Mark Scheme (Results)

November 2012

GCSE Mathematics (2MB01) Higher
5MB1H (Calculator) Paper 01

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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 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.

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

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Question		Working	Answer	Mark	Notes

1			18 9 9
			19 0 3 5 8
			20 0 5 6 7 7
			21 1 2 8
			22 3
			
			Key
				3	B2 for a correct ordered diagram
					  (B1 for an unordered diagram with at most1 error or omission
					   OR for an ordered diagram with 1 or 2 errors or omissions
					   Note: 1 error can look like 2 in the diagram when 1 value
					     is misplaced
					
					B1 (indep) for a correct key eg Key: 18| 7 represents 187 (g)
					
					NB for an ordered diagram of the form
					
					1 | 89 89 90 93 95 98
					2 | 00 05 06 07 07 11 12 18 23
					
					award a maximum of B1 for an ordered diagram with 1 or 2 errors or omissions
					The B1 for a key can still be earned.

2	(a)	$1 - (0.12 + 0.39 + 0.18)$ $1 \quad 0.69$	0.31	2	M1 for $1 - (0.12 + 0.39 + 0.18)$ or 1 "0.69" A1 cao
	(b)	50×0.12	6	2	M1 for 50×0.12 seen or for $\dfrac{6}{50}$ A1cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
3		$(2 \times 11) + (6 \times 23) + (10 \times 14)$ $+ (14 \times 2)$ $= 22 + 138 + 140 + 28 = 328$ $328 \div 50$	6.56	4	M2 for use of midpoints accept one error or three of 22, 138, 140, 28 seen or three of 2×11, 6×23, 10×14, 14×2 seen (M1 for use of *fw* with *w* consistent within intervals (including end points) accept one error) M1 (**dep** on M1) for use of "Σ*fw*" ÷ 50 or "328" ÷ 50 A1 cao
4		Top Cat = $35 \times 4 = 140°$ Katkins = $30 \times 4 = 120°$ Coolkat = $15 \times 4 = 60°$	Pie chart	3	M1 for $360 \div 90$ or 4 seen or one angle (TC or Ka or Co) correct in pie chart $\pm 2°$ ignore labels, or one correct angle calculated A1 for any two angles (TC or Ka or Co) correct in pie chart. $\pm 2°$ ignore labels A1 for fully correct and labelled pie chart. All angles ±2°
5	(a)		positive	1	B1 Accept with 'positive' valid extra words eg strong positive
	(b)		46 – 54	2	B2 46 – 54 Or M1 for a single line segment with positive gradient that could be used as a line of best fit or a vertical line from 44 A1 for given answer in the range 46 – 54

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Question	Working	Answer	Mark	Notes
6	<table><tr><td></td><td>**A**</td><td>**G**</td><td>**T**</td><td>total</td></tr><tr><td>**F**</td><td>**77**</td><td>(26)</td><td>**13**</td><td>(116)</td></tr><tr><td>**M**</td><td>**53**</td><td>**9**</td><td>(22)</td><td>**84**</td></tr><tr><td>total</td><td>(130)</td><td>**35**</td><td>**35**</td><td>(200)</td></tr></table> ( ) value given	53	4	M1 for calculation of total male students 200 – 116 or 84 seen M1 for Graphics total or Textiles total = (200 – 130) ÷ 2 or 70 ÷ 2 or 35 seen M1 for calculation of male students choosing Graphics, "35" – 26 or male Graphics 9 or female students choosing Art, 116 – 26 – ("35" – 22) or " 90" – "13" or 77 A1 cao or Answers may appear in a two-way table with no methods seen B1 for male total, 84 B1 for Graphics total or Textiles total, 35 M1 for male Graphics, 9 or (**dep** on B1) for a table that balances (condone 77 and/or 13 missing or 9 missing) A1 in table or on answer line
7	$P(F) = \dfrac{3}{5}$ $\dfrac{3}{5}$ students = 96 Total = 96 ÷ 3 × 5 = 32 × 5 or F : M = 3 : 2 = 96 : x M = 96 ÷ 3 × 2 = 32 × 2 = 64 Total = 96 + 64	160	3	M1 for $P(F) = \dfrac{3}{5}$ or 96 ÷ 3 or $\dfrac{3}{5}$ (students) = 96 oe or 32 seen M1 for 96 ÷ 3 × 5 or "32" × 5 or "480" ÷ 3 A1 cao or M1 for F : M = 3 : 2 oe or 3 : 2 = 96 : ? oe or 96:64 or 64 seen M1 for 96 ÷ 3 × 2 + 96 or "32" × 2 + 96 or "192" ÷ 3 + 96 or "64" + 96 A1 cao

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Question		Working			Answer	Mark	Notes

8*		A = (78 + 52 + 165) × 2 + 236
		  = 295 × 2 + 236 = 590 + 236
		  = 826
		
		826 × 0.95 = 784.70
		
		B = (68 + 48 + 160) × 2 + 242
		  = 276 × 2 + 242 = 552 + 242
		  =794
		794 × 0.97 = 770.18
					Shop B	5	M1 for finding the total cost for 1adult and 2 children for lift passes for 6 days in either shop A or shop B
							e.g 236 + 2 × 165 or 242 + 2 or 2× 160 or 236 + "330" or 242 + "320" or 566 seen or 562 seen
							   or the total cost of 2 children only for ski hire and boot hire for 6 days in either shop A or shop B
							  e.g. 2× 78 + 2 × 52 or 2× 68 + 2 × 48 or "156" + "104" or "136" + "96" or 260 seen or 232 seen
							
							M1 for a complete calculation of cost for shop A or shop B
							Eg (78 + 52 + 165) × 2 + 236 or (68 + 48 + 160) × 2 + 242 or "295" × 2 + 236 or "276" × 2 + 242 or 826 or 794 seen
							M1 for a correct method to find the reduced cost for shop A or for shop B
							e.g. "826" × 0.95 or "794" × 0.97
							A1 for (€)784(.70) or (€)785 and (€)770(.18)
							C1 (dep on M1 scored) ft for 'cheaper shop' identified

		Shop	**A**	**B**			
		Skis	156	136			
		Boots	104	96			
		S & B	260	232			
		Lift(Ch)	330	320			
		Lift (Ad)	236	242			
		Lift total	566	562			
		Total	826	794			
		%age off	41.3	23.82			
9	(a)				2 reasons 2 statements	2 2	B1 only asked females oe B1 recognition of why only asking people in one store is biased or for the need to ask people in a different location B1 for overlapping numbers oe B1 for not exhaustive oe
10		$(5 \times x + 7 \times y) \div 12$			$\frac{5x + 7y}{12}$	2	M1 for $5 \times x$ or $7 \times y$ oe seen A1 for $\frac{5x + 7y}{12}$ oe (ignore kg units)

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Question	Working	Answer	Mark	Notes
11	$1700 + 1700 \times 4 \div 100$ $= 1700 + 68 = 1768$ $1768 + 1768 \times 4 \div 100$ $= 1768 + 70.72$	1838.72	3	M1 for 1700×1.04 or $1700 + 0.04 \times 1700$ or for 1768 or 68 or 136 or 1836 seen M1 (**dep**) for "1768" $\times 1.04$ or for "1768" $+ 0.04 \times$ "1768" or "1768" + "70.72" A1 for 1838.72 cao (If correct answer seen then ignore any extra years) **Alternative method** M2 for 1700×1.04^2 or 1700×1.04^n n > 2 or digits 183872 seen A1 for 1838.72 cao [**SC**: Award B2 for 138.72 seen]
12		BFACED	3	B3 for all 6 correct (B2 for 4 or 5 correct) (B1 for 2 or 3 correct)

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Question		**Working**	**Answer**	**Mark**	**Notes**
13	(a)	$244 \div 740 \times 60 = 19.78378\ldots$ $315 \div 740 \times 60 = 25.54054\ldots$ $181 \div 740 \times 60 = 14.6756$	20, 25, 15	3	M1 for $244 \div 740 \times 60$ or $315 \div 740 \times 60$ or $181 \div 740 \times 60$ A1 (**dep** on method shown for their answer) 19.7… or 19.8 or 20 or 25.5… or 25 or 26 or 14.6… or 14.7 or 15 seen B1 (**indep**) for 20, 25, 15 or 20, 26, 14
	(b)(i)		random	2	B1 for all have an equal chance oe
	(ii)		method		C1 for valid method eg put all names in a hat and pull out 20, 25, 15 **ft** from (a) or 60 eg number each person and use random numbers on calculator or table to select 20, 25, 15 **ft** from (a) or 60
14	(a)(i)	Line drawn at 10, Median = 46	45 - 46	3	B1 answer in range 45 to 46 inclusive
	(ii)	Line drawn at 5(or 4.75) LQ = 30 ± 1 Line drawn at 15 (or 14.25) UQ = 56 ± 1 IQR = 56 30	26		M1 for lines drawn to the graph at 5 and 15 or at 4.75 and 14.25, (tolerance $\pm \dfrac{1}{2}$ square) or LQ = 30 ± 1 seen or UQ = 56 ± 1 seen A1 for answer in range 26 ± 2
	(b) *	IQR Wilson = $64 - 28 = 36$	comment	2	B1 for Wilson IQR = $64 - 28$ or 36 seen C1 (dep on B1) (**ft** from 14aii) for a valid statement that compares the two classes e.g. Mr W's class has greater IQR than Mrs A's class

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Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)	f.d. = 2, 12, 10, 3 e.g. each square = 4 people 1:15:10:1.5 e.g. each square = 2 people 2:30:20:3	histogram	3	B2 for all 4 bars fully correct with areas in the ratio 1:15:10:1.5 or 2:30:20:3 oe (B1 for 2 or 3 bars drawn in the correct ratio to each other) B1 for labelling the vertical axis f.d and consistent scaling or for a key
	(b)	Monday 40 + 6 = 46 more than 7 hours Tuesday One square = $12 \div 6 = 2$ $2 \times 3.5 \times 7 = 49$ more than 7 hours	No with reason	2	M1 for a valid method to work out the frequency for more than 7 hours on Tuesday, $(12 \div 6) \times 3.5 \times 7$ or $2 \times 3.5 \times 7$ or 7×7 or 2×24.5 or 49 A1 No with 46 and 49 seen

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Question	Working	Answer	Mark	Notes
16	$\dfrac{4}{10} \times \dfrac{6}{9} + \dfrac{6}{10} \times \dfrac{4}{9}$ $= \dfrac{24}{90} + \dfrac{24}{90}$ OR $1 - (\dfrac{4}{10} \times \dfrac{3}{9} + \dfrac{6}{10} \times \dfrac{5}{9})$ $= 1 - (\dfrac{12}{90} + \dfrac{30}{90})$ $= 1 - \dfrac{42}{90}$	$\dfrac{8}{15}$	4	M2 for $\dfrac{4}{10} \times \dfrac{6}{9}$ or $\dfrac{6}{10} \times \dfrac{4}{9}$ or $\dfrac{24}{90}$ oe (M1 for $\dfrac{6}{9}$ or $\dfrac{3}{9}$ or $\dfrac{5}{9}$ or $\dfrac{4}{9}$ seen on diagram or in a calculation) M1 for $\dfrac{4}{10} \times \dfrac{6}{9} + \dfrac{6}{10} \times \dfrac{4}{9}$ or " $\dfrac{24}{90}$ " + " $\dfrac{24}{90}$ "oe A1 for $\dfrac{8}{15}$ oe **OR** M2 for $\dfrac{4}{10} \times \dfrac{3}{9}$ or $\dfrac{6}{10} \times \dfrac{5}{9}$ or $\dfrac{12}{90}$ or $\dfrac{30}{90}$ or $\dfrac{42}{90}$ oe (M1 for $\dfrac{6}{9}$ or $\dfrac{3}{9}$ or $\dfrac{5}{9}$ or $\dfrac{4}{9}$ seen on diagram or in a calculation) M1 for $1 - (\dfrac{4}{10} \times \dfrac{3}{9} + \dfrac{6}{10} \times \dfrac{5}{9})$ or 1 (" $\dfrac{12}{90}$ " + " $\dfrac{30}{90}$ ") or 1 " $\dfrac{42}{90}$ " oe A1 for $\dfrac{8}{15}$ oe **SC** (if no marks scored) B1for $\dfrac{4}{10} \times \dfrac{6}{10} + \dfrac{6}{10} \times \dfrac{4}{10}$ or $\dfrac{24}{100} + \dfrac{24}{100}$ or $\dfrac{48}{100}$

Ofqual

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