

Mark Scheme (Results)

June 2011

Modular Mathematics (GCSE)
Unit 1: 5MB1H_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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 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.

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

5MB1H_01																											
Question	Working				Answer	Mark	Notes																				
1 (i)	<table border="1"> <thead> <tr> <th></th> <th>Y 4</th> <th>Y 5</th> <th>Y 6</th> <th>To t</th> </tr> </thead> <tbody> <tr> <td>S</td> <td></td> <td>21</td> <td>18</td> <td></td> </tr> <tr> <td>N S</td> <td>11</td> <td></td> <td></td> <td>37</td> </tr> <tr> <td>To t</td> <td></td> <td></td> <td>30</td> <td>96</td> </tr> </tbody> </table> <p>OR $96 - 37 = 59$ children can swim $18 + 21 = 39$ children in Y5 or Y6 can swim $59 - 39$</p>					Y 4	Y 5	Y 6	To t	S		21	18		N S	11			37	To t			30	96	20	4	<p>M1 for including 4 of the 6 pieces of information given in a clearly labeled two-way table A1 for 20 or 20 out of 96 or 20/96</p> <p>OR M1 for a correct method that leads to the number of children in year 4 that can swim eg $96 - 37 (= 59)$ children can swim $18 + 21 = (39)$ children in Y5 or Y6 can swim '59' - '39' A1 for 20 or 20 out of 96 or 20/96</p>
	Y 4	Y 5	Y 6	To t																							
S		21	18																								
N S	11			37																							
To t			30	96																							
(ii)	<table border="1"> <thead> <tr> <th></th> <th>Y 4</th> <th>Y 5</th> <th>Y 6</th> <th>To t</th> </tr> </thead> <tbody> <tr> <td>S</td> <td>20</td> <td>21</td> <td>18</td> <td>59</td> </tr> <tr> <td>N S</td> <td>11</td> <td>14</td> <td>12</td> <td>37</td> </tr> <tr> <td>To t</td> <td>31</td> <td>35</td> <td>30</td> <td>96</td> </tr> </tbody> </table> <p>OR $20 + 11 = 31$ children in Y4 $30 + 31 = 61$ children in Y4 or Y6 $96 - 61$</p>					Y 4	Y 5	Y 6	To t	S	20	21	18	59	N S	11	14	12	37	To t	31	35	30	96	35		<p>M1 for one correct calculation leading to a 'new', piece of information in a clearly labeled two-way table A1 for 35 or 35 out of 96 or $\frac{35}{96}$</p> <p>OR M1 for a correct method that leads to the total number of children in year 5 eg '20' + 11 (= 31) children in Y4 $30 + '31' (= 61)$ children in Y4 or Y6 $96 - '61'$ children in Y5 A1 for 35 or 35 out of 96 or $\frac{35}{96}$ SC If M1 not earned then award B1 if $\text{ans(ii)} = 55 - \text{ans (i)}$</p>
	Y 4	Y 5	Y 6	To t																							
S	20	21	18	59																							
N S	11	14	12	37																							
To t	31	35	30	96																							

5MB1H_01				
Question	Working	Answer	Mark	Notes
2 (a)	See scatter graph	(12,14) and(17,20) plotted	1	B1 for correct plotting of both points
(b)			1	B1 Positive (accept a correct relationship)
(c)		16 to 18	2	B2 16 – 18 (M1 for a single line segment from $m=11$ to $m = 16$ within overlay or a vertical line drawn from $m = 15$ A1 for an answer in the range 16-18 or ft their line of best fit $\pm 2\text{mm}$)

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Question	Working	Answer	Mark	Notes
3 (a)	$\frac{15}{100} \times 2400 = 360$ $2400 - 360 = 2040$ $2040 \div (1 + 2 + 5) = 255$ $255 \times 1, 255 \times 2, 255 \times 5$	Cement = 255 Sand = 510 Stone = 1275	4	M1 for $\frac{15}{100} \times 2400$ or $\frac{85}{100} \times 2400$ M1 for '2040' $\div (1 + 2 + 5)$ M1 (dep on previous M1) for '255' $\times 1$ or '255' $\times 2$ or '255' $\times 5$ either explicitly or with answer(s) on the answer line. A1 for all 3 correct masses
(b)*	$255 \times 30 - 6500 = 1150 \text{ so not enough}$ <p>OR</p> $6500 \div 255 = 25.5 \text{ m}^3 \text{ worth of cement}$ <p>Which is less than 30 so not enough</p> <p>OR</p> <p>6.5 tonnes of concrete gives $6.5 \times 8 = 52$ tonnes of dry mixture 30 m³ of concrete requires $30 \times 2400 \times 0.85$ kg of dry mixture = 61200kg of dry mixture (=61.2 tonnes)</p>	No, with justification	3	B1 for a correct conversion between kg and tonnes e.g. 6.5 tonnes = 6500 kg (but not 1 tonne = 1000 kg) M1 for '255' $\times 30$ C1(dep on M1) for an answer of No (Yes), supported by (ft) calculations. OR B1 for a correct conversion between kg and tonnes e.g. 6.5 tonnes = 6500 kg (but not 1 tonne = 1000 kg) M1 for $6500 \div '255'$ C1(dep on M1) for an answer of No (Yes), supported by (ft) calculations OR M1 for 6.5×8 and $30 \times 2400 \times 0.85$ B1 for a correct between kg and tonnes e.g. 61200 kg = 61.2 kg (but not 1 tonne = 1000 kg) C1 (dep on M1) for an answer of No (Yes), supported by (ft) calculations.

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Question	Working	Answer	Mark	Notes
4 (a)		$ \begin{array}{l l} 14 & 8 \\ 15 & 2 \ 4 \\ 16 & 0 \ 2 \ 4 \ 4 \ 8 \\ 17 & 0 \ 3 \ 4 \ 9 \\ \hline 14 & 8 = 148 \text{ cm} \end{array} $	3	B2 for a fully correct ordered diagram (B1 for correct unordered diagram or ordered with at most two errors) B1 for a correct key eg $14 \mid 8 = 148 \text{ cm}$ (cm not required)
(b) *	Boy's Median = 170 Girl's Media = 164 Boy's Mean = $170(.38)$ Girl's Mean = 164 Boy's Range = 27 Girl's Range = 31 Boy's IQR = 14 Girl's IQR = $14.5 - 15.25$ $ \begin{array}{l l} 15 & 7 \ 9 \\ 16 & 2 \ 6 \ 8 \ 9 \\ 17 & 0 \ 3 \ 4 \ 6 \ 6 \\ 18 & 1 \ 4 \end{array} $	Compares: medians/means + Range + Spread	3	A maximum 2B marks from: B1 for a correct mean or median for either the boys or the girls. B1 for a correct measure of spread for either the boys or the girls. B1 for a correct stem and leaf diagram drawn for the boys (no need for a key) C1 for any correct comparison based on 2 medians(ft) or 2 means(ft) or 2 ranges(ft) or 2 IQRs (ft) or a correct statement following from comparing the correct stem and leaf diagrams. This comparison must be a general statement which compares the boys' heights with the girls' heights.
5 (a)	$1 - 0.3 - 0.1 - x$	$0.6 - x$	2	M1 for $0.3 + 0.1 + x + P(2) = 1$ oe A1 $0.6 - x$ or $\frac{6}{10} - x$ or $1 - (0.4 + x)$ or $1 - 0.3 - 0.1 - x$
(b)	$0.3 + 0.1$	0.4	1	B1 cao
(c)		$300x$	1	B1 for $300x, x \times 300$ oe

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Question	Working	Answer	Mark	Notes
6 (a)		Overlapping response boxes Leading/biased question Age too personal Missing units	2	B2 for any two of: overlapping response boxes, too personal to ask person's age, a leading or biased question, no units (B1 – just one of the above).
(b)		How many pieces of fruit do you eat each day? 0 to2, 3 to 4, over 4	2	B1 for a sensible question including a time period B1 for at least 3 response boxes. Any pairs of response boxes must not overlap
(c)	$\frac{73}{536 + 384 + 48 + 73} \times 100$	7	2	M1 for $\frac{73}{536+384+48+73} \times 100$ Or $100 \div \left\langle \frac{536+384+48+73}{73} \right\rangle$ Or 7.01... A1 for 7
7	1200×1.035^3 Or $1200 \times 1.035 = 1242$ $1242 \times 1.035 = 1285.47$ $1285.47 \times 1.035 = 1330.46$	1330.46	3	M2 for 1200×1.035^3 A1 1330.46 – 1330.47 Or M1 1200×1.035 M1(dep) for '1242' $\times 1.035$ and '1285.47' $\times 1.035$ A1 1330.46 – 1330.47 [SC: B1 for 42 or 84 or 126 or 1242 or 1284 or 1326 seen, if M0 scored]

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Question	Working	Answer	Mark	Notes
8 (a)		$25 \leq t < 30$	1	B1 for the interval $25 \leq t < 30$ described unambiguously
(b)	$12.5 \times 6 + 17.5 \times 4 + 22.5 \times 24 + 27.5 \times 44 + 32.5 \times 10 + 37.5 \times 4$ $= 75 + 70 + 540 + 1210 + 325 + 150$ $= 2370$ $2370 \div 92$	25.8	4	M1 for finding at least 4 products fx consistently within interval (including end points) M1 (dep) for use of at least 4 correct midpoints M1 (dep on first M) for $\frac{\sum fx}{\sum f}$ A1 25.76 – 25.8
(c)	Cf table: 6, 10, 34, 78, 88, 92 Cf graph	Correct CF graph	3	B1 Correct cumulative frequencies (may be implied by correct heights on the grid) M1 for at least 5 of "6 points" plotted consistently within each interval A1 for a fully correct cf graph.
(d)	Median at the $(92+1) \div 2 = 46.5$ day temp IQR = UQ – LQ = 69.75 th day temp – 23.25 th day temp	Median = 25.4 IQR = 6.7	3	B1 for a median in the range 24.5–26.5 or B1 ft read off at CF = 46(.5) from a CF graph tol $\frac{1}{2}$ square M1 for reading off temps at CF= 69 or 69.75 (± 0.5) and 23 or 23.25(± 0.5) from a CF graph and subtracting A1 ft

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9	Gradient = $\frac{68-32}{20}$	$m = 1.8, k = 32$	3	M1 for attempting to find the gradient of the line eg from height \div base of a triangle with the line as hypotenuse A1 for $m = 1.7 - 1.9$ B1 for $k = 31 - 33$	
10	(a)	0.8 0.6 0.2 0.4 0.5 0.5	2	B2 for all 6 correct probabilities (B1 for two correct probabilities)	
	(b)	0.6×0.8	0.48	2	M1 for '0.6' \times '0.8' ft probability tree diagram A1 cao
	(c)	$1 - (0.4 \times 0.5)$ $1 - 0.2$ OR $0.6 \times 0.8 + 0.6 \times 0.2 + 0.4 \times 0.5$	0.8	3	M2 for $1 - '0.4' \times '0.5'$ ft probability tree diagram A1 cao OR M2 for ' $0.6' \times '0.8' + '0.6' \times '0.2' + '0.4' \times '0.5'$ ' (M1 for any two of ' $0.6' \times '0.8'$ ', ' $0.6' \times '0.2'$ ', ' $0.4' \times '0.5'$ ' added) A1 cao

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11 (a)		Histogram Fd axis labelled say 0 to 8 5 – 10, fd = 1.6 10 – 12, fd = 7.5 12 – 16, fd = 6 16 – 20, fd = 4 20 – 25, fd = 2	3	M1 for fd axis labeled and 1 correct block or for one correct division eg $8 \div 5$ or 1.6 A1 for at least 2 additional correct blocks or 2 additional frequency densities calculated A1 for completely correct histogram SC B2 for a fully correct but unlabeled histogram OR M1 for area key and 1 correct block A1 for at least 2 additional correct blocks A1 for completely correct histogram SC B2 for a fully correct but unlabeled histogram
(b)		32	2	M1 for $6 \times 1 + 16 + 10$ A1 cao

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