GCSE

Edexcel GCSE

Statistics (1389)

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Summer 2006

Examiners' Report

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1 PRINCIPAL EXAMINER'S REPORT – PAPER 1389/1F (FOUNDATION)

1.1 GENERAL POINTS

1.1.1 This paper was accessible to the majority of the candidates and there was little evidence to suggest that they were short of time.

1.1.2 The average attainment of candidates this year is comparable to last year, with many of the weaker candidates being able to make some progress in questions throughout the paper.

1.1.3 The presentation of work was generally good. An increasing number of candidates are showing the intermediate stages in their calculations, and these are usually done in the space provided.

1.1.4 Candidates should be reminded to use blue or black ink in this examination.

1.2 REPORT ON INDIVIDUAL QUESTIONS

Section A

1.2.1 Question 1

This question was done very well, with most candidates gaining at least two of the three marks. Some only ticked three statements, the one omitted was usually "There is copper in brass, bronze and pewter".

1.2.2 Question 2

Most candidates were able to interpret the pictogram in parts (a) and (b).
In part (c), many gave only one reason why the Fleetwood Larne route was unpopular, generally commenting that the journey was too long.

1.2.3 Question 3

Completing the two-way table in part (a) was done well by most of the candidates. Common mistakes were either to omit "850" from the table, or to add both rows and columns and write "1700" in the table.
Part (b)(i) was done quite well by many candidates, with most happy to leave their answers as a fraction. A common error in (ii) was $\frac{210}{440}$.
More than three-quarters of the candidates were able to get full marks in part (c). Most give at least two comparisons relating the size of eggs to the type of hen. Comparisons between the total numbers of eggs laid by each type of hen were less common.

1.2.4 Question 4

Part (a) was done well by nearly all the candidates. Common mistakes were 22810 and 23.
Part (b) was not done well. Most candidates thought that the discrepancy in the totals was due to an error in recording the data, or in data that had

somehow been missed out. Very few referred to rounding errors in the data values.
In part (c), those candidates referring to specific values in the data did not always do as well as those who described the trend of the data, but most were able to score at least one mark.

1.2.5 Question 5

Part (a) was done well by nearly all the candidates.
In part (b), most candidates could come up with some sort of description of the uneven spread of nests in the bird reserve, such as “more in the bottom right” or “more in the south-east”. The most common mistake was a description of the number of nests in each individual section rather than a comment on the overall spread.

1.2.6 Question 6

Part (a) was answered well by virtually all the candidates.
In part (b), almost three-quarters of the candidates could interpret the scatter graph to find the total number of text messages sent.
In part (c), about three-quarters of the candidates could describe the correlation shown in the graph, “positive” being the most popular answer. A less common correct answer was “as one goes up, the other goes up”.
In parts (d) and (e), most candidates could draw a suitable line of best fit and interpret it to estimate the number of text messages she received. It was rare to see an answer given as a decimal.

1.2.7 Question 7

In part (a), most candidates could complete the table accurately, but only about half of these could use the information to work out an estimate for the mean. A very common error here was $\frac{50+55+60+65+70}{5}$.
In part (c), few candidates realised that they had to suggest further statistical information for the tomatoes. Most thought that the quality, or cost, or colour of the tomatoes was required.

Section B

1.2.9 Question 1

In part (a), there was a marked improvement in the number of candidates confusing a census with the National Census, and many could give at least one sensible reason why the company should take a sample rather than a census; “cheaper” , “quicker” and “easier” were the most popular responses.
In part (b), many candidates had difficulty writing down a closed question for the market research company, and less than half provided suitable response boxes. A typical response was “What do you think of our supermarket?”
In part (c), only the best candidates could give two reasons for doing a pilot survey. A common response here was “To test the questions”.
In part (d), the majority of candidates were able to explain that this was a biased question, but many failed to comment that it was therefore an unsuitable question.

1.2.10 Question 2

Part (a) was done well by about half the candidates. A common error here was to mark C at 0.5.

More than half the candidates were able to gain full marks in part (b). A common incorrect answer was 0.55 (usually achieved by considering 0.5 as 0.05 when adding the decimals in the table).

Parts (c) and (d) were quite poorly done. Many did not realise that they needed to add the probabilities in part (c).

Part (e) was not done well. Few candidates realised that they had to multiply probabilities, and many of those that did were unable to do this correctly. A common incorrect answer was 0.5.

1.2.11 Question 3

Part (a) was done well by many candidates. Most could interpret the cumulative frequency diagram to find the median, and then write down the number of students taking less than 38 minutes to read the essay. Few gave a decimal answer in (iii). A common error in (i) was 55.

In part (b), most candidates could complete the stem and leaf diagram accurately and, in part (c), use it to find the median. Many of those candidates who incorrectly completed their stem and leaf diagram in part (b) managed to gain both follow-through marks in part (c).

Part (d) was done quite well - many gaining a mark for commenting that the females read the essay faster than the males. Fewer gained the second mark for a sensible reason that compared like with like. A common error here was to misinterpret the cumulative frequency diagram for the fastest female reader - many thought this was 15 minutes.

1.2.12 Question 4

In part (a), virtually none of the candidates could give a sampling frame for the plants in the greenhouse. Many thought it was a method of sampling.

Describing how to take a random sample in part (b) continues to be a problem for many candidates. Many forgot that they needed to uniquely identify each of the plants before selecting their random numbers. “Names from a hat” is still a very popular response to this question. A significant number of candidates described a systematic method of sampling.

Parts (c) and (d) were done well by most of the candidates. A common error in part (d) was 10.

Few candidates were able to do part (e), typically giving their answer as 15 or 30. Many of those using the correct method were unable to multiply and add all the numbers accurately - typically calculating 3×0 as 3.

In part (f), many candidates gained a mark for multiplying their answer in part (e) by 100.

1.2.13 Question 5

In part (a), most candidates could calculate the moving averages and plot them on the graph, but some plotted their values starting at period 1 2002.

Part (b) was done well by most of the candidates.

Part (c) was generally done well. Some candidates in (i) were too specific about which period had the most sales, typically giving the answer "Sep – Dec 2002".

Index numbers continues to be a difficult topic for most candidates. Parts (d) and (e) were not done well. A common error in part (d) was 12 (obtained by subtracting the values).

In part (e), only a very small number of candidates were able to write down the index number for 2004.

1.2.14 Question 6

Part (a) was generally done well, with most candidates scoring at least one mark for working out the range.

Few candidates were able to give one disadvantage of using the range as a measure of spread. Many said it was inaccurate, but did not give a reason.

The majority of candidates could draw the box plot in part (c) but some indicated the critical values on the grid with only crosses (i.e. without drawing the box and whiskers).

Part (d) was not done well. Few understood the demands of the question. Most thought that speed cameras had already been installed, and that they were being asked to comment on how effective they had been. Others discussed the need for speed cameras in general and didn't use the information to support their argument.

2 PRINCIPAL EXAMINER'S REPORT – PAPER 1389/1H (HIGHER)

2.1 GENERAL POINTS

2.1.1 The Statistics GCSE examination this year contained more questions than usual that required candidates to interpret statistical data and less that required calculations. Candidates tackled the questions well. Even the less able seemed to be pleased to have the opportunity to write down comments.

2.1.2 In the past, teachers have expressed concern that the candidates had too much time in which to complete the paper. This year most candidates managed to finish the paper but there was plenty to occupy them for most of the two and a half hours.

2.1.3 The format of the paper seemed to work well although occasionally candidates made errors in drawing lines of best fit and rather than ask for more graph paper they tried to put one line on top of another.
A few candidates used soft lead or coloured pencils which produced work that was difficult to read.

2.2 REPORT ON INDIVIDUAL QUESTIONS

Section A

2.2.1 Question 1
Parts (a) and (b) were generally done well although in part (b) some candidates added the weights and divided by 5. Part (c) caused problems. Candidates did not realise that **statistical** information was required. 'Colour' and 'taste' were common incorrect answers.

2.2.2 Question 2
Candidates generally liked this question and most made a good attempt at it. A few got muddled between large eggs and large hens.

2.2.3 Question 3
This topic had not been tested before and the question was often done badly – many candidates guessed the answers. Common incorrect answers were 1/2 for (a), 2:1 for (b) and 1/3 for (c). Some candidates had obviously not covered this part of the specification and had no idea where to start.

2.2.4 Question 4
Few candidates could give a definition of a random sample – most explained how to get one using a calculator. Parts (b) and (c) were badly done. Candidates picked a strange variety of numbers from the random number table including numbers well beyond the range required. A number of candidates wrote down the number 07 twice. If a number crops up a second time in a list of random numbers it should be omitted.
In part (c) generally only one mark was gained. Candidates did not remember to identify the students by numbering them.

2.2.5 Question 5

Most candidates got at least 3 marks for this question. Some lost the mark for (c)ii because they did not recognise that a trend could be level. A common answer was 'no trend'. It is clear that many candidates do not realise that when looking for a trend one is looking for a general change over time – mentioning each rise and fall is not appropriate.

2.2.6 Question 6

Better candidates could cope with part (a) but many did not recognise the implication of the larger pie chart. In part (b) it was common for mention to be made of 'numbers' of videos and DVD's rather than percentages, proportions or ratios.

2.2.7 Question 7

Many candidates appeared not to have covered this part of the specification and gained no marks for this question. Those that had done the work usually managed to do (a) and (b). In (c) many found the arithmetic mean instead of the geometric mean. It was unusual to find a candidate who recognised that the answer to (d) was (c) – 100.

2.2.8 Question 8

This question was generally done badly. Few recognised the significance of the standard deviation and many had no concept of stock usage. An answer of 200000 tonnes was common for (a) and candidates did not realise that this was obviously incorrect. Some candidates managed to get a mark in (b) for a sensible discussion of the amount of stock that might be required although they often gave no suggestion of a figure.

Section B

2.2.9 Question 1

Most candidates could rank and find the differences. The usual faults cropped up in using the formula – the 1 either got lost or got put on top of the fraction. Since the formula is given this should not happen. Some candidates managed to write down the formula but had no idea what n referred to. Other candidates did not give their answer to 3 decimal places as requested. Many lost one mark in (c) as they gave no contextual answer.

2.2.10 Question 2

Many candidates did this question well except for part (b). Few knew that quota sampling is the name given to the sampling described. Stratified was a common answer but a variety of incorrect sampling methods were named. Part (c) was generally well done. Some of the answers to part (d) were unusual – they suggested that candidates did not realise that a pilot study, as well as not being anything to do with flying, is also something done before the real survey takes place. In part (d) candidates often did not state that the question was not suitable and lost 1 mark.

2.2.11 Question 3

Part (a) was well done. Candidates choosing the easier of the two formulae given on the paper often managed to get (b) correct. Those choosing the $\sum(x-\bar{x})$ route got bogged down in numbers and sometimes even used the wrong $\bar{x}$. In (b) many candidates could compare the means in context although a number talked about numbers of strikes rather than working days lost. Few candidates could interpret the standard deviation in context.

2.2.12 Question 4

Parts (a) and (b) were well done. Parts (c) and (d) were only done correctly by the best candidates but the question was designed as a discriminator. Most candidates cannot cope with conditional probability using a tree diagram. An answer of 0.02 was common for (c).

2.2.13 Question 5

This question was done well by almost everyone. Sometimes the answer to (b) was not given in context so 1 of the two marks was lost. Occasionally a very poor line of best fit was drawn going through (0, 3.5) and (35, 8.5). Occasionally the line of best fit was not drawn through the mean point. A very few candidates did not realise that water could come from sources other than the sprinklers and lost a mark in (f).

2.2.14 Question 6

Most candidates made a good attempt at this question. There are many ways of working out quartiles so a variety of answer pairs were accepted for part b. These answers were used for follow through marks where appropriate. Many candidates had no idea how to identify outliers and did not attempt part(c). Those candidates who did understand what to do had no problems with the possible confusion of 126 not being an outlier. All answers were looked at, even those crossed out and candidates were given marks for any correct working. In (d) very occasionally candidates re calculated their values for drawing the box plots. Provided the values used were a set given in the answer scheme marks were given. Part (e) required a comparison of the two distributions. The specification requires this to be done by considering a measure of spread and a measure of central tendency. Candidates should compare the medians and either the range or the interquartile range. This year a consideration of skew was also accepted as an answer. Some candidates called the median the mean which lost them a mark. Part (f) was done well.

2.2.15 Question 7

Most candidates got the marks for (a) and (b) but only those who have covered the Binomial as a topic could tackle (c). Some candidates did all the working for (c)ii but then could not identify the terms required and did not write down the answer.

2.2.16 Question 8

This question was quite well done. Most candidates got (a) and (b) correct. Some added the moving averages already calculated rather than the original data to get the two moving averages required in part (c) and lost an accuracy mark. The weaker candidates did not know where to plot the moving averages on the graph. Many managed to get the correct height position but did not get the correct horizontal position.

2 PRINCIPAL MODERATOR'S REPORT – PAPER 1389/02 (COURSEWORK)

2.1 GENERAL ADMINISTRATIVE POINTS

2.1.1 The administrative work was managed well by most of the centres. Many centres continue to use plastic wallets, which cause much frustration and time wasting to moderators. A treasury tag or a piece of string is much the preferred way of tying the projects together. If centres wish to use plastic wallets then numbering pages would be sensible.

2.1.2 The sample coursework from most centres was received by the due date.

2.1.3 There are still a few centres who fail to follow the instructions sent to them. Some candidate record sheets were unsigned by teachers and/or pupils. Very occasionally OPTEMS were unsigned. Occasionally centres that received U6's were not as co-operative as one would expect them to be. The work of a withdrawn candidate that should have been in the sample was often not replaced and, too often, the work of the best and weakest candidates was not included.

2.2 COURSEWORK TASKS

The general level of coursework submitted was very similar to last year. Once again 'Mayfield' was the most popular choice for data. 'Newspapers' and 'Cars' were also in evidence. It was refreshing to see examples of works that used 'AJB Sports', 'Reaction Times' and 'House Prices'. Some centres encouraged candidates to explore a wide variety of topics of their own choice. This allowed the most able candidates to demonstrate an ability to plan, construct and implement an original piece of work. This helped some to achieve the higher marks.

Few candidates scored less than 10 marks. Every student seemed to be able to collect some data, have an aim and draw a meaningful diagram. Teachers of the less able candidates had obviously worked very hard with their groups and judging from the work with marks in the 8 to 14 range many candidates seemed to have enjoyed what they did and would appear to have gained from their coursework. Some teachers did write notes apologising for the level of the work but said that they were using the course to 'turn the students on'.

Some candidates handed in their Maths data handling coursework with an 'add on' piece for Statistics at the end. This seldom improved the mark that would have been gained without it. It usually involved a few more calculations at a level already covered. It also produced a coursework that did not flow well.

Several centres produced their own mark record sheet, which usually ensured that the marks were more consistently awarded if not always accurately. Annotation or comments as to why marks have been awarded is very helpful to the moderator.

A number of centres did not annotate their work so moderators really did not know where or why marks had been allocated. This makes constructive feed back on the centre reports quite difficult. A few centres are still failing to moderate internally. One rogue marker can have a profound effect on the marking of the entire centre.

2.2.1 Strand 1a Planning

Some candidates were given a great deal of guidance as to how their work should be presented. Often moderating one piece of coursework from a centre gave a very good idea about the content and style of the other pieces of coursework from that centre. This is not a problem for lower ability candidates but it does not allow ‘A’ grade candidates to demonstrate their own individual ability to plan and so does not allow the higher marks for planning to be awarded.
Teachers often awarded marks of 4 or 5 for work that was not sufficiently demanding. There was often no evidence of a well-defined strategy for achieving aims or using statistical techniques. There were many instances of work that involved multiple hypotheses; only the best candidates gave sensible reasons for their choice of hypothesis, and many of these failed to explain how these were interrelated. A number of candidates did not explain why they used a statistical technique.
Only the best candidates were able to anticipate problems and plan for ways to overcome them. Hardly any candidates planned to compare their results with and without outliers.

2.2.2 Strand 1b Collecting Data

Many candidates had been given all the data to analyse. In such cases, few candidates questioned the validity of the data or acknowledged its source. There was evidence of centres collecting primary data in groups through surveys and experiments. Even some less able candidates seemed to do quite well with this communal approach.

The data source was often not discussed – just named in the title. Discussion of the validity of the data source is essential for higher level candidates.
Discussion of the data collection was weak. If a census is used it is important to say why. If a sample is taken the method of sampling should be explicitly explained. If primary data is collected then there needs to be detailed discussion about how it was collected, questionnaires used and results of possible pilot studies. Many candidates claimed to use a stratified random sample but failed to understand that a stratified sample has layers within the sample. Simply taking proportions from each section of the population and making comparisons between them is not stratified sampling!
For a mark of 4 or above the sampling method must be named correctly, justified and described explicitly. A discussion of anomalous data,

problems in collection, how bias might occur and how it is to be avoided are also required.

2.2.3 Strand 2a Analysis

T There was evidence to suggest that candidates used and interpreted scatter graphs more accurately than last year; but the poor use of spreadsheets continues to be an issue with weaker candidates - they would certainly do much better drawing diagrams by hand. Poor scales on scatter graphs often detract from work at Grade C and above.
The use of the equation function in EXCEL ensured that candidates were able to obtain the equation for the line of best fit for their data, but these were often not used to enrich the analysis of the work. Some candidates inappropriately related the gradient of the line to the strength of the correlation**.** Lines of best fit should only be drawn when appropriate.
Many candidates could draw box plots quite well but often did not make full use of the technique as they failed to use them to make obvious comparisons. Box plots need to have the same scales and be on the same page to be compared.

A mark of 7 and above was often awarded for work that was not worthy of such a mark. For marks above 6, a range of appropriate diagrams and graphs that conform to the 'A' grade criteria need to be produced. The justification for their choice must also be explained.
Often diagrams were not properly labelled or sensibly scaled. Sometimes diagrams were done for their own sake rather than to forward the work. This is understandable from lower ability candidates but not from those aspiring to high grades.

Cumulative frequency diagrams drawn for comparison, by many candidates, were from different sample sizes. Solving this problem with justification was an indicator for the award of higher marks. An 'A' grade candidate should also explain why they are using a cumulative frequency curve instead of a cumulative frequency step polygons or vice versa. Few candidates who used percentiles gave reasons for doing so.

Too generous or insufficient marks were often given for plotting histograms with unequal intervals. Candidates should state why they have chosen their class intervals. Histograms were often drawn that cried out for having a bell shaped curve drawn on them. This would have offered candidates an opportunity to explore the normal distribution.

2.2.4 Strand 2b Calculations

This strand is one which causes a lot of problems. All calculations must be justified and interpreted.

Some candidates did very little work that could gain marks in this section – tallies and adding cumulative frequencies was the limit. The lower ability candidates should be encouraged to show calculations of at least one average and measure of spread.

Many centres awarded credit for calculations, such as the standard deviation, which were then either not used, or used superficially. These “higher” calculations were rarely planned or justified e.g. why use the standard deviation in preference to the inter-quartile range?

ICT was not always helpful to the candidate in that they failed to use the resultant output. Providing a list of computer produced calculations which are not used is redundancy.

Occasionally teachers failed to notice calculations that were obviously wrong.

Equations of lines should be given no credit if there is no demonstration of how they can be used and Spearman is pointless if not interpreted in context.

Work done that is outside the specification is encouraged but it must be both relevant and correctly used. For example there must be a reason for using PMCC rather than Spearman’s rank correlation coefficient.

2.2.5 Strand 3 Interpretation

Most candidates were able to write down some kind of conclusion to their work. This was often a simple statement relating to their hypothesis. Some lower ability candidates were treated rather harshly as they were not given credit for these simple statistical statements.
Interpretation needs to refer back to strand 2 (providing evidence) and include reference to the original aims. Vague comments such as ‘no correlation’ should be avoided by better candidates unless then put into context.

Many candidates had been instructed to include comparative box plots in their work, but relatively few could make more than superficial comparisons of medians, and sometimes inter-quartile range.
Often a description of results was given without interpreting these in context. For a mark of 4 and above evidence, using such phrases as ‘which means.....’ or ‘which shows.....’ helps to show understanding in real world terms. Each technique needs interpretation as the coursework progresses.
Often candidates did not draw the work together in a final summary. An evaluation was often also missing. Few could evaluate the significance, or the limitations, of their conclusion(s).

Comparisons with published results were rarely seen.

2.3 CONCLUDING REMARKS

The most successful projects arose when candidates had some feeling of ownership and were not given a list of instructions. There was a great deal of evidence that even the most able candidates were not planning or working independently.

The readily acceptable source of Mayfield does restrict the opportunities to meet the coursework requirements in full and gain the elusive marks above 36.

Some candidates are still producing far more than is required. There is a large amount of redundancy at the top end, often under the pretence of studying separate ‘related’ hypotheses. Many diagrams are not being used or interpreted.

The specification requires the candidate to make a choice of techniques, justify their use and interpret the outcomes.

In a very few cases the hand writing was not legible and a good use of ICT and a word processor could have improved the readability of the work.

The best work continues to impress the moderators and the understanding of statistics by the candidates continues to improve.

Overall the work was well presented. Thank you.

4 STATISTICS

4.1 MARK RANGES AND AWARD OF GRADES

Unit/Component	Maximum Mark (Raw)	Mean Mark	Standard Deviation	% Contribution to Award
1389 / 1F	80	46.7	12.5	75
1389 / 1H	100	58.6	15.6	75
1389 / 02	40	20.7	6.0	25

4.2 GRADE BOUNDARIES

The table below gives the minimum raw marks required for each component grade

	Max	**A***	**A**	**B**	**C**	**D**	**E**	**F**	**G**
1F	80				**50**	41	32	**24**	16
1H	100	78	**63**	48	**34**	**23**			
02	40	30	**26**	22	**18**	**15**	13	**11**	9

4.3 OVERALL GRADE BOUNDARIES

The table below gives the minimum subject marks required for each overall grade.

	A*	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Foundatin				57	46	36	26	16
Higher	76	63	50	37	27			

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