

# Mark Scheme (Results) Summer 2010

GCSE

GCSE Statistics (1389)  
Higher Paper 1H

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Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**6 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

**7 Probability**

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**8 Linear equations**

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

**9 Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**10 Range of answers**

Unless otherwise stated, when an answer is given as a range (e.g. 3.5 - 4.2) then this is inclusive of the end points (e.g. 3.5, 4.2) and includes all numbers within the range (e.g. 4, 4.1)

1389/1H - Section A						
Question	Working		Answer	Mark	Notes	
A1	(a)		24	4 correct in correct place	2	B1 B1 If two or three numbers correct in correct place then just B1
			44			
		40	28			
	(bi)			$\frac{40}{68}$ or $\frac{20}{34}$ or $\frac{10}{17}$ or 0.59 or 59%	2	B1 For the decimal and % answers accept 2sf or better – answer is 0.5882352941.....
(bii)			$\frac{12}{44}$ or $\frac{6}{22}$ or $\frac{3}{11}$ or 0.27 or 27%		B1 For the decimal and % answers accept 2sf or better – answer is 0.27272727..... Do NOT accept words for bi and bii e.g. 40 out of 68	
(c)			Any two of: Trap 1 caught the most moths /Trap 2 caught least moths. oe OR Trap 1 caught more of moth B/Trap 2 caught more of moth A oe OR Trap 2 caught similar amounts of each type of moth oe (allow equal)	2	B1 B1	

1389/1H - Section A				
Question	Working	Answer	Mark	Notes
A2		<p>Any 3 from: The scale does not start at 0</p> <p>Anything which describes the problems with the vertical scale e.g the break in the vertical scale</p> <p>Anything which describes that the horizontal scale is poor</p> <p>The lines are thick/tubular</p> <p>Axes poorly labelled e.g 000 tonnes</p>	3	<p>B1 B1 B1</p> <p>Do not accept that the vertical axis is on the wrong side.</p> <p>Do not accept comments criticising the position of the labels – this is common acceptable practice.</p> <p>Only give 1 mark for the same point being made twice.</p> <p>Look out for equivalent statements.</p> <p>Look out for two correct misleading statements in one sentence.</p>

1389/1H - Section A				
Question	Working	Answer	Mark	Notes
A3 (a)		The journeys all took longer in 2008 OR It has increased in 2008 They have decreased/are shorter	1	B1
(b)		Reasonable line that lies between both (10, 8) and (10, 20) and also between (70, 68) and (70, 84)	1	B1 Do not allow line that is not drawn with a ruler and seems to join the points Single line required
(c)		Any figure in range 68 - 84 inclusive.	1	B1
(d)		Any figure in range 30 - 42 inclusive.	1	B1
(e)		No implied Plus: Either: 100 minutes is a long way outside the data range Or This involves extrapolation	1	B1

1389/1H - Section A				
Question	Working	Answer	Mark	Notes
A4 (a)		1748.4	1	B1
(b)	318.8 + 258.1	576.9	1	B1
(c)		It is a rising/going up/ increasing trend. Increase each year It has increased/gone up It is positive	1	B1 Do not accept comparison of individual numbers.
(d)		This is due to rounding oe Any mention of rounding	1	B1
(e)	10.7/44.8 (=0.2388)  1 - 'their 0.2388' OR 100 - 'their 23.88'  (Alternate method +/- (10.7 - 44.8) = +/- 34.1 M1 (+/- 34.1/44.8) × 100 M1)	awrt 76% minus condoned	3	M1 This may also be given if any of these figures are seen: 0.2388, 23.88, 34.1  M1  A1  SC: Answers which round to 24% gets B1



1389/1H - Section A				
Question	Working	Answer	Mark	Notes
A5 (ai)		4	3	B1 (correct answer only)
(aii)	$(1 \times 1) + (2 \times 3) \dots / 50$ $= 240/50$	4.8		M1 (See some evidence of x and + or see 240) (240 comes from: 0,1,6,27,48,40,42,35,32,9 added) A1  Remember a correct answer with no working gets full marks. Look out for candidate who gets all the working correct and shows 4.8 in the main body of the working and then rounds up and puts 5 in the answer space. They can still be awarded full marks.
(b)		They will put the mean score down.  Plus a reason in words: 4 is less than the mean or 4.8 OR Both scores less than the mean oe	2	B1  B1 dependent on getting first B mark. (A calculation on its own does not get this mark)

1389/1H - Section A				
Question	Working	Answer	Mark	Notes
A6	(a)	Blocks in correct order Each part correct height	2	B1 (Must fill space to 100) B1 (Tolerance half a space +/-1)
	(b)	Answers in the range 64-66(g)	1	B1
	(c)	Peanuts and walnuts are different weights or: walnuts are heavier	1	B1 Condone use of size rather than weight
A7	(a)	Read off graph $5700 - 5450 = 250$ $6100 - 5700 = 400$ $6300 - 5950 = 350$ $250 + 400 + 350 = 1000$ $1000/3$	3	M1 for effort to read off graph; at least 1 correct number from 250, 400, 350 M1 Dependent on getting the first M mark. For adding their three numbers (with at least one correct) and dividing by 3  A1 Allow 330000 - 340000
	(b)	6200 + their answer to (a)	2	M1 for adding their answer to (a) to 6200  A1 Allow 6530000 - 6540000 Remember a correct answer in the range with no working gets full marks.

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
B1 (a)		Drawing two Normal Curves labelled A and B  Curve A centred on 85 and spread between 77.5 and 92.5  Curve B centred on 76.3 and spread between 70.6 and 82  Curve B has a greater height (taller) than Curve A	4	M1 Curves must be bell shaped.  A1 (tolerance +/- 0.5 square)  A1 (tolerance +/- 0.5 square)  A1 Note that the M mark MUST be gained to get any of the A marks
(b)		2.5% or 1/40 or 0.025 (oe)	1	B1
(c)		72.5 (kg) to 80.1 (kg)	1	B1 cao(kg not required)

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
B2 (a)		Either: Men get arthritis at an earlier age than women. OR: Women get arthritis at a later age than men oe	1	B1 Note that this should be in the form of a statement not a question.
(b)		Any one of: It would be impossible to ask all the people who have arthritis. OR It would be time consuming. OR It would be too costly. OR It would produce too much data to handle.	1	B1
(c)		All people (who have arthritis)in England	1	B1 Suggesting an age group is not acceptable since the research is for all England and arthritis occurs at all ages  Note: we need to see/have implied the word all and in England

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
(d)		Ad: Any one from: Cheaper, Quicker, Easier, Not too much data to handle Dis: Could be biased, not exact/accurate	2	B1  B1 Do not allow converse of the advantages Do not allow 'wrong answers'
(e)		Any Two from: Make sure surveys get relevant answers OR Make sure questions are understood OR To check response rates OR Identifies ambiguity OR Checks the methods/design work OR Identifies likely responses OR Allows for changes to questions OR Checks how long it will take OR To see what results they get	2	B1 B1 Do not accept: To predict results OR To check spelling OR To check for leading questions OR To check if it's fair/unbiased OR To check if it's offensive

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
(f)		<p>This is an OPEN question Or It allows for too many answers OR People will not give direct answers Or People will/may not know how old they were. Or It is difficult to process answers. oe Or No option boxes.</p>	1	<p>B1 Do not allow they may not have arthritis.</p>
(g)		<p>Any relevant question with correct boxes (oe)</p>	2	<p>B1 must have a question and some effort at boxes (oe) to get this mark.</p> <p>B1 Non overlapping boxes (oe) which cover the full range of answers to their question</p>

1389/1H - Section B							
Question	Working			Answer	Mark	Notes	
B3 (a)	Rank	Rank	$d$	$d^2$	Correct ranks (Accept opposites) Correct values of $d^2$	2	B1  B1 Opposite ranks are:
	8	8	0	0			
	3	10	7	49			
	1	2	1	1			
	9	6	3	9			
	7	7	0	0			
	10	9	1	1			
	4	1	3	9			
	5	4	1	1			
	6	3	3	9			
2	5	3	9				
(b)	$1 - \frac{6 \times 88}{10 \times 99} = 1 - 0.533$			0.47 awrt	2	M1 for putting their $\Sigma d^2$ into correct formula. A1	
(c)				There is positive correlation. (There is some evidence to show that) the bigger the land area the bigger the population.	2	B1 ✓ for answers to (b) between +1 and -1  B1 ✓ for answers to (b) between +1 and -1	

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
B4 (a)	$\frac{8}{200} = \frac{200}{x}$ $8x = 40000$		3	M1 for seeing either $\frac{8}{200}, (0.04)$ OR $\frac{200}{8}, (25)$ M1 for correctly dealing with the proportion e.g. $200 \times 25 (= 5000)$ or $200/0.04 (= 5000)$ etc A1 cao
(b)		5000 Any two from: The marked woodlice were spread randomly throughout the population when the second sample was taken. OR The population has not changed. e.g. none born/died/moved. OR: The paint had not come off. OR The probability of catching every woodlouse the same.	2	B1 B1



1389/1H - Section B				
Question	Working	Answer	Mark	Notes
B5 (ai)		21	3	B1
(aii)		19		B1
(aiii)		23		B1
(b)	$23 - 19 = 4$ Outliers at $uq + (1.5 \times 4)$ 29 Outliers at $lq - (1.5 \times 4)$ 13	          So 12 only outlier	3	M1 $1.5 \times n$ where $n$ must be either 4 or be found from a subtraction which needs to be seen  M1 for A - (their $1.5 \times n$ ) and B + (their $1.5 \times n$ ) where $B - A = \text{their } n$  A1 12 cao In this case the A mark cannot be awarded without seeing 29 and 13. Note: The question requires working to be shown.
(c)		A box plot with a divided box and 2 tails  Quartiles correct and one tail at 26 other tail at 13 or 17 Outlier marked as cross at 12	3	B1  B1/ NB If they have identified no outliers their tail can end at 12 B1/ ft is not available if no outliers are identified

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
(d)		<p>Two comparisons:</p> <p>1. Median of sample 2 greater or converse. oe</p> <p>2. Ranges equal or IQR greater for sample 2 or converse. oe</p>	2	<p>B1B1 follow through from their diagram.</p> <p>Do not allow a mark for picking out one whisker, quartile or highest/ lowest value or use of the word 'medium'</p> <p>We need to see words range or IQR and do not accept spread for the second option.</p>
(e)		<p>The shells would appear to be bigger in 2008 than in 2005</p> <p>OR Yes there has</p> <p>Plus</p> <p>Some correct statistical reason such as:</p> <p>The median is higher.</p> <p>OR</p> <p>The middle 50% is higher</p> <p>oe</p>	2	<p>B1</p> <p>B1 dependent on getting the first B mark</p> <p>Do not allow a mark for picking out one whisker, quartile or highest/ lowest value</p>

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
B6 (a)		544.3 (%)	1	B1
(b)		They went up continuously (until Oct 2007) and then they went steadily down (until July 2008)	1	B1 Do not accept 'they increased'. There must be an indication of a rise and then a fall.
(c)	$\frac{610.7}{620.1} \times \text{£}191\,500$	£188 597 awrt	2	M1 for 98.48(%) or $\frac{610.7}{620.1}$ A1
(d)	$574 - 644.3 = -70.3$ $\frac{-70.3}{644.3} \times 100$ Alternative Method: $\frac{574}{644.3} (0.891)$ $1 - 0.891$ or $100 - 89.1$	- 10.9% ( Accept drop or fall in place of -)	2	M1 for seeing 70.3, 89.1 or 0.891  A1 If you see 10.9 without the - then M1A0
(e)		This would even out small changes. OR It gives a better result for long term house price changes. OR It Minimizes fluctuations. OR It decreases the amount of data to be analysed.	1	B1

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
B7 (a)		Evidence of Frequency Density (either figures 5 and 3 or both bars of correct height)  Vertical scale of (0),5,10,15,(20)  Both bars correct height and width.	3	B1  B1 5,10 and 15 must be seen.  B1
(b)	15764/150	105.1 awrt (105 awrt with working)	3	M1 for attempt at fx. At least one fx correct (776, 1000, 2244, 3952, 3392, 1944, 1100, 1356) M1 adding their fx and dividing by 150. A1 awrt 105 (allow even after minor slips)  NB: Any answer that rounds to 105.1 gets full marks.  105 with no working gets M0 M0 A0

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
(c)	$\sqrt{\left(\frac{1658900}{150} - \left(\frac{15764}{150}\right)^2\right)}$	3.8 awrt	3	M1 for $1658900/150 - (\text{The correct mean or their mean (part (b))})^2$ . (11059.333... - (The correct mean or their mean (part (b)) ) <sup>2</sup> .)  M1 for SQ root dependent on previous M being awarded.  A1  NB An answer of 5.86 implies M1M1A0
(d)		Yes it is. Plus any one from: The shape is reasonably symmetrical/bell shaped. OR All the data is within 3 standard deviations of the mean OR 95% of data within 2 standard deviations of mean oe	2	B1  B1 dependent on getting the first B1  Do not accept mean=median=mode

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
B8 (a)		4/5 or 0.8 or 80%	1	B1 80 with no % gets B0
(bi)		Binomial	6	B1
(bii)	Use $4qp^3 = 4 \times 0.2 \times 0.8^3$	0.4096 or $\frac{256}{625}$		M1 For evidence of attempting to use $4qp^3$ or $4pq^3$ This must involve substituting probabilities for p and q where $p + q = 1$  A1 (Accept 0.41/0.410)

1389/1H - Section B				
Question	Working	Answer	Mark	Notes
(biii)	<p>Method 1:</p> $q^4 + 4q^3p (p^4 + 4p^3q)$ $0.2^4 + (4 \times 0.2^3 \times 0.8)$ $0.0016 + 0.0256$ $(1/625 + 16/625)$ <p>Method 2:</p> $1 - (6q^2p^2 + 4qp^3 + p^4)$ $(1 - (6p^2q^2 + 4pq^3 + q^4))$ $1 - (6 \times 0.2^2 \times 0.8^2 + 4 \times 0.2 \times 0.8^3 + 0.8^4)$ $1 - (0.1536 + 0.4096 + 0.4096)$ $1 - (96/625 + 256/625 + 256/625)$	$0.0272 \text{ or } \frac{17}{625}$		<p>M1 For evidence of attempting to use one of the methods where <math>p + q = 1</math></p> <p>A1 For a correct un-simplified version. 0.2 and 0.8 or fraction equivalents must be used.</p> <p>A1 Accept 0.03 or 0.027</p>

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