GCSE
COMPUTER SCIENCE

8520/2: Written Assessment
Report on the Examination

8520
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Question 1

This question focused on conversion between number bases. A high percentage of students were able to convert from decimal to binary but only just over half were able to accurately convert from hexadecimal to decimal. Whilst many showed that they understood that hexadecimal A is converted to decimal 10, for which a mark was awarded, a large number then gave the final answer as 10 + 4 = 14. This demonstrated a lack of understanding of the column values of the hexadecimal number.

Question 2

This question concerned units of information. Over half of the students gave a correct response to question 2.1 but only a third of students were able to correctly answer question 2.2.

The most common incorrect response to question 2.1 was 32 (or 2^5) whereas the correct response was $2^5 - 1$

Where students showed their working out for question 2.2, most correctly gave the number of bits in a byte as 8. Many also expanded the number of bytes in a megabyte as 1 000 000. Many subsequently did not carry out the next intermediate step and multiply this by 3 to give the correct number of bytes.

One of the most common incorrect responses to question 2.2 was a failure to multiply 3 000 000 by 8 to give the correct number of bits.

Question 3

Over two thirds of students answered this question correctly.

Question 4

Around 88% of students achieved both marks for this question.

Question 5

This question concerned software classification. Two thirds of students were able to provide one correct example of application software, but only one third gained both marks. Many students provided examples of brand names, which was specifically excluded in the question. Many others gave examples of system software or operating system functions.

Question 6

Over two thirds of students answered this question correctly.

Question 7

The focus of this question was on how secondary storage devices operate. This is a more technical area of the specification where students appear to struggle to understand how storage devices actually work.

Less than one fifth of students gained full marks and less than half gained two marks or more.

Students often confused the operation of optical disks with magnetic hard disks. In addition students often gave vague answers such as 'A light is shone…' rather than the more specific correct answer 'A laser is shone…'. There were similar vague answers to indicate the use of the reflection of light to interpret data stored on the disk. Answers such as: 'A laser beam is shone at the spinning disc. The light is reflected differently from pits and lands. Because of the difference the computer interprets the reflections as 1s and 0s' were sufficiently detailed for full marks.

It was pleasing to see some responses which gave great technical detail in their responses that went well beyond the knowledge required at this level.

Question 8

This question assessed the students' understanding of techniques for data compression. Generally, responses to this question demonstrated good understanding of Huffman coding. Almost two thirds of students gained the maximum marks for the whole question and three quarters gained the maximum marks for question 8.2.

Question 9

This question concerned the legal impacts of the theft of computer code and the issues surrounding copyright of algorithms.

Nearly two thirds of students were able to gain two or more of the marks available.

Many students were able to give one reason with an explanation. These were usually to do with the potential for hackers to identify vulnerabilities and the consequences, or modifying code and passing it off as original and the financial consequences of this.

Many students incorrectly wrote about algorithms being copyrighted which is not possible, although it is possible to patent them. Many responses referred to 'a website' and contained information that might have been applicable to websites but not to the source code of computer programs. Other typical incorrect responses referred to the theft of code if the code was made public or the theft of open source code.

Question 10

Less than one fifth of students were able to give a good definition of an embedded system and less than two thirds of students gained any marks on this question. Many responses focused on the properties of an embedded system such as it having more ROM than RAM or gave vague answers about 'a system not being able to be re-purposed'. Students who wrote about 'a system within a system' and gave an example were able to gain one of the two marks available.

Question 11

This question concerned the fundamentals of computer networks.

Many students drew correct diagrams for questions 11.1 and 11.2. More than four-fifths of students gained maximum marks on these questions. Some students did not appear to have read the questions carefully and drew numerous computers, printers, internet connections, storage devices and other peripherals. In some cases this appeared to have distracted them from the core of the

questions and they then failed to show the correct number of desktop computers, which meant that some marks could not be awarded.

A disappointingly large number of students were unable to give two advantages of using a star topology. What was apparent was that many of these students instead gave disadvantages of using a bus network. Whilst the converse of these reasons might be advantages of using a star network, this is not what question 11.3 asks and so was not creditworthy.

Responses to question 11.5 were varied. Many concentrated on the sharing of resources, sharing of data and managed backup of data as benefits and spreading of malware and security of data as disadvantages. Often these answers were more descriptions or simple explanations rather than discussions and therefore could not be awarded the higher marks.

Some students focused almost exclusively on environmental benefits, social issues or the use of the internet and social media. These responses contained little that was creditworthy.

Question 11.6 was not well answered. Less than one third of students were awarded the full marks. Often students described specific protocols or wrote about 'instructions' rather than giving a simple, accurate definition.

Question 12

This question was about network security.

Only a third of students gained the full marks for question 12.2. Many students stated that a firewall prevented malware from getting access to a network or that it prevented hackers or unauthorised users from gaining access to it. Whilst it may lessen the likelihood of these occurring it does not prevent them.

Question 12.2 was better answered and many students were able to give clear descriptions of how passwords, biometric measures and other common methods are used to confirm identity.

The most common incorrect response was to discuss various CAPTCHA methods. Another was to explain three different forms of biometric recognition. Other less common incorrect responses described how strong passwords are created and the use of MAC address filtering, neither of which was creditworthy.

Less than half of the students gained two or more marks for question 12.3. Often this was because the student confused penetration testing with hacking. This led to them describing the black-box tester as a malicious hacker trying to damage a system or extort money. They also described white-box testers as trying to penetrate security for ethical reasons.

Question 13

Around a quarter of students achieved both marks for this question with a further quarter achieving 1 mark. Almost half of students gained 0 marks for this question.

Question 14

This question about cyber security threats was generally well answered. Although some students were not able to give good descriptions of the malware that they named, most were able to name

three common categories of malware such as trojans, spyware, adware and worms. Almost half of students were awarded four or more marks. However, students were often unable to give a sufficiently detailed description of how the malware worked and were not able to access the higher marks.

Some students confused malware with social engineering and wrote about social engineering techniques.

Question 15

This question was about logic gates and was well answered.

Some answers using unexpected combinations of logic gates to arrive at the expected outputs were awarded marks.

Question 16

This question concerned various aspects of systems architecture. About half of students gained six or more marks for their responses.

More effective responses not only compared the specifications of the two devices but also discussed how some aspects, whilst appearing to be worse, might compensate for other weaknesses and vice versa. These responses often used technical language to demonstrate the students' understanding of the topic and showed that students could apply this knowledge to particular circumstances. Typically these responses recognised that though Device B's raw processing power might be greater than Device A's, the small amount of cache available to Device B may well cause bottlenecks. Another typical, more effective response was to state that Device A might have a quad core processor but that not all software is able to take advantage of it.

Some very good comparisons were made between HDDs and SSDs, with clear descriptions made of capacity and speed of access.

Less effective responses often confused cache memory with RAM and RAM with secondary storage.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

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