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Mark Scheme (Results)

November 2011

Modular Mathematics (GCSE)
Unit 2: 5MB2H_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. 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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 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.

12 Parts of questions

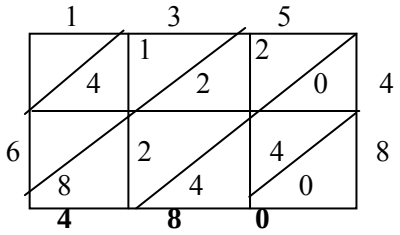
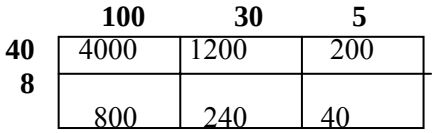
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

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

<table>
<tr><th colspan="6">5MB2H_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>1</td><td></td><td>$\frac{1}{5} + \frac{3}{7} = \frac{7}{35} + \frac{15}{35}$
Or
<table><tr><td></td><td>3</td><td>7</td></tr><tr><td>1</td><td></td><td>7</td></tr><tr><td>5</td><td>15</td><td>35</td></tr></table>Or
0.2+0.42(857…)</td><td>$\frac{22}{35}$ oe</td><td>2</td><td>M1 for attempt to put over a common denominator with at least one fraction correctly done ie $\frac{7}{35}$ oe or $\frac{15}{35}$ oe
Or
M1 for table structure shown with all cells correct
Or
M1 attempt to use decimals, must use at least 2 decimal places for $\frac{3}{7}$
A1 $\frac{22}{35}$ oe</td></tr>
<tr><td>2</td><td>(a)</td><td></td><td>20 fg</td><td>1</td><td>B1 in any acceptable order</td></tr>
<tr><td></td><td>(b)</td><td>$9a + 3(8 - 2a)$
$= 9a + 24 - 6a$</td><td>$3a + 24$</td><td>2</td><td>M1 for 3×8 and $\pm 3 \times 2a$ oe within at most 4 terms seen
A1 cao</td></tr>
<tr><td></td><td>(c)</td><td></td><td>c^8</td><td>1</td><td>B1 cao</td></tr>
<tr><td></td><td>(d)</td><td></td><td>x^{15}</td><td>1</td><td>B1 cao</td></tr>
<tr><td></td><td>(e)</td><td></td><td>$7(y + 3)$</td><td>1</td><td>B1 cao</td></tr>
</table>

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3		135 48 1080 5400 6480 Or  Or  4000 + 1200 + 200 + 800 + 240 + 40 = 6480 Or 48x1=48 48x0.30=14.4(0) 48x.05=2.4(0) Or 48x1=48 48x0.35=16.8(0)	55.08	6	M1 for a complete method with relative place value correct Condone 1 multiplication error, addition not necessary. Or M1 for a complete grid. Condone 1 multiplication error, addition not necessary. Or M1 for sight of a complete partitioning method. Condone 1 multiplication error, addition not necessary. Or M1 for sight of a complete partitioning method which partitions the money only and uses consistent units Condone 1 multiplication error, addition not necessary. A1 (dep on M1) for digits 648 seen M1 for 15 ÷ 100 × '64.8' oe eg 10% = 6.48 5% = 3.24 (done in pence or £) (= £9.72 oe) M1 for '64.8' – 15 ÷ 100 × '64.8' oe (done in pence or £) (or M2 for 85 ÷ 100 × '64.8' oe (done in pence or £)) A1 for digits 5508 seen A1 cao

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
		11475 48 91800 459000 550800 **1 1 4 7 5** **4** 4 4 1 6 2 8 2 0 **8** 8 8 3 2 5 6 4 0 5 5 0 8 0 0 10000 1000 400 70 5 40 400000 40000 16000 2800 200 8 80000 8000 3200 560 40 480000 48000 19200 3360 240 480000+48000+19200+3360+240= 550800			OR M1 for $15 \div 100 \times 135$ oe eg 10% = 13.5 5% = 6.75 (done in pence or £) (= 20.25p oe) M1 for $135 - '15 \div 100 \times 135'$ oe (done in pence or £) (or M2 for $85 \div 100 \times 135$ oe (done in pence or £)) A1 for digits 11475 seen M1 for a complete method with relative place value correct Condone 1 multiplication error, addition not necessary. Or M1 for a complete grid. Condone 1 multiplication error, addition not necessary. Or M1 for sight of a complete partitioning method. Condone 1 multiplication error, addition not necessary. Or M1 for sight of a complete partitioning method which partitions the money only and uses consistent units Condone 1 multiplication error, addition not necessary. A1 digits 5508 seen A1 cao

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4		Big area = 144 Small area = 64 Area frame = 144 – 64 = 80 80 ÷ 4 Or Area one piece is a trapezium ½ (12+8) × (12– 8)÷2 ½ × 20 × 2 = 20 Or Area of rectangle and 2 triangles 8 × 2 + 2× (½ × 2 × 2) 16 + 4 Or Area of rectangle – 2 triangles 12×2-2× (½ × 2 × 2) 24-4	20	4	M1 for 12 × 12 or 8 × 8 or 144 seen or 64 seen as areas M1 for 12 × 12 – 8 × 8 or '144' – '64' or 80 seen as areas M1 for (12 × 12 – 8 × 8) ÷ 4 or '(144 – 64)' ÷ 4 or '80' ÷ 4 seen as areas A1 for 20 cao Or M1 for 12 – 8 or 4 seen as difference in lengths M1 for height of trapezium = (12 – 8) ÷ 2 or '4' ÷ 2 or 2 M1 for area trapezium = ½ (12 + 8) × '2' oe A1 for 20 cao Or M1 for ½ × (12 – 8) or 2 for width of frame M1 for 8 × 2 = 16 for rectangle M1 for 2× (½ × 2 × 2) or 4 for 2 triangles A1 for 20 cao Or M1 for ½ × (12 – 8) or 2 for width of frame M1 for 12 × 2 = 24 for rectangle M1 for 2× (½ × 2 × 2) or 4 for 2 triangles A1 for 20 cao NB Marks can be awarded for correct measurements indicated on the diagram Note If 80 is seen on the answer line following a correct calculation of one piece of card, full marks can be earned.

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		64	1	B1 cao
	(b)		$6n + 4$	2	B2 for $6n + 4$ (oe, including unsimplified) (B1 for $6n + k$, $k \neq 4$ or k is absent, $n=6n+4$)
6		$96 \div 2^2$ $= 96 \div 4$ $= 24$	No + calculations	3	M1 for $96 \div 2^2$ oe A1 for 24 C1 dep on M1 for "No" with a calculation to support their conclusion SC C1 96÷2 and correct conclusion from '96÷2' NB 24 with no working and No gets no marks
7		½ (4 x 3) x 7 = 6 x 7	42 cm^3	4	M2 for ½ × 4 × 3×7 oe (M1 for ½ (4 × 3) or 4 × 3 × 7 or 6 seen as an area or 7× 'cross sectional area' or 84 seen) A1 for 42 B1 (indep) for cm^3

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8	(a)		3.5, 4.5, 5	2	B2 for 3.5, 4.5, 5 oe (B1 for 1 correct)
	(b)		Single line from (–2, 3) to (2, 5)	2	B2 cao for correct single line between $x = –2$ and $x = 2$ (B1 ft for plotting at least 4 points correctly or for a line with gradient ½ or for a single straight line passing through (0, 4))
	(c)(i)	(1, 2) to (0, 4)	Correct line	3	B1 ft for a perpendicular line through (0, 4) for at least x= -1 to x=1
	(ii)		$y = –2x + 4$		B2 correct answer or f.t. correct equation for their line (B1 $y = -2x + k$ or $-2x+4$ or ft correct expression for their line with no y=)

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		Lisa = 4½ miles in 30 min = 9 mph Martin = 16 × 5 ÷ 8 = 10 mph Or Lisa = 9 × 8 ÷ 5 = 14.4 km/h Martin = 16 km/h Or For 5miles Lisa took 33 minutes 10 miles is 66 minutes Martin = 16 × 5 ÷ 8 = 10 miles in 1 hour Or Martin 16 km/h = 10 mph = 5 miles in 30 minutes Draw travel graph for Martin Martin's graph steeper (or Lisa = 4.5 miles in 30 minutes)	Martin faster + calculation or graph	4	M1 for Lisa's speed or distance × 8 ÷ 5 or Martin's 16 × 5 ÷ 8 A1 for one correct conversion from metric to imperial or imperial to metric for their speed or distance (units should be seen) M1 for using the same time period or same distance C1 (dep on M2) concluding statement + both answers correct with units OR M1 for plotting (30, 5) on the graph A1 for a correct line to show Martin's speed M1 for converting 16 km/h to 10 mph oe C1(dep on M2) for concluding statement fully supported by working ie Martin is faster because his graph is steeper oe
10		66 ÷ 2 = 33 ± (6 ÷2) $P = 30$ and $T = 36$ Ages = 30 : 36 = 5 : 6 770÷11=70 each part 5 × 70 = £350 6 × 70 = £420	350 420	5	M1 66 ÷ 2 = 33 ± (6 ÷2) or (66-6)÷2 or for at least 3 trials with a total of 66 or a difference of 6 or for $x + x + 6 = 66$ or $x + x - 6 = 66$ oe A1 for 30 and 36 seen or 5 and 6 oe M1 for 770 ÷ '11' or 770 ÷ 66 M1 for '770÷66'×'30', where '30' is a ft from their previous answer or '770÷66'×'36', where '36' is a ft from their previous answer or '770÷11'×5 or '770÷11'×6 oe A1 for $P = 350$ and $T = 420$

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		6.08×10^7	1	B1 cao
	(b)		0.00017	1	B1 cao
12	(a)		$(e + 10)$ $(e - 10)$	1	B1 cao
	(b)		$(x - 5)$ $(2x + 3)$	2	M1 for $(2x \pm 3)(x \pm 5)$ A1 cao
	(c)		$(g - 7)^6$	1	B1 cao
13		$\frac{3}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}}$	$\frac{3\sqrt{7}}{7}$	2	M1 for $\times \frac{\sqrt{7}}{\sqrt{7}}$ A1 cao
14		Angle *ORT* = 90° Angle between the tangent and the radius is 90° Angle *AST* = 90° Corresponding angles with angle *ORT* as *AS* is parallel to *OR*	Proof	3	B1 for angle *ORT* (or angle *ORS*) = 90° C1 for angle between the tangent and the radius is 90°/right angle C1 for angle *AST* = 90° and angle *AST* = angle *ORT* because corresponding angles are equal oe or for angle *ASR*= 90° because of allied /co-interior angles, so angle *AST* = 90° because angles on a straight line add up to 180°

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)	$(x + 2)(x + 1) + x(2x + 2)$ $= x^2 + 3x + 2 + 2x^2 + 2x$ Or $(x + 2)(x + 1) + x[2x + 2 – (x + 2)] + (x + 2)(x)$ $= x^2 + x + 2x + 2 + x^2 + x^2 + 2x$ Or $(2x + 2)(x + x + 1) – (x + 1)[2x + 2 – (x + 2)]$ $= (2x + 2)(2x + 1) –(x + 1)x$ $= 4x^2+6x+2-x^2-x$ Or $(x+2)(2x+1) + xx = 2x^2+x+4x+2+x^2$	$3x^2 + 5x + 2$	4	M1 for area of 1 rectangle Eg $(x + 2) \times (x + 1)$ oe or $x \times (2x + 2)$ oe or $(2x+2)(x+x+1)$ oe or $x\times(x+1)$ oe or $(x+2)(2x+1)$oe or xx oe A1 for correct simplification of this area Eg $x^2 + x + 2x + 2$ (or better) or $2x^2 + 2x$ (or better) or $4x^2+4x+2x+2$ (or better) or $x^2 + x$ (or better) or $2x^2+x+4x+2$ (or better) or x^2 M1 (dep on M1) for a complete method to find the area using at least two quadratic expressions Eg '$(x + 2)(x + 1)$' + '$x(2x + 2)$' A1 cao for $3x^2 + 5x + 2$
	(b)	$3x^2 + 5x + 2$ $= (3x + 2)(x + 1)$		1	B1 cao $(x + 1)$

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