



## External Assessment Report 2009

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|---------|-----------|
| Subject | Computing |
| Level   | Higher    |

**The statistics used in this report are pre-appeal.**

**This report provides information on the performance of candidates which it is hoped will be useful to teachers/lecturers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding. It would be helpful to read this report in conjunction with the published question papers and marking instructions for the Examination.**

# Comments on candidate performance

## General comments

The 2009 Higher Computing Question Paper was generally well received, fair and within the grasp of a prepared candidate with fewer blank responses to questions than in previous years. There were no changes to the structure of the paper since last year. The average mark gained by candidates dropped from 61.8 in 2008 to 59.9 this year. This, coupled with a significant drop of 3.2 marks in the average gained for the Coursework, has produced slightly poorer marks. The perceived increase in difficulty was taken into account during the setting of the grade boundaries.

The standard of written English is quite poor in many candidates and coupled with the fact that a significant number of candidates were not reading the questions properly, meant that the standard of many responses was well below that expected in Higher Computing. Candidates still tend to give rather simplistic responses, lacking the technical detail required at Higher level. Explanations and descriptions tended to be rather short and often just a few words. The questions that centred on a scenario seldom drew out answers in context. The average mark was 14.8 out of 30 in Section I, and candidates gained, on average 25.3 out of 60 in Section II.

Many candidates appear to be poorly prepared for the Question Paper, with nearly 12% gaining less than 70 marks out of 200 for the Question Paper and Coursework combined, which may suggest candidates may not be wholly suited to Higher level. Centres should ensure candidates are presented for the appropriate level.

The proportions of candidates attempting the optional three units were as follows:

- 36% for Artificial Intelligence with an average mark of 22.3 out of 50.
- 26% for Computer Networking with an average mark of 18.9 out of 50.
- 38% for Multimedia Technology with an average mark of 19.5 out of 50.

The performance in the two core Units was 22 out of 45 for Computer Systems and 18.1 out of 45 for Software Development.

## Areas in which candidates performed well

### Section I

Question 1 showed that candidates have a good grasp of binary and twos complement format

Question 2 showed an understanding of the representation of text.

Question 3 showed a firm understanding of bit depth.

Question 5 was well done by most candidates, although some answers lacked technical knowledge.

Question 10 revealed candidates have a good grasp of the software development cycle being iterative.

### Section II

Question 18(b), like all the calculations, was very well done by the majority of candidates. Good layout of the calculation greatly increased chances of success.

The standard of answer to the pseudocode Question 22(d) was much better than in previous years.

Question 23 (f) candidates showed a firm grasp of the creation of one-dimensional arrays.

### Section III

Question 25 revealed that the majority of AI candidates were well versed in the topic of Natural Language Processing. However many candidates did not read the question properly, for example failing to give two different examples in the answer to part (e).

Question 26 (b) was well answered again this year, although many candidates were inconsistent in their use of labels and arrows.

Question 28(b) - the standard of the response to the trace question continues to improve. Layout and a practiced technique are vital in this important area of the Course.

Question 29 showed that candidates had a good grasp of TCP and CRC.

Question 30 enabled candidates to display a good knowledge of HTML code and the workings of the Domain Name Server.

Responses to Question 32 parts (e) to (g) were strong in the areas of network access and security issues.

Question 33 drew out good responses, particularly to the calculation and compression within MPEG.

Question 34(d) enabled most candidates to show good knowledge of audio formats.

The calculation in Question 36 (b) gained full marks for many candidates in both parts. Where this was not the case, it generally resulted from a simple error.

## Areas which candidates found demanding

### Section I

Question 4(a) showed that the understanding of the function of a Disk Editor is weak. Candidates tended to answer in terms of editing software or disk cleanup tools, such as undelete.

Question 6 was very poorly done, with candidate responses of “can store more data” being common.

Question 8 revealed a simplistic grasp of the differences. Responses such as “has a server” or “they have equal rights” were very common and showed little real understanding of the balance between distributed and centralised control. Some candidates responded in terms of topology.

Question 9 was a good example of lack of contextualisation costing marks. Candidates ignored the end of the question, stating “in this situation” and gave weak general responses.

Question 11 clearly states that “the software specification can act as part of the legal contract” and yet many candidates fell back on this stock answer for one, or even both, of the other purposes.

Question 12(a) yielded few valid graphical design notations, with many just writing down three names with arrows between them. Candidates should be able to exemplify this design tool in the production of a flow chart or structure chart.

Question 16 drew too many vague or simplistic answers.

Question 17(b) revealed that only a handful of candidates know what a user-defined function is. Most give responses linked to user actions triggering code, and most responses to this item gained zero marks.

### Section II

Responses to Question 18(a) were vague and seldom justified two marks.

Question 18(c) examines the use of buses and the function of the write control line. The question was asked before, with similar levels of success. Each stage of the process must mention a bus or control line for the mark, as clearly stated in the question.

Responses to Question 18(d) were vague and lacked understanding of operating system functions.

Although the standard of responses to virus detection techniques has improved, the knowledge of virus camouflage, tested in 19(b)(iii), shows a basic lack of understanding of the process. Many candidates confused this technique with a trojan horse.

Question 20(a) sought a labelled diagram with a switch at the centre, fully correct responses were rare.

Question 20(e) was generally poorly done, with many candidates answering in terms of network developments rather than developments in browser software.

Question 22(b) asks for benefits of writing modular code. A great proportion of candidates mistakenly offered general answers about the use of modules or module libraries.

Question 22 (c) targets the two aspects of testing in the Computing Higher arrangements - systematic and comprehensive. Responses to this question were poor.

Many responses to Question 22(e) used a round function, which was inappropriate here as it would not extend a whole number in order to display it to two decimal places.

Responses to question 23d generally offered a standard description of what the term portable means. Many candidates have not learned this definition effectively.

In question 23(e) the comparison of a number of discrete ‘IF’ statements with a single multiple-outcome structure proved difficult for most candidates. Many answered in terms of the programmer typing in the text of the program.

Question 23(f) (ii) showed there is still a lack of understanding of the difference between by value and by reference for many candidates.

### Section III

There was a lack of understanding of the term combinatorial explosion for many candidates.

Question 27(d) sought contextualised responses relating cache memory and improved search times to which candidates offered standard descriptions of cache memory.

Many candidates gave poor responses and appeared to be looking for more complicated answers to Question 29(b).

Question 30 (c) (iii) required candidates to provide in depth responses when comparing the quality of results from search engines. Many candidates gave simplistic responses related to user error.

Question 32(d) did not require candidates to know what a differential backup was, that information was in the stem, but to come up with a rationale as to why it might be better to back up some, rather than all the files.

Only the strongest 'Networking' candidates gained marks here.

Question 34(c) the majority of Multimedia candidates gave the response "anti-aliasing" to re-sampling an image. Many answers to part (ii) were simplistic, such as "remove jagged edges".

Question 35 (c) the requirement of exemplification of SVG code proved difficult for most candidates, who gave generalised responses.

Question 35(d)(i) most candidates were able to identify the colour as blue but most did not know that three bytes were required to store the full RGB triad in part (ii).

Question 36 presented three areas of difficulty. In Part (a) candidates provided a list of objects to be included, such as graphics, rather than more technical answers. Part (c) demonstrated a lack of familiarity with the details of the ADPCM format. In the final part of the question there was a lack of technical knowledge regarding holographic storage.

### Advice to Centres for preparation of future candidates

- Candidates must ensure that they read the whole question, as many candidates missed out marks by misreading. For example, describing a function of an interface named in the stem of a question rather than describing another as required (see Question 21(a)).
- Attempt every question in the first two sections and in the optional topic studied. A blank response can gain no marks.
- The standard of response should be appropriate to that required at Higher level. Candidates should not offer answers like 'it is easier/quicker/cheaper' without some corresponding justification of why it is easier/quicker/cheaper. In topics where Core and Options overlap, the Options have more detail within the Arrangements and candidates are therefore expected expand their responses.
- Work steadily throughout the year, making notes and learning the material properly. Candidates who cram at the last minute seldom recall with the required level of detail during the exam itself.
- The simple recall of facts may not help candidates when they are asked to relate parts of the Course or answer in context. The context of a question is important. If a candidate does not link their answer to the scenario they will lose marks.
- Read the marking instructions and reports for previous years. These documents contain invaluable advice for candidates and centres on a range of questions.
- Some candidates have very poor handwriting, causing difficulty in assessing what the response says. Where candidate handwriting is particularly poor, centres should explore other options such as scribing, transcription or word processing responses.

## Statistical information: update on Courses

|                                    |      |
|------------------------------------|------|
| Number of resulted entries in 2008 | 4252 |
|------------------------------------|------|

|                                    |      |
|------------------------------------|------|
| Number of resulted entries in 2009 | 4305 |
|------------------------------------|------|

## Statistical information: Performance of candidates

### Distribution of Course awards including grade boundaries

| Distribution of Course awards | %     | Cum. % | Number of candidates | Lowest mark |
|-------------------------------|-------|--------|----------------------|-------------|
| Maximum Mark - 200            |       |        |                      |             |
| A                             | 16.1% | 16.1%  | 693                  | 132         |
| B                             | 24.1% | 40.2%  | 1036                 | 111         |
| C                             | 26.7% | 66.9%  | 1150                 | 91          |
| D                             | 10.5% | 77.4%  | 452                  | 81          |
| No award                      | 22.6% | 100.0% | 974                  | -           |

- While SQA aims to set examinations and create marking instructions which will allow a competent candidate to score a minimum of 50% of the available marks (the notional C boundary) and a well prepared, very competent candidate to score at least 70% of the available marks (the notional A boundary), it is very challenging to get the standard on target every year, in every subject at every level.
- Each year SQA therefore holds a grade boundary meeting for each subject at each level where it brings together all the information available (statistical and judgemental). The Principal Assessor and SQA Qualifications Manager meet with the relevant SQA Business Manager and Statistician to discuss the evidence and make decisions. The meetings are chaired by members of the management team at SQA.
- The grade boundaries can be adjusted downwards if there is evidence that the exam is more challenging than usual, allowing the pass rate to be unaffected by this circumstance.
- The grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual, allowing the pass rate to be unaffected by this circumstance.
- Where standards are comparable to previous years, similar grade boundaries are maintained.
- An exam paper at a particular level in a subject in one year tends to have a marginally different set of grade boundaries from exam papers in that subject at that level in other years. This is because the particular questions, and the mix of questions are different. This is also the case for exams set in centres. If SQA has already altered a boundary in a particular year in say Higher Chemistry this does not mean that centres should necessarily alter boundaries in their prelim exam in Higher Chemistry. The two are not that closely related as they do not contain identical questions.
- SQA's main aim is to be fair to candidates across all subjects and all levels and maintain comparable standards across the years, even as arrangements evolve and change.