

Mark Scheme (Results)

November 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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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	(a)	$1-(0.4+0.25+0.15)$ $1-0.8$	0.2	2	M1 for $1 - "(0.4+0.25+0.15)"$ or $1 - 0.8$ or sight of 0.92 A1 for 0.2 oe
	(b)	0.4×60	24	2	M1 for 0.4×60 A1 for 24 or '24 out of 60' SC B1 for $\frac{24}{60}$ or 24 in 60
2		$60 \div 12 = 5$ $2 \times 5 = 10; 3 \times 5 = 15; 7 \times 5 = 35$	10 15 35	3	M1 for $60 \div (2+3+7)$ or $\times 5$ or multiple build-up (at least 3 correct) eg 2:3:7, 4:6:14, 6:9:21, 8:12:28 M1 for $60 \div (2+3+7) \times 2$ or $60 \div (2+3+7) \times 3$ or $60 \div (2+3+7) \times 7$ or sight of the numbers 10,15,35 together or 2×5 or 3×5 or 7×5 A1 cao SC B1 2 correct numbers out of 3 in a ratio
3		$(x + x + 3 + 2x) \div 3$	$\frac{x + x + 3 + 2x}{3}$ oe	2	M1 $x + x + 3 + 2x (=4x+3)$ oe or $4x+3 \div 3$ oe A1 $\frac{x + x + 3 + 2x}{3}$ oe

5MB1H_01					
Question		Working	Answer	Mark	Notes
4	(a)		Reasons	2	1 st aspect: no time frame 2 nd aspect: overlapping boxes 3 rd aspect: not exhaustive ie no <1, no “other”, no >20 B2 for two aspects (B1 for one aspect)
	(b)		Question and responses	2	1 st aspect: question including time frame (or question and time frame in response boxes) 2 nd aspect: at least 3 non overlapping response boxes, with discrete values or a range; need not be inclusive of all OR a set of at least 3 boxes which are exhaustive (but which may over lap) B2 for two different aspects (B1 for one aspect)
5	(a)		Points plotted	1	B1 points plotted (180,72) and (170,65) ±2mm
	(b)		Positive	1	B1 positive (correlation) cao
	(c)		Line of best fit	1	B1 straight line passing between (140,40)(140,55) and between (185,60)(185,75) with a positive gradient
	(d)		52-60	1	B1 within the range 52-60 or ft a single straight line segment with positive gradient.

5MB1H_01				
Question	Working	Answer	Mark	Notes
6	(a)	comparative figures and conclusion	4	<p>M1 $3.95 \div 15 (=0.263\dots)$ small M1 $6.15 \div 22 (=0.279\dots)$ large A1 for 0.26(3..) and 0.27(9...) or 26p and 28p or 26p and 27p C1 (dep on a previous M mark) for 'small box' using two comparative figures OR M1 $15 \div 3.95 (=3.797\dots)$ small M1 $22 \div 6.15 (=3.577\dots)$ large A1 for 3.7(97..) and 3.5(77...) ie rounded or truncated to 1 or more decimal places C1 (dep on a previous M mark) for 'small box' using two comparative figures OR M2 $3.95 \times 22 \div 15 (=5.793\dots)$ or $6.15 \times 15 \div 22 (=4.193\dots)$ A1 for 5.79... or 4.19... C1 (dep on a previous M mark) for 'small box' OR M1 $3.95 \times 22 (=86.90)$ small M1 $6.15 \times 15 (=92.25)$ large A1 for 86.9(0) and 92.25 C1 (dep on a previous M mark) for 'small box' using two comparative figures OR M1 3.95×3 small M1 6.15×2 large A1 11.85 and 12.3(0) C1 (dep on a previous M mark) for 'small box' using two comparative figures OR M1 $3.95 \div 15 (=0.263\dots)$ M1 $3.95 + '0.263\dots' \times 7$ A1 for 5.79... C1 (dep on a previous M mark) for 'small box'</p>

5MB1H_01				
Question	Working	Answer	Mark	Notes
	(b)(i) (ii)	356.5 357.5	2	B1 for 356.5 B1 for 357.5 or 357.49 or 357.49... or 357.49 recurring or 357.499
7	(a) eg 60/30 = (b) 40÷30=1.3(3.....) (c)	2 Train A and explanation 15	2 1 1	M1 for method shown to work out the gradient for train A eg right-angled triangle drawn, 60÷30, etc. A1 cao Ignore units. SC B1 $y=2x+k$ B1 Train A and slope is greater oe or accept a calculated speed, or distances for consistent time period or times for consistent distance B1 cao
8	(a) (b) $\frac{6}{20}$ or 0.3 (c)	11 13 9 10 12 13 15 10 11 13 14 16 $\frac{6}{20}$ £21 with supporting calculations	1 2 4	B1 table completed correctly M1 ft for $\frac{a}{20}$ ($a \neq 6$) and $a < 20$ or $\frac{6}{b}$ ($b \neq 20$) and $b > 6$ A1 ft for $\frac{6}{20}$ oe M2 for $\frac{2}{20} \times 60 \times (1.50 \text{ or } 150)$ oe (M1 for $\frac{2}{20} \times 60$ oe or $\frac{2}{20} \times 1.50$ oe or $\frac{2}{20} \times 150$ oe or 60×150 or 60×1.50 or sight of any of numbers (6, 15, 0.15, 9000, 90) M1 (income) $60 \times 0.5 (=30)$ or $60 \times 50 (=3000)$

5MB1H_01				
Question	Working	Answer	Mark	Notes
				A1 (Dep on at least 2 previous method marks) 21 cao
9	(a)	4, 22, 46, 86, 110, 120	1	B1 for all correct
	(b)	cf graph	2	B1 for 5 or 6 of their points correctly plotted ($\pm 2\text{mm}$) B1 for their points joined by a curve or line segments provided no gradient is negative SC B1 if 5 or 6 points plotted not at the end but consistent within each interval and joined by a curve or line segments provided no gradient is negative
	(c)	50	2	M1 clear method to read off from cf graph at 36 miles. Can be awarded from their reading $\pm 2\text{mm}$ OR $24 + 10 + \frac{4}{10} \times 40$ OR $120 - (\frac{6}{10} \times 40 + 46)$ A1 ft or answer in the range 48 to 52 (SC B1 for answer in range 68-72 if M0 scored)

5MB1H_01					
Question		Working	Answer	Mark	Notes
10	(a)	Lowest = 16 LQ = 20 Median = 28 UQ = 42 Highest = 50	Box plot drawn	3	B3 for fully correct box plot (B2 for at least 3 correctly plotted values including box and whiskers/ tails) (B1 for at least 2 correctly plotted values including box or whiskers/tails or 5 correct values plotted and no box or whiskers/tails)
	(b)			2	C2 ft for two relevant comparisons one for median/average and one for IQR or range (C1ft for one relevant comparison) ie IQR or range or use of median for comparison
11		$59 / 300 \times 50$ or $59 / 6$ or $2950 / 300$ or $9.8(3\dots)$	10	2	M1 for $59 \div 300 \times 50$ or $59 \div 6$ or $2950 \div 300$ or $9.8(3\dots)$ A1 cao

5MB1H_01				
Question	Working	Answer	Mark	Notes
12	(a)	(20), (30), 45, 60, (48)	2	M1 for frequency = $fd \times \text{column width}$, can be implied by 1 frequency correct OR fd correctly marked on vertical axis $2\text{cm}=1\text{unit}$ OR identifying 1 cm^2 as frequency of 5oe A1 45 and 60 both correct
	(b)	histogram bars	2	B2 for 2 correct histogram bars; heights at 6cm and 2.4cm (B1 1 correct bar)
	(c)	41 – 43	2	Area method: M1 ft for calculation of total area and division by 2 (eg $40.6 \div 2$ or 20.3) A1ft answer 41–43 OR Proportionality method: M1 ft for $203 \div 2 = 101.5$ and $6.5 \div 60 \times 20 = 2.16$ or $204 \div 2 = 102$ and $7 \div 60 \times 20 = 2.33\dots$ A1 ft answer 41–43
				Area method: Total area 40.6 cm^2 For median: $\div 2 = 20.3$ 0 to 40 is 19 cm^2 median lies 41–43 OR Proportionality method: Total $203 \div 2 = 101.5$; 0 to 40 is 95 40–60: $6.5 \div 60 \times 20 = 2.16$ Median is $40 + 2.16 = 42.16$ OR $204 \div 2 = 102$; 0 to 40 is 95 40–60: $7 \div 60 \times 20 = 2.3\dots$ Median is $40 + 2.33 = 42.33$

5MB1H_01				
Question	Working	Answer	Mark	Notes
13	(a)	$\frac{3}{7}, \frac{4}{7}, \frac{3}{7}, \frac{4}{7}, \frac{3}{7}$	2	B2 Fully correct tree (B1 $\frac{3}{7}$ on first branch)
	(b)	$\frac{3}{7} \times \frac{3}{7}$	2	M1 ft for $\frac{3}{7} \times \frac{3}{7}$ provided $0 < \frac{3}{7} < 1$ A1 ft for ' $\frac{9}{49}$ ' oe
14		$15 \div 70 = 120 \div n$ $120 \times 4.66(\dots)$ OR $\frac{120 \times 70}{15}$ OR 8×70 OR $\frac{15}{70} \times \left(\frac{8}{n}\right) = \frac{120}{n}$ OR $120 \div 21.4 \times 100$	4	M2 $\frac{120 \times 70}{15}$ or $120 \times 4.66\dots$ or 8×70 or $\frac{15}{70} \times \left(\frac{8}{n}\right) = \frac{120}{n}$ oe or $120 \div 21.4 \times 100$ (M1 for $\frac{15}{70}$ oe or 21.4% seen or $120 \div 15 (= 8)$ or $\frac{15}{120} (= \frac{1}{8})$ or 4.66(...) seen) A1 560 cao C1 for a correct mathematical assumption eg population hasn't changed overnight or sample is random, etc.

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