



**General Certificate of Secondary Education
June 2011**

Mathematics

43601H

Higher

Unit 1

Final

Mark Scheme

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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.
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 for a common misinterpretation which has some mathematical worth.
oe	Or equivalent.
[<i>a</i>, <i>b</i>]	Accept values between <i>a</i> and <i>b</i> inclusive.

UNIT 1

HIGHER TIER

43601H

1a	Stem 6, 7, 8, 9 and suitable key	B1	
	Leaves 9 2 6 7 7 8 8 8 9 1 3 3 6 8 9 0 0 1	B2	B1 two correct rows of leaves or leaves correct but unordered
	Stem, leaves and aligned correctly to show distribution	Q1	Strand (ii) Allow omission of 6 9 row Logical organised working
1bi	(Median for class A =) 80	B1	Median = 6 cm more
	(Range for class A =) 22	B1	Range = 4 cm more
	Stride lengths are more varied in A and Stride lengths are on average longer in B	B2 ft	oe B1 ft strides are more varied in A or strides are on average longer in A ft their values for median and/or range
1bii	Yes and valid reason	Q1	oe eg Average stride length is longer in B Strand (iii) Accept You cannot tell with valid reason eg comment about average in context Supporting answers with explanation and evidence

2	$\frac{6}{100} \times 23.5(0) (= 1.41)$	M1	oe
	their $1.41 + 23.5(0) (= 24.91)$	M1 dep	oe $1.06 \times 23.5(0)$ M2
	their $24.91 \times 4 (= 99.64)$ or $100 \div \text{their } 24.91 (= 4.(...))$	M1	$100 \div 4 (= 25)$
	Yes and 99.64 or Yes and 4.(...)	A1	Yes and $24.91 (<) 25$
	Alternative method 1		
	$4 \times 23.5(0) (= 94)$	M1	
	$\frac{6}{100} \times \text{their } 94 (= 5.64)$ or $100 - \text{their } 94 (= 6)$	M1	oe
	their $94 + \text{their } 5.64 (= 99.64)$ or $\frac{\text{their } 6}{\text{their } 94} \times 100 (= 6.(...))$	M1 dep	oe 1.06×94 M3 dep on second M1
	Yes and 99.64 or Yes and 6.(...)	A1	
	Alternative method 2		
	$100 \div 4 (= 25)$	M1	
	their $25 - 23.5(0) (= 1.5(0))$	M1	
	$\frac{\text{their } 1.5(0)}{23.5(0)} \times 100 (= 6.(...))$	M1	
	Yes and 6.(...)	A1	

3a	80(%) : 20(%) (= 4 : 1) or $\frac{4}{5}$ seen	B1	oe 80 to 20
3b	Rows/columns for History and not History	B1	oe
	Columns/rows for think real and not think real	B1	oe Allow extra column/row for don't know
3c	17 : 3 = 5.(...) : 1 or $17 \div 3 (= 5.(...))$	M1	oe (4 : 1 =) 12 : 3
	Yes and 5.(...)	A1	Yes and 12 : 3
	Alternative method		
	$\frac{17}{20}$ (= 85(%)) or 85 : 15	M1	80% = $\frac{16}{20}$ or $\frac{17}{20}$ seen
	Yes and 85% or Yes and 85 and 80	A1	Yes and $\frac{17}{20} (>) \frac{16}{20}$
	Alternative method		
3d	$56 \div (17 - 3) (= 4)$	M1	Ratio equivalent to 17 : 3 or two integers in ratio 17 : 3
	their $4 \times (3 + 17)$	M1 dep	68 : 12 or 68 and 12 seen
	80	A1	
	Alternative method		
	$56 \div (85 - 15) (= 0.8)$	M1	oe
	their 0.8×100	M1 dep	
	80	A1	

4a	$2 \times 0.4 (+) 3 \times 0.6 (+) 7 \times 0.8 (+)$ $4 \times 1.0 (+) 3 \times 1.2 (+) 1 \times 1.4$ (= 17.2) or $0.8(+)$ $1.8(+)$ $5.6(+)$ $4(+)$ $3.6(+)$ 1.4 (= 17.2)	M1	Attempt at \bar{fx} - at least one product seen
	their $17.2 \div$ their ($2 + 3 + 7 + 4 + 3 + 1$) or their $17.2 \div 20$	M1 dep	Condone one error or omission in frequencies
	0.86	A1	Ignore further working SC2 [15.8, 15.9] or 0.76 or 0.96 SC1 [2.8, 2.9]
4b	Mention of collecting data about heights of ball bounce on concrete	B1	eg do an experiment dropping (same) balls (from same height) onto concrete and collect data
	Mention of summary statistics, a suitable graph or other calculation for comparison	B1	eg calculate the average heights of the bounces for concrete or plot a frequency polygon of heights on concrete
	Mention of interpreting results or link to given hypothesis	B1	eg compare the averages or compare the graphs
4c	$2 \times \frac{3}{5} \left(\times \frac{3}{5} \right)$ or $1.2 \left(\times \frac{3}{5} \right)$	M1	oe
	0.72 or $\frac{18}{25}$	A1	72 cm Ignore further working

5ai	0.9	B1	oe
5aia	(10, 0.9) plotted	B1 ft	$\pm \frac{1}{2}$ square ft their 0.9
5b	$0.55 \times 20 (-9)$ or $11 (-9)$	M1	oe
	2	A1	
5c	$0.6 \times 130 (= 78)$	M1	oe $60 + 0.6 \times 30$ Must use 0.6
	78 and no	A1	Yes as 78 is nearly 80 oe
	Alternative method 1		
	$\frac{80}{130} (\times 100)$	M1	
	0.61... or 0.62 and 0.6 and No 61.(...) or 62 and 60 and No	A1	Yes as 60 is nearly 61.(...) or 62 Yes as 0.6 is nearly 0.61 (...) or 0.62 Must use 0.6 or 60
	Alternative method 2		
	Full explanation that you cannot tell because the sample size is only one packet	B2	oe

6ai	Median and quartiles marked at 502, 508, 510	B1	$\pm \frac{1}{2}$ square					
	Box formed and whiskers correctly joined to 496, 514	B1	SC1 condone consistent misread of scale SC1 3 out of 5 correct					
6aii	Valid reason using (median) average and Valid reason using interquartile range and machine A ticked	B2 ft	B1 for point comparison (min, LQ, median, UQ, max) or range comparison or IQR comparison irrespective of box ticked eg the median for machine A was higher					
6b	their max – their min or a correct bound seen	M1	Allow for M1 $514 < \text{their max} < 515$ $495 < \text{their min} < 496$ 514.5 or $514.499(\dots)$ or 495.5 Accept $514 - 496 + 1$					
	19 or 18.999...	A1	oe					
6c	$1550 \div 31 (= 50)$ or $31 \div 1550 \left(= \frac{1}{50} \right)$	M1	2% or 0.02 seen					
	$24 \times \text{their } 50$ or $1800 \div \text{their } 50$	M1 dep	oe					
	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>1200</td> <td>1450</td> <td>(1800)</td> </tr> <tr> <td>(24)</td> <td>29</td> <td>36</td> </tr> </table>	1200	1450	(1800)	(24)	29	36	A2
1200	1450	(1800)						
(24)	29	36						

7a	$\sqrt{0.36} = 0.6$ or $0.6 \times 0.6 (= 0.36)$	B1	oe
7b	$(1 - 0.6) \times (1 - 0.6)$ or 0.4×0.4	M1	oe
	0.16	A1	oe
7c	$1 - 0.36$	M1	oe $0.6 \times (1 - 0.6) \times 2 + (1 - 0.6) \times (1 - 0.6)$ or $0.6 \times (1 - 0.6) \times 2 + \text{their } 0.16$ or $0.4 + 0.6 \times 0.4$
	0.64	A1	oe

8	Indication that they need to swap 20p and 10p	B1	
	$\frac{1}{5}$ or $\frac{2}{4}$	M1	oe
	$\frac{1}{5} \times \frac{2}{4}$	M1 dep	oe Condone $\frac{1}{5} \times \frac{2}{3}$
	$\frac{2}{20}$	A1	oe eg $\frac{1}{10}$ SC3 $\frac{2}{15}$ oe