edexcel

# Mark Scheme (Results)

## Summer 2015

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Higher (Calculator) Unit 3

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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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 a 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<br>A1 – accuracy mark<br>B1 – Working mark<br>C1 – communication mark<br>QWC – quality of written communication<br>oe – or equivalent<br>cao – correct answer only<br>ft – follow through<br>sc – special case<br>dep – dependent (on a previous mark or conclusion)<br>indep – independent<br>isw – ignore subsequent working |

| 5MB3H/01 June 2015 | | | | |
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| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | | 71.40 | 2 | M1 for 41.65÷7<br>A1 for 71.4(0) |
| 2 | | 4 | 3 | M1 $\frac{4.5}{100} \times 300$ (=13.5) or $\frac{104.5}{100} \times 300$ (=313.5) oe<br>M1 50 ÷ "13.5" (=3.7) or at least 3 repeated addition of "13.5"<br>A1 cao<br><br>SC B1 for $1.045^n \times 300$ |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 3 (a) | | 1.75 | 2 | M1 for intention to multiply brackets or for intention to divide all terms by 4 as the first step<br>A1 for 1.75 oe |
| (b) | | p > 7.5 | 2 | M1 for correct method to isolate *p* or intention to divide all terms by 2 as the first step (condone the use of '=' in method)<br>A1 for *p* > 7.5 oe |
| (c) | | 3, -5 | 3 | M2 for $(x - 3)(x + 5)$<br>(M1 for $(x \pm 3)(x \pm 5)$)<br>A1 cao 3 and –5<br><br>OR<br>M1 for $\frac{-2 \pm \sqrt{2^2 - 4 \times 1 \times -15}}{2 \times 1}$<br>M1 for $\frac{-2 \pm \sqrt{64}}{2}$<br>A1 for 3 and – 5 cao |

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| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| *4 | | 275g (£7.95) pack with reason | 4 | M1 for one of 439 ÷ 150 (= 2.92),<br>639 ÷ 200 (= 3.19), 795 ÷ 275 (= 2.89)<br>OR one of 150 ÷ 439 (= 0.341),<br>200 ÷ 639 (= 0.31), 275 ÷ 795 (= 0.345)<br>OR any other calculation that could lead to a comparative figure<br>M1 for calculations that could lead to comparative figures for 2 jars<br>M1 for calculations that could lead to comparative figures for 3 jars eg all 3 from the above lists<br>C1 for correct comparative figures for all 3 jars leading to a correctly stated comparison: 275g best value |
| 5 (a) | | 7, -2, -1 | 2 | B2 for all three correct values 7, -2, -1<br>(B1 for two correct values 7, -2 or -1) |
| (b) | | Correct curve | 2 | B2 for fully correct curve<br>(B1 ft for at least 5 points plotted correctly) |
| 6 | | 6 | 4 | M1 for $7x + 22$ or $(5x+2)$ or $7b + 22p$ or $5b + 2p$<br>M1 for forming equation $7x + 22 = 2(5x + 2)$<br>M1 for correct intent to isolate $x$ on one side<br>A1 cao |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 7 | | 28 | 3 | M1 for 240 × 1.2 (=288)<br>M1 for "288" ÷ 10 (=28.8)<br>A1 cao<br><br>OR<br>M1 for 10 ÷ 1.2 (=8.33)<br>M1 240 ÷ "8.33" (=28.8)<br>A1 cao |
| 8 | | Correct position marked | 3 | M1 for perpendicular bisector of the line AC<br>M1 for arc of circle centre D radius 7cm<br>A1 for correct point |
| *9 | | No with comparison of correct figures. | 3 | M1 for correct method to find frame dimensions 15+5+5 (=25) and 10+5+5 (=20)<br>M1 for finding relationship between length and width for both<br>eg 15 ÷ 10 (=1.5) and 25 ÷ 20 (= 1.25) or for correct use of a scale factor to find a comparable length<br>C1 for correct conclusion following comparison of 2 correct comparable figures |
| 10 | | Rotation, 90° clockwise centre (1,4) | 3 | B1 for rotation<br>B1 for 90° clockwise or 270° anticlockwise<br>B1 for (1,4)<br>NB Award B0 if more than one transformation given |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 11 | | 3.4 | 3 | M1 for $\pi \times 3.5^2 \times 10$ (=384.85 or =122.5π) or $\pi \times 6^2$ (=113.1 or =36π)<br>M1 (dep) for "384.85" ÷ "113.1" or 122.5(π) ÷ 36(π)<br>A1 for 3.4 – 3.5<br>OR<br>M1 for $\left(\frac{12}{7}\right)^2$ (=2.9) or $\left(\frac{7}{12}\right)^2$ (=0.34)<br>M1 for 10 ÷ "$\left(\frac{12}{7}\right)^2$" or 10 × "$\left(\frac{7}{12}\right)^2$"<br>A1 for 3.4 – 3.5 |
| 12 | | $7.5 \times 10^9$ | 2 | M1 for $2.1 \times 10^7$ or 21000000 or sight of figures 75<br>A1 for $7.5 \times 10^9$ |
| 13 | | 29.6 | 4 | M1 for $8^2 + 5^2$ or 64 + 25 or 89<br>M1 (dep) $\sqrt{"8^2"+"5^2"}$ (=9.4)<br>M1 for "9.4..." × π<br>A1 for 29.5 – 29.65 |
| *14 | | 49 | 3 | M1 for 180 - 56 - 75<br>A1 for 49<br>C1 for alternate segment theorem and angles on a straight line add up to $180^o$<br>OR alternate segment theorem and angles in a triangle add up to $180^o$<br>Appropriate to methods shown |

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| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 15 | | 0.84 | 3 | M2 for $2 \times 0.75^3$<br>(M1 for $2 \times 0.75$ (=1.5) or $2 \times 0.25$ (=0.5) and $2 - $ "0.5" )<br>A1 for 0.84 − 0.844 |
| 16 | $y(x+5) = 3x$<br>$yx+5y = 3x$<br>$5y = 3x - yx$<br>$5y = x(3 - y)$ | $x = \frac{5y}{3-y}$ | 3 | M1 for intention to multiply by $x + 5$<br>M1 for intention to isolate $yx$ and $3x$ on one side to get $3x - xy$ oe<br>A1 for $x = \frac{5y}{3-y}$ or $\frac{-5y}{y-3}$ |
| 17 | | 85.6 | 4 | M1 for $360 \div 5$ (=72)<br>M1 (dep) for $\frac{1}{2} \times 6^2 \times$ sin"72" (=17.12)<br>M1 for completing full method to find total area of pentagon<br>A1 for 85.5 − 85.6<br><br>OR<br>M1 for $360 \div 10$ (=36) or $\frac{1}{2}(180 - 360 \div 5)$ (=54)<br>M1(dep) for<br>eg $6 \times$ sin"36" $\times 6 \times$ cos"36" (=17.12)<br>or $\frac{1}{2}$ $6 \times$ sin"54" $\times 6 \times$ cos"54" (=8.55)<br>M1 for completing full method to find total area of pentagon<br>A1 for 85.5 − 85.6 |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 18 | | $y = \frac{375}{x^2}$ | 3 | M1 for $y \propto \frac{1}{x^2}$ or $y = \frac{k}{x^2}$ or $k = yx^2$<br>M1 for $5^2 \times 15$ (=375)<br>A1 for $y = \frac{375}{x^2}$ or $y = \frac{k}{x^2}$ and $k = 375$ |
| 19 | | 300 | 3 | B1 for 45 or 0.15<br>M1 for $45 \div 0.15$<br>A1 for 300 cao |
| 20 (a) | | $p = 4$,<br>$q = -10$ | 3 | M1 for sight of $(x - 4)^2$ or $p = 4$<br>M1 for $(x - 4)^2 - 16 + 6$<br>A1 for $p = 4$, $q = -10$<br><br>OR<br>M1 for $x^2 - 2px + p^2 + q$ or $-2p = -8$ or $p^2 + q = 6$<br>M1 for $-2p = -8$ and $p^2 + q = 6$<br>A1 for $p = 4$, $q = -10$ |
| (b) | | (4, -10) | 1 | B1 ft |
| 21 (a) | | Correct graph | 2 | M1 for any translation along $x$ axis<br>A1 correct position |
| (b) | | $y = -g(x)$ | 1 | B1 for $y = -g(x)$ oe from correct interpretation of diagram |

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|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |
| 22 | | 6.2 | 5 | M1 for a method to find an angle<br>*RAB* = 70, *ABR* = 50, *BRA* = 60 or *TAR* = 20<br>M1 for substitution into sine formula $\frac{AR}{\sin"50"} = \frac{12}{\sin"60"}$<br>M1 for use of sine rule to find *AR*, *AR* = $\frac{12}{\sin"60"} \times \sin"50"$ (=10.61)<br>M1 for substitution into cosine formula<br>$TR^2 = 5^2 + "10.61"^2 - 2 \times 5 \times "10.61" \times \cos 20$ (=37.92)<br>A1 for 6.15 - 6.2 |
| 23 | | $\frac{3}{4}(\mathbf{b} + \mathbf{a})$ | 4 | B1 for $\mathbf{b} - \mathbf{a}$ or $\frac{1}{2}(\mathbf{b} - \mathbf{a})$ or $\mathbf{a} - \mathbf{b}$ or $\frac{1}{2}(\mathbf{a} - \mathbf{b})$<br>M1 for $\overrightarrow{OM} = \mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a})$ or $\mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b})$ oe<br>M1 for $\overrightarrow{ON} = \frac{3}{2}(\mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a}))$ or $\frac{3}{2}(\mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b}))$<br>A1 for $\frac{3}{4}(\mathbf{b} + \mathbf{a})$ oe (simplified) |

## 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: ±5°
Measurements of length: ±5 mm

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| PAPER: 5MB3H_01 | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q4 | | Diagrams have been removed. | M1 for one of 439 ÷ 150 (= 2.92),<br>639 ÷ 200 (= 3.19), 795 ÷ 275 (= 2.89)<br>OR one of 150 ÷ 439 (= 0.341),<br>200 ÷ 639 (= 0.31), 275 ÷ 795 (= 0.345)<br>OR any other calculation that could lead to a comparative figure<br>M1 for calculations that could lead to comparative figures for 2 jars<br>M1 for calculations that could lead to comparative figures for 3 jars eg all 3 from the above lists<br>C1 for correct comparative figures for all 3 jars leading to a correctly stated comparison: 275g best value |
| Q5 | (a) | Wording added: 'There are three spaces to fill.'<br>Table produced in vertical format. | B2 for all three correct values 7, -2, -1<br>(B1 for two correct values 7, -2 or -1) |
| Q5 | (b) | 1½ cm grid provided. | B2 for fully correct curve<br>(B1 ft for at least 5 points plotted correctly) |

| PAPER: 5MB3H_01 | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q8 | | Size of diagram kept as original.<br>Scale put on diagram as well as in text. | M1 for perpendicular bisector of the line AC<br>M1 for arc of circle centre D radius 7cm<br>A1 for correct point |
| Q9 | | Diagram has been enlarged.<br>Dotty shading.<br>Measurement labels moved to be more accessible for candidates. | M1 for correct method to find frame dimensions 15+5+5 (=25) and 10+5+5 (=20)<br>M1 for finding relationship between length and width for both<br>eg 15 ÷ 10 (=1.5) and 25 ÷ 20 (= 1.25) or for correct use of a scale factor to find a comparable length<br>C1 for correct conclusion following comparison of 2 correct comparable figures |
| Q10 | | The grid has been enlarged.<br>Shapes are labelled triangle A and triangle B.<br>Wording added: 'It shows two triangles on the grid, triangle A and triangle B.'<br>Dotty shading | B1 for rotation<br>B1 for 90° clockwise or 270° anticlockwise<br>B1 for (1,4)<br>NB Award B0 if more than one transformation given |

| PAPER: 5MB3H_01 | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q11 | | The diagram has been enlarged.<br>2 models provided for all candidates.<br>A diagram is also provided for MLP. | M1 for $\pi \times 3.5^2 \times 10$ (=384.85 or =122.5π) or $\pi \times 6^2$ (=113.1 or =36π)<br>M1 (dep) for "384.85" ÷ "113.1" or 122.5(π) ÷ 36(π)<br>A1 for 3.4 – 3.5<br>OR<br>M1 for $\left(\frac{12}{7}\right)^2$ (=2.9) or $\left(\frac{7}{12}\right)^2$ (=0.34)<br>M1 for 10 ÷ "$\left(\frac{12}{7}\right)^2$" or 10 × "$\left(\frac{7}{12}\right)^2$"<br>A1 for 3.4 – 3.5 |
| Q13 | | The diagram has been enlarged. | M1 for $8^2 + 5^2$ or 64 + 25 or 89<br>M1 (dep) $\sqrt{"8^2"+"5^2"}$ (=9.4)<br>M1 for "9.4..." × π<br>A1 for 29.5 – 29.65 |
| Q14 | | The diagram has been enlarged.<br>Wording added: 'Angle CAB is marked x'. | M1 for 180 - 56 - 75<br>A1 for 49<br>C1 for alternate segment theorem and angles on a straight line add up to $180^o$<br>OR alternate segment theorem and angles in a triangle add up to $180^o$<br>Appropriate to methods shown |

| PAPER: 5MB3H_01 | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q16 | | MLP:<br>*x* changed to *e*.<br>*y* changed to *f*. | M1 for intention to multiply by $e + 5$<br>M1 for intention to isolate *yx* and $3x$ on one side to get $3e - ef$ oe<br>A1 for $x = \frac{5f}{3-f}$ or $\frac{-5f}{f-3}$ |
| Q17 | | The diagram has been enlarged. | M1 for $360 \div 5$ (=72)<br>M1 (dep) for $\frac{1}{2} \times 6^2 \times \sin"72"$ (=17.12)<br>M1 for completing full method to find total area of pentagon<br>A1 for 85.5 − 85.6<br><br>OR<br>M1 for $360 \div 10$ (=36) or $\frac{1}{2}(180 - 360 \div 5)$ (=54)<br>M1(dep) for<br>eg $6 \times \sin"36" \times 6 \times \cos"36"$ (=17.12)<br>or $\frac{1}{2}$ $6 \times \sin"54" \times 6 \times \cos"54"$ (=8.55)<br>M1 for completing full method to find total area of pentagon<br>A1 for 85.5 − 85.6 |
| Q19 | | MLP and braille:<br>a changed to x.<br>b changed to f. | B1 for 45 or 0.15<br>M1 for $45 \div 0.15$<br>A1 for 300 cao |

| PAPER: 5MB3H_01 | | | |
|---|---|---|---|
| **Question** | | **Modification** | **Notes** |
| Q21 | (a) | The grid has been enlarged. | M1 for any translation along *x* axis<br>A1 correct position |
| Q21 | (b) | The grid has been enlarged. | B1 for $y = -g(x)$ oe from correct interpretation of diagram |
| Q22 | | The diagram has been enlarged.<br>TR is joined by a dashed line. | M1 for a method to find an angle,<br>$RAB = 70$, $ABR = 50$, $BRA = 60$ or $TAR = 20$<br>M1 for substitution into sine formula $\frac{AR}{\sin"50"} = \frac{12}{\sin"60"}$<br>M1 for use of sine rule to find $AR$, $AR = \frac{12}{\sin"60"} \times \sin"50"$ (=10.61)<br>M1 for substitution into cosine formula<br>$TR^2 = 5^2 + "10.61"^2 - 2 \times 5 \times "10.61" \times \cos 20$ (=37.92)<br>A1 for 6.15 - 6.2 |
| Q23 | | The diagram has been enlarged.<br>OM is joined by a dashed line. | B1 for $\mathbf{b} - \mathbf{a}$ or $\frac{1}{2}(\mathbf{b} - \mathbf{a})$ or $\mathbf{a} - \mathbf{b}$ or $\frac{1}{2}(\mathbf{a} - \mathbf{b})$<br>M1 for $\overrightarrow{OM} = \mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a})$ or $\mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b})$ oe<br>M1 for $\overrightarrow{ON} = \frac{3}{2}(\mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a}))$ or $\frac{3}{2}(\mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b}))$<br>A1 for $\frac{3}{4}(\mathbf{b} + \mathbf{a})$ oe (simplified) |

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