**General Certificate of Secondary Education
June 2013**

Statistics **43101H**

(Specification 4310)

Unit 1:Statistics Written Paper (Higher)

Final Mark Scheme

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.

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.
M Dep	A method mark dependent on a previous method mark being awarded.
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.
B Dep	A mark that can only be awarded if a previous independent mark has been awarded.
E	Explain marks are awarded for a full and detailed explanation
ft	Follow through marks. Marks awarded following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
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.

Unit 1 Higher Tier

Q	Answer	Mark	Comments
1	BEDCA	B2	B1 BE … or …. CA

Q	Answer	Mark	Comments
2(a)	A small scale version of the main study	B1	oe
2(b)	To test question wording, collection methods or response rate	B1	oe
2(c)(i)	2	B1	
2(c)(ii)	120 identified	B1	Accept 7 or 7th
	It is a lot bigger than any other value	B1dep	oe
2(d)	Gender	B1	oe

Q	Answer	Mark	Comments
3(a)	Digits 63 ÷ digit 6	M1	Can be implied by digits 105
	10.5 or $10\frac{1}{2}$	A1	SC1 $\frac{21}{2000}$
3(b)	Circles births and says that the birth rate is higher than the death rate	B1 ft	or circles births with value of 48 seen for number of deaths

Q	Answer	Mark	Comments
4(a)	Some people will own a cat and a dog	B1	oe
4(b)	0.248	B1	Accept [0.24, 0.25]
4(c)	Sight of 3.3 or 1.7	M1	
	5(.0)	A1	
4(d)	Higher percentage of people own a cat compared to dog	B1	oe (refers to 1st table)
	Percentage owning more cats is greater	B1	oe (refers to 2nd and 3rd tables) eg % owning fewer dogs is lower

Q	Answer	Mark	Comments
5(a)(i)	12.5 and 17.5	B1	
5(a)(ii)	Plotted at correct midpoints ft	B1	ft Their table
	Plotted at correct frequencies	B1	
	Their 4 plots joined	B1	Ignore work before 1st and after last plot
5(b)	Pet ducks live longer than wild ducks (on average)	B1	oe eg, compare modes
	Pet ducks live to more varied ages	B1	oe eg, compare ranges

Q	Answer	Mark	Comments
6(a)	Percent(age) or %	B1	Accept deviation / difference (from mean of zero) Ignore other words if correct one(s) seen
6(b)	As the point (for 2010) is below the x axis	B1	oe
6(c)	Increases circled	B1	Accept any indication

Q	Answer	Mark	Comments
7(a)	Systematic	B1	
7(b)	Identifying every 50th. in a crowd	E1	
	Difficult to conduct interviews	E1	
7(c)	Systematic identifies person to be chosen **or** Quota allows interviewer to select from a given category	E1	

Q	Answer	Mark	Comments
8(a)	small / medium size : grey / brown colour: large / black	B1	oe
8(b)(i)	20/100	B2	oe B1 sight of 20
8(b)(ii)	29/100	B2	oe B1 sight of 29
8(b)(iii)	$36 + 46$	M1	or sight of 0.82 oe
	$82 - 10 = (72)$	M1	or $11 + 25 + 10 + 8 + 18$ M2 oe
	72/100	A1	
8(b)(iv)	7/44	B2	oe B1 numerator B1 denominator
8(c)	75 / 100	B1	
	$n / 100 \times (n\text{-}1) / 99 \times (n\text{-}2) / 98$	M1	'n' any non zero number < 100
	$2701/6468 = 0.41759$	A1	SC2 for 0.421875(wr) oe

9(a)	Route A: Shorter time on average	B1	oe for Route B
	Greater variation in times	B1	
	Outliers present or reference skewness	B1	
9(b)(i)	Route A: more likely than on B (50%)	E1	
9(b)(ii)	Route B:always arrives within 40 mins	E1	

Q	Answer	Mark	Comments
10(a)(i)	2	B1	
10(a)(ii)	8	B1	
10(b)(i)	315 / 90	M1	
	3.5	A1	
10(b)(ii)	1483/90 – their(3.5)^2	M1	
	√(4.2278)	M1dep	
	2.056	A1	
10(c)	Ticks yes: takes in to account all the data	E1	Accept no: if references skewness
10(d)	Mode : stays the same	E1	
	Mean : increases	E1	
	Range : decreases	E1	

Q	Answer	Mark	Comments
11(a)	246 + 230 + 266	M1	
	742	A1	
11(b)	35 – 13	M1	or 310 – 288
	22	A1	
11(c)(i)	increasing	E1	
11(c)(ii)	EU expansion, government policies employment, salary levels	E1	Any suitable reason
11(c)(iii)	2004	E1	
11(d)	42 – 37 = (5)	M1	
	(their 5/42) x 100	M1dep	
	11.9….	A1	
	12	B1ft	Accept 10

Q	Answer	Mark	Comments
12(a)	Estimate of relative frequency $(2 + 5 + 3 + 1 + 6 + 0)/(6 \times 25)$	M1	Allow one omission award for sight of 17 and 150
	17/150	M1dep	oe
	[$50/n =$ their $17/$ their 150]	M1dep	oe
	441.176 (442)	A1	
12(b)	Population contained/constant	E1	Sampling with replacement/allow for deer to mix
12(c)	Symmetrical and bell shaped	B1	
	Peak at 50	B1	
	3σ limits : tails approaching 26 and 74	B1	

Q	Answer	Mark	Comments
13(a)	$(10.4 + 15.6 + 19 + 11.8)/4$	M1	Any correct method
	14.2 15.4 16.3	A2	A1 For any one correct
13(b)	Horizontal position	B1	
	Height	B1ft	
13(c)	Suitable trend line	B1	
13(d)	Reading off trend value plus seasonal effect for quarter 3 of 2013 (their $18.6 + 3.65$)	M1	
	22.25	A1ft	
	Reading off trend value for quarter 4 with adjustment (their $19.5 - 3.49$)	M1	
	16.01	A1ft	
13(e)	$15.2 + 19.2 +$ estimates from (d) (72.66)	M1	
	Comment relating to target (of 85 tonnes) unlikely to be met	A1ft	

Q	Answer	Mark	Comments
14(a)	More shots on goal , more goals scored.	B1	
14(b)	Unlikely to be connected	B1	Boot size not linked to goals scored
14(c)	Limits for $r \pm 1$	B1	

Q	Answer	Mark	Comments
15 (a)	Prices cheaper in 2010 than 2005	B1	
15(b)	No : weight for group 04 is 129/1000 or 12.9%	B1	
15(c)(i)	108×124.3 (=13424.4)	M1	
	114800 – their 13424.4 (= 101375.6)	M1dep	
	their 101375.6/892	M1dep	
	113.6	A1	Accept 113.7
15c)(ii)	Item removed with high value index	B1	