AQA

AS-LEVEL
COMPUTER SCIENCE

7516/2: Paper 2
Report on the Examination

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Question 1.1

This question part was generally well answered. Where marks were not awarded this was generally due to the student stating or implying that natural numbers can include decimals.

Question 1.2

Again, this question part was generally well answered. The most common misconception was that irrational numbers could include recurring decimals, while rational numbers could not.

Question 2.1

The majority of students answered this question correctly.

Question 2.2

Most students identified that hexadecimal is easier for humans to read, understand and/or remember. The most common mistake was to suggest that it is 'easier to represent' which was not enough.

Question 2.3

This question was generally well answered. The most common mistake was miscounting/calculating rather than lack of understanding.

Question 2.4

A number of students demonstrated the procedure without explaining the process, converted the first number from positive to negative wrongly or subtracted the second number from the first rather than the correct way around. When referencing two's complement there was a misconception that one 'performs' two's complement to convert a positive bit pattern to a negative bit pattern. This did, on occasion, fail to gain a mark when phrasing such as 'perform two's complement on the bit pattern' was used.

Question 3.1

Many students identified that the computer would subtract 48//00110000. Some students were able to identify that a bitwise AND with 00001111 or XOR with 00110000 could be used. A number of students failed to gain marks when they stated that subtraction, AND or XOR would be applied without any identification of the number or bit pattern that would need to be used. Many students suggested the computer would use a lookup table. This did not gain marks.

Question 3.2

Most students identified that Unicode can represent more characters that ASCII. However, few identified the benefits this had on international exchange of data and files. There is a misconception evident that ASCII could be used to only represent Latin characters, while actually there were variations of ASCII for many languages. Unicode allowed many languages to be represented within the same character set which, in turn, enhanced portability of data between systems which used different base languages.

Question 4.1

While the majority of students got the correct answer, there were a number of subtraction errors and some left the answer as 1024 without calculating the difference.

Question 4.2

Some students still use 1024 instead of 1000 for conversion to megabytes. This is differentiated in the specification and therefore did not gain marks.

Question 5.1

The majority of students answered this question well. Where marks were not gained, the most common error was suggesting that hardware only existed outside the main computer system (ie that it was a peripheral).

Question 5.2

The majority of students answered this question well. Where marks were not gained the most common problem was vagueness of answers such as ‘digital components’ or ‘non-tangible parts of a system.’

Question 5.3

More students were able to define system software than application software. System software was often defined as managing the computer system. A common incorrect answer was that it was the ‘more technical aspects’ of the software. More effective answers referred to application software being user-oriented or completing tasks that would need to be completed even without the computer. Incorrect answers suggested application software was for ‘completing a particular task’ or attempted to answer by example, which was not enough.

Question 5.4

Most students identified the correct answer for this question part.

Question 6.1

This question part was generally well answered, although a number of students did not know the name of the gate.

Question 6.2

There were a lot of successful answers to this question part. Where students did not achieve high marks, the most common mistake was missing NOT gate symbols. Some students struggle to clearly differentiate when drawing AND and OR gates symbols. More conscientious students labelled the symbols as well which, on some occasions, allowed marks to be given which otherwise may not have been.

Question 6.3

Many students achieved this mark. Where the mark was not achieved, the most common incorrect answer was an AND gate which shows a lack of understanding of De Morgan’s Laws.

Question 6.4

Some centres appear to have been teaching De Morgan's laws by using an overbarred AND/OR in place of an OR/AND, eg $\overline{\overline{A}.\overline{B}} = A \bar{.} B$. While this may help some students learn the procedure to follow when applying De Morgan's laws, they must remember to convert any overbarred AND/OR to OR/AND in their final answer to gain the mark(s). Many students failed to gain marks due to missing brackets when parts of equations have been simplified but required the brackets for correct order of further simplification. On occasion this has inadvertently led to a correct final answer as the student has assumed the brackets are there, but they have failed to gain working marks as full understanding is not evident.

Question 7

A large number of students showed a lack of knowledge about the use of buses. Buses are merely wires and therefore carry a signal transiently while the actual sending, transmitting, receiving or control comes from the devices to which the buses are connected. Answers suggesting the buses 'send' data/signals were not awarded marks. It is also clear that many students do not know the purpose of the control bus. A significant number discussed the fetch-execute cycle, went into detail about the directions of buses, or suggested the buses were for moving data within the processor. None of these points were worthy of marks.

Question 8.1

The majority of students were able to differentiate between solid state discs and magnetic hard discs, particularly with respect to storage capacity and access speed. However, fewer students were able to apply this understanding to explaining why a computer may have both, with common errors including the need to be able to use one as a backup of the other and the ease with which data can be deleted from one but not the other.

Question 8.2

A reasonable number of students identified that SSDs have the advantage of no moving parts, although very few were able to achieve the second mark identifying that a purely electronic device suffers from minimal latency. A significant number of students, however, achieved no marks on this question, some referring to hard drives (which were not in the question), discussing a fictional proximity to the processor, confusing an SSD with a memory stick and often suggesting that optical drives were slowed down by the speed of laser light.

Question 9.1

Many students were able to identify that a central server wasn't needed and that setting up a server would be costly in terms of time and maintenance. Fewer were able to differentiate this into two separate points. Relatively few students identified the aspects of client-server networking that were not needed by the students such as access level controls, centralised backups, etc. As in previous examinations, a relatively high number of students showed a lack of clear understanding of the similarities and differences between peer-to-peer and client-server networks, particularly in respect to links between network types and topologies which were incorrect and irrelevant. A common incorrect answer was that peer-to-peer networks are better for gaming as the computers are directly connected to one another and the data doesn't have to go through a central server.

Question 9.2

This question was generally well answered, with the most common incorrect response being that protocols are instructions rather than rules.

Question 9.3

This question was relatively well answered. A number of students gave slightly too vague responses about signal frequency changes or numbers of signals per second while a more common mistake was to refer to rates of bit transfer.

Question 9.4

This question part was most often incorrectly answered as a measurement of the number of bits being transferred. Other students confused the range of frequencies of the transmission media with the frequency of a sound signal and cited Nyquist's theorem.

Question 9.5

This question part was generally well answered. SSID hiding was sometimes described as stopping access rather than making it harder to access and use of a MAC address white list was sometimes incorrectly described as use of a black list, or not described at all. The most inconsistently answered point was that of encryption which while often attempted was often poorly described, with the suggestion that it just means the network needs a password rather than actually describing how encryption enhanced security.

Question 9.6

Many students did not identify that the network has to be checked for traffic before sending the RTS if there is none. Many students had the right idea of CSMA/CA although few managed to cover all sections in sufficient detail for top marks. The most commonly missed section of CSMA/CA was the acknowledgement section. Although many students had an understanding of majority voting, quite a few discussed 'data' rather than bits, bytes or similar being transmitted and compared. A significant number of students discussed the process comparing the received data with the data that was sent, which is clearly not possible.

Question 9.7

Although a reasonable number of students achieved this mark, a significant number gave vague or incorrect answers. Commonly students said that majority vote was quicker than parity bits (without evidence to support this) or that it involved sending less data (which is incorrect).

Question 10.1

Some students are still using line numbers within assembly code programs and branch statements. This is not part of the published assembly AQA assembly code syntax and may result in lower marks if used. A number of students are misusing branch statements by including the condition/comparison within the statement, eg `BEQ R0, #0, endloop` or `B<R0=0> endloop` rather than `CMP R0, #0/BEQ endloop`.

Question 10.2

Although generally well answered, some students did not gain marks as they offered vague answers such as ‘machine code can be read by a computer whereas assembly cannot’ – both can be read by a computer, the difference is in the execution. Other vague answers referred to assembly as containing a language, English words or an instruction set.

Question 10.3

This question part was quite well answered. The most common cause for a failure to gain marks was confusion between direction (eg an assembler converts assembly code to source code, or converts object code to assembly code).

Question 11

The extended answer question was generally well answered this year, with more separate points being made compared to similar questions in previous series. In some cases, there was overemphasis on law, with the Data Protection Act being commonly applied incorrectly. There was also quite a lot of emphasis on the police breaking the law by accessing data without understanding that there are exemptions in law for such purposes. Students should be encouraged to fully decompose and plan solutions to the question prior to answering. While very long answers did not prevent students from gaining marks, students often wrote a lot to make points that could have been expressed in a much simpler and more succinct way.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.