Examiners' Report/
Principal Examiner Feedback

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GCE Decision D1 (6689) Paper 1

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Decision Unit D1
Specification 6689

General

This paper proved accessible to the candidates. The questions differentiated well, with most giving rise to a good spread of marks. All questions contained marks available to the E grade candidate and there also seemed to be sufficient material to challenge the A grade candidates also.

Candidates are reminded that they should not use methods of presentation that depend on colour, but are advised to complete diagrams in (dark) pencil. This remains a particular problem in the questions on sorts and on matchings (questions 1 and 4 on this paper) .

Candidates are also reminded that this is a 'methods' paper. They need to make their method clear; 'spotting' the correct answer, with no working, rarely gains any credit.
Some candidates are using methods of presentation that are too time-consuming. The space provided in the answer booklet and the marks allotted to each section should assist candidates in determining the amount of working they need to show.

Some very poorly presented work was seen and some of the writing, particularly numbers, was very difficult to decipher. Candidates should ensure that they use technical terms correctly. This was a particular problem in questions 2(a), 5(c), 6(b) and 7(e).

Report on individual questions

Question 1

This proved an accessible starter for most candidates with almost 75% of the candidates getting at least 7 marks out of 9.

In part (a) most said the list needed to be in alphabetical order but a significant minority simply said that the list needed to be 'in order'. Part (b) proved more challenging. Many candidates took the precaution writing out the alphabet for those who did not list the alphabet it was not usual to see the final list in incorrect order, often starting CB. A significant number of candidates did not name the algorithm they used. Candidates are expected to make a 'stop' statement at the end of both a sort and a search.

In part (b) most used the quicksort and correctly identified their pivots clearly, most errors arouse from writing their letters down in the wrong order. The most common mistakes were having F and G the wrong way round after the first pass and not pivoting the F and G sublist. Errors were more common in those choosing to carry out the bubble sort. A small minority wasted a lot of time writing out each swap rather than just each pass.

Part (c) was generally completed successfully. Some candidates need to make their choice of pivots more explicit and writing out the new lists at each pass is a good way of displaying an unambiguous answer. The only common mistakes apart from this were retaining the pivots and choosing middle left as pivot, but these were not seen too often. It is worth noting that the specification does state that the middle right pivots need to be chosen for binary search.

Question 2

Well over half the candidates were able to get at least 6 marks out of 8, with many candidates finding part (a) the trickiest part. Many candidates had learnt the definitions needed and gained all three marks. Others struggled and often misused technical terms. Few said that a tree needed to be connected and many candidates lost marks by saying that a MST was made up of **arcs** (or routes or paths) of least weight rather than that the **total** arc length should be least.

Parts (b) and (c) were usually extremely well answered though some wasted time in rewriting arc lists several times or included a lot of unnecessary repeated text. Candidates must consider the arcs in order and indicate, for each arc, if it is to be included or rejected. Examiners need to see the stage at which each arc was selected or rejected. Apart from some confusion over the word 'unique' most candidates realised that part (d) concerned arcs CF and EF, though some candidates worryingly stated that Prim's algorithm would give a different tree**.**

Question 3

This question proved a good discriminator and differentiated the candidates well at all levels. In part (a) candidates generally did well selecting the correct inequality for the two line with positive gradients, but many got muddled dealing with the inequality of the lines with negative gradients. Those that used the objective line method in (b) were generally more successful, these candidates either stopped here or then went on to deal with the correct two lines leading to a solution that was either exact, or to 1 or more decimal places. Those that used point testing usually read directly from the graph and gave answers only to 1 decimal place. It was disturbing to see a good number of candidates spend time deriving all four points exactly and then not test any of them.

Part (c) was generally only done successfully by those who had found the point algebraically. A popular wrong answer for (d) was (7, 3) and many did not seem to understand the meaning of integer and restated their answer to (b).

Question 4

This was an accessible question for well-prepared candidates, with 45% of the candidates able to score full marks. Candidates should be advised that clear matching diagrams are acceptable, but not with an alternating path drawn on as well. In part (a) almost all candidates found one path, A – 1 = H − 2 but some did not get the other. In part (b) very many produced the correct matching, though a few omitted H = 1 in their answer. Some lost this mark for writing down the path, not the matching. Part (c) was answered well with most getting a correct path from J to 2 although, as always, many candidates did not state or show their 'change of status' and lost a mark.

Question 5

This question differentiated well. Most candidates were able to correctly identify 3 pairings of their 4 odd nodes. A common mistake made by many was in selecting AD direct rather than via C increasing the total to 25. Most were able to list the three arcs that should be repeated, a big improvement on previous years. Most candidates were able to state the length of the route in part (b) though some omitted the route.

Part (c) proved more challenging. Almost all the candidates realised they still needed to repeat a path and the more able ones realised that this should not have D at one end. Many chose to avoid the longest path rather than select the shortest to repeat. Some were tied to their choice in part (a). Of those who correctly selected CEF to repeat many gave no reason for their choice, losing two marks. The finish vertex and/or length of their route was often omitted.

Question 6

This question also discriminated well. Part (a) was usually done well by the majority of candidates. The order in which the working values are listed is of paramount importance. They must be listed in the order in which they are found in order to demonstrate that the algorithm is being applied properly. The most common errors were: not writing down the working values in the order that they are found, particularly at E and H; working values missing, often at E; additional working values, often at F and H; incorrect order of labelling, particularly at B and D. Most found the correct route and its length. Those candidates in part (b) who showed the 6 calculations usually went on to score full marks, while those who attempted a worded explanation usually scored just the first mark (for 'working backwards'). Part (c) was straightforward for most but the most common incorrect answers were ACEGH, ABEGH and ACBGH.

Question 7

This proved a challenging and discriminating question for many candidates with odd marks being picked up in each part. Part (a) gave rise to a good spread of marks. The dummies caused problems for some with D being frequently omitted from the list for I and J.

Part (b) was often correctly completed although the late finish time of 8 at the end of A proved a challenge. Forward passes were usually more correct than backward passes. Often candidates only listed one critical path in part (c) rather than all of the critical activities (even though they were often all correctly shown in the Gantt chart for (d)). Few scheduling diagrams were seen in (d) and most were able to handle all the critical activities correctly. The float at A was often incorrect and many candidates omitted at least one activity – a final check that all activities are there would be wise. Scheduling became the preferable way of tackling part (e), however, many candidates gave no consideration to the floats on activities or talked specifically about time. The most successful and succinct answers to this question were usually to consider the lower bound within time 7-16, but very few candidates were able to do this, opting to ignore the question and talk about the project as a whole, or simply say that there were "too many activities so 4 workers were needed".

Question 8

Only 5% of the candidates scored full marks and about 8% of the candidates made no attempt. The first mark for defining variables and the final mark for one variable non-negative were rarely gained, the latter not even by able candidates. Many failed to define variables at all, and of those that did try most said "x = type A" rather than "let x be **the number of** type A". A majority were also unable to produce the correct two inequalities involving percentage. Some lost marks for incorrect strict inequalities. Some candidates used a mixture of $x-y$ and A−B variables. A number of candidates wasted time and tried to solve the resulting problem even though the question asked for candidates only to formulate the problem

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