



**General Certificate of Secondary Education
June 2013**

Mathematics

43601H

Unit 1 Higher tier

Final

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

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Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
Q	Marks awarded for Quality of Written Communication
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
3.14 ...	Allow answers which begin 3.14 eg 3.14, 3.142, 3.149.
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

Questions which ask candidates to show working

Instructions on marking will be given but usually marks are not awarded to candidates who show no working.

Questions which do not ask candidates to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Unit 1 Higher Tier

Q	Answer	Mark	Comments
1	Two different valid criticisms from options not exhaustive options overlap no option for other responses	B2	oe B1 One valid criticism eg no box for less than 5 no box for Don't know
2	957	B1	Driving school A total
	$0.15 \times 23 (\times 47)$ or 3.45 or 162.15	M1	
	$(23 - \text{their } 3.45) \times 47$ or $23 \times 47 - \text{their } 162.15$	M1	
	918.(85) or 919	A1	Driving school B total
	(Driving school) B	Q1 ft	Strand (iii) ft conclusion based on two values if M1 awarded
	Alternative method 1		
	957	B1	Driving school A total
	0.85×23 or 19.55	M1	Price per lesson for B
	their 19.55×47 or their $957 \div 47$	M1	
	918.(85) or 919 or 20.(36...)	A1	Total for B or Price per lesson for A
	(Driving school) B	Q1 ft	Strand (iii) ft conclusion based on two values if M1 awarded
	Alternative method 2		
	957	B1	Driving school A total
	47×23 or 1081	M1	
	their 1081×0.85	M1	
	918.(85) or 919	A1	Driving school B total
(Driving school) B	Q1 ft	Strand (iii) ft conclusion based on two values if M1 awarded	

Q	Answer	Mark	Comments														
3a	21 male and 21 female dogs	B1															
	15 male and 5 female rabbits	B1															
	50 males and 30 females	B1															
	14 male and 4 female cats	B1 ft	If their 50 + their 30 = 80, ft their 50 – (their 21 + their 15) and ft their 30 – (their 21 + their 5) SC1 any 2 correct entries B4 if all correct: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>D</th> <th>C</th> <th>R</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>M</th> <td>21</td> <td>14</td> <td>15</td> <td>50</td> </tr> <tr> <th>F</th> <td>21</td> <td>4</td> <td>5</td> <td>30</td> </tr> </tbody> </table>		D	C	R	Total	M	21	14	15	50	F	21	4	5
	D	C	R	Total													
M	21	14	15	50													
F	21	4	5	30													
3b	$\frac{42}{80} \times 100$	M1	oe														
	52.5	A1	Condone 53 from full method SC1 47.5														
4a	Suitable hypothesis	B1	eg BBC1 viewers are older (than Sky 1 viewers) oe														
4b	B D A C	B2	B1 C in the final position														
5a	One correct midpoint	B1	27.5, 32.5, 37.5, 42.5														
	fx attempted for at least 3 frequencies	M1	Condone any midpoints [25, 30] etc $12 \times 27.5 (= 330)$ $18 \times 32.5 (= 585)$ $24 \times 37.5 (= 900)$ $6 \times 42.5 (= 255)$														
	their total $fx \div 60$	M1 dep	dep on M1 and 4 values of fx $2070 \div 60$														
	34.5	A1	SC3 1819.25														
5b	Data is grouped	B1	oe														

Q	Answer	Mark	Comments					
5c	Plotted at midpoints ($\pm \frac{1}{2}$ sq)	B1	27.5, 32.5, 37.5, 42.5					
	Heights correct ($\pm \frac{1}{2}$ sq) and points joined with straight lines	B1	12, 18, 24, 6 SC1 for three correct points					
5d	Journey time is shorter on average for Chen	B1ft	ft mean from part (a) oe comment on modal class or mean					
	More consistent times for Chen	B1	oe comment on spread					
6a	0.4 (relative frequency of white) or 1 (pink)	B1	oe					
	their $5 \div 10 (= 0.5)$ or $1 - \text{their } 0.4 - 0.1 = (0.5)$	M1	oe					
	Fully correct table ie <table border="1" style="margin-left: 20px;"> <tr> <td>(4)</td> <td>1</td> <td>5</td> </tr> <tr> <td>0.4</td> <td>(0.1)</td> <td>0.5</td> </tr> </table>	(4)	1	5	0.4	(0.1)	0.5	A1
(4)	1	5						
0.4	(0.1)	0.5						
6b	Comment about increasing the sample size	B1	eg she should repeat it more times or sample more balls oe					
7a	5	B1						
7b	[100.5, 101.5]	B1						
7c	[105.5, 106.5] or [92.5, 93.5]	M1						
	[12, 14]	A1						
8a	$17\,000\,000 \times 1.8 (= 30\,600\,000)$	M1	30.6 million					
	3.06×10^7 or 3.1×10^7	Q1	Strand (i) Correct notation Accept 3×10^7 with method seen Condone 3.06 (or 3.1) $\times 10^1$ million SC1 any value changed correctly to standard form SC1 $9.4(\dots) \times 10^6$					

Q	Answer	Mark	Comments
8b	$(5.6 \times 10^{11}) \div 17\,000\,000$	M1	oe 560 000 000 000 \div 17 000 000 or $(5.6 \times 10^{11}) \div (1.7 \times 10^7)$
	32941.(...)	A1	May be implied by 30 000, 33 000, 32900 or 32940
	30 000 or 33 000	B1 ft	oe ft any value > 2sf rounded to 1 or 2 sf SC1 $3.(0) \times 10^{-5}$ or 0.00003(0)
9a	Correct box drawn and median and quartiles at 20, 50, 80	B1	$\pm \frac{1}{2}$ square
	IQR box formed and whiskers correctly joined to 15 and 90	B1	$\pm \frac{1}{2}$ square
9b	120 is $\frac{3}{4}$ or 40 is $\frac{1}{4}$ seen or implied	B1	May be implied by M1 scored Condone lower quartile = 40 or $Q_1 = 40$
	$120 \div 3 \times 4 (\div 2)$ or 160 seen or $120 - 40$	M1	oe $\frac{2}{3} \times 120$ or 40×2
	80	A1	SC2 median linked with 80 in working
10a	Attempt at frequency density $45 \div 1.5 (= 30)$ or $195 \div 1.5 (= 130)$	M1	One frequency \div one class width ($\neq 1$)
	4 correct frequency densities	A1	30, 490, 270, 130
	Widths correct and bars in correct positions	A1	Must have correct frequency density for first or fourth bar
	Bars to correct heights and vertical scale or key	A1 ft	ft their frequency densities with M1 awarded
	Alternative method		
	Attempt at standard frequencies eg $45 \div 3$, $490 \div 2$, $270 \div 2$, $195 \div 3$	M1	Any two attempted
	4 correct standard frequencies	A1	eg 15, 245, 135, 65
	Widths correct and bars in correct positions	A1	Must have correct standard frequency for at least two bars
	Bars to correct heights and key	A1 ft	ft their standard frequencies with M1 awarded

Q	Answer	Mark	Comments
10b	$\frac{45}{1000}$	M1	oe
	$\frac{45}{1000} \times \frac{44}{999}$	M1	Award for any $\frac{n}{1000} \times \frac{n-1}{999}$, $n < 1000$
	$0.00\dot{1}9\dot{8}$ or $\frac{11}{5550}$	A1	SC2 0.002025 or $\frac{81}{40000}$ oe Only accept 0.002 or 0.0020 or 0.00198 with correct working
11	9.5 or 10.5 seen	B1	
	$145 \div [10.49, 10.5]$	M1	Condone use of 144.5
	13.(8095...)	A1	Must be using 145 and 10.5
	13	B1 ft	M1 must have been scored Truncates their answer to nearest integer
	Alternative method		
	9.5 or 10.5 seen	B1	
	$[10.49, 10.5] \times \text{integer } [10, 13]$ and $[10.49, 10.5] \times \text{integer } [14, 20]$	M1	Both must be correctly evaluated
	$10.5 \times 13 = 136.5$ and $10.5 \times 14 = 147$	A1	
13	B1	M1 must have been scored	