
GCSE

COMPUTER SCIENCE

8520/1 Computational thinking and problem-solving
Report on the Examination

8520
November 2020

Version: 1.0

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General Introduction to the November Series

This has been an unusual exam series in many ways. Entry patterns have been very different from those normally seen in the summer, and students had a very different experience in preparation for these exams. It is therefore more difficult to make meaningful comparisons between the range of student responses seen in this series and those seen in a normal summer series. The smaller entry also means that there is less evidence available for examiners to comment on.

In this report, senior examiners will summarise the performance of students in this series in a way that is as helpful as possible to teachers preparing future cohorts while taking into account the unusual circumstances and limited evidence available.

Overview of Entry

Overall students seemed well prepared for this paper and showed a good application of the computational thinking and problem-solving skills they had been taught.

As with previous papers a key point for students is to ensure that they read the question carefully as responses indicated that this was not always the case.

Comments on Individual Questions

Question 1

This question focused on bitmap images and the first three parts were answered well with over 70% of students being able to define a pixel, and over half being able to calculate bit depth. The calculations continued into part 3 where 80% of students managed to gain at least a mark for doing part of the calculation: this highlights the importance of students showing their working when attempting this type of question. Part 1.4 was the first trace table in the paper and many students found this challenging; half were able to complete the loop counter (`i`) to gain 1 mark but only 5% were able to gain all the available marks.

Question 2

This was the first of two questions in the paper on algorithms where students were asked to explain how a given algorithm worked, in this question the linear search algorithm. Over half of students gained two of the three available marks with the most common omission being that reaching the end of the list meant that the item has not been found.

Question 3

This question focused on computer logic: it was pleasing to see that this topic has been well taught across centres. Most students were able to identify a gate from a truth table, nearly half were able to identify all four gates in the system and three quarters were able to identify two of the four.

Question 4

This question examined programming terms and high/low-level languages. The majority of the students were able to identify datatypes and this is an area that is improving year on year. It is still disappointing that students struggle to trace through an algorithm without a trace table and this is an area for schools to focus on.

Nearly all students were able to give at least one reason for using a high level language which shows that this area is also being well taught across centres.

As in previous series students often write the algorithm to suit the specific examples given and not the general problem posed by the question – students must read the question carefully.

Question 5

In comparison to the previous question, students were better able to trace through the algorithm using trace tables: over half gained full marks on both parts of the question. Fewer students were able to identify the purpose of the algorithm.

Question 6

This was the second of the questions asking students to describe an algorithm.. Students were asked to describe the steps involved in working through a sorting algorithm and could choose bubble or merge sort. The majority of students chose merge sort and drew a solution rather than describing one in words. Students clearly understood how the algorithm worked but unfortunately some answers did not gain full marks as they started with the list being separated.

Question 7

This question presented a complicated algorithm involving subroutines. It was pleasing to see that most students gained at least one mark and nearly half of students were able to trace through all the subroutines to gain full marks. Over three quarters of students were able to describe at least one way of structuring code.

Question 8

With this question students showed a good understanding of ASCII character codes. The most common mistake was identifying that the value for Question 8.2 was 71 but then not converting it to the character "G".

The algorithm design part was well answered with nearly half of students gaining three out of the available five marks. Students most often missed the mark available for creating the subroutine with parameters and often used the given subroutines in the wrong order. This type of question has been seen on previous papers and students should be encouraged to practice questions where they are asked to write a subroutine.

Question 9

Students were asked to explain how records and arrays could be used together. Whilst the majority were able to identify the data types required, some students were not specific enough, saying for example that "the developer could use strings" without clarifying which variable could be of the

string data type, and so were unable to access marks. Students often struggled to describe how records and arrays could be used together and attempted to define them instead, and although many were able to state what an array was they were less familiar with records. This is an area that centres need to address.

Question 10

This was the third of the ‘design an algorithm’ questions in the paper and was well answered by students with over half gaining at least five out of the six marks and nearly all gaining at least one mark. As with previous papers a small number of students did not even attempt the question although two marks were available for simple variable assignment of user input which made the question very accessible. The mark missed most often was that for using iteration, a common problem often seen in previous series.

Question 11

This was another algorithm question, this time with several Boolean conditions and it was pleasing to see so many students making a solid attempt at this question. Mistakes were often made confusing the < and > symbols. Over half of students achieved at least seven of the marks, although students often missed the iterative element (as they did with Question 10). However, this series saw more students attempting these questions fully than in previous years

Question 12

This question was a different type of algorithm question, giving students descriptions of subroutines and asking them to alter a set of switches using those subroutines. For each of the questions nearly three-quarters of students were able to follow part of the algorithm and gain at least one mark with nearly half gaining all three marks. The final question asked students to use all the subroutines once to create a solution to a problem, and whilst we saw many excellent solutions to the problem many students missed marks by not using all three subroutines once as asked in the question. Solutions that were not fully correct did show a good understanding of what they had been asked to do and demonstrated the skills expected in this paper.

Concluding Remarks

A small percentage of students did not attempt some of the higher mark algorithm questions. Teachers should encourage students to attempt this type of question as often marks can be gained for straightforward variable assignment and Boolean conditions. Examples are often given at the beginning of the questions to help guide students. A tip for students might be to tick off each item on the list of requirements when they have included it in their answer.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.