1 mark) (_____, _____, _____)	B1 cao

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Question	Modification	Notes
Q13	Diagram has been enlarged. MLP x changed to y .	M1 for $(x+8) - (x+5) (=3)$ or $(x+4) - (x+2) (=2)$ M1 for area of one rectangle eg $(x+2)(x+5) (=x^2+7x+10)$ M1 for complete method to find area e.g. $(x+2)(x+5) + 3(x+4) (=x^2+7x+10 + 3x+12)$ A1 cao
Q17	Diagram has been enlarged.	M1 for using x oe for AOB or CPB or consistent use of three letter notation M1 for correct use of at least one circle theorem or for extending PR and CA to meet at ' X ' and using triangles OBX and PCX A1 for correct proof C2 for fully correct reasons for each stage of proof (C1 for any relevant circle theorem reason) Possible reasons: <u>Angles</u> in a <u>triangle</u> add up to <u>180°</u> <u>Angles</u> in a <u>quadrilateral</u> (4 sided shape) add up to <u>360°</u> <u>Angles</u> on a <u>straight line</u> add up to <u>180°</u> The <u>tangent</u> to a circle is <u>perpendicular</u> (90°) to the <u>radius</u> (<u>diameter</u>) <u>Tangents</u> from an external <u>point</u> are <u>equal</u> in length. Reasons must be relevant for method shown.

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