Version 1.0

General Certificate of Education (A-level)
June 2011

Mathematics MD01

(Specification 6360)

Decision 1

Report on the Examination

Further copies of this Report on the Examination are available from: aqa.org.uk

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX.

General

Overall, the response to this paper seemed to be at the same level as in previous series for candidates at the lower end of the spectrum, who were able to pick up marks from both the earlier questions and the simpler parts of the later questions. At the opposite end, good candidates were achieving slightly lower scores than seen previously. Very few candidates in comparison to previous years scored above 65. Many candidates were well-drilled, quite capable of rehearsing familiar algorithms, but then failed to cope with anything slightly out of the ordinary. The general standard of presentation was quite good. Some scripts were very well presented and the majority were adequate in this respect with very few scripts unacceptably untidily written and presented.

Question 1

(a) Apart from the rare slip or completely wrong format, this part was almost always correctly answered.

(b) The majority of candidates scored 4 or 5 marks here: 4 when the final matching was not listed but left in diagrammatic form. Most candidates now list their paths clearly, although there is still a determined minority of candidates who believe that one utterly unintelligible diagram will be acceptable. There also seems to be a growing minority of candidates who are devising unorthodox ways of recording their paths; they are strongly advised to look at the mark schemes for previous papers.

Question 2

This was a slightly different type of sorting question which might have thrown candidates but they answered it well. The sorts were well known with full marks being quite common. The most common error was to have $x < 2$ for part (a)(ii). Correct use of inequalities was a big problem for weaker students. After errors in parts (a) and (b), answers offered in part (c) often bore little or no relation to the preceding parts.

Question 3

This question was a problem for some candidates, with their failure to understand Prim's or Kruskal's algorithms and their persistence in finding a route. However, for the better candidates, the question was generally well answered. It was apparent that candidates had attempted a correct application of Prim's algorithm but totally failed to indicate the **edges** involved correctly. These candidates had often done all their working within the table of the question. Candidates should be aware that even where they have attempted to show the order of choice of vertices within the table, it is not always clear to examiners precisely which edges are involved. Whatever method of working, there should be an explicit statement of the order of choice of vertices.

In part (b), many candidates deleted only two edges from their minimum spanning tree instead of the required three. Others failed totally to make clear which edges were being deleted and added, offering only a sequence of apparently random numbers which was futile given the number of repeat values in the table.

Question 4

The question was very well answered. Apart from some slips, the loss of the odd mark usually occurred in part (a)(i) and was caused by a failure to present the work with the correct detail. As with all questions on this paper, the object for the candidate is not only to obtain the final correct answer but also to demonstrate that the algorithm used has been executed correctly in every respect.

Question 5
This question clearly differentiated between those candidates who could follow an algorithm and those who understood the method fully. In part (a), many candidates made mistakes on the pairings but overall this part was well attempted. However, mistakes were made when, after finding the correct odd nodes, the distances between them were incorrectly calculated. Almost all found the correct minimum pair sum, $AC + FD = 32$, and thus the correct final answer. Full credit for this was not allowed unless all the pair sums had been correctly calculated. Parts (b) and (c) were not well answered. There was much confusion as to what might be added to, or subtracted from, 150 or 180.

Question 6
The ability to trace this type of algorithm is steadily improving and, at a slightly slower rate, so is the standard of presentation. Candidates should be aware that it is not sufficient just to show the succeeding values of the variables; it is also important to make clear the order in which they have been found. Explicit values should also be stated at all stages. Where no instruction about accuracy is given in the question, candidates should be mindful of the general rubric that final answers should be given correct to three significant figures and state their intermediate values to the necessary accuracy.

The answers to part (a) were generally quite good; those to part (b) were generally poor. Many identified the lack of output but most struggled to identify the need for an interval to be known and those who did often lacked the ability to express themselves clearly.

Question 7
Parts of this question proved to be very accessible to most candidates. The great majority scored 3 or 4 marks on part (a), the lost mark almost always being because of the omission of the function to be minimised. Many candidates lost marks on the graph. The different scales caused problems, especially on the x-axis, with 11 being marked where 12 was clearly intended, being a common error. These problems were exacerbated by a surprising number of slipshod errors in actually drawing the lines.

Candidates should realise that examiners have to make judgements about accuracy. Some tolerance is allowed but many candidates failed to draw inside this and consequently lost marks. Regardless of success at the graphs, most candidates managed to find the correct values required for x and y, whereupon a few promptly lost a mark by failing to refer back to the context. A smaller number lost another mark by failing to specify the currency unit.

Question 8
This question was a variation on a standard theme but it was accessible to most candidates who were able to attempt the early parts. The application of the classical problem to a practical context differentiated between candidates who fully understood the problem in part (b)(ii) but allowed weaker candidates to score good marks on parts (a) and (b)(i). In part (a), many candidates lost a mark by failing to explain why the route *PUSR* was the shortest, being content merely to verify that it was 40 minutes in extent. There were very few marks lost in filling the table.

Part (b) caused more problems. Some candidates failed to realise the significance of the words in part (b)(i): "… on **Table 1** ..." and worked with the diagram. Many of those who worked with the table stated clearly only the final numerical answer and completely failed to explain clearly their method, which required a clear statement of the derived tour and evidence that the nearest neighbour algorithm had been used. Most candidates completely missed the point of part (b)(ii) and simply repeated their answer for the previous part, not realising the need to refer back to the context in the diagram.

Part (c) was a problem for candidates who failed to show a clear method of obtaining a lower bound. This was quite a simple problem but candidates lost marks by not writing down edges or even a diagram identifying the edges. Many candidates found the correct answer of 83 but for many candidates this was at the end of a series of sums of unidentified numbers. For full marks, the algorithm used needed to be clear with the spanning tree edges and the two shortest edges from *Q* clearly identified. This could be done either by clear diagrams or text.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results statistics page of the AQA Website. UMS conversion calculator www.aqa.org.uk/umsconversion