

KEY SKILLS APPLICATION OF NUMBER (JUNE SERIES) 2006

Chief Examiner's Report

Level 3

The comments in the first sections of this report are identical to those made in May 2006 however I feel that they are relevant enough to repeat, also being aware that different centres have used the two series.

"I really am sorry that you had to mark this. All my other subjects have nothing to do with maths at all..... and I'm not very good at it anyway.

I totally forgot everything that I learnt at GCSE. I'm actually very sorry for wasting your time."

Application of Number candidate – May 2006

Examiners find little notes on candidate's work from time to time. However, this plaintive apology struck a chord as it seemed to reflect the performance of so many candidates in this series. Few candidates were well prepared for this test and for many of them it must have been a disheartening experience. It is my belief that this should not be so, and so I begin with the comments below.

Firstly, it is sad that no-one appears to have helped this candidate make the links that should be inherent in Application of Number, to their lives and to their courses for example:

- Which academic subject does not use statistics in collecting and analysing information? If not, why not?
- What skills are needed to check costings – in household bills, in estimates for building work, etc? In what contexts will students make financial decisions?
- How many will never go on a foreign holiday?
- What is the basis for decisions about effectiveness or efficiency in many commercial settings? Even in education, we are all aware how we are surrounded by statistical analyses.
- How is information presented in reports and journals?
- How can one tell if the answer produced by the 'magic box' – calculator or computer – is sensible?
- Can I rely on someone else's interpretation of a plan or a graph?

The students of English or History may not see an immediate link to their curriculum subjects though they are often there, but they live in a real world and will be moving out into real occupations where numerate skills cannot be ignored. The candidates doing Level 3 are presumably those who expect to progress into supervisory or management positions: there are few who are operating in such roles that are not required to use numerate (and not just statistical) skills.

Secondly, it appears that some candidates are being expected to perform well on the basis of previous knowledge and with little if any preparation or practice of the tests. The performance varied with centre, but many exhibited major weaknesses in their knowledge and use of number skills.

It is often suggested that the papers are difficult. I would agree that some sections contain complex information. In some cases excessively so but this is Level 3! As in any paper there is a range of difficulty, but most of the required knowledge is within GCSE Mathematics, even at Intermediate level.

On the other hand this test has very different requirements to GCSE Mathematics; even if the candidate quoted had remembered everything (s)/he knew from GCSE, it might not have been enough. Too often, candidates show a lack of skills and knowledge in the number skills relevant to everyday life and in topics which have regularly featured in previous papers, for example:

- Time is not decimal!
- Calculations using simple proportion. Often, in these questions, their poor presentation of the processes causes more confusion to the candidates than the question has!
- Changing between everyday metric units eg even as simple as centimetres to metres.
- Using and interpreting a scale drawing.
- It is appalling to see that a substantial number of candidates think that the only angle between 0° and 90° is 45° , despite clear evidence that the angle cannot be 45° .
- Use of percentages.
- Setting up and solving 2×2 simultaneous equations (We know that these are not a common everyday application but they have been common in the tests!).
- There are some centres where no candidates knew what a histogram is (May paper), or where to plot the points for a cumulative frequency graph (June paper). Neither of these should be a surprise; they have appeared repeatedly.
- The concept of continuous data seems to be foreign to many candidates as they ignore it, both in drawing graphs and in calculations.
- Finding statistical measures for continuous data: mean, mode, median and interquartile range. No candidate should be answering that they have chosen the mean 'because it is the average' or 'because it is more accurate'.
- Working accurately.
- Dealing with large or small numbers (using a calculator of course!). It appears that many candidates have difficulty in any calculation on a calculator which goes beyond the four rules ie calculations involving BODMAS, powers, roots etc.
- Some candidates seem to think that they will get a mark for a single step calculation (even at Level 2, it usually requires a calculation of more than two steps to earn a mark!). A multi-stage calculation will normally be required to earn a mark at Level 3. This may include choosing suitable accuracy or units. A small number of candidates seem to think that they need only write down answers.

While candidates cannot be prepared for all the contexts in which Application of Number may be encountered, it should be possible to ensure that their skills are developed so that the test is a challenging but manageable culmination of a relevant course.

The June paper had a more familiar range of contexts for the questions, with which candidates seemed more comfortable. Candidates competent in topics such as those listed in the comments above moved easily beyond the pass mark. However a substantial number of candidates were struggling to show skills to earn more than the 'odd' mark here or there, rather than completing blocks of work.

Candidates need to be continually reminded that part marks and 'follow through' marks can only be awarded when steps are shown.

Some issues specific to this paper:

- Q.1 (a) Generally well answered but surprisingly many could not work correctly through the data to a correct final answer.
- (b) Fewer could work with the standard form figures and not all understand the concept of producing a simple fraction to make the comparison.
- Q.2 (a) Many correct calculations. All candidates should be aware that money should be written to two (not one!) decimal places.
- (b) With the use of factors for each percentage change, this calculation is straightforward. Many candidates confused themselves by having a large number of steps without clear presentation.
- (c) & (d) This question is not complicated mathematically, but many candidates' responses show their inability to 'control' the steps, which calculation to do for each step and a failure to 'control' units eg is it pence or pounds? I feel that this relates closely to the comments made in the introduction above about presentation.
- (e) Once again issues about using simple proportion and working in standard form.
- Q.3 (a) There is quite a lot of information in this question; the lack of skill in breaking down the data and using it in the correct order and with the correct operations is the largest problem for many candidates. A further complication is lack of knowledge of area formulae; even some candidates using the wrong formula for the area of a rectangle!
- (b) This should be a simple application of Pythagoras' theorem for a Level 3 candidate, but they do need some experience in interpreting three dimensional objects.
- (c), (d) & (e) Few candidates formed and solved these simultaneous equations with confidence. The mark for (e) cannot be given unless substitution is seen in (d).
- Q.4 (a) The combination of scaling and area (or volume) has caused problems before. **The scaling should precede the area calculation.** Candidates need to know what units are in use at all stages of a calculation.
- (b) I felt this question was difficult to understand, but a substantial number of candidates recognised the need to use trigonometry; some did not choose the correct ratio.

- (c) Another example with proportion. It may be presented in different ways, but as so often in these questions, many candidates do not 'present' their steps and so get themselves lost.
 - (d) As usual with repeated percentage change, those who use a factor for the percentage change mostly produce correct answers.
- Q.5
- (a) The techniques in this question should be familiar to candidates. There were many mistakes in substituting into the formula, evaluating the value inside the bracket or then the power. Few reached the stage of having a simple linear equation, and of these, many could not evaluate an accurate answer (because they had a long decimal on the calculator and needed to divide by it?).
 - (b) This is basically a straightforward use of ratio. Some could not do the work with ratios. Others found the correct charities' total but could not link it with the information coming from part (a).
- Q.6
- (a) This seemed a straightforward question; however, many candidates continue to look at particular values rather than overall patterns.
 - (b) & (c) The graph requires a title and **continuous** scales labelled with units – call waiting time (in seconds) is the independent variable. The cumulative frequency value must be plotted at the **end** of the interval. Most candidates ignored one or both of these fundamentals. Consequently it is difficult to answer (c) correctly!
 - (d) Many candidates struggled with the use of ratio/proportion and units.
 - (e) This ought to be a standard procedure for Level 3 candidates. Sadly many are still unable to find the mean from a grouped frequency table. Note that for these intervals the correct mid-interval values are 50.5, 150.5 etc.
 - (f) Many candidates did not use all the data, or failed to 'control' the units as their presentation was poor.

I would again encourage the use of the wide range of question papers and mark schemes to provide candidates with a better understanding of the standard of performance needed to achieve complete marks at this level. Many candidates are doing little bits of work which earn no credit.