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Examiners' Report June 2009

GCSE

GCSE Statistics 1389

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Publication Code – UG021724

June 2009

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1. PRINCIPAL EXAMINER'S REPORT – PAPER 1389/1F

1.1. GENERAL COMMENTS

1.1.1. The vast majority of candidates attempted all the questions.

1.1.2. Though hand writing remains an issue for many candidates there was a general improvement in the overall presentation of both written and graphical communication.

1.1.3. Candidates should be advised to write down all the figures on their calculator display and show all stages of their work. They should also pay close attention to the scale of axes when interpreting graphs - one square does not necessarily represent 1 unit.

1.1.4. When comparing distributions candidates should be advised to compare the medians and either the range, the inter-quartile range or the skew (referring specifically to these).

1.2. INDIVIDUAL QUESTIONS

1.2.1. Question A1

This question was generally answered well. In part (a), virtually all the candidates were able to read the table correctly. The most common correct answer here was Portland. In part (b), most candidates were able to complete the frequency table correctly using tallies and/or frequencies and then add the required frequencies to get the correct answer in part (c). A significant number of candidates used the frequency column in the table to work out the cumulative frequencies, but many of these were still able to get the correct answer in part (c). A common incorrect answer in part (c) was 4, which was awarded 1 mark.

1.2.2. Question A2

In part (a), only the best candidates were able to give a correct reason for why the graph could be misleading. The most common unacceptable answer here was that the horizontal axis was misleading because "it only shows two months (for each year)". In part (b), the majority of candidates were able to read the graph correctly to find an estimate for the missing point at March 2002. A common incorrect answer here was to write down the percentage at March 2003.

1.2.3. Question A3

In part (a), the majority of candidates were able to write down the mode from the frequency table. A common in correct answer here was 25, and answers of 3 or 7 were not uncommon. Part (b) was done well by virtually all the candidates. Part (c)(i) was not done well. Few candidates were able to identify the skew of the distribution as positive. By far the most common incorrect answer was negative,

which was often accompanied by some reference to correlation. A significant number of candidates were able to gain a mark in part (c)(ii) for a comment referring to the lines decreasing from left to right.

1.2.4. Question A4

This question was generally done well. The vast majority of candidates were able to interpret the choropleth map to find the correct regions. A common incorrect answer in part (b) was West Midlands and East Midlands.

1.2.5. Question A5

Part (a) was generally done well. The majority of candidates were able to interpret the stem and leaf diagram correctly to find the median pulse rate. Common incorrect answers here (in order of frequency) were 4 and 8. Part (b) was generally done better than part (a) with nearly three quarters of the candidates able to write down the mode of the pulse rates. A common incorrect answer here was 8. In Part (c), about three quarters of the candidates were able to work out correctly the mean pulse rate, but some candidates ignored the given information and attempted to add all the pulse rates in the stem and leaf diagram (usually incorrectly) before dividing by 27. A significant number of candidates thought that they needed to divide the 2295 by 6 to find the mean. In part (d) only the very best candidates were able to give a correct reason for why the mode is used to summarise the data. The most common unacceptable answers simply referred to the definition of the mode.

1.2.6. Question A6

Generally this question was not done well. In part (a), very few candidates were able use the random number table correctly to write down the required set of numbers. Common incorrect answers here were 5, 1, 1, 9, 5, 3 (very common) and 51, 19, 53, 84, 38, 63 (less common). In part (b), few candidates were able to explain how these random numbers could be used to obtain the sample. A common incorrect answer here was ‘give each person a random number and draw the numbers from a hat’. A significant number of candidates thought that they needed 60 numbers in the random number table- presumably one for each of the 60 people.

1.2.7. Question A7

In part (a), most candidates were able to score at least 1 mark for completing the table. A common incorrect answer here was 34 (instead of 32). In part (b), the vast majority of candidates were able to write down the probability that a woman will be chosen. Usually this answer was given as a fraction, but an answer given as a percentage or as a decimal was not uncommon. Part (c) was not done as well. Common incorrect answers here were 24/68 (very common) and 24/28 (less common).

1.2.8. Question B1

Part (a) was generally done well. The vast majority of candidates were able to read the table correctly to find the required life expectancy. The most common error here was 47.2. In part (b), the vast majority of candidates were able to score at least 1 mark for a correct comparison of the life expectancies of males and females at a single age. About 40% of candidates were able to score both marks for realising that females have a greater life expectancy (or equivalent) for all ages and/or years.

Part (c) was done well. About three quarters of the candidates were able to describe how the life expectancies for both males and females changed over the period and gave a sensible reason for this. By far the most common acceptable answer here was that it was due to medical advances and/or improvements in life style.

1.2.9. Question B2

Part (a) was generally done well. Over three quarters of the candidates were able to write down the correct probability (usually as a fraction). A relatively common incorrect answer here was 0.03- presumably obtained by rounding the answer on their calculator to 2 decimal places. Candidates should be advised to write down all the figures on their calculator display.

In part (b), the majority of candidates realised that they needed to use 1/10 and 1/20 to answer the question, but only the best knew that these should be multiplied and not added. Candidates adopting a tree diagram approach were generally more successful in this question.

1.2.10. Question B3

Generally this question was done well. In part (a), virtually all the candidates were able to complete the bar chart correctly. Some candidates misplaced the bar to the right but were not penalised. Part (b) was generally done well. Most were able to interpret the bar chart correctly to find the total number of repeat programs. A common incorrect answer here was 114, which if they showed their working generally scored 1 mark. Candidates should be advised to show all stages of their work. Part (c) was generally done well. About three quarters of the candidates were able to give two correct comparisons from the bar chart. The most common correct answer here was “BBC2 most and ITV1 least”. Some candidates only gave the number of repeat programmes for each of the channels and consequently did not provide any comparisons from the data.

1.2.11. Question B4

Part (a) was generally done well. Most candidates were able to give two reasons why the manager should take a sample rather than a census. The two most common correct answers here (in order of frequency) were cheaper and quicker. Relatively few candidates this year confused census with the National Census. In part (b), only the very best candidates were able to write down the name of the required sampling process. The most common incorrect answer here was systematic. Most candidates were able to score at least 1 mark in part (b)- usually for identifying Question 1 as a leading question, but only the best candidates were able to give acceptable criticisms for both Question 2 and Question 3. In Question 2 a common acceptable answer was to re-write the response boxes so that the intervals did not overlap. In part (d), only the beat candidates were able to give two reasons why the manager should do a pilot survey. By far the most common incorrect answer here was that it would be cheaper and easier- perhaps indicating a general confusion between a pilot survey and a sample.

1.2.12. Question B5

Part (a) was generally done well. Most candidates were able to identify point G as an outlier or to state the mark for each examination. Some candidates thought that the labels on the points referred to examination grades. In part (b), most candidates were able to describe the correlation as positive, and about a quarter could give an acceptable interpretation of what this meant in terms of the marks. Common acceptable answers here were “the higher the mark in mathematics the higher the mark in statistics” and “the students scored about the same in each examination”. In part (c), most candidates were able to plot the mean point and draw the line of best fit within the required tolerances, but a significant number of candidates did not realise that the line of best fit should pass through the mean point. In part (d)(i), a significant number of candidates had difficulty interpreting the vertical axes when reading off the mark for the Statistics exam from their line of best fit. Candidates should be advised to pay close attention to the scale axes when interpreting graphs- one square does not necessarily represent 1 unit. In part (d)(ii), many candidates were able to score a mark for suggesting that the estimate was accurate, but only the very best candidates could give a clear explanation for this.

1.2.13. Question B6

In part (a), just over half the candidates were able to correctly describe the trend in the number of soft drinks sold. Common incorrect answers here were “it goes up and down” (clearly indicating a lack of understanding of the word trend), and “positive correlation” (clearly indicating a lack of understanding of the meaning of correlation). In part (b), only the very best were able to work out the required seasonal variation. A common incorrect answer for the small

number of candidates that were able to identify the values 200 and 225 was 25. Part (c) was generally done well. Many candidates were able to identify the third quarter and give a sensible reason for why the sales were highest in this quarter- "it is summer" being the most common correct answer. A small number of candidates identified the third quarter of 2006 as being the highest, but many of these were able to score the mark for a sensible reason for this.

1.2.14. Question B7

In part (a), about three quarters of the candidates were able to write down the correct median from the box plot. A common incorrect answer here was 234. In part (b), only the very best candidates were able to work out the inter-quartile range of the data. A significant number of candidates using the lower and upper quartiles 226 and 245 simply found the average of these numbers. A common incorrect answer here was 36 (i.e. the range of the data). Part (c) was generally done well. Most candidates were able to score 1 or 2 marks for drawing the required box plot- the loss of marks for a significant number of candidates was due to the inaccurate interpretation of the scale. Part (d) was not done well. When comparing distributions candidates should be advised to compare the medians and either the range, the inter-quartile range or the skew (referring specifically to these). Common unacceptable answers here were "Bramleys are heavier than Granny Smiths" and "Granny Smiths have a bigger distribution". In part (e), only the best candidates were able to both identify the Bramley apples as having the smaller variation in weight and give an acceptable statistical reason for this. Some thought that the cost of the apples was an important factor here.

1.2.15. Question B8

Part (a) was not done well. A significant number of candidates did not realise that the total cumulative frequency for the data was 200, and consequently halved the vertical axis to incorrectly find the median at 125. Similarly in part (b), many candidates quartered the vertical axis to incorrectly find the upper and lower quartiles at 62.5 and 187.5. Here, as elsewhere, a significant number of candidates incorrectly interpreted the horizontal scale to find correctly the required estimates for these values. In part (c), only the best candidates were able to use the cumulative frequency diagram to give an acceptable comparison of Justin's pocket money. Common incorrect answers here were "he got about the same as everyone else" and "he got the median amount".

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

2.1. GENERAL COMMENTS

2.1.1. The paper seemed to be accessible to most students and most had ample time to complete all the questions.

2.1.2. Poor handwriting continued to present problems and a number of students had difficulty in writing down clearly the information they wished to convey.

2.1.3. Some areas such as standardised scores and index numbers showed a marked improvement over previous years. Other areas such as the binomial and comparing box plots, where even able students failed to use statistical language were disappointing.

2.1.4. A minority of students did not carefully read the question and lost easy marks.

2.2. INDIVIDUAL QUESTIONS

2.2.1. Question A1

In part (a) most candidates produced a good answer. The main error was references to numbers or percentages being absent.

In part (b) there were many correct answers here. Those that did lose marks here generally did so due to premature rounding.

2.2.2. Question A2

There were very few errors in part (a) and (b). Those that did appear were usually due to carelessness.

In part (c) most candidates have been taught to make sufficient comparisons to get two marks although some only gave one comparison. A number of candidates wrote far more than required. Those that lost both marks usually did so because they just wrote a list of numbers without making direct comparisons.

2.2.3. Question A3

This question was very badly done. Few candidates understood that they needed 6 numbers between 0 and 59. Those that did manage to get full marks for part (a) could often do part (b).

Common incorrect answers in part (a) gave single digit numbers e.g. 5, 1, 1, 9, 5, 3. Other answers involved taking every 10th single digit. Some candidates managed to master the idea of double digits but then did not eliminate the numbers that were too large. Some candidates said the question could not be done as there were not 60 numbers.

In part (b) a few candidates managed to get one mark for numbering the people but got no further. They often then went on to say 'put the numbers in a hat' or 'use RAN on the calculator'. They did not fully make the connection between this part and part (a). They did not take in the meaning of the expression 'these numbers'.

2.2.4. Question A4

This question was done well by all candidates. Some candidates lost the mark in part a because they did not read directly from the table. They gave the answer 81.3 (51.3 + 30).

2.2.5. Question A5

Although a large number of candidates were able to identify the two main features, ie the increasing trend and the jump in 2000, many only wrote one of these and some wrote a year by year description failing to recognise the importance of identifying trends in time sequence data.

In part (b) a large number of candidates failed to utilise the units of scale of the graph and used hundreds, thousands or millions.

The majority of candidates when doing part (c) realised that their prediction was unreliable but many found it difficult to express an acceptable reason. It was good to see extrapolation mentioned by some and descriptions such as 'outside the data' also appeared. A large number referred to the possibility of another jump as in 2000. A common error was to believe that if a point was on a 'line of best fit'(sic) then it must be right.

2.2.6. Question A6

This question was done very well by a few but most candidates failed to get any marks.

The common error was to write the answer as a fraction. 2/3 was common. Occasionally in part (c) candidates did get some idea of what was required but put 8/20 instead of 8.

2.2.7. Question A7

A number of candidates in part (a) knew that they had to substitute the numbers 52, 65 and 10 but a sizeable minority confused x and μ and so gave an answer of 1.3 instead of -1.3. Others divided by 65.

Whilst in part (b) a substantial majority of candidates followed through correctly and identified the correct examination mark as better but all too often lost the final mark of the question by stating 'closer to the mean' or 'close to zero' rather than 'higher'.

2.2.8. Question A8

It was clear that a sizeable minority of candidates in part (a) were well practised in questions of this type and produced clear and accurate solutions. Others seemed to have difficulties, including identifying the midpoints (or indeed whether using the midpoint was necessary) and/or that the divisor should be 50.Some candidates wrote down an answer of 42 without showing any working. It is possible that this solution was reached on a calculator but by rounding with no working there were unable to achieve any marks.

There were a number of errors made in part (b) of the question. Many candidates had no idea of how to substitute into the equation for the standard deviation. Many ignored the square root sign even though the whole equation is given at the front of the paper.

Some candidates did not carry forward their mean and either recalculated or provided a spurious number -often this was √91367/50.

2.2.9. Question B1

Although the majority of candidates scored well in part (a) of the question, some wrote the reasons why a census should not be carried out without making clear that they were referring to a census and so failed to attain 2 straightforward marks.

In part (b) most candidates identified that a stratified sample was appropriate. However, a sizeable minority suggested a variety of other sampling methods including quota and systematic.

A high proportion of the candidates identified that the first question was biased, leading or open in part (c). The majority were also able to see the overlap between the ranges of cost presented but this was missed by many. The third question provided a variety of answers with some missing the fact that this was an open question.

Part (d) some candidates confused a pilot study with a sample and others thought that the purpose was to find errors such as spelling mistakes.

2.2.10. Question B2

In part (a) nearly all candidates were able to plot the points correctly. Occasional errors appeared to be the consequence of forgetting the different scales on the x and y axes.

It was quite common in part (b) for candidates to obtain one of the two available marks. They either identified negative correlation or gave a contextual description. Occasionally negative correlation was stated with a contextual description of positive correlation.

Part (c) a substantial majority correctly drew a line of best fit through their plotted points. However, some drew wildly inaccurate lines that passed through only one or two of the points or even missed them completely. Occasionally they drew lines that went through no points and were in the opposite direction.

During part (d) nearly all candidates were able to read off the value from their line of best fit, the main error being using the scale correctly.

In part (e) too many candidates thought it sufficient to state that 'it followed the trend line'. Only a few used the word interpolation, although many more were able to describe this by stating that there were points either side or similar phrases.

Very few candidates were able to answer part (f) correctly. Those that made a sensible attempt tended to expand upon their answer to part (b) by including the word gradient. It seemed that candidates did not understand the word 'practical'. They thought that meant so much along and so much up – not a contextual answer.

2.2.11. Question B3

Nearly all candidates at part (a) were able to attain one mark with most being awarded both of the available marks. There were an appreciable number who believed that some data on the internet was fake or deliberately misleading. Perhaps this scepticism of unregulated information is wise. In part (b) candidates that ranked their data were usually able to make a sensible attempt at substituting into the Spearman's rank correlation coefficient formula. Some used n=14 and others squared their value of d^2. There were however some strange methods of completing the available columns on the table with numbers being multiplied, divided etc.

At part (c) most candidates with a sensible value for the correlation coefficient were able to state that this meant that that the data was positively (negatively if they got their answer to b as negative) correlated. Far fewer were able to place this on the context of the question.

2.2.12. Question B4

Part (a) of the question was generally answered well. A few candidates attempted to enter multiple column bar charts into the spaces provided. Others overlapped the sections so that they did not fill 100% of the composite bars.

Although in part (b) the majority stated that Bill was wrong there were a significant number that stated he was right, often giving the reason that the first percentage was larger than the second. Of those

that gave the correct answer, many did not perform the calculations so failed to attain the second mark.

Some students in part (c) did not attempt this question and others used an entirely incorrect method. Common errors among those making a sensible attempt were forgetting to multiply by 100, creating an index from the base year in each case, inverting the calculations and rounding incorrectly.

In part (d) only a minority of students were able to attempt a geometric mean and many of those that did made errors in calculation.

As most students had either no answer to part (d) or a totally inaccurate one few were able to make a sensible interpretation. Most of those realised that there was an increase at part (e) but far fewer were able to state the amount of this increase.

2.2.13. Question B5

The majority of candidates got full marks for part (a) of the question. Candidates seemed to find part (b) of the question difficult. Parts of the method were applied at random. The number of them that multiplied the IQR by 1.5 was small and many of these then added 10.5 to the median. Many candidates appeared to have 'guessed' without showing any working and often included 47 along with 54 and 58.

In part (c) nearly all of the candidates drew an accurate box plot with the quartiles in the correct positions. However, the majority of these then drew an incorrect upper whisker and did not plot the outliers.

While at part (d) few candidates achieved full marks for this question. Too many referred to spread rather than the range or IQR. Those who considered the range omitted the outliers of the female swimmers in their considerations and so believed that males had the larger range. Some of those who had seen that the medians were the same referred to these as means. The number that noted that both distributions had positive skew was disappointingly low.

2.2.14. Question B6

Most candidates obtained the one mark available at part (a). The majority of these gave 'time consuming' as the reason and the other reasons were given by a small number. There were a few candidates who thought that the 'packet' referred to the empty packet and so found this difficult to answer.

In part (c) any candidates used the mean ± 2 s.d. i.e. 1520 ± 8 and achieved a correct solution, although a few made slips when calculating 1520 – 8. There were a small number of candidates who

tried to calculate a standard deviation from the sample given in part (d).

In part (e) many candidates wrote down an action but provided no justification for their answer. A few again tried to calculate the standard deviation of the sample. Those that calculated the correct value of mean ± 3 s.d. usually also gave a correct action with some clearly stating that another sample should be taken as the mean was between the 'warning' value and the 'action' value.

A number decided that no action needed to be taken since 1529 was within the allowable limits – this was given the comment mark.

A number of candidates commented incorrectly on the various sizes of the sample.

2.2.15. Question B7

In part (a) most candidates placed 9/10 in the correct position but some candidates were unable to place the second set of 1/5 and 4/5 in the correct positions.

Par (b) the majority of candidates identified that the fractions 1/10 and 1/5 should be used but many attempted to add these and of those that correctly attempted to multiply, there were many erroneous solutions, including 2/50 and 2/15.

Few candidates obtained full marks for at part (c) for this question. A number realised that the fractions ¼ and ¾ were involved but either calculated only one of the required elements or a variation of one or more of these. Only the very best candidates managed to get right through to a correct answer.

3. PRINCIPAL EXAMINER'S REPORT – COURSEWORK 1389/02

3.1. GENERAL COMMENTS

3.1.1. The majority of centres had followed the instructions sent out by Edexcel and coursework arrived with the moderators on time and in some cases early which was very helpful. Work which does not arrive until after the closing date causes problems and additional work.

3.1.2. A few centres are still not including the work of the highest and lowest scoring candidates, this is needed in order to draw the regression lines against which all of the work is moderated. Most of the work was well organised but there were still a few centres who had not checked that the marks on the candidate record forms matched those submitted on the OPTEMS.

3.1.3. A few centres used the marking criteria and record forms for the new Controlled Assessment which caused problems. Centres are asked to ensure that they use the Candidate Record Forms and Assessment Criteria for the current 1389 specification. A number of centres sent all copies of the OPTEMS forms to the moderator. The top copy should be sent to the Edexcel address shown on the form.

3.1.4. The Candidate Record Forms were in most cases signed as requested but centres are advised that these will be removed by the moderator and they should ensure that the candidates name, candidate number and the centre number are written on the front of the actual project.

3.1.5. Edexcel provides plastic sacks for the packaging of coursework and these are more weatherproof than brown paper. It is helpful to moderators if parcels are tied together with string or at least labelled as parcel 1 of 2 if more than 1 parcel is sent. They can get separated when a moderator is dealing with a large number of packages.

Many schools continue to use plastic wallets often in conjunction with staples, treasury tags etc. Moderators prefer treasury or string to secure coursework. Plastic wallets add to the time taken by moderators and to postage costs. Loose sheets secured only by paperclips are not recommended.

A big thank you to the centres who took the trouble to arrange the work in candidate order. This is a big time saver.

3.2. MARKING

Internal moderation was effective in ensuring consistency within many centres. Many of the best centres provided assessment grids which were helpful in the moderation process.

Annotation is very useful in helping moderators to agree a centre's marks. There was a significant minority of centres that were too harsh on the lower end of their marking and were too lenient with those achieving higher marks.

3.3. PRESENTATION

Candidates should be reminded that the organisation and presentation of their work is important if they are to achieve their full potential. The higher marks for planning will not be awarded to work which is not well organised.

Candidates with illegible handwriting should be encouraged to word process their coursework. Pages should be numbered and fastened in the correct order.

Raw data should be placed in an appendix.

3.4. CHOICE OF PROJECT

3.4.1. The most popular projects continue to be Mayfield High and Cars. A few centres opted for an in house project where they collected their own data, a common one in this category being reaction times.

3.4.2. A number of centres appear to have encouraged many of their pupils to follow exactly the same route through the tasks. This does limit the marks available for planning and led to candidates using techniques which they did not fully understand and were unable to apply correctly.

3.4.3. Centres should guide the better pupils towards investigating hypotheses, which would lead to higher level analyses. Many candidates did much more work than necessary to achieve their mark, with a lot of additional effort for no added benefit. Typically they would repeat the same skill several times.

3.4.4. Centres should be reminded that the project should not be a series of disjointed investigations to exhibit a range of techniques. The better marks are gained for planning to investigate a single main hypothesis, considering the different factors that may have an effect and then drawing their evidence together in a coherent conclusion.

3.4.5. Planning usually lacked sufficient reasoning for specific techniques.

3.5. Strand 1a) Planning

Most centres had encouraged candidates to express clear aims and to choose appropriate diagrams and calculations. The better candidates were able to describe what they expected to find from their techniques. Often, centres over marked the planning stage because candidates only made cursory references to things like outliers, techniques planned and any sampling methods chosen. A list of techniques or sampling methods without justification is not worthy of 3 marks. Text book lists of definitions are also of little value. To gain a mark of 4 or above and the subsequent 'A' grade marks in strand 2 the candidate must plan justify and explain techniques of 'A' grade standard.

The source of the data should be stated by all candidates and its integrity questioned by the better ones.

Marking in strands 1a and 1b continues to be very generous. It is insufficient for candidates to say my sample isn't biased without justifying the statement, or to give a list of text book definitions to indicate that a variety of sampling regimes have been considered.

3.6. Strand 1b) Data Collection

Many candidates failed to include enough detail about how exactly they were collecting their data.

There is no requirement to used stratified sampling but if it is used it must be fully explained and justified. It should be noted that stratified sampling should be used to ensure the sample is representative of the population NOT in order to compare between the strata which is the most common misconception.

Where a stratified sample is taken it is necessary for the strata to be combined when used. Many candidates used very small sub samples as a result of inappropriate stratified sampling. Many candidates who compared between strata used samples which were too small without any comment.

Candidates often did not explain how they planned to do their random sampling.

Anomalous data must be discussed in detail to access the higher marks.

3.7. Strand 2a) Analysis, Presentations and Diagrams

This was probably the strongest area for most candidates with most scoring at least 4 of the available marks however to achieve full credit the techniques must be planned and justified in strand 1. Teachers were clearly encouraging candidates to focus on relevant and meaningful diagrams, with most providing some analysis on or after each diagram. It was less common however, for the candidates to compare results from the different strata for each set of similar diagrams either here or later in their overall conclusions.

The use of ICT is to be encouraged but a full understanding must be shown in the commentary provided by the candidate.

The quality of presentation of work varies a lot between centres and candidates. Some miss off scales, others don't seem to own a ruler or a pencil, while some still think a bar graph is a histogram, even though the vertical axis clearly states frequency.

Large numbers used comparative box plots effectively (although some missed labels or units), but many failed to compare IQR and very few took the opportunity to refer to skew. Some centres had many students referring to skew in the wrong direction. There was a tendency for centres to be generous in awarding a mark of 7 or 8 upon the mere mention of skew without setting it in context or analysing it in any quantitative way. The indication of outlier boundaries was not much in evidence.

Lines of best fit were often added to scatter diagrams when there was no evidence of correlation. Many candidates think that drawing a line will show if there is correlation, rather than adding a line to approximate a relationship having established that there is correlation.

Histograms were a problem. Bar charts with gaps and bar charts with the vertical axis showing frequency were called histograms. Few candidates who did variable width histograms explained why they were doing them or why the groups were of variable width.

There were some extremely good presentations of Normal Curves superimposed on histograms with an excellent explanation.

3.8. Strand 2b) Calculations

Most centres used IT well, but must remember that statistics produced on Autograph need to be printed only when relevant.

Some candidates used scatter graphs alone and showed no calculations at all. Centres should encourage candidates to plan hypotheses so that a variety of appropriate graphs and calculations can be used in the project.

A mark of 1 may be awarded in this strand if a candidate has used relevant data to produce a scale on a diagram.

Credit can only be given for skills correctly and appropriately applied with adequate justification and from which suitable conclusions are drawn.

Many candidates calculated Spearman's rank correlation but didn't use it. There was very little in the way of justifying a choice to use the Product Moment Correlation Coefficient instead of Spearmans giving it no additional value.

Some of the better candidates were able to use standard deviation with the Normal Distribution and fit their distributions to the curves, commenting on the inclusion or otherwise of outliers, and skew. A small minority of candidates had incorrect calculations, and a number had used the spreadsheet functions on the computer to do the calculations.

Centres need to warn candidates that if distributions are skewed then finding the mean and standard deviation is inappropriate.

3.9. Strand 3) Interpretation

The quality of the conclusion was varied and usually reflected the level of difficulty of the project being tackled. There were a few candidates who produced comment free work, and some who seemed to be able to make conclusions without evidence.

For the more average and less able candidates this was often the weakest part of their project, but in most cases candidates were able to relate their findings to the original inquiry with many scoring 4 marks for correctly interpreting correlation and what it meant in their project.

Grade 'C' candidates often failed to interpret, a candidate might correctly observe that 'the IQR for male heights was larger than that for females', but then failed to interpret that this meant the females were more consistent or males more variable.

Many candidates made an attempt to deal with outliers although many did not show an appreciation of the effect of including or excluding them. A number of candidates assumed that they were a measure of accuracy of the data without considering whether they could be a real feature.

For the higher level marks evaluation is essential and candidates need to discuss the limitations and significance of their work.

4. STATISTICS

4.1. MARK RANGES AND AWARD OF GRADE

Unit/Component	Maximum Mark (Raw)	Mean Mark	Standard Deviation	% Contribution to Award
1389/1F	80	45.5	11.8	75
1389/1H	100	59.3	17.4	75
1389/02	40	20.8	5.5	25

4.2. GRADE BOUNDARIES

The table below gives the lowest raw marks for the award of the stated uniform marks (UMS).

	Max	**A***	**A**	**B**	**C**	**D**	**E**	**F**	**G**
1F	80				**50**	41	32	**24**	16
1H	100	80	**65**	50	**36**	**26**	21		
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**
Foundation				57	47	37	27	17
Higher	79	65	51	38	29	24		

Publication Code: UG 021724
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