GCSE

Computing

General Certificate of Secondary Education **J275**

OCR Report to Centres

January 2013

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

OCR will not enter into any discussion or correspondence in connection with this report.

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OCR REPORT TO CENTRES

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Overview

This is the last time that a January session will be offered and the entry was unsurprisingly rather low. As was the case in the May 2012 cohort, the work was mostly of an encouraging standard which confirms that a computing specification is well within the capabilities of most students. There were a few minor problems that could usefully be addressed, in order to maximise performances.

In A451, candidates performed well on many of the topics that are characteristically “computing” rather than “ICT”. However, it was surprising that many candidates did not have a solid understanding of databases; how they are constructed, how they are processed and how data is protected from errors or loss. Databases are an important part of the specification and all students should have had experience of creating, amending and interrogating a relational database of at least three linked tables. They should understand such concepts as data redundancy and data integrity and also how and why applications usually act on data through a DBMS.

In the controlled assessment, the work presented was mostly of good quality and marked realistically. What did emerge however is the close link between quality of organisation and presentation of the material and the inherent quality of the work. Candidates need to approach both the controlled assessments in a methodical and organised way. They also do best when the work is presented as one or just a few documents, rather than a multiplicity of files and folders that are difficult to understand. They must remember that it is not only their job to do the assignments but to present them in an easy to follow, well commented manner.

The specification is proving to be popular and clearly most teachers and students are enjoying the experience of teaching and learning a formal computing course.

A451 Computer Systems and Programming

Candidates seem to be more prepared for this examination and have covered most of the specification. This is evident by the fact that they are able to make a reasonable attempt at most of the questions. However, it is unfortunate that we are still getting candidates who demonstrate ability in some areas but are unable to score well because they clearly have not covered parts of the specification and are leaving questions blank or making uninformed guesses. After the specification becomes linear in 2014, this will no longer be an issue, but centres are reminded that the experience of being an IT user, while useful, is not adequate preparation for this examination. On the contrary, it may actually disadvantage candidates if they rely solely on background knowledge in cases where common usage of technical terms or the common understanding of Computing concepts is inaccurate. Specific instances where this was evident, as well as other feedback about the candidates' performance, are given in the detailed comments on questions below.

Question 1
Part (a) was well answered. Most candidates had no difficulty with the portion of the binary addition where there was no carry, but weaker candidates were less sure about what to do about the carry with some even using the digit 2. In part (b) it was unfortunate that a good number of candidates did not simply use the technical term ("overflow") – however, those who did not use this term were still able to get the mark by giving an accurate description of an overflow error.

Question 2:
Most candidates gained two marks for correctly identifying the purpose of JPG and MP3 files. Candidates needed to be more precise in describing the purpose of HTML files than many of them were. Many candidates simply said that it was used to make websites, despite the fact that the question already tells them that all four file types are part of a website. The answers for PDF files were even more disappointing. Candidates have obviously seen PDF files before, but without the adequate instruction, some candidates were unable to describe what they are for and resorted to vague, incorrect answers like "for read-only files" or "for text files".

Question 3
Most candidates answered part (a) correctly. As expected, some weaker candidates were less able to work with the logic gates in combination in part (b).

Question 4
It was evident that a majority of the candidates did not understand the term "secondary storage" and we suspect that they guessed (rather than had been taught) that this was some kind of backup storage medium in case the hard drive failed, which is the answer that most gave in part (a). In part (b), some candidates did not read the question carefully. It asked for the *characteristics* of magnetic and solid state storage, but these candidates wrote about the applications of these types of storage and how they work (sometimes in great detail). There was some evidence of candidates making "uninformed guesses" here such as making a semantic association between the "hard" in hard drive and the "solid" in solid state, and assuming that hard drives and solid state storage mean the same thing. That said, it was encouraging to note the currency of the knowledge of some candidates who included solid-state as well as magnetic hard drives in their response. On the other hand, examiners were surprised by the number of candidates who thought of magnetic storage exclusively in terms of magnetic tape and floppy disks and ignored the most current use of this technology.

Question 5
Part (a) was intended to be fairly straightforward – standard answers for the advantages of having a network in a context in which most of them are familiar. Candidates who did not get full marks here either gave answers that were too vague such as "it allows the computers to

communicate with each other" – which is just a definition of what a network does, not an advantage – or they compared a LAN to a WAN. The weakest candidates even tried their luck with very generic answers like "it's cheaper," demonstrating little understanding of the actual subject content being tested. In 5(b) the candidates were asked to explain two security measures for a school's network. While most were able to identify two appropriate measures, only the better candidates went on to give a full explanation to gain all the marks. Another common error was to refer to other measures which would normally be taken in a school network without referring to security, for example filtering sites with content that is inappropriate for children.

Question 6

This question was poorly answered and it was obvious that many of the candidates had not studied this. Most candidates thought sampling was the same as compression, while others used their experience of downloading large media files to describe sampling as a "taster file" to determine whether the rest of the file is of acceptable quality. In part (ii) some of those who were on the right track lost marks because their answers lacked precision. The question asked about the effect of the sample interval but some candidates interpreted this as the sample rate. As these are reciprocals of each other, the sample rate obviously gives the wrong answers, unless the candidate specifically stated that this is what they were referring to. Other candidates were even less precise with answers like "it increases the quality" without stating what change in the sampling interval increases the quality.

Question 7

This question gave a good spread of marks as was expected, although we would have liked to see marginally more answers in the high level band. This was an open ended question where candidates were expected to apply principles they have learnt on the impact and reliability of modern applications of computing in a relatively familiar but probably unrehearsed context, so that their ability to reason around the material they have studied can be assessed. Most candidates gave a reasonable, and often good, account of the advantages of using a computer system instead of people in this scenario but did not give an equally reasonable account of the importance for such a system to be reliable. In many cases, this is what prevented some able candidates from achieving a high level mark.

Question 8

A number of candidates were able to make the connection between the use of binary and the design of computer circuitry which is what was being addressed in part (a). Many other candidates made some relevant point which allowed them to gain one of the marks, but missed this crucial link. Part (b) was generally well answered, with the best answers for part (b)(iii) referring clearly to the fact that the number of bits per character imposes a limit on the number of symbols that can be represented.

Question 9

Candidates who had learnt a definition for logic error were able to answer this more clearly and succinctly than candidates who were attempting to put it in their own words, often confusing the use of the term "logic" here with the everyday use of the term and giving answers such as "it doesn't make sense". Part (b) was fairly well answered although there are two important points to note here about such test plans. Firstly, the reason for the test should be precise enough to clearly define the test case of that row (of which the data is only an example of) and exclude the other test cases/rows. It is not enough to say "to see if it works"(this is too general) or "to see if you get DEF when you input C"(this is too specific). Secondly while preparing for this examination and doing A453, candidates should be encouraged to make their programs robust by dealing with invalid inputs in a reasonable way. It is not desirable to design a program so that when the input is invalid (as in the third row in this question) the expected outcome is that it "crashes" or "nothing happens".

Question 10
Part (a) was fairly well answered and part (b) was answered correctly by almost all candidates. In part (c) it was pleasing to see a reduction in the common misapprehension that being free of charge is an essential or defining characteristic of open source software. This shows, to some extent, that centres have taken note of the feedback provided from previous sessions.

Question 11
Part (a) was another question which was intended to be accessible to many because it required the simple recall of a definition that candidates should learn as they study the specification. Candidates who had learnt this definition were able to gain the two marks easily, but those who hadn't, struggled to define a database in their own words. Where they succeeded in doing so, they gained the marks, arguably demonstrating greater understanding than candidates who simply recalled the answer. However, this question was not intended to test this level of understanding which is tested later in part (c). In part (b) validation rules for gender and password were generally good, unlike the rules for email address. Centres should note that names of types of validation rule (eg length check) were generally too vague for credit as they do not say what the actual rule is. (An example was given in the question to stop candidates giving such answers, but some candidates still did so). Part (c) was a difficult question intended to test the candidates' deeper understanding of the purpose of relationships in tables. In particular, we expected the candidates to apply this understanding to this context and identify that the primary key of USER would be an attribute in PICTURE, using key technical terms correctly. Only the most able candidates were able to do this well enough to gain full marks.

Question 12
In part (a) it was pleasing to see that candidates were using their experience of programming to answer the question. Where they did not gain full marks, this could have improved by providing further detail about the tools, or especially by using correct technical terms to describe these tools. Part (b) was generally well answered although a few candidates lost both marks by confusing the less than and greater than symbols. Part (c) was quite well answered with nearly half the candidates gaining all marks for a fully correct algorithm, which is pleasing to see. The question was generally answered equally well as a flow chart or (pseudo)code. Where candidates did not get full marks it was often for omissions such as not outputting the final result. Candidates should also be aware that while it is perfectly acceptable to answer in pseudocode, their pseudocode should add to the information in the question. For example answers like "output the greater" are too vague because we are looking for precisely how they determine which is greater.

A452 Practical investigation

The sample was small for this final January assessment session and in most cases, the work was well done and clearly presented.

As with the programming tasks, it was evident that candidates who organised their work logically generally produced the highest quality solutions as well. We do not need copious rough notes or irrelevant off-topic material such as health and safety essays. The better candidates submitted only what was required for the assessment.

The best candidates generally submitted a single document in which the separate tasks could easily be identified. They explained well the stages that they took as well as presenting evidence of their work.

It is important that the material should be commented to a sufficient extent so that it is clear what is being presented. In some cases print outs and screen dumps were included with no indication of what they were supposed to show.

Good A452 submissions show considerable evidence of research. This should always be well referenced so that it is clear from where information has been obtained. Any verbatim quotes, either in the text or parts of program code, should be limited and the sources clearly acknowledged.

The final question in each A452 assignment is intended to set the scenario in a real-world context. This will usually relate to the IT industry rather than a social context. The best candidates show a confident awareness how professionals produce computer solutions and they look beyond the immediate work that they have provided in the rest of the assignment.

A wide variety of presentation methods was seen, with word processed documents being favoured as well as plenty of Powerpoint presentations. There were many animated screen captures showing solutions in action.

Candidates must not work to a pre-planned template. The A452 tasks are designed to be open ended to various degrees and it is intended that candidates find their own, preferably original solutions to problems. This does not lend itself to a formulaic directed approach and will not give the candidates any advantage.

Ideally, work should be submitted electronically, with great care being taken to ensure that all material is easy to find. The repository is the preferred method for many reasons and the moderation process is greatly facilitated which is to the candidates' advantage.

Most of the marking was realistic, showing that the banded approach is well understood by the centres. There were still a few centres where minimal and trivial work was credited with very high marks. In particular, it should be noted that top bands cannot be awarded unless all of the questions are successfully tackled. Most centres provided justification for their marks on the URS forms which helped the moderators to understand the thinking behind the assessments.

A453 Programming project

This session was the last January session for this unit with a limited number of entries to moderate. The overall impression was pleasing with some excellent work from centres. It was also clear that the best work was produced as a result of a well-organised and logical approach to the controlled assessment. Candidates who were well organised tended to provided the evidence required to demonstrate the required skills more effectively than those who were not. The characteristics of these well-organised submissions were single document reports for each task (or for all tasks) taking the assessor through the process illustrating the key elements of the process with explained code and evidence of testing. Where candidates had submitted a large number of randomly named files it was often a reflection of a disorganised and, consequently, less effective approach to completing the assignments.

A number of the available task sets were used and centres were generally selecting the task set most suited to their choice of language. The tasks were worked in a number of languages including Python, VB and Java, these worked well and candidates were generally able to complete the tasks effectively.

The process to complete the tasks should start with an analysis of the problem. Candidates should think about what the task requires and identify other information they will need to complete the tasks. While the tasks are generally quite clear in their requirements it must not be assumed that there are no other factors to consider, most programs will fall over easily if there is no validation of inputs, for example.

It is important candidates plan the solutions carefully based on an analysis of the requirements but this was often the weakest section in the work submitted. Designs must show evidence of planning and an important part of planning is to know what the goal is. Identifying success criteria is a key part of the process but one that was often missing from work. The design section needs to include success criteria, detailed algorithms and a test strategy or plan including the data to be used to test the solution during development. Algorithms are an essential element of this subject and it was disappointing to see high marks for algorithms when there were no discernable algorithms. A good algorithm will define the solution and flowcharts are often the most effective approach with these flowcharts further refined with pseudo code explanations of the solutions.

The development should show the code being built and tested. Too frequently the code was presented in a completed form with little evidence of any testing. We urge candidates to show an iterative approach to coding testing and to provide evidence at each stage of the process. We do not object to small sections of code taken from websites being modified and used, but this must be acknowledged. It is the supervising teacher's responsibility to ensure that the bulk of the code is written by the student. While we require annotation it is worth noting we require this to explain the code and demonstrate an understanding of what the code does.
Testing should be used to try and break the program, not simply to show that it works if the right values are input. Lack of test evidence is also a significant factor characterising weaker solutions. In the best solutions the testing is chosen to be destructive and identify issues and used to cross-reference with the success criteria to evaluate the solution. Evaluations that simply concentrate on the candidate's feelings about the process do not meet the criteria for this section and good evaluations are a result of careful, detailed design, a good choice of measurable success criteria and careful planning for, and completion of, testing.

Having made all of these points it is worth noting that the majority of centres produced well-structured and organised work and marked realistically. The tasks were accessible to a wide range of abilities with many lower grade students clearly getting something positive from the experience. The best work is produced by candidates who have independence when writing the

code, those that are too teacher led often fail to allow the candidates to demonstrate their abilities effectively.

It is worth noting that templates and teacher direction are not permitted under the regulations for controlled assessment and will be treated as malpractice. It is important students work independently producing their own solutions not constrained by writing frames, templates and teacher directed approaches to the solution. Whether choosing postal or repository entry the advice is to submit the work electronically in a small number of well-organised files with electronic evidence of the solution.

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