



## **General Certificate of Secondary Education**

# **Mathematics (Modular) 4302**

*Specification B*

### **Module 4 Option X 43004X**

# **Report on the Examination**

*2007 examination - March series*

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Moderators and examiners reported that there had been some minor improvements in the work submitted for this session. In particular, there seemed to be a greater spread of marks awarded to the work although the variety of tasks seen was rather narrow. Nonetheless, the majority of candidates were suitably prepared for this coursework component and some candidates achieved some creditable marks.

However, as in previous sessions, some candidates were disadvantaged by a lack of understanding about the coursework criteria. In a significant minority of centres there was still a tendency to overmark at the top of the mark range and undermark at the bottom end. Other problems arose where centres submitted inappropriate tasks or else offered work that did not easily allow the criteria to be met.

In particular, there was an increase in the numbers of centres submitting work from other awarding boards, especially the 'T totals' task where there was a noticeable lack of manipulative (grade B) type algebra to award some of the higher marks requested. In too many cases, the algebra was limited to adding a series of simple expressions thus reducing the potential to achieve higher marks under the middle strand.

Centres are reminded to encourage candidates to show all of their working. Candidates should be told that it is their responsibility to communicate their thinking at each stage of the work. It is not the moderator/examiners' responsibility to try to guess what the candidate was thinking when they wrote their work up. Similarly, it is not the centres role to credit work where candidates do not communicate their mathematical thinking.

## **Administration**

Examiners and moderators reported that most centres were sufficiently well organised although a number of centres are still failing to meet AQA-set deadlines for the submission of coursework. Some centres are still not using the latest Candidate Record Forms or else fail to complete all the required information on these forms especially information such as centre numbers and candidate numbers.

Similarly, teacher and candidate authentications are essential to confirm that the work is the candidate's own. Authenticating the work is still 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 as well as 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 should ensure that these criteria include reference 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 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.*
- *An award of mark 6 is appropriate where a candidate 'pulls together' their various algebraic investigations at a level commensurate with grade B work.*
- *The inclusion of an algebraic formula is, on its own, insufficient to suggest an award of mark 6.*
- *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 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 8 is appropriate where a candidate explores a task **extensively** and **independently**.....similar work is unlikely to be independent.*

**Communicating mathematically**

- *Candidates should not waste time drawing tables and/or graphs unless they are relevant, commented upon and interpreted.*
- *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 show **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. Centres are advised to check the accuracy of algebraic manipulation and ensure that all working is clearly shown.*
- *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**

- *Where generalisations are written down it is important that they are adequately explained in the text to confirm the candidate's own understanding.*
- *Testing should be undertaken on 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.*
- *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.*

#### **Further support**

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

#### **Option T – Teacher-assessed**

The tasks set were generally appropriate and allowed candidates to make some progress against the assessment criteria. The AQA-set tasks were particularly popular, especially the *Number Grid* task and, increasingly, the *Spacers* task. However, 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.

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.

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 how the task was undertaken or any comment to explain a candidate's thinking 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 opportunities are essential to keep staff (especially new staff and part time staff) up to date with the additional exemplification offered and ensure that marking is consistent across all staff in each examination session.

### **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. The most popular task seen was *Number Grid* but much of the work received from individual centres was very similar in terms of content and routes through the problem. The task often suffered from excessive teacher guidance so that work followed the same format with little evidence of candidates really understanding what they were doing.

Centres are reminded that the tasks titled *Round and Round* and *Tangled Triangle* have now been withdrawn from the list and can no longer be submitted under Option X. Submissions of these titles can only be made under Option T (ie teacher assessed and board moderated).

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 the <http://www.aqa.org.uk/over/stat.html> page of the AQA Website.