Version 1.0

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.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from: aqa.org.uk

Copyright © 2013 AQA and its licensors. All rights reserved.

Copyright

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX.

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 × 23 (× 47) or 3.45 or 162.15	M1	
	(23 − their 3.45) × 47 or 23 × 47 − 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 ÷ 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

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

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 ÷ 10 (= 0.5) or 1 – their 0.4 – 0.1 = (0.5)	M1	oe
	Fully correct table ie (4) | 1 | 5 0.4 | (0.1) | 0.5	A1	oe accept equivalent fractions or percentages for relative frequencies throughout
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 × 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 $9.4(...) \times 10^6$

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 ÷ 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 ÷ [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] × integer [10, 13] **and** [10.49, 10.5] × integer [14, 20]	M1	Both must be correctly evaluated
	10.5 × 13 = 136.5 **and** 10.5 × 14 = 147	A1	
	13	B1	M1 must have been scored