A-LEVEL
Mathematics

MD01 – Decision 1
Report on the Examination

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General

The vast majority of students were well prepared for the paper, although there was an increase in the number of scripts that showed evidence of some students not having been taught all of the topics to a sufficient depth. This was particularly true in question 8.

The general standard of presentation was quite good. However, there was an increase in the number of scripts that were poorly presented. In Decision Maths, a subject which demands precision and clarity, such an approach can lead to students unnecessarily losing marks. Students are advised to cross out and totally replace work rather than trying to alter values.

There were several parts of questions which required students to present a clear, logical answer or argument. The response, even from a considerable proportion of otherwise quite able students, was extremely disappointing.

Question 1

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

(b) This part was usually well answered. Marks were lost either by not using an algorithm and merely writing a correct answer down, or by not writing the answer as a final statement.
Some students used an idiosyncratic method of writing their paths for which credit could not justifiably be awarded. Centres are strongly recommended to study previous mark schemes.

Question 2

The diagrammatic method and/or presentation of Prim's algorithm is clearly less well known in detail than other methods of finding a spanning tree.

(a)(i) This part was poorly answered. Many students did not know how to apply Prims to a table. Some good students seemed to indicate use of the table but there were either no lines or no highlighting of entries on it. Many students ended with a trail rather than a MST.

The rest of part **(a)** was answered well.

(b) Many students clearly did not know the difference between an edge and a vertex. Students were unable to interpret their answer to part **(a)** and state the final two edges given by Kruskal's algorithm.

Some students gave complete lists in each part and did not identify the last two edges.

Question 3

Generally this was a very high scoring question with many maxima.

(a) Most of the marks that were lost in this part were due to detail or arithmetic slips. Students are advised to check their working.

The most common error in the rest of the question occurred in **(c)** where a significant minority

seemed to assume that road flooding at I necessarily meant that a route through C rather than B would be required.

Question 4

(a) The majority of students applied the Chinese Postman algorithm correctly. The correct 4 vertices were universally identified. As expected, the pairing AE+CG was often evaluated incorrectly, the other two pairs being correct.

(b) The majority of students scored full marks.

(c)(i) This part was poorly answered. Many students appeared to think that only a length from the previously used pair, AG and CE, could be used, rather than using the list of 6 possibilities and selecting the smallest.
(ii) Many students just wrote down the four vertices stated used in part (a).

Question 5

(a) The graph drawing required was of a high standard, correct and almost always of great accuracy. The most common error was in drawing the line $3x + 8y = 64$. It usually went through $(0,8)$ but often not through $(8,5)$.
Students should be encouraged to shade on one side of the lines drawn to indicate acceptable or non-acceptable areas, and to label the feasible region.

(b) This part was answered much less successfully. Some students did not realise that each answer required two parts, a clearly stated value and a clearly stated pair of co-ordinates. The most common method appeared to be to calculate the values obtained at each vertex of the feasible area and inspect these to find the required answer. This produced most of the marks but often failed to be sufficiently accurate for the second part.

Many students appeared not to notice that part **(iii)** required the minimum rather than the maximum.

Question 6

This question was a good source of marks for the majority of students, but it did differentiate between a C grade student and an A grade student.

(a) The response "33, 17" was quite a common error.

(b)(i) Students needed to answer this part in the context of the question, by making a reference to city L, a key to any definition of the route in question.
(ii) There was a surprising number of students who missed out this part of the question.
(iii) Many students scored the method mark for an expansion and a significant number gave a fully correct expansion. Some students simply wrote out the question again as their answer.
(iv) There were many fully correct responses. The most common mistake was in failing to return to M.

Question 7

Many students failed to realise that the two sets of times were given in different units and this led to a loss of marks. The mistake of thinking that there are 100 minutes in an hour occurred.

Some students insisted on including A, B and C in their inequalities. They also failed to realise that the total daily production must simply be $x + y + z$ and produced linear combinations with a wide range of coefficients.

Students who got past these initial stumbling blocks usually scored quite well. They obtained and correctly simplified the first three inequalities. They also usually obtained the next two although it was here that almost all of the few inequality errors were made.

The final inequality, involving percentages caused problems. Most managed to write a correct first version down, the most common errors were to leave this as just a statement involving "15%" or to express their inequality as $y \geq 0.15(x + z)$. Only the very best students managed to produce the correct simplification.

7(a)(i) – Often explanations focused on odd being possible rather than even being impossible.
7(a)(ii) – The B1 for a graph was often scored fortuitously. Similarly the B1 for $x=1$ was occasionally scored but there was no real conviction that the student knew why x was 1.
7(b)(i) – The min was usually quoted as 1 not 0 though max of 9 was regularly seen.
7(b)(ii) – It was rare to see a correct (or indeed any) explanation.

Question 8

This question proved to be difficult for most students. There were two parts to this difficulty: the first was to know what the answer was, the second was to formulate this in a way clearly understandable to the examiner.

(a)(i) The mathematical problems were mainly the difference between the particular case and the general case. The particular case can be done, but must include all options, and the need to give consideration to both even and odd. Many students just demonstrated the truth for odd and ignored even totally. This showed a major lack of understanding of proof.

Students who pursued the 'sum of vertices' route were usually far more successful in producing a clear and fully correct answer.

(ii) This was by far the best answered part of the question, with its requirement to find the particular case.

(b) The overwhelmingly most popular answer was '1 and 9'. This did not prevent most of those offering this answer from constructing an answer to the last part based on various untrue statements. Those who did have the basic facts correct, still often found it difficult to enunciate their answers clearly.

A significant number of students gave their answers as 9 and 45.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator www.aqa.org.uk/umsconversion