# Mark Scheme (Results)

# Summer 2014

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Unit 3: 5MB3H_01 (Higher)

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

| Guidance on the use of codes within this mark scheme |
| --- |
| M1 – method mark for correct method <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 |

| Paper: 5MB3H_01 | | | | |
|---|---|---|---|---|
| Question | Working | Answer | Mark | Notes |
| 1 | | 226.80 | 3 | M1 for method to find 5% of 54 (= 2.7) or 5% of "54×4" (=10.8) or 105% of 54 (= 56.7)<br>M1 for a complete method to find the total amount<br>A1 for 226.8(0) |
| 2 | | 7.4 | 3 | M1 for a correct method to find the weight of 1 metre of hosepipe, eg. (1 ÷ 0.5) × 150 (= 300)<br>M1 (dep) for a correct method to find the weight of the hosepipe alone, eg. "300" × 20 (= 6000)<br>A1 for 7.4 (accept 7400 g) |
| 3 | | enlargement<br>scale factor 3<br>centre *O* | 3 | B1 for enlargement<br>B1 for scale factor 3<br>B1 for (centre) *O* oe<br>NB: B0 for any combination of transformations |
| *4 | **Examples**<br>**£ per bag**<br>2.15÷50 = 0.043 (4.3)<br>3.29÷80 = 0.0411.. (4.11..)<br>5.17÷125 = 0.0413..(4.13..)<br>**Bags per £ (or pence)**<br>50÷2.15  = 23.2(5...)<br>80÷3.29  = 24. 3(1...)<br>125÷5.17 = 24.1(7...)<br>**Price per 400 bags**<br>S: 2.15×8 = 17.2<br>M: 3.29×5 = 16.45<br>**Price per 1000 bags**<br>M: 3.29×12.5=41.125<br>L: 5.17×8=41.36 | Medium | 4 | M1 for division of price by quantity for at least two boxes<br>or division of quantity by price for at least two boxes<br>or a complete method to find price of same quantity for at least two boxes<br>or to find quantity of same price applied to at least two boxes<br><br>M1 for a complete method to give values that can be used for comparison of all 3 boxes.<br><br>A1 for correct values that can be used for comparison for all 3 boxes<br><br>C1 ft (dep on M2) for comparison of their values with a correct conclusion. |

| Paper: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| Question | | Working | Answer | Mark | Notes |
| 5 | | | 41.1 to 41.2 | 3 | M1 for a method to find the circumference of the circle, eg. $\pi \times 16$ (= 50.265..)<br>M1 for a method to find the length of the semicircle, eg. "50.265.." ÷ 2 (= 25.132..)<br>A1 for answer in the range 41.1 to 41.2 |
| 6 | (a) | | $5x - 3 = 52$ | 3 | M1 for $2x$ or $2x - 3$ seen<br>M1 for $x$ and $2x$ and $2x - 3$<br>A1 for $5x - 3 = 52$ from correct working |
| | (b) | | 11 | 2 | M1 for intention to either add 3 to both sides or to divide all terms by 5 as a first step<br>A1 cao |
| 7 | | | 77 to 77.2 | 4 | M1 for $\pi \times 40^2 \times 90$ (= 452389. ..)<br>M1 for "452389. .." – 65000 (= 387389. ….)<br>M1 (dep on at least M1) for "387389. .." ÷ ( $\pi \times 40^2$ )<br>A1 for answer in the range 77 to 77.2<br><br>OR<br>M1 for $\pi \times 40^2$ (= 5026. ...)<br>M1 for 65000 ÷ "5026. ...." (= 12.93...)<br>M1 (dep on at least M1) for 90 − "12.93..."<br>A1 for answer in the range 77 to 77.2 |

| Paper: 5MB3H_01 | | | | | |
|---|---|---|---|---|---|
| Question | | Working | Answer | Mark | Notes |
| 8 | | *x*=2   gives 20<br>*x*=2.1 gives 21(.86...)<br>*x*=2.2 gives 23(.84...)<br>*x*=2.3 gives 25(.96...)<br>*x*=2.4 gives 28(.22...)<br>*x*=2.5 gives 30(.62...)<br>*x*=2.6 gives 33(.17...)<br>*x*=2.7 gives 35(.88...)<br>*x*=2.8 gives 38(.75...)<br>*x*=2.9 gives 41(.78...)<br>*x*=3   gives 45<br>*x*=2.35 gives 27.0(7...)<br>*x*=2.36 gives 27.3(0...)<br>*x*=2.37 gives 27.5(3...) | 2.3 | 4 | B2 for a correct trial $2.3 \le x \le 2.4$ evaluated<br>(B1 for a correct trial $2 \le x \le 3$ evaluated)<br>B1 for a different correct trial $2.3 < x < 2.4$ evaluated<br>B1 (dep on at least one previous B1) for 2.3<br><br>Accept trials correct to the nearest whole number (rounded or truncated) if the value of *x* is to 1 dp but correct to 1 dp (rounded or truncated) if the value of *x* is to 2 dp<br><br>NB:  no working scores no marks even if answer is correct |
| 9 | | | shaded region | 3 | B1 for arc of circle centre *A* radius 2 cm<br>B1 for arc of circle centre *B* radius 4 cm<br>B1 ft for correct region shaded |
| 10 | (a) | | 2, −1, 2 | 2 | B2 for all correct<br>(B1 for two correct) |
| | (b) | | graph | 2 | M1 for at least 5 points plotted correctly (ft from table if at least B1 awarded in (a))<br>A1 for a fully correct graph |
| | (c) | | −0.4, 2.4 | 2 | B1 for an answer in the range 2.3 to 2.5 or ft their graph<br>B1 for an answer in the range −0.3 to −0.5 or ft their graph |

| Paper: 5MB3H_01 | | | | |
|---|---|---|---|---|
| Question | Working | Answer | Mark | Notes |
| 11 | | 16 | 3 | M1 for a correct first step in a process to find $q$, eg. a right-angled triangle drawn with correct vertical and horizontal lengths shown or correctly finding the difference in $x$ coordinates and the difference in $y$ coordinates of any two of the three given points<br>M1 for a complete method to find $q$<br>A1 cao |
| 12 | (a) | $e > \frac{9}{4}$ | 2 | M1 for correct process to isolate terms in $e$ from other terms<br>A1 for $e > \frac{9}{4}$ oe |
| | (b) | shaded region | 2 | M1 for $x + y = 1$ drawn or for a region shaded above their line with negative gradient<br>A1 for region shaded above line |
| 13 | (a) | 5.0 | 3 | M1 for $2.1^2 + 4.5^2$ or 4.41+20.25 or 24.66<br>M1 for $\sqrt{(2.1^2 + 4.5^2)}$ or $\sqrt{24.66}$<br>A1 for answer in the range 4.9 to 5.0 |
| | (b) | 115 | 4 | M1 for a correct method to find the angle at the tower ($A$) or the angle at the tree ($B$),<br>eg. $\tan (A) = \frac{4.5}{2.1}$ ($= 2.14\ldots$) or $\tan (B) = \frac{2.1}{4.5}$ ($= 0.46\ldots$)<br>M1 for $\tan^{-1}\left(\frac{4.5}{2.1}\right)$ ($= 64.98..$) or $\tan^{-1}\left(\frac{2.1}{4.5}\right)$ ($= 25.01\ldots$)<br>A1 for 64.9(8...) or 25.0(1...)<br>A1 for 115 or ft 180 – "64.98..." or 90 + "25.01" |

| Paper: 5MB3H_01 | | | | |
|---|---|---|---|---|
| Question | Working | Answer | Mark | Notes |
| 14 | | 2700 | 3 | M1 for a correct method to find 25% of 4800 (= 1200)<br>M1 for a fully complete and correct method to find the value of the car at the end of 2015<br>A1 cao<br><br>OR<br><br>M2 for $4800 \times (0.75)^2$<br>A1 cao |
| 15 | | 57.6 | 2 | M1 for $\frac{D}{8} = \frac{36}{5}$ oe<br>A1 for 57.6 oe |
| 16 | (a) | 0.0045 | 1 | B1 cao |
| | (b) | $6.58 \times 10^{-6}$ | 2 | M1 for $(2.5 \div 3.8) \times 10^{(-2-3)}$ or $0.657...\times 10^{-5}$ or 0.00000657..<br>A1 for an answer in the range $6.57 \times 10^{-6}$ to $6.58 \times 10^{-6}$ |

| Paper: 5MB3H_01 | | | | |
|---|---|---|---|---|
| Question | Working | Answer | Mark | Notes |
| *17 | Example:<br>4a+5b=1115<br>3a+2b=530<br><br>12a+15b=3345<br>12a+ 8b = 760<br>        7b=1225<br>b=175<br>a=(1115 − 5×175)÷4 (= 60)<br>OR<br>  8a+10b=2230<br>15a+10b=2650<br>7a        = 420<br>a=60<br>b=(1115 −4×60)÷5 (=175) | Small = 60<br>Large = 175 | 5 | M1 for two correct equations expressed in terms of two variables<br>M1 (dep) for correct process to eliminate either variable (condone one arithmetic error)<br>A1 for 60 or 175<br>M1 (dep) for correct substitution of their found variable<br>or<br>M1 (indep) for correct process to eliminate the other variable (condone one arithmetic error)<br>C1 (dep on M3) for a statement giving small = 60 **and** large = 175 |
| *18 | | No with reason | 4 | M1 for $\frac{4}{3} \times \pi \times 2^3$ (=33.51...)<br>M1 for 45 ÷ "volume"<br>A1 for 1.3 – 1.4<br>C1 (dep on M1) for No and eg. 1.34 > 1.24<br><br>OR<br>M1 for (volume =) 45 ÷ 1.24 (= 36.29...) oe<br>M1 for ($r^3$ =) "36.29..."÷ ($\frac{4}{3} \times \pi$) oe<br>A1 for 8.6 − 8.7<br>C1 (dep on M1) for No and eg. 8.6... > 8 |

| Paper: 5MB3H_01 | | | | |
|---|---|---|---|---|
| Question | Working | Answer | Mark | Notes |
| 19 | | proof | 4 | B1 for $\overrightarrow{AM} = 0.5\mathbf{b}$ or $\overrightarrow{MC} = 0.5\mathbf{b}$ or $\overrightarrow{BC} = \mathbf{a}$ or $\overrightarrow{CX} = \mathbf{a}$ or $\overrightarrow{BX} = 2\mathbf{a}$ <br> Note: This could be shown on the diagram or in a correct vector expression <br> M1 for a correct relevant vector expression for $\overrightarrow{OM}$ or $\overrightarrow{MX}$ or $\overrightarrow{OX}$ <br> eg $\overrightarrow{OM} = \overrightarrow{OA} + \overrightarrow{AM}$ or $\overrightarrow{OX} = \mathbf{b} + 2\mathbf{a}$ <br> A1 for any two from $(\overrightarrow{OM}) = \mathbf{a} + 0.5\mathbf{b}$, $(\overrightarrow{MX}) = \mathbf{a} + 0.5\mathbf{b}$ and $(\overrightarrow{OX}) = \mathbf{b} + 2\mathbf{a}$ <br> B1 for a fully correct proof, eg." $\overrightarrow{OX} = 2\overrightarrow{OM}$ so the vectors are parallel and have a common point $O$ " <br><br> OR (geometric proof) <br> M1 for <OAM = <MCX or OA = CX and AM = CM <br> A1 for <OAM = <MCX with reason (alternate angles) and OA = CX and AM = CM <br> B1 for ΔOAM ≡ ΔXCM with reason, eg SAS <br> B1 for correct proof, eg <AMO = <CMX with reason (vertically opposite angles) |
| 20 | | 15500 to 15600 | 3 | B1 for 50.5 (accept 50.4$\dot{9}$) or 227.5 (accept 227.4$\dot{9}$) or 177.5 (accept 177.4$\dot{9}$) <br> M1 for 0.5 × "227.5" × "177.5" ×sin"50.5" <br> A1 for an answer in the range 15575 to 15580 from using three **correct** upper bounds |
| 21 | | −4, 1 | 4 | M1 for method to clear the fraction., eg $4 - 2x = x(x + 1)$ oe <br> M1 for rearranging to the form $ax^2 + bx + c = 0$ condone one error <br> M1 (dep on previous M1) for a method to solve their quadratic equation <br> A1 for −4 and 1 |

## 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

| PAPER: 5MB3H_01 | | |
|---|---|---|
| **Question** | **Modification** | **Notes** |
| Q03 | 1.5cm grid | |
| Q04 | No pictures | |
| Q07 | model provided as well as diagram | |
| Q09 | diagram size X2<br>10km and 20km changed to 20km and 40 km | |
| Q10 | grid x 2<br>2cm squares | |
| Q12 | 2 cm grid Q13 On the diagram crosses at tower and tree changed to filled in circles | |