Edexcel GCSE

Statistics 1389

Paper 1389/1H

Summer 2008

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Mark Scheme

Edexcel GCSE GCSE Statistics 1389

NOTES ON MARKING PRINCIPLES

1 Types of mark

M marks: method marks
A marks: accuracy marks
B marks: unconditional accuracy marks (independent of M marks)

2 Abbreviations

cao – correct answer only
ft – follow through
isw – ignore subsequent working
SC: special case
oe – or equivalent (and appropriate)
dep – dependent
indep – independent
awrt – anything which rounds to

3 No working

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

4 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.
If there is no answer on the answer line then check the working for an obvious answer.

5 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
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: eg. incorrect cancelling 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 eg 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 a 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.

1389/1H – Section A					
Question		**Working**	**Answer**	**Mark**	**Notes**
A1			**Any two from: (only one from each bullet point)** • The 3 D effect (distorts the sizes) • Taking a slice out • Some colours stand out more or some colours are very similar.	2	B1 B1 Some of the comments that you might see that are acceptable for B1: - can't see size of sector (Bullet 1) - a comment relating to it being a perspective view such as 'not a birds eye view' or 'it is at an angle'or 'it's harder to see which sectors/bits are bigger' (Bullet 1) Note: The question does not ask them to say why it is misleading **Do not allow:** - no key - no figures/percentages

Question		Working	Answer	Mark	Notes
A2	(a)		604441	1	B1
	(b)		Rising/ going up/increasing oe	1	B1. Look for a general comment. Sometimes this appears with figures as well. Sometimes you will need to ignore subsequent sentences. B0 For positive/positive trend only.
	(c)		There are always more than 1000 male births for every 1000 female births.	1	B1 It must make clear that the number is more for every year. **Do not allow:** Reference to a single year without making clear that every other year is also above.
	(d)		Falling/going down/decreasing oe Because Non-UK is going up.	2	B1 B1 This mark only goes to a reason using the information on the table.

Question		Working	Answer	Mark	Notes
A3	(a)		35 to 39	1	B1
	(b)		50 to 54	1	B1
	(c)		**EITHER:** There is a greater % of people below 20(accept 19) in Northern Ireland than the UK. **OR:** It is higher/more in NI **OR**: It is lower/less in UK	1	B1 The answers must suggest a comparison of % and not a comparison of numbers of people. The % sign will not necessarily be there. **Do not allow:** More people in NI OR: Less people in UK Anything that suggest numbers of people

Question		Working	Answer	Mark	Notes
A4	(a)		176, 108, 62, 620	1	B1
	(b)		11	1	B1
	(c)	"620"/"62" or any correct method	10	2	M1 Using "their total *fx* " divided by "their total frequency" A1 cao. 620/6 is a common incorrect method and gets M0A0 Watch out for 10 being found from incorrect methods or incorrect figures.
	(d)		10	1	B1
	(e)		**EITHER:** 1 The mean: • because it uses all the data or • because it is more accurate or • no skew/symmetrical or • there are no extreme values **OR:** The median: • because it is not affected by skew/extreme values or • not symmetrical • slight negative skew. **OR:** 10 because the mean and median are both 10	1	B1 Allow the mean and the median are both the same.

Question		Working	Answer	Mark	Notes
A5	(a)		**Any Two of:** • It will identify any problems with the survey. • It will see the sort of response there is. • It will find any errors. • It will get an idea of the response rate • It will give feedback so that you can alter things • It will ensure questions are clear	2	B1 B1 Look for equivalent wording. Beware: Two answers are often making the same point. **Do not allow:** • Checking for bias • Looking for offensive questions • Deciding on which sample size to use
	(b)		**Any one from:** • Not all workers may work on Monday morning. • It could be biased • All workers do not have an equal chance of being chosen. • Only one day is used	1	B1 Look for equivalent wording **Do not allow**: • References to being stuck in traffic or arriving late/early, unless they go on to say there were not included as a result. • She is picking certain people. • It is a census because she is asking all

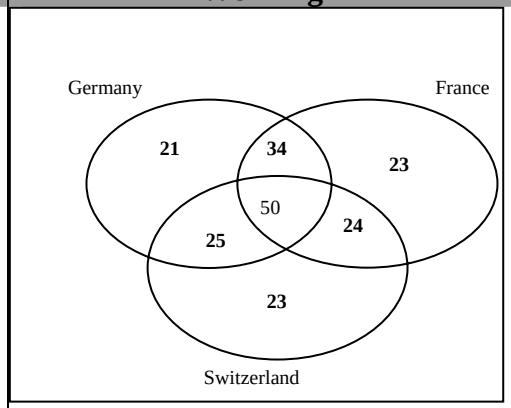
Question		Working	Answer	Mark	Notes
	(c)		**EITHER**: Number all the workers. **plus** Use a random number table, generator, calculator or a computer to select the numbers you require. **OR:** Put the name of each worker on a piece of paper. Plus Put the names in a hat and draw one out.	2	B1 B1 One mark for numbering or listing in some way. The other mark for selection. To just say pick randomly is not enough. We need to know **how** they would do the random selection.
	(d)(i)		continuous	2	B1
	(ii)		Qualitative		B1

Question		Working	Answer	Mark	Notes
A6	(a)		June	1	B1
	(b)	70% of £720	£504	2	M1 A1 If you see the following numbers anywhere then give M1. They have correctly calculated for the wrong month 698.4, 792, 691.2 Some candidates might try to find 30% and take it from £792. This is an acceptable method. Answer only scores full marks

Question		Working	Answer	Mark	Notes
A7	(a)		802.75	1	B1 Accept 802.8 or 803. Look carefully in the answer space. Candidates do not always put the answer on the line
	(b)	$\sqrt{(5196408/8 - 802.75^2)}$ or $\sqrt{(5196408/8 - 803^2)}$ or $\sqrt{(5196408/8 - 802.8^2)}$	**EITHER:**71.7 awrt **OR**: 68.9 awrt **OR:** 71.2 awrt	2	M1ft Look for them using their $(a)^2$ to get the M1 (For 802.75^2 = awrt 644407 and 803^2 = 644809 802.8^2 = 644487) A1 There is no follow through for this it is these three correct answers only Look carefully at the working if the answer is wrong
	(c)		Puts it down (or equivalent correct wording) **PLUS**: 720 < 802.75 **OR:** 1st quarter for 2006 is below the original mean **OR:** A value below the original mean is being added on.	2	B1ft (for their answer to a) B1 ft (for their answer to a) and Depends on previous B mark being gained. Note: If their answer to (a) is below 720 all of these statements will be reversed and the candidate can still gain full marks on ft.

Question		Working	Answer	Mark	Notes
A8	(a)	(260 – 251)/4.5 = 2 (sd's)	2.5% oe	2	M1 A1 If they use 95% within 2 standard deviations and write 5% then give M1 If they use 96% within 2 standard deviations and write 2 % then give M1 If they show that they are considering 2 standard deviations from the mean give the M1
	(b)		**Yes** they do conform Less than 2.5% below 250g OR 2.5% is less than 251g OR the standard deviation could be as high as 5g.	2	B1 for Yes B1dep The second B mark depends on the first B mark being gained

1389/1H – Section B					
Question		**Working**	**Answer**	**Mark**	**Notes**
B1	(a)		Draw a box plot LQ Median and UQ correct Upper and lower values correct	3	B1 B1 B1
	(b)		Red Squirrel symmetrical (or normally distributed or no skew) **and** grey squirrel positive skew	2	B1 not equal or even. B1
	(c)		The grey Squirrel has a higher **median.** PLUS The grey squirrel has a greater **IQR** or **rang**e or **spread.** (Reverses acceptable using red squirrel)	2	B1 B1 We are looking for a comparison of medians and of spread/range/IQR/ wider distribution/ variability. Comparisons of ends or other quartiles are not acceptable. Make sure only one range gets a mark
	(d)		Any two from: Squirrels weighing more than 360 grams are likely to be grey. Squirrels weighing less than 300 grams are likely to be red. Squirrels between 300 and 360 grams may be either red or grey	2	B1 B1 We are looking for reference to the 300 and 360 grams Special case. B1 B0 Identifying a particular squirrel by its weight- red /grey/we can't tell.

Question		Working	Answer	Mark	Notes
B2	(a)		Look for 25 ,24, 34 and 21, 23, 23 all in the correct places	3	B1 B1 B1 (B1 for 2 figures in the correct places B1 B1 for 4 figures in the correct places. B1 B1 B1 for all correct)
	(b) (i)		50/200 or 1/4 or 0.25 or 25%	4	B1
	(ii)	(200 – 131)/200	= 69/200 or 0.345		B1ft (the denominator must be 200)
	(iii)	A number divided by 131 to give a probability			M1
			74/131 or awrt 0.56 or 0.565		A1 cao

Question		Working	Answer	Mark	Notes
B3	(a)		A or y = ax^2	1	B1
	(b)		The greater the length the greater the wingspan. **OR** Body length approx half wing span. **OR** Relationship less obvious for big birds. oe	1	B1
	(c)	$y = ax + b$ a = $(y_1 - y_2)/(x_1 - x_2)$ (say = (80 -28)/(150 – 50) or (80 – 30)/(150 – 50) or other suitable)	b = 4 awrt a = between 0.48 and 0.52 (these values get the M mark) y = 0.48 to 0.52 x + 4 awrt	3	B1 M1 For an obvious effort at gradient A1 Allow equivalent fraction for gradient.
	(d)	('0.52' × 100) + '4' OR Line on graph	Answer in range 52 to56 awrt	2	M1 For either substituting into their equation or a clear line up and across from 100 on the graph A1 Answers without working within the range score M1A1

Question		Working	Answer	Mark	Notes
B4	(a)		**Any two from:** • Expensive, • Time Consuming, • Difficult to do • Lots of data (to handle) (equivalent words acceptable)	2	B1 B1
	(b)		**Any one from:** • The sample is very small. • The sample is likely to be biased. • No rural people are involved. • Not everyone has a land-line telephone. • Not everyone has a chance of being asked.	2	B2 **<u>Special case</u>** 'Not an ideal/good sample' scores B1
	(c)		**<u>A</u>** (The first question) is best. Plus The first question is closed and/or the second question is open. (oe)	2	B1 B1 Accept as reason: A has only two possible answers (It is possible to get B0 B1 if A is not stated) **NB : Choice of B scores B0B0**

Question		Working	Answer	Mark	Notes
B5	(a)		0.95	1	B1
	(b)		Binomial	1	B1
	(c)(i)	M1 for seeing $4p^3q$ or $4pq^3$ OR 4 x 0.95^3 x 0.05 OR 4 x 0.05^3 x 0.95	= 0.171 a.w.r.t	5	M1 Remember if you see $4p^3q$ or $4pq^3$ give the M1 A1
	(ii)	Either $1 – (p^4 + 4p^3q)$ or $(6p^2q^2 + 4pq^3 + q^4)$ $1 – (0.815 + 0.171)$	0.81450625 or 0.0135375 or 0.000475 or 0.00000625 = 0.014 a.w.r.t		M1 For a full attempt at one of the two methods M1 For one of these figures A1 For 0.014 gained by a correct method. (Watch out for a final answer of 0.014 obtained incorrectly from $6p^2q^2$ = 0.014 when rounded. This could get M0 M1 A0 if they have the exact number 0.0135375 in their working)

Question		Working	Answer	Mark	Notes
B6	(a)(i)	+/-(55 – 52)/ 15	= 1/5 or 0.2 oe fraction	3	M1 Method correct for i or ii A1 Answers only full marks.
	(ii)	(48 – 45)/12	¼ or 0.25 oe fraction		A1 (Both i and ii correct gets 3 marks)
	(b)		Tyson did best in **Maths.** **Plus:** He has the **higher standardised score** in maths. or The standardised score for statistics is not so much **above** the mean	2	B1 B1 dep on previous B1 **Do not allow:** The standardised score is further **from** the mean. **Special case** Tyson did best in Statistics because he has a higher standardised score B2
	(c)		**Any two of:** • Maths was a more difficult exam./Statistics easier • Students did less well in maths/better in Stats • Stats results more variable than maths o.e	2	B1 B1

Question		Working	Answer	Mark	Notes
B7	(a)		1, 2, 3, 4, 6, 5, 7, 10, 8, 9. (0, 0, 0, 0, -1, 1, 0, -2, 1, 1). 0, 0, 0, 0, 1, 1, 0, 4, 1, 1	2	B1 B1 ft for d^2 with their ranks (if you see 322 B0 B1 as they have used reverse ranks)
	(b)	1 – (6x8) / (10 x 99) = 1 – 48/990		2	M1 Make sure full formula is used (Watch out for ft of their d^2 they will get the M1)
			= 0.95 (awrt)		A1
	(c)		There is (strong) **positive** correlation between distance from the bank and the depth. The further from the river bank the deeper the water (oe)	2	B1ft from their answer to part b. NB must follow through from their part (b) B1ft correct interpretation following on from the first B1 No ft for 'no correlation' If NO answer in part (b) they can score no marks in part (c)

Question		Working	Answer	Mark	Notes
B8	(a)		Evidence of frequency density.	3	M1 Evidence acceptable is EITHER: Seeing figures 2.9 or/and 1.2 OR: One bar with correct height (ignore their scale at this point). **Remember that if they do not get this M mark they get no marks for this part**
			Sensible Vertical Scale or Key		A1 The scale can go up in multiples of 1, 2, 3, 4….
			Both bars correct - First bar(10 wide 2.9 high), Second bar (15 wide 1.2 high)		A1 Allow tolerance of +/- half little square in height.
	(b)		**EITHER:** It would help to give some idea of the proportions of **each shoe size** required. **OR:** So he knows how many of **each size** to make/sell. **OR:** Which size**s** to make the most of.	1	B1 B0 Do not accept individual shoe size comments.

Question	Working	Answer	Mark	Notes
(c)	M1 Require either 100^{th} or 100.5^{th}person. **Must be seen** M1 dep An answer value in the range 260 - 265	= 261.52 or 261.59	3	M1 (Accept 10 or 10.5) M1 dep on previous M1 A1 Correct answer with no working gains full marks.
(d)		Normal	1	B1

Question		Working	Answer	Mark	Notes
B9	(a)	Add any four consecutive figures/4	94 and 97	3	M1 One correct answer implies M1 A1 A1
	(b)		Plotted correctly	1	B1ft
	(c)		Ruled straight line that at least touches points 1 and 5 and passes all the given points.	1	B1 Do not allow joining up the points.
	(d)		-42 (hundreds) or -4200	1	B1
	(e)	'their102(00)' to 100(00) – '42(00)' Or their d	= any value between 6000 and 5800	2	M1 (If the answer is not in the range and no working is shown then M0A0 If working is shown then you will have to check for ft .) A1 ft (no ft without working)