



General Certificate of Secondary Education

Mathematics 4301

Specification A

Coursework

Moderators' Report

2008 examination – June series

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Specification A

Coursework

The standard of work presented in this session was similar to that of previous sessions. A small but significant number of centres still had difficulties with their administration especially submitting work on time or failing to complete information on the candidate record forms.

The majority of candidates were able to display their knowledge and understanding of the task set but some were disadvantaged by a lack of understanding about how the coursework would be assessed so their writing was not prepared for this. Similarly, some centres submitted inappropriate tasks or offered work that did not easily allow the criteria to be met. In a growing number of centres, the work followed a formulistic approach raising questions about the authenticity of the work. As in previous years, such work was identified so that centres were asked to confirm the authenticity of the work and explain similarities.

Centres are, again, reminded to encourage candidates to show all their working as it is the candidates' responsibility to communicate their thinking throughout the work. Moderators and examiners cannot be expected to credit work where candidates do not communicate their mathematical/statistical thinking.

Administration

Most centres were sufficiently well organised although a number of centres failed to meet the AQA-set deadlines for the submission of coursework. Some centres did not use the latest Candidate Record Forms or else failed to complete all the required information on these forms, especially information such as centre and candidate numbers.

Teacher and candidate authentications are essential to confirm that the work is the candidate's own. Authenticating the work was problematic in some centres resulting in work having to be returned and authentications sought, thus slowing down the process and reducing the time available to moderators and examiners.

Centres are reminded that:

- *Deadline dates are not optional and should be adhered to except in special circumstances with the agreement of AQA*
- *All work submitted must be authenticated by the teacher/lecturer and the candidate - arrangements may need to be made to ensure that this happens*
- *Sufficient work must be undertaken under the direct supervision of a teacher/lecturer for the work to be confidently authenticated*
- *Task starters and/or any other material used (for example writing frames, help sheets or marking schemes) should be forwarded with the coursework for information*
- *Centres devising their own assessment criteria for Option T should ensure that these criteria are specifically referenced and linked to the original coursework criteria*
- *Coursework presented should be sequenced with page numbers and should identify candidate details on each page*
- *The use of plastic wallets and elaborate folders to contain coursework is actively discouraged and treasury tags should be used to bind work together.*

The following comments are offered under each of the three strands for the using & applying (AO1) task.

1 Making and monitoring decisions to solve problems

This strand is about deciding what needs to be done, then doing it. The strand requires candidates to select an appropriate approach, obtain information and introduce their own questions which develop the task further. For the higher marks candidates need to analyse alternative mathematical approaches and apply, independently and extensively, a range of appropriate techniques.

2 Communicating mathematically

This strand is about communicating what is being done using words, tables, diagrams and symbols. Candidates should consider the appropriateness of their chosen presentation and amend this as necessary. For the higher marks candidates will need to use mathematical symbols accurately, concisely and efficiently in presenting a reasoned argument.

3 Developing skills of mathematical reasoning

This strand is about testing, explaining and justifying what has been done and requires the candidate to search for patterns and provide generalisations. Generalisations should then be tested, justified and explained. For the higher marks candidates will need to provide a sophisticated and rigorous justification, argument or proof considering the conditions under which it remains valid.

The following additional comments from moderators' and examiners' reports might be useful to centres in preparing candidates for the using and applying mathematics coursework.

Making and monitoring decisions to solve problems

- *An award of mark 5 can only be given where the task is independently extended beyond the original problem set*
- *The pulling together of work for an award of mark 6 should be convincing and presented at a level commensurate with grade B work*
- *An award of mark 7 can only be given where the candidate co-ordinates three features or variables at a level commensurate with grade A work*
- *The award of mark 7 requires that the candidate is working confidently with three variables rather than just introducing a third variable*
- *An award of mark 8 is appropriate where a candidate explores a task **extensively** and **independently**.....similar work is unlikely to be independent.*

Communicating mathematically

- *An award of mark 4 requires candidates to consider their representations (tables or graphs) and make some appropriate and correct comment*
- *An award of mark 5 can only be given (as best fit) where candidates make use of algebra rather than simply making an algebraic statement. For example, substitution into the candidates' own derived formula might be sufficient to suggest mark 5*
- *An award of mark 6 can only be given where candidates demonstrate **sustained** evidence of correct and convincing algebraic manipulation, factorisation or transposition at a level commensurate with grade B work*
- *The use of algebra for proving and justifying must be accurate and convincing. Missing brackets and misplaced negative signs are not indicative of grade B work*
- *Pattern spotting is not a higher level technique and an algebraic approach to the work is necessary for the higher marks.*

Developing skills of mathematical reasoning

- *An award of mark 3 is appropriate where a candidate offers such a generalisation even if the generalisation is in words.*
- *Testing should be undertaken on a candidate's own generalisations and make use of new data with a comment to say whether the test works or not.*
- *An award of mark 5 can only be given where candidates justify (ie, prove) why a generalisation works.....repeated numerical substitution does not constitute a proof.*
- *Justifications must be properly introduced to explain 'why' the generalisation works. Many justifications offered lacked sufficient detail for the award to be given.*
- *The inclusion of an algebraic formula such as $t = g(l-1)(w-1)$ is not usually indicative of mark 7 without further supportive work.*

- *An award of mark 7 under this strand can only be given where strand 1 has been awarded a mark of 7 or 8.*
- *An award of mark 8 would usually require the candidate to give some consideration to the conditions under which their proof remains valid.*

The following comments are offered under each of the three strands for the handling data (AO4) task.

1 Specifying the problem and planning

This strand is about choosing a problem and deciding and planning what needs to be done. The strand requires the candidate to provide clear aims, consider the collection of data (sample size and sample method), identify practical problems and explain how they might overcome them. For the higher marks, candidates need to decide upon a suitable sampling method, explain what steps were taken to avoid possible bias and provide a well-structured report.

2 Collecting, processing and representing the data

This strand is about collecting data and using appropriate statistical techniques and calculations to process and represent the data. Diagrams should be appropriate and calculations (mostly) correct. For the higher marks, candidates need to accurately use statistical techniques and calculations from the Higher tier GCSE Mathematics specification content giving reasons for their inclusion.

3 Interpreting and discussing the results

This strand is about commenting, summarising and interpreting data. The discussion should link back to the original problem and provide an honest evaluation (strengths and weaknesses) of the work as a whole. For the higher marks, candidates need to provide sophisticated and rigorous interpretations of their data and provide an analysis of how significant their findings are.

The following additional comments from moderators' and examiners' reports might be useful to centres in preparing candidates for the handling data coursework.

Specifying the problem and planning

- *Greater consideration needs to be given to sampling and why, for example, 30 people or 100 words might be an appropriate sample size*
- *Insufficient detail was often given of how the sampling was actually undertaken in order to avoid bias and ensure that the sample was truly representative*
- *The best hypotheses are generic and easily allowed candidates the opportunity of refining, extending and developing their work*
- *An award of mark 5 can only be given if the task is substantial and developed beyond the original task at a level commensurate with grade C*
- *Databases, where used, should be sufficiently large to allow sampling to take place and provide a variety of possible extensions to the original task*
- *For the higher marks, work requires careful specification and evidence of extensive, independent thought.*
- *Candidates should be encouraged to make greater use of pilot surveys, control groups and pre-testing as appropriate to the task.*

Collecting, processing and representing the data

- *Calculations and representations need to be considered for their relevance to the problem as statistics for the sake of statistics gains few marks*
- *Statistical representations and calculations add little to the task unless their inclusion is explained and the outcomes interpreted*
- *Candidates should appreciate the purposes of different representations. For example, measures of spread are not appropriate to words lengths in a sentence*
- *Calculations and representations should be accurate and suitable for their purpose to provide useful information to support the hypothesis*
- *Cumulative frequency diagrams are most appropriate for continuous and/or grouped data*

- *Techniques such as standard deviation and rank correlation are not indicators for the higher marks unless they are appropriate, explained and interpreted.*

Interpreting and discussing the results

- *Suggestions that the hypothesis is proven or not proven need to be backed up and explained using evidence from the candidate's own work*
- *Candidates are now showing evidence of evaluating their strategy focussing on each aspect of their work*
- *Simplistic evaluations such as those suggesting the use of a bigger sample need to explain why or else consider other possible areas for improvement*
- *Comments on representations and calculations were too often descriptive, eg "the distribution is negatively skewed" without interpreting this in terms of the hypothesis*
- *For the higher marks, candidates must recognise possible limitations to their strategies.*

Further support

Additional support is provided through the AQA network of coursework advisers who are assigned to each AQA centre. Further details about coursework advisers can be obtained by contacting the AQA (Manchester) office.

Option T – Teacher-Assessed

The tasks set were mostly appropriate and allowed candidates to make some progress against the assessment criteria. AQA-set tasks were still popular especially *Number Grid* and the *Spacers* task, with *Read All About It* a particular favourite for many centres. However, centres made use of a wider range of tasks including personal statistics presented in databases and the *Where in the World* task which offered many opportunities for candidates to pursue cross-curricular work with geography and citizenship. Too many tasks suffered from excessive teacher guidance so that work followed the same format with little evidence of candidates really understanding what they were doing.

The wider range of tasks offered allowed candidates a bigger choice of topics thus allowing them to feel greater ownership of the task. This often resulted in more interest being shown in the task and, inevitably, higher marks as a result of their enthusiasm and engagement.

Centres are asked to note that the provision of the original mark schemes for the AQA-set tasks was intended to provide suggestions for possible routes through these tasks. The teachers' notes in the right-hand column are not intended as a replacement for the minimum requirements and original criteria against which all tasks should be used when assessing coursework.

Centre produced mark schemes, mark schemes produced prior to 2003 and mark schemes from other awarding bodies often caused problems where centres took insufficient notice of the original criteria. Centres are advised to contact their coursework adviser if they are not sure about the suitability of mark schemes being used.

Similarly, tasks produced prior to 2003 and tasks from other awarding bodies also caused problems especially where tasks were over prescriptive or else the tasks were not suitable for candidates on the Higher tier. Again, centres are advised to contact their coursework adviser if they are not sure about the suitability of tasks being used.

Centres are reminded that all coursework submitted under Option T **must** be suitably annotated to explain how work has been assessed and how marks have been arrived at. This information is usually included on the Candidate Record Form under the heading of key evidence. Any other information provided by the teacher/lecturer about the task will be considered by the moderator in the assessment of the work.

Finally, moderators reported that a small number of centres were not undertaking sufficient internal moderation to ensure that the work submitted produced a valid rank order. Regular internal moderation is essential to ensure that marking is consistent across all staff including new staff and part-time staff.

Option X – Externally-Assessed

The AQA-set tasks allowed candidates the opportunity to make some progress against the assessment criteria and thus gain credit for their performance. Again, the most popular tasks were *Read All About It*, *Guestimate* and *Number Grid* but much of the work received from individual centres was very similar in terms of content and routes through the problem. In most cases, however, the tasks were rarely extended beyond the original to produce a substantial task. In particular, too much work in the *Guestimate* task concentrated on the guesses rather than the errors.

Pulse Rates and *Reaction Times* were less favoured, presumably due to the amount of time required to set up the experiments to collect data. Centres' attention is drawn to the *Census at School* website at www.censusatschool.ntu.ac.uk where candidates may collect data on reaction times from a database. Similarly databases for *Guestimate* and *Where in the World* can be found at <http://www.censusatschool.ntu.ac.uk/aqa/>

Care should be taken to ensure that candidates are actively discouraged from following similar 'pathways' making use of similar representations and calculations. It was often difficult to differentiate between the responses of different candidates except where centres provided additional comments to explain. Sampling should ensure that candidates are making use of different data sets.

Annotation is not required for coursework submitted under Option X but any information provided by the teacher/lecturer about how the task was undertaken or any comment to explain a candidate's thinking will be considered by the examiner in the assessment of the work.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on <http://www.aqa.org.uk/over/stat.html> page of the AQA Website.