COMPUTER SCIENCE

Paper 0478/11
Paper 1

Key messages

This syllabus has now been running for a few sessions and candidate's work continues to improve. There is a continued move to provide questions where candidates have to apply their knowledge, rather than just show their ability to simply remember facts. There is strong evidence that this is producing candidates who are now exhibiting an improved understanding of many of the topics.

General comments

Candidates and centres are reminded that written papers are now scanned in and marked on computer screens by examiners. Consequently, if a candidate writes the answer to a question on an additional page, they must indicate very clearly to the examiner where their revised answer is to be found. Also if answers have been crossed out, the new answer must be written very clearly, so that examiners can easily read the text and award candidates the appropriate mark.

Comments on specific questions

Question 1

Many candidates identified the correct terms. The most common error was candidates stating that computers or humans use a hexadecimal system. Candidates must understand that hexadecimal is a notation method to make it easier to read binary values.

Question 2

Many candidates had the correct answer for 42, but some candidates struggled with the two remaining values. Candidates need to be able to convert larger values as well as smaller ones.

Question 3

Many candidates gave the correct register and were able to explain how they had arrived at that answer. Candidates need to make sure that they explain the process in full to gain the full amount of marks available; some candidates were brief, leaving out key information.

Question 4

(a)   Many candidates gave the two correct compression methods. Some candidates gave examples of the compression methods. Candidates were not asked to provide by example and needed to identify the two methods to gain the marks.

(b)   Many candidates gave the correct method of compression and explained why that method would be best. Some candidates did not state a chosen method and instead described the method. It would be beneficial for candidates to state the method they are describing.

Cambridge Assessment
International Education

Question 5

Many candidates paired the correct components with the correct descriptions. The most common errors were the Immediate Access Store and the Register. Candidates are reminded to choose the most suitable description for the component.

Question 6

(a) Most candidates provided a correct logic circuit. It would be helpful if candidates were clear and accurate with the logic gates that they draw. Small details that are unclear can change the nature of a logic gate. Candidates should avoid trying to simplify a logic statement as this is not a requirement of the specification.

(b) Most candidates provided the correct outputs for the truth table. It is pleasing to see candidate's ability regarding logic elements.

Question 7

Many candidates were able to identify that the translators translate high-level language into machine code. It would be beneficial if candidates were accurate and detailed in their description about how this is done. Some candidates provided limited detail about how the program is translated.

Question 8

(a) Some candidates provided a detailed response that gained full marks. It would be beneficial for candidates to understand that a four mark question would require a reasonable level of detail about the process. Many candidates stated that a laser/light is shone at the barcode and the light is reflected back. Very few candidates provided accurate detail beyond this.

(b) Some candidates were able to provide a response that referred to a system where stock could be automatically deducted when a product is scanned. Most candidates were able to provide little detail beyond this. Some candidates began to repeat detail from the previous answer about how the barcode is scanned. Candidates are reminded to read a question and consider how the knowledge they have can be applied to that scenario.

(c) Very few candidates were able to provide a detailed response about infra-red touch screen technology that gained full marks. It would be beneficial for candidates to demonstrate a greater understanding of the operation of touch screen technology.

(d) Many candidates provided a detailed response about each type of storage. Some candidates described what the storage is used for, rather than describing what is meant by the storage.

Question 9

Some candidates gave a detailed response that fully described the process. Many candidates missed key details. It would be beneficial for candidates to provide a response that relates to the scenario given and not a generic response about sensors and microprocessors.

Question 10

(a) Many candidates showed understanding of structure and presentation and what it is used for. It would be beneficial for candidates to provide a clear and accurate distinction between the two in their response.

(b) (i) Some candidates could correctly identify the two different parts. It would be beneficial for candidates to understand and demonstrate the correct terminology for the parts of a URL.

  (ii) Most candidates understood the meaning of HTTPS.

(c)   Many candidates were able to provide a suitable example of how cookies can be used. It was pleasing to see that the scenario given was reflected in candidate's responses.

(d)   Some candidates gave a detailed response that fully described the role of a proxy server. It would be beneficial for candidates to demonstrate an improved level of knowledge about the role of a proxy server.

COMPUTER SCIENCE

Paper 0478/12
Paper 1

Key messages

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General comments

Candidates and centres are reminded that written papers are now scanned in and marked on computer screens by examiners. Consequently, if a candidate writes the answer to a question on an additional page, they must indicate very clearly to the examiner where their revised answer is to be found. Also if answers have been crossed out, the new answer must be written very clearly, so that examiners can easily read the text and award candidates the appropriate mark.

Comments on specific questions

Question 1

Most candidates were able to put the units in the correct order.

Question 2

(a)   Some candidates were able to describe how the image is converted to digital. It would be beneficial for candidates to read the question in detail as some candidates described how the camera captured the image, but provided little detail about how the image is then converted to digital form.

(b)   Most candidates were able to provide the correct compression method. It would be beneficial for candidates to read the question in detail as some candidates described how lossy compression compresses a file and didn't address why lossy would be the better compression method. It would also benefit candidates to understand that it would make sending the images quicker, but not easier, as some candidates commented.

Question 3

(a), (b) and Question 4 Many candidates were able to correctly convert the values. Candidates are reminded that leading zeros must be shown if a register size has been defined.

Question 5

Many candidates gave the correct register and were able to explain how they had arrived at that answer. Candidates need to make sure that they explain the process in full to gain the full amount of marks available; some candidates were brief, leaving out key information.

Question 6

Few candidates were able to complete all the terms correctly. It would be beneficial for candidates to gain and improved level of knowledge about the role of the key components involved in the Von Neumann model.

Cambridge Assessment
International Education

Question 7

(a)   Most candidates provided a correct logic circuit. It would be helpful if candidates were clear and accurate with the logic gates that they draw. Small details that are unclear can change the nature of a logic gate. Candidates should avoid trying to simplify a logic statement as this is not a requirement of the specification.

(b)   Most candidates provided the correct outputs for the truth table. It is pleasing to see candidate's ability regarding logic elements.

Question 8

Many candidates chose the correct translator. It would be beneficial for candidates to read the question carefully as many described how a compiler translates a file and did not provide information in their response about why a compiler should be used.

Question 9

(a)   Most candidates were able to correctly identify the barcode.

(b)   Many candidates were able to identify that a camera and an app are required to read the QR code. Few candidates gave further detail about the process.

Question 10

(a)   Few candidates were able to provide a detailed response about capacitive touch screen technology that gained full marks. It would be beneficial for candidates to demonstrate a greater understanding of the operation of touch screen technology.

(b) (i)   Many candidates were able to provide understanding about why the technology would no longer work.

(ii)   Many candidates were able to provide a sensible suggestion about how the problem could be overcome. It was pleasing to see candidates could problem solve the scenario given.

Question 11

Some candidates gave a detailed response that fully described the process. Many candidates missed key details. It would be beneficial for candidates to provide a response that relates to the scenario given and not a generic response about sensors and microprocessors.

Question 12

(a) (i)   Many candidates correctly identified that encryption could be used.

(ii)   Some candidates were able to provide a detailed response about the encryption process, but many candidates gave a vague and inaccurate description. It would be beneficial for candidates to understand the terminology involved in the encryption process.

(b)   Many candidates identified and described two error detection methods. Some candidates identified check digit, however this is not an error detection method used for the transmission of data, but rather to check data entry. It would be beneficial if candidates understood this distinction.

COMPUTER SCIENCE

Paper 0478/13
Paper 1

Key messages

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General comments

Candidates and centres are reminded that written papers are now scanned in and marked on computer screens by examiners. Consequently, if a candidate writes the answer to a question on an additional page, they must indicate very clearly to the examiner where their revised answer is to be found. Also if answers have been crossed out, the new answer must be written very clearly, so that examiners can easily read the text and award candidates the appropriate mark.

Comments on specific questions

Question 1

Many candidates were able to provide a sensible sensor for each application. It would be beneficial if candidates made sure they are using accurate names for sensors.

Question 2

Most candidates were able to match the correct data transmission term with the correct application.

Question 3

Many candidates were able to provide an accurate description of phishing and pharming. Some candidates were vague in their understanding of spam, but did have a basic understanding it is junk or unwanted email.

Question 4

(a) (i) Most candidates could correctly identify which bytes had been transmitted correctly or incorrectly. It would be helpful is candidates ticked the boxes and didn't use any other annotation, such as Y and N.

   (ii) Most candidates could correctly identify an error checking method. Some candidates identified check digit, however this is not an error detection method used for the transmission of data, but rather to check data entry. It would be beneficial if candidates understood this distinction.

(b) (i) Many candidates could correctly describe parallel data transmission. It would be beneficial if candidates used correct terminology and avoided reference to terms such as multiple cables, as this is too vague.

   (ii) Most candidates were able to provide a suitable suggestion for a device that uses parallel transmission.

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(iii) Some candidates provided information about why serial is more suitable. It would be beneficial for candidates to provide reasons for using serial rather than describing what is meant by serial transmission.

(c) (i) and (ii) Most candidates correctly explained how encryption can protect data. Many went on to state how the encryption could be strengthened. Many candidates referred to asymmetric encryption being suitable. This was an outside syllabus response that was also acceptable.

Question 5

(a), (b) and (c) Many candidates were able to correctly convert the values. Candidates are reminded that leading zeros must be shown if a register size has been defined.

Question 6

(a) Some candidates could accurately describe the role on an interrupt. However, some candidates demonstrated only a vague understanding, providing statement such as it stops processes. It would be beneficial for candidates to have a firm understanding of the role of an interrupt.

(b) Many candidates could provide a suitable device that would make use of an interrupt.

Question 7

(a) Many candidates were able to provide limited understanding of the benefits of this system. It would be beneficial for candidates to show more relation to the scenario in their response.

(b) Few candidates were able to provide a detailed response about resistive touch screen technology that gained full marks. It would be beneficial for candidates to demonstrate a greater understanding of the operation of touch screen technology.

Question 8

(a) Most candidates provided the correct outputs for the truth table. It is pleasing to see candidate's ability regarding logic elements.

(b) Most candidates provided a correct logic circuit. It would be helpful if candidates were clear and accurate with the logic gates that they draw. Small details that are unclear can change the nature of a logic gate. Candidates should avoid trying to simplify a logic statement as this is not a requirement of the specification.

Question 9

Many candidates demonstrated a good level of knowledge about a compiler and an interpreter. Most candidates showed limited knowledge about the role of an assembler. It would be beneficial if candidates had an improved understanding of the role of an assembler.

Question 10

Many candidates gained three marks on this question. Some showed a good understanding of how an instruction is fetched, but many left out key parts of the process. It would be beneficial for candidates to show understanding of each component in the Von Neumann model in the fetch-decode-execute cycle.

Question 11

Most candidates could provide a detailed response about the storage devices.

Question 12

Some candidates provided a correct calculation and correct answer. The most common error was not dividing by 8.

Question 13

Many candidates showed limited understanding of the role of an Internet Service Provider. Many could give little detail beyond understating it provides access to the Internet. It would be beneficial for candidates to have an improved understanding of the role of an Internet Service Provider.

COMPUTER SCIENCE

Key messages

Candidates who had previously completed the tasks for the pre-release (Computer Shop) were able to demonstrate appropriate techniques for solving this problem using a number of valid interpretations of the tasks. These candidates were able to provide answers for **Section A** that demonstrated the programs they had written, descriptions of how they had solved tasks and why they had used their chosen methods.

Candidates who were able to explain their code when requested performed better than those who simply wrote out their code.

Candidates should be careful when answering questions pertaining to a specific task in the pre-release materials that their response is related specifically to that task and not generically to the overall pre-release material, or to programming in general. Also, when declaring variables, constants and arrays, it is important that the identifier declared could be used and would work in a program, i.e. it must follow the rules of the programming language to which it relates. Candidates are further advised to ensure that identifiers are descriptive, rather than vague single characters, to demonstrate good programming practice.

Candidates should take care to note the difference between pseudocode and program code when answering questions to ensure their responses are as requested throughout the paper. Candidates with a good knowledge of pseudocode as described in the course specification perform better than those who do not.

Candidates are also advised to ensure any flowcharts they construct make use of standard programming flowchart symbols, conventions and that they are fully connected.

General comments

Very few questions were left unanswered and the overall performance on this paper was of a high standard, in line with good performances on other recent series.

Comments on specific questions

Section A

Question 1

(a) (i)   Many candidates scored quite highly on this question, being able to correctly state a data structure, its name, data type and use, that they used in Task 1 of the pre-release materials.

   (ii)   Many correct answers were seen for this question, with the full range of marks awarded. However, the main reason for not gaining the marks here was for the inclusion of responses not relevant to Task 2 of the pre-release material, as required in the question.

(b)   Some interesting and innovative answers were seen for this question, involving random generation, timestamps, or simple counting routines. However, marks were sometimes missed by candidates misinterpreting the question and showing how the estimate price was calculated rather than the unique estimate number..

(c)   This question permitted a degree of flexibility in candidates' responses and most candidates made a good attempt at a response; however, very few candidates achieved full marks. Most candidates

were able to obtain the marks for checking the stock for either or both of their chosen processor and RAM. They were also able to demonstrate how a customer would be advised if one or both of these components was unavailable. Unfortunately, few candidates remembered to confirm to customers if one or both of their components was in stock or available, and even fewer stopped the checking process if the first component was out of stock, so that, for example, the candidate would still check if RAM was available even if they had previously found that the chosen processor was out of stock. Further marks were also available for a demonstration of the useful programming technique of using flags.

(d)   Candidates who only wrote code for this question did not receive any marks, as they were asked to explain how they solved the specific problem of determining the daily sales statistics and producing an end of day summary of these statistics. However, the full range of marks was seen with candidates demonstrating how their programs kept track of the number of orders, the number of components sold, the total amount of money earned in the day for sales and outputting the results. Not all candidates fully included all of these elements, but most included some of them and some responses were complete.

Section B

Question 2

(a)   This question was generally answered very well with many high scoring responses. Some marks were lost due to candidates misreading the question and including a section that counted the number of even numbers entered, whereas the question was looking for the number of positive numbers and the number of zeros entered. This question specifically asked for answers to be presented either as a flowchart or in pseudocode. Candidates are therefore advised to not answer this type of question using programming code.

(b)   Candidates generally got the correct idea here that testing the algorithm would be more manageable if the number of inputs of test data was reduced.

Question 3

(a)   The full range of marks was seen for this question with the vast majority of candidates scoring at least one mark. Candidates were usually able to correctly populate the trace table data and generally were able to correctly calculate at least one SUM. Marks were not awarded due to errors in the Digit(8) calculation, especially in the lower tables, where 10 was recorded rather than 0. However, some candidates did also achieve the OUTPUT mark, but marks were not awarded here where candidates had forgotten to include the 'standard' GTIN–8 in their output, or they had placed commas between the digits. A correct answer for five marks is:

(b)   This question required changes to an algorithm to be explained, so marks were not awarded if candidates only included code without any explanation. However, many candidates achieved at least one mark and some candidates scored full marks.

Question 4

Candidates were rewarded here for their use of correct terminology in relation to test data. The items of test data were already given in the question with candidates being asked to explain the reason each piece of test data was chosen. The full range of marks was given, but candidates who read the question, understood the parameters of the test and then used the correct terminology scored more marks. There are many possible correct answers.

Question 5

Most candidates gained some marks for this question; however, marks were not awarded if candidates were not specific enough about the two programming concepts counting and totalling, or if they got them mixed up. Candidates were able to achieve higher marks if they were able to describe each of the concepts separately and then give an example of how each may be used. There are many possible correct answers.

Question 6

(a)   No real problems with this question other than a few candidates who swapped around fields and records.

(b)   Candidates generally scored highly on this question by naming appropriate validation checks on the Show Number field. The most common reason for not gaining marks, was including validation checks that were not appropriate.

(c)   Good candidates scored highly on this question, however, common mistakes included missing out the table name, not ticking the correct 'show' box, using search criteria in a format that did not match the data types e.g. missing out the quotes for text data types. Some marks were also not gained if the field names did not match the given field names exactly. Candidates who read the question carefully would have found all the information they needed to complete the query-by-example grid correctly.

COMPUTER SCIENCE

| Paper 0478/22 |
| Paper 2 |

Key messages

Candidates must take care when declaring and using variables, constants and arrays as part of a response to ensure that the identifier declared could be used in a program. Identifiers must not contain spaces or other punctuation. Once declared or used the same identifier should be used throughout the answer. Candidates are advised to read through each answer to ensure that no errors have been made.

Candidates must include explanations or descriptions as part of an answer, when instructed to do so in the question. Questions requiring an algorithm only for the answer will instruct candidates to write an algorithm.

General comments

Successful candidates showed evidence of practical experience in designing, programming and testing solutions to the three tasks from the pre-release (milk production of a herd of cows) to provide answers for **Section A** that demonstrated problem-solving and programming skills. Candidates need to read each question carefully and answer the question as set on the paper as a question may only require a response that is a partial solution or an extension to a task set out in the pre-release material.

Comments on specific questions

Section A

Question 1

(a) (i) Many candidates correctly declared variables with a meaningful name, suitable data type and a description of its use in **Task 2**. Common errors included incorrectly putting spaces or other punctuation in variable names or stating an incorrect data type.

  (ii) Describing the data structures used in **Task 1** and including sample data proved more challenging. Common errors included describing code structures, declaring arrays without an accompanying description and not including sample data.

(b) Some candidates explained how their program ensured a 3-digit identity code was unique. A common error was explaining how to ensure there were only three digits in the code.

(c) Candidates that provided pseudocode or code for **Task 2** usually scored high marks. Those candidates drawing flowcharts often scored lower marks, as the flowcharts lacked the detail required.

(d) (i) Those candidates that provided an explanation of the programming statements used to find the cows with a daily yield of less than 12 litres of milk for four or more days in the week usually scored high marks. Unlike part **(c)**, this answer requires an explanation of how the candidate's programming code works. All programming statements must be explained in order to be creditworthy. A common error was to repeat the question.

  (ii) Better candidates explained that an array was required and extra programming statements to store the cow ids in the array. Any programming statements included in the answer must be explained in order to be creditworthy. A common error was to repeat the question.

Section B

Question 2

(a)   This part of **Question 2** discriminated well with better candidates drawing a flowchart that matched the algorithm. A common error was to omit initialising the count of positive numbers to zero.

(b)   Many candidates correctly identified the changes required. A common error was to not count the negative numbers separately.

Question 3

(a)   Most candidates correctly completed the columns for the variables in the trace table. Better candidates correctly showed the **OUTPUT.**

(b)   Better candidates rewrote the algorithm using a CASE statement.

Question 4

(a)   Most candidates described verification, fewer candidates explained why verification was chosen by the programmer.

(b)   Most candidates correctly identified two validation checks.

Question 5

Better candidates gave three items of test data with two decimal places. Common errors were to include test data that had already been rejected.

Question 6

(a)   Nearly all candidates stated the correct number of fields.

(b)   Many candidates described a change to the tree numbering system or provided an example, better did both.

(c)   Completion of the query-by-example grid required good attention to detail, the field names used must match those given in the question and be needed for the query. A common error was to include a field that was not needed.

COMPUTER SCIENCE

Paper 0478/23
Paper 2

Key messages

Candidates must take care when declaring variables, constants and arrays to ensure that the identifier declared could be used in a program. Identifiers must not contain spaces or other punctuation. Once declared the same identifier name should be used throughout the answer.

When answering questions that ask candidates to explain how a task is performed, it is not sufficient to just write down the programming code used, candidates must always explain how any programming code included in an answer performs the task.

General comments

Candidates who had completed the tasks for the pre-release (car park operation) were able to provide answers for **Section A** that showed good understanding of the tasks undertaken. Candidates, who read each question carefully and answered the question, set on the paper, performed better than those who wrote out the code from their solution to the task mentioned in the question.

Comments on specific questions

Section A

Question 1

(a) (i) Many candidates correctly declared arrays with a meaningful name, suitable data type and a description of its use in **Task 1**. Common errors included incorrectly putting spaces in variable names, incorrect data type or incorrectly choosing a variable from Task 2 or Task 3.

(ii) Better candidates correctly stated two constants used in **Task 3** with their values and uses. Common errors included putting spaces in constant names, incorrectly stating a range of values or a data type or incorrectly choosing a variable from Task 1 or Task 2.

(b) Those candidates providing pseudocode, code for **Task 1** usually scored high marks. Candidates providing a flowchart often scored lower marks as the task was just repeated in flowchart boxes.

(c) Those candidates that provided an explanation of the programming statements used to find whether a car had overstayed and calculate the car parking charge scored good marks. Unlike part **(b)**, this answer requires an explanation of how the programming code used by the candidate to provide a solution. All programming statements must be explained in order to be creditworthy.

(d) Better candidates correctly included two items of test data and explained why the items were chosen. Weaker candidates did not supply the test data required.

Section B

Question 2

Validation was better understood by candidates than verification.

Question 3

Due to an issue with this question, careful consideration was given to its treatment in marking in order to ensure that no candidates were disadvantaged. The question was generally well answered with most candidates supplying at least one correct item of programming code.

Question 4

(a)   Most candidates showed some understanding of the purpose of the algorithm.

(b) (i)   Nearly all candidates correctly identified an appropriate change to allow for a sentinel value.

  (ii)   Candidates found rewriting the algorithm more of a challenge, with only the best candidates providing a working solution.

Question 5

(a)   Most candidates correctly entered values for Num. Some candidates forgot to initialise Counter to zero.

(b)   Most candidates could correctly identify at least one of the changes required.

Question 6

(a)   Most candidates correctly identified the number of records shown.

(b) (i)   Nearly all candidates correctly identified CatNo as their choice of primary key.

  (ii)   Nearly all candidates gave a creditworthy reason for using CatNo as a primary key.

(c)   Most candidates correctly identified at least two appropriate data types.

(d)   Better candidates listed all five fields from the correct two records.

(e)   Completion of the query-by-example grid required good attention to detail. Candidates needed to ensure that both Genre 1 and Genre 2 Sci-Fi movies were included by making use of 'or' in the criteria and only display the catalogue number and the title.