General Certificate of Secondary Education
November 2011

Mathematics   **43601H**

Higher

Unit 1

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.

UMS conversion calculator www.aqa.org.uk/umsconversion

The following abbreviations are used on the mark scheme:

M	Method marks awarded for a correct method.
M dep	A method mark which is dependent on a previous method mark being awarded.
A	Accuracy marks awarded when following on from a correct method. It is not necessary always to see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special Case. Marks awarded for a common misinterpretation which has some mathematical worth.
oe	Or equivalent.
[a, b]	Accept values between a and b inclusive.

UNIT 1   HIGHER TIER   **43601H**

1a	4 correct plots	B2	B1 2 or 3 correct plots
1b	Draws a suitable line of best fit	M1	
	(5.10+) their read off value at 5.10	M1 dep	
	Correct answer for their 5.10 + read off value	A1 ft	Must have M2 SC1 M0 but answer [5.40, 5.45]
1c	Suitable question eg How long does it take you to get home?	B1	oe
	Non-overlapping and exhaustive	B2 ft	B1 ft non-overlapping or exhaustive ft their question

2	7209	B1	Offer 3
	$\frac{2}{3} \times 11\ 100$ or $0.6 \times 12\ 000$	M1	oe eg $\frac{1}{3} \times 11\ 100$ (= 3700) 11 100 – their 3700 or $0.4 \times 12\ 000$ (= 4800) 12 000 – their 4800
	7400	A1	Offer 1
	7200	A1	Offer 2
	Offer 2	A1 ft	M1 must be awarded to ft their choice of offer

3	5, 12, 29 (any order) Range 24 median 12	B3	B2 correct values, median and/or range wrong or missing B1 incorrect values but median and range correct for them SC1 any student who gives 29 as range and 6 as median
	Alternative method for students using **all** 6 numbers for the range (29) or median (6)		
	Also award B3 for any of these sets | **Numbers (any order)**	**Range**	**Median** | 0, 3, 12 12 6	B3	SC1 any student who gives 29 as range and 6 as median

Numbers (any order)	**Range**	**Median**
0, 3, 12	12	6
0, 3, 12	29	6
0, 3, 12	12	3
0, 5, 12	12	6
0, 5, 12	29	6
0, 5, 12	12	5
0, 7, 12	12	6
0, 7, 12	29	6
0, 7, 12	12	7
5, 12, 29	29	6
5, 12, 29	24	6
5, 12, 29	29	12

4a	$1 - (0.41 + 0.24 + 0.22 + 0.04)$	M1	$1 - 0.91$ oe Allow $100 - 91$
	0.09	A1	Accept 9% or $\frac{9}{100}$
4b	12 : 11	B2	B1 any correct **ratio** not in simplest form including 0.24 : 0.22 B1 uses wrong value(s) but correctly gives simplified ratio as answer SC1 11 : 12 as answer
4c	$0.41 \times 8000 \ (= 3280)$	M1	$(1 - 0.41) \times 8000 \ (= 4720)$ oe
	15 000 – their 3280	M1 dep	their 4720 + (15 000 – 8000)
	11 720	A1	11 720 SC2 13 080 or 13 240 or 14 280 or 14 680

5	$1 + 2 + 3 + \ldots + 10 \ (= 55)$ or $8 \times 5 \ (= 40)$	M1	Allow one omission in addition
	their 55 – their 40	M1 dep	Successfully finds 8 numbers that add up to 40
	15	A1	
	7 and 8 or 9 and 6 or 10 and 5	A1 ft	ft where possible to do so

6a	min = 18 max = 34	B1	
	Correct method to find median or lower quartile or upper quartile	M1	Implied by **one** correct measure
	Median = 26 LQ = 20 UQ = 32	A2	A1 two correct
	Structure appropriate (box with LQ, median and UQ with whiskers to min and max)	Q1	Strand (ii)
6b	More raspberries on average	B1 ft	oe ft their values must interpret
	Interquartile range for strawberries = their 12	B1 ft	
	More consistent number of raspberries	B1 ft	oe ft their values must interpret

7a	7.5×10^{18}	Q1	Strand (i)
7b	Sight of 110 or 1.1(0)	M1	
	$6.81(8…) \times 10^{18}$ or 6.82×10^{18}	A1	or correct answer in another form
	6.8×10^{18}	B1 ft	ft any number correctly rounded to 2 significant figures and in standard form

8a	2 + 1 = 3 or clear connection between 1, 2 and 3	B1	oe eg $\frac{2}{3} + \frac{1}{3} = 1$ or clear connection between $\frac{1}{3}$, $\frac{2}{3}$ and 1
8b	Each probability male $\frac{2}{3}$	B1	oe [0.66, 0.67]
	Each probability female $\frac{1}{3}$	B1	oe 0.33 or better SC1 probabilities wrong but all pairs add to 1
8c	$\frac{1}{3} \times \frac{1}{3}$ or $\frac{2}{3} \times \frac{2}{3}$ or $\frac{2}{3} \times \frac{1}{3}$	M1	or sight of $\frac{1}{9}$ or $\frac{2}{9}$ or $\frac{4}{9}$
	Two males = $\frac{4}{9}$ or Two females = $\frac{1}{9}$ or MF or FM = $\frac{2}{9}$	M1	Probabilities must be linked with genders Check on tree if not labelled to ensure correct outcomes being used
	One of each = $2 \times \frac{2}{9} = \frac{4}{9}$ or both same = $\frac{4}{9} + \frac{1}{9} = \frac{5}{9}$	A1	Must show how either $\frac{4}{9}$ or $\frac{5}{9}$ is achieved
	Two of same (gender more likely)	A1	First A1 must be awarded and decision for 4 marks but if both answers given, both must be correct

9a	Readings are at same time/day/place	B1	oe eg sight of officer affects speeds eg consecutive readings not independent
9b	Attempt at frequency density	M1	One frequency ÷ one correct class width
	4 correct frequency densities	A1	40, 88, 72, 12
	Widths correct	B1	Must have M1
	Bars to correct heights and vertical scale	B1 ft	ft but must have M1
9c	$\dfrac{84}{1000}$	M1	Accept 84 or 7×12 or $(40 - 33) \times \left(\dfrac{120}{10}\right)$ oe
	$\dfrac{84}{1000} \times \dfrac{83}{999}$	M1	Award for any $\dfrac{n}{1000} \times \dfrac{n-1}{999}$; $n < 1000$
	[0.0069, 0.0070] or $\dfrac{581}{83250}$	A1	SC2 0.007056 or $\dfrac{441}{62500}$ oe