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Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Foundation (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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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)

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

PAPER: 5MB3F/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		0.25	1	B1 cao
	(b)		$\frac{7}{10}$	1	B1 for $\frac{7}{10}$ oe
	(c)		$\frac{21}{25}$	2	M1 for $\frac{42}{50}$ oe A1 cao
	(d)		50	1	B1 cao
2	(i)		25.1	4	M1 for any route starting and ending at C going through H, S and Y. Condone missing last section back to C M1 for a valid route for which their correct total is shown A1 for 25.1 B1 ft for communicating their shortest route (must start and end at C and pass through S, H and Y).
	(ii)		CSHSYC or CYSHSC		
3	(a)		B, G	1	B1 cao
	(b)		C	1	B1 cao
	(c)		Enlarged shape	2	M1 for drawing at least two sides correct length or a correct enlargement of scale factor other than 3 (excluding 1) A1 for fully correct enlargement

PAPER: 5MB3F/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		32, 12, 88.92	3	B1 for 32 B1 for 12 B1 ft "32" for 88.92
	(b)		509.98	3	M1 for a correct step 452.25 + 120 (= 572.25) or 452.25 + 2.56 (= 454.81) or 452.25 – 64.83 (= 387.42) or 120 + 2.56 (= 122.56) or 120 – 64.83 (=55.17) or 64.83 – 2.56 (= 62.27) M1 for a complete method A1 cao
5	(a)		pentagon	1	B1 cao
	(b)		Line drawn	1	B1 for parallel line drawn.
6	(a)		Reflected shape	1	B1 cao
	(b)		Rotated shape	2	M1 for quarter turn clockwise about any point or quarter turn anticlockwise about *O* A1 cao
	(c)		Tessellation	2	B2 for at least 6 correct shapes, including initial shape, correctly tessellating and no incorrectly drawn tiles or gaps. (B1 for at least 4 correct shapes, including initial shape, correctly tessellating; ignore any additional sections attempted, gaps or incorrect shapes)
7			20	3	M1 for 5×60 (=300)or 8×35 (=280) M1 for $5 \times 60 - 8 \times 35$ A1 cao

PAPER: 5MB3F/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8			30	3	M1 for 50 + 10 (= 60) or 50 ÷ 2 (= 25) M1 for correct order of operations + 10 then ÷ 2 A1 cao
9			–3	3	M1 for full substitution or –12 or 9 M1 for –12 + 9 A1 cao
10	(a)		7	1	B1 for 6.8 – 7.2
	(b)		110	2	M1 for correct angle used or for 68 - 72 or 288 - 292 A1 for 108 – 112
	(c)		Cross in correct position	1	B1 for a possible correct position
*11			Decision (supported)	3	M1 for 258 + 24 × 27.5 + 24 × 8.5 (=1122) oe M1 for 45 × 24 (= 1080) C1 for 1080 and 1122 and “No, £45 is not enough” oe OR M1 for 258 ÷ 24 (= 10.75) M1 for “10.75” + 27.50 + 8.50 C1 for £46.75 and “No, £45 is not enough” oe OR M1 for 27.50 × 24 + 8.50 × 24(=864) oe M1 for (“864” + 258) ÷ 24 C1 for £46.75 and “No, £45 is not enough” oe OR M1 for 45 – 27.50 – 8.50 (= 9) M1 for 258 ÷ 24 (= 10.75) C1 for 9 and 10.75 and “No, £45 is not enough” oe

PAPER: 5MB3F/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		83	1	B1 for 82 – 84
	(b)		0.3 – 0.7	3	M 1 for reading off graph at 80°, 70° or 60° with at least one reading in 0.5 – 0.6 oe, or 2.5 – 2.6 oe, or 5.0 – 5.1oe or one correct interval (1.9 - 2.1 or 2.4 - 2.6) oe M 1 for reading off graph at 80°, 70° and 60° with all 3 readings in 0.5 – 0.6 oe and 2.5 – 2.6 oe and 5.0 – 5.1 oe or both correct intervals (1.9 - 2.1 and 2.4 - 2.6) oe A1 for 0.3 – 0.7
*13			Farm B has the greater area	3	M1 for 80 ÷ 2.47 or 35 × 2.47 A1 for 32.(3….) (hectares) or for 86.(4..)(acres) C1 for correct conclusion, eg “Farm B has the greater area”
14	(a)		13	1	B1 cao
	(b)		3	1	B1 cao
	(c)		36	2	M1 for intention to subtract 3 from both sides or to multiply all three terms by 4 A1 cao
15			Correct triangle	2	M1 for angle *P* drawn as 44 – 48° or PQ drawn as 6.8 to 7.2 cm A1 correct triangle
16	(a)		56.25	1	B1 for 56.25 or $\frac{225}{4}$
	(b)		3.2	1	B1 for 3.2 or $\frac{16}{5}$

<table>
<tr><th colspan="5">PAPER: 5MB3F/01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>17</td><td></td><td></td><td>Correct region shaded</td><td>3</td><td>M1 for a circle centre M or N (accept arc of sufficient length to define the region)
M1 for circle centre M radius 5 cm and circle centre N radius 3 cm (accept arc of sufficient length to define the region)
A1 for correct region shaded</td></tr>
<tr><td>*18</td><td></td><td></td><td>Decision (supported)</td><td>3</td><td>M1 for correct first step e.g. 15 ÷ 3
M1 for complete method
C1 ft for decision with accurate figures</td></tr>
<tr><td>19</td><td></td><td>
<table>
<tr><td>3</td><td>42</td></tr>
<tr><td>3.1</td><td>45.(291)</td></tr>
<tr><td>3.2</td><td>48.(768)</td></tr>
<tr><td>3.3</td><td>52.(437)</td></tr>
<tr><td>3.4</td><td>56.(304)</td></tr>
<tr><td>3.5</td><td>60.(375)</td></tr>
<tr><td>3.6</td><td>64.(656)</td></tr>
<tr><td>3.7</td><td>69.(153)</td></tr>
<tr><td>3.8</td><td>73.(872)</td></tr>
<tr><td>3.9</td><td>78.(819)</td></tr>
<tr><td>4</td><td>84</td></tr>
<tr><td>3.71</td><td>69.6(14811)</td></tr>
<tr><td>3.72</td><td>70.(078848)</td></tr>
<tr><td>3.73</td><td>70.5(45117)</td></tr>
<tr><td>3.74</td><td>71.(013624)</td></tr>
<tr><td>3.75</td><td>71.4(84375)</td></tr>
</table>
</td><td>3.7</td><td>4</td><td>B2 for a trial between 3 and 4 exclusive
(B1 for a trial at 3 or 4)
B1 for a different trial of $3.7 < x \leq 3.75$
B1 (dep on at least one previous B1) for 3.7

NB. Trials should be evaluated to at least 2 sf truncated or rounded for values of x correct to 1 decimal place. Trials should be evaluated to at least 1 dp truncated or rounded for values of x correct to 2dp.

NB No working scores 0 marks even if answer is correct</td></tr>
</table>

PAPER: 5MB3F/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
20			161.50	5	M2 for a correct method to decrease 6720 by 20%, eg 6720 × 0.8 (= 5376) or 6720 × 0.2 (= 1344 and 6720 – 1344(= 5376)) (M1 for a correct method to find 20% of 6720 eg 6720 × 0.2 or $\frac{20}{100}$ × 6720 (= 1344)) M1 for subtracting 1500 (= 3876) after a percentage calculation M1 "3876" ÷ 24 after the subtraction of 1500 A1 for 161.5(0)
*21			Conclusion (supported)	4	M1 for π × 120² (= 45 216 – 45 249) M1 for "π × 120²" ÷ 1800 A1 for 25.1 – 25.2 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for π × 120² (= 45 216 – 45 249) M1 for 20 × 1800 A1 for 36 000 and 45 216 – 45 249 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for π × 120² (= 45 216 – 45 249) M1 for "π × 120²" ÷ 20 A1 for 2260 – 2263 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for 1800 × 20 M1 for 36000 ÷ π (=11 457 – 11465) A1 for 107(.0…) C1 ft (dep on M2) for appropriate conclusion from their figures

PAPER: 5MB3F/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
22			22.5	4	M1 for $4(x - 8) = 2x + 13$ M1 for expansion of bracket or division of all terms by 4, eg $4x - 32 = 2x + 13$, or $x - 8 = \frac{2x}{4} + \frac{13}{4}$ M1 for isolating x and number terms eg $2x = 45$, $\frac{x}{2} = \frac{45}{4}$ A1 for $\frac{45}{2}$ or 22.5 OR M1 for $(180 - 64) \div 2$ (= 58) M1 for $4(x - 8)$ = "58" or $2x + 13$ = "58" or "58" – 13 (= 45) M1 for isolating x and number terms eg $4x = 90$, $2x = 45$ or "45" ÷ 2 A1 for $\frac{45}{2}$ or 22.5 OR M1 for $64 + 4(x - 8) + 2x + 13$ M1 for $64 + 4(x - 8) + 2x + 13 = 180$ M1 for isolating x and number terms eg $6x = 135$ A1 for $\frac{45}{2}$ or 22.5

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: ±5º
Measurements of length: ±5 mm

PAPER: 5MB3F_01			
Question		**Modification**	**Notes**
Q2		Diagram enlarged. Solid circles added at C, Y, S and H.	M1 for any route starting and ending at C going through H, S and Y. Condone missing last section back to C M1 for a valid route for which their total is shown A1 for 25.1 B1 ft for communicating their shortest route (must start and end at C and pass through S, H and Y).

PAPER: 5MB3F_01			
Question		**Modification**	**Notes**
Q3		Background grid removed. Shapes enlarged. Labels added above shapes. Shape D removed and last three shapes renamed. Grid enlarged. Shape F changed to shape E. Scale factor 3 changed to scale factor 2. Shape E put on the grid. Last 4 columns removed. Braille only: Question reversed. Shapes E and F given on diagram. Candidates asked to describe the transformation. Question changed: 'Look at the diagram for Question 3(c). The diagram shows shape E and shape F on a grid. Describe the single transformation that maps shape E on shape F.' Braille only - a set of cut out shapes is also available for this question. Shape E as original exam (was Shape F) Shape F x 2 scale factor enlargement given as (to match your MLP).	B1 cao B1 cao M1 for drawing at least one side correct length or a correct enlargement of scale factor other than 2 (excluding 1) A1 for fully correct enlargement
Q4	(a)	Wording added 'There are three boxes to fill.' under 'Complete the bill.' Outline of boxes made thicker. Answer lines removed from boxes.	B1 for 32 B1 for 12 B1 ft "32" for 88.92
Q5	(a)	Diagram enlarged.	B1 cao
Q5	(b)	Line kept the same size as in standard. Wording changed to 'On the diagram, draw a line parallel to the line given.' Braille only – Line made 10 cm long.	B1 for parallel line drawn.

PAPER: 5MB3F_01			
Question		**Modification**	**Notes**
Q6	(a)	Grid enlarged. Mirror line label repeated below. Mirror line extended at the top and bottom. Wording for V version added 'A cut out shape is available for you to use.' Shading changed to dotty shading.	B1 cao
Q6	(b)	Grid enlarged. Shading changed to dotty shading. Image labelled 'triangle A'. Rotation shown on the grid labelled 'triangle B'. Wording changed to 'It shows triangle A and triangle B on a grid.' Question changed: Image labelled triangle A, rotation shown on the grid labelled triangle B. Wording changed: 'Describe fully the single transformation that maps triangle A onto triangle B. Three answer lines given. Wording for V version added 'A cut out shape is available for you to use.'	M1 for 90° rotation or quarter turn. A1 clockwise about *O*
Q6	(c)	Grid enlarged. Shading changed to dotty shading. Top and bottom rows removed from the grid. Wording changed to 'You should draw at least 5 shapes. A cut out shape is provided for you to use if you wish.'	B2 for at least 6 correct shapes, including initial shape, correctly tessellating and no incorrectly drawn tiles or gaps. (B1 for at least 4 correct shapes, including initial shape, correctly tessellating; ignore any additional sections attempted, gaps or incorrect shapes)
Q10		North line extended. Frame removed. Crosses changed to filled in circles. Scale moved above and to the left of the diagram. Dashed line joins Skelton to Catterlen. Wording removed 'with a cross (x)'.	B1 for 8.5 – 9.5 M1 for correct angle used or 70 or 290 A1 for 105 – 115 B1 for a possible correct position

PAPER: 5MB3F_01			
Question		**Modification**	**Notes**
Q12		Grid enlarged. The horizontal axis is 1.5 cm for 1 and the vertical 1.5 cm for 10. [Leeway needed for answering the question.]	B1 for 82 - 88 M1 for reading off graph at 80°, 70° or 60° with at least one reading in the intervals, 0.5 – 0.7, 2.4 – 2.7, 4.8 – 5.2 M1 for correct method to find one time interval A1 for 0.3 – 0.7
Q15		Diagram enlarged. PR line kept the same size and standard and put below first diagram. Angle QPR changed to 45^{o}. Crosses changed to filled in circles. Braille only – measurements given in the text.	M1 for angle P drawn as 40 – 50° or PQ drawn as 6.5 to 7.5 cm A1 correct triangle
Q17		Diagram kept the same size as original. Scale moved above the diagram and also put in the question paper.	B1 for circle centre M radius 5 cm B1 for circle centre N radius 3 cm B1 for correct region shaded

PAPER: 5MB3F_01			
Question		**Modification**	**Notes**
Q21		Diagram enlarged. Cross changed to filled in circles. Arrow heads removed.	M1 for $\pi \times 120^2$ (= 45238….) M1 for "$\pi \times 120^2$" ÷ 1800 A1 for 25.0 – 25.2 C1 for "surface is large enough as 25 > 20" oe OR M1 for $\pi \times 120^2$ (= 45238….) M1 for 20 × 1800 A1 for 36000 C1 for "surface is large enough as 36000 < 45238..." oe OR M1 for $\pi \times r^2 = 1800 \times 20$ M1 for 36000 ÷ π (=11459..) A1 for 107.0… C1 for "surface is large enough as 107…< 120" oe

Q22		Diagram enlarged. MLP only – x changed to y. Braille only – measurements given in the text.	M1 for $4(y - 8) = 2y + 13$ M1 for expansion of bracket or division of all terms by 4, eg $4y - 32 = 2y + 13$, $y - 8 = \frac{2y}{4} + \frac{13}{4}$ M1 for isolating x and number terms eg $2y = 45$, $\frac{y}{2} = \frac{45}{4}$ A1 for $\frac{45}{2}$ or 22.5 OR M1 for $(180 - 64) \div 2$ (= 58) M1 for $4(y - 8) = 58$ or $2y + 13 = 58$ M1 for isolating y and number terms eg $4y = 90$, $2y = 45$ A1 for $\frac{45}{2}$ or 22.5 OR M1 for $64 + 4(y - 8) + 2y + 13$ M1 for $64 + 4(y - 8) + 2y + 13 = 180$ M1 for isolating x and number terms eg $6y = 135$ A1 for $\frac{45}{2}$ or 22.5

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