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Mathematics MD01

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Decision 1

Report on the Examination

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General

The majority of students were again well prepared for the exam. There were great numbers of well-drilled students quite capable of rehearsing familiar algorithms. However there continues to be a problem with anything slightly out of the ordinary or requiring thought. The ability to use the English language clearly and precisely in the explanation parts of the paper, was still weak but a little better than in the past.

The general standard of presentation was quite good. Some scripts were very well presented and the great majority were adequate in this respect with very few scripts unacceptably untidily written and presented.

Many students scored very well on the first four questions with many managing to earn all 27 marks. Most of these also earned the first 5 marks of question 5. The rest of the paper was quite different in this respect. There were however, some students who coped well with the later questions. Of the weaker students, these all found places to earn some worthwhile marks.

Question 1

The majority of students scored well on this question. The use of the algorithm in part (b) was usually clear. However, there were two common errors:

(i) Some students still persist in using ticks/crosses for a matrix,
(ii) Some students forget to *state* the complete matching in part (b) clearly.

Question 2

This was again a high scoring question. The most common errors were to assume that in part (a) the sequence went 1, 2, 3 and to state in part (c) that the algorithm was complete because the numbers were now in correct order.

Question 3

The question was almost always very well answered. In part (b) weaker students often confused 'edge' and 'vertex'.

Question 4

In part (a) only a small minority of students failed to make the details of Dijkstras' algorithm completely clear – there must be evidence of the rejection of numbers.

Part (b) was a disaster for the majority of students. Students were unable to cope with an elementary distance-time question. Knowledge of the relation between dist/speed/time, or even the difference between a distance and a time, seems sadly lacking.

Question 5

Part (a) was well-answered – students had been well-drilled in the rote use of an elementary algorithm, although arithmetical accuracy was sometimes weak. However, in the remainder of the question, students were required to do a little elementary analysis and thinking and many failed completely. It appears that these modified situations are not handled well. Students need to spend time studying semi-Eulerian situations.

Question 6

This questioned differentiated well between the students. Many students showed a lack of understanding or knowledge of graph theory and were unable to answer this question correctly and weaker students found the abstractness of this question a too much of a challenge.

The most common problem with par (b)(ii) was an incomplete or inaccurate description of vertices of an odd order, with students often talking about “odd vertices” or an “odd number of vertices”.

Marks were quite often lost in part (c) because of a failure to note the implications of the phrase “state in terms of n” and part (c)(iv) identified the strongest students.

Question 7

There were very few errors in part (a).

In part (b), the students who elected to write their tour down, vertex by vertex, underneath the table usually earned full marks. Those who elected to work entirely in the table (notwithstanding the rubric as to where answers were to be written) often failed to make clear the order in which vertices had been selected and thus that they had actually used the nearest neighbour algorithm.

In part (c), many students knew what was required but very many did not show sufficient workings, and thus failed to earn full, or in some cases any, marks. Edges must be clearly identified to demonstrate clearly the method.

Very few students were able to provide the necessary explanation for part (d) often noting that the result was not a tour/cycle but not recognising the significance that this meant the tour would be greater than 100.

Question 8

Although the clarity of presentation of the trace was much improved from the previous session, it still proves difficult for many students to do it accurately. The method that proved most successful was the method demonstrated in the mark scheme which the majority of students now seem to be following. Some students still fail to round to the required accuracy of 3sf and so lose marks for oversimplification.

In part (b) most students were able to state *what* would happen but comparatively few could explain convincingly and fully *why*.

Question 9

In part (a) most students successfully wrote down enough for the first 2 marks but again using percentages defeated a surprising number of students.

Even for those students who managed the first part, the substitution of $z = 0.5x$ in part (b) proved too difficult for all but the strongest students.

Graphs are still not always accurately drawn, and many were unable to draw the graph of $y=x$ due to the different scales used on the axes. Also, a surprising number of students omitted to draw the lines $x = 100$ and $y = 200$.

The last two parts proved too much for all but the most able. Only the strongest students were able to find the objective function and identify the correct numbers of each type of pillow. Some also insisted on not writing this in context and so were not awarded the marks.

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