

# COMPUTER SCIENCE

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<p><b>Paper 2210/12</b> <b>Paper 1</b></p>
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## **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. Consequently, if a candidate writes the answer to a question on an additional page, they must indicate very clearly 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 it can be easily read, to enable candidates to be awarded the appropriate mark.

## **Comments on specific questions**

### **Question 1**

Many candidates provided the correct operation. Some candidates did not provide the operation, as requested, but provided the binary value. Candidates are reminded to read the question thoroughly and follow the instructions given.

### **Question 2**

Many students provided the correct storage category for the storage devices/media given. The most common incorrect answer was HDD and SSD being described as primary storage.

### **Question 3**

- (a) The full range of marks was seen in candidates' answers for this question. Some candidates demonstrated an excellent understanding of both number systems. Some candidates were too vague in their statements, for example, the denary system uses all of the numbers. This is not specific enough in detail; candidates need to state the specific number range, for example 0–9.
- (b) Many candidates achieved 4 or 5 marks for this question. Candidates demonstrated an excellent level of knowledge about how binary is converted to denary. There were alternative methods that were credited, not just the one given on the mark scheme.

### **Question 4**

- (a) (i) Many candidates provided a correct suitable data transmission method. The most common incorrect answer given was parallel.
- (ii) Candidates demonstrated limited knowledge of why serial data transmission would be suitable. Some candidates were also too vague in their response, for example, stating serial is more reliable. This does not provide enough detail, as it does not state what it is more reliable for, for example, over longer distances.

- (b) Candidates demonstrated a good level of knowledge about error checking methods and how they operate. The level of knowledge demonstrated by candidates for this question was pleasing to see.

#### Question 5

- (a) Candidates demonstrated limited knowledge about cookies. It is advised that candidates develop their knowledge about cookies. The most common marks given were that cookies are data/files sent from the webserver to the web browser. Very few marks beyond this were achieved.
- (b) Despite showing limited knowledge about what cookies are, candidates provided a wide range of uses of cookies. Some candidates were too vague in their responses, for example stating that they are used in advertising. This does not provide enough information about how they are used in this way.

#### Question 6

Many candidates provided the correct terms for what was described in the question. The most common incorrect answer was translator for compiler. Translator was not specific enough.

#### Question 7

Many candidates did very well with this question, providing an accurate logic circuit. It is pleasing to see that the accuracy to which candidates are drawing their logic circuits is improving.

#### Question 8

- (a) Many candidates provided a correct calculation for this question, but for what was a relative simple calculation, it was surprising how many candidates became very confused in their calculation, for example trying to divide values by 8.
- (b) Many candidates gained a mark by stating a suitable item that would be stored in RAM. Some candidates clarified that this item would currently be in use, to gain a second mark. A number of candidates missed stating that it would currently be in use.
- (c) Some candidates provided an excellent answer to this question, providing both sides of the comparison. Some candidates did not provide both sides of the comparison, only stating information about RAM and missing how it is different in that way to ROM.

#### Question 9

- (a) Many candidates were not specific enough in their answer to this question. Many stated that a sensor is a device, but not that it is an input device.
- (b) Many candidates gained two marks for this question, few candidates gained full marks. The common error that candidates displayed is a lack of understanding of how a sensor operates. Many candidates described the sensor as detecting a change. Candidates must understand that it is not the sensor that detects the change, that the sensor just measures the environment. The detection of an issue occurs at a later stage, when the data is processed by the microprocessor.

#### Question 10

- (a) Candidates demonstrated limited knowledge of Transport Layer Security (TLS). Candidates are advised to improve their knowledge about TLS. The most common mark achieved was that TLS encrypts data.
- (b) Although candidates demonstrated limited knowledge about TLS, many candidates were able to provide at least two suitable applications of TLS.

#### Question 11

The full range of marks was awarded to candidates for this question. The most commonly confused terms were freeware, shareware and free software.

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Paper 2210/13  
Paper 1

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## General comments

Candidates and centres are reminded that written papers are now scanned in and marked on computer screens. Consequently, if a candidate writes the answer to a question on an additional page, they must indicate very clearly 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 it can be easily read, to enable candidates to be awarded the appropriate mark.

## Comments on specific questions

### Question 1

- (a) Most candidates provided the correct answer. The most common incorrect answer given was input device.
- (b) Most candidates correctly converted the error code from hexadecimal to binary. The most common incorrect answer was an incorrect value for the hexadecimal value E.
- (c) Many candidates provided a correct answer. The most common correct answer given was that a hexadecimal code can fit in a smaller amount of display space. Some candidates gave an answer that was not applicable to the question, such as, it is easier for the programmer to write hexadecimal code. Candidates must make sure that the answer they provide is applicable to the given scenario. Candidates are reminded to consider all the benefits that they are aware of, then analyse which of those would apply to a scenario, if they have been provided with one.
- (d) Many candidates gained three marks for this question, few candidates gained full marks. The common error that candidates displayed is a lack of understanding of how a sensor operates. Many candidates described the sensor as detecting a change. Candidates must understand that it is not the sensor that detects the change, that the sensor just measures the environment. The detection of an issue occurs at a later stage, when the data is processed by the microprocessor.

### Question 2

Most candidates provided a correct file extension. The most common incorrect answer was a confusion of file extensions between sound and video.

### Question 3

- (a) Some candidates provided a correct answer, but it was evident that candidates lacked some knowledge in the understanding of the different parts of a Uniform Resource Locator (URL). Many candidates were not aware of the protocol and domain name parts of a URL.

- (b) It was evident that candidates have limited knowledge of an IP address. Many candidates showed understanding that an IP address is used to identify a device on a network, however knowledge demonstrated beyond this was limited.

#### Question 4

Many candidates gained full marks for this question. The most common incorrect answer was a confusion between the role of registers and the immediate access store.

#### Question 5

- (a) Many candidates provided a correct logic circuit for the logic statement.
- (b) Many candidates provided a correct drawing and description of the operation of an XOR gate. The level of detail given for many of the descriptions was excellent.

#### Question 6

Few candidates demonstrated that they understood the operation of a 2D scanner and a 3D scanner. Candidates are advised to develop their understanding of how each of these devices operates. Some candidates described the operation of a 3D printer, rather than a 3D scanner.

#### Question 7

Many candidates demonstrated a good level of knowledge about firewalls. The most common incorrect answer was a lack of understanding that firewalls can be both software and hardware.

#### Question 8

- (a) Most candidates showed some understanding of how data can be accidentally damaged. Some candidates described how data can be maliciously or purposefully damaged, for example, by a virus, rather than how it can be accidentally damaged.
- (b) Many candidates were able to give at least two applications of SSL. Some candidates were too vague in their response, for example, used in messages. This is not enough detail about what kind of messages it is used in. Candidates must be specific in their application.
- (c) Many candidates answered this question well. A wide range of different security methods were seen in candidate's answers. Some candidates identified a security method but did not go on to describe how the method would make online banking safer. Candidates are reminded to identify all key words in the question and provide a response for them.

#### Question 9

- (a) Many candidates demonstrated a good level of knowledge about how data is read from a compact disc. The level of understanding shown in responses to this question was pleasing to see.
- (b) Many candidates provided a correct calculation for the file size.
- (c) The full range of marks was awarded to candidates for this question. Some candidates only gave points about primary storage, or secondary storage, and not both.

#### Question 10

The full range of marks was awarded to candidates for this question. Some candidates displayed excellent knowledge of assembly language; however some candidates displayed a very confused understanding of assembly language.

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Paper 2210/22  
Paper 2

## Key messages

Successful candidates showed evidence of practical experience in designing, programming and testing solutions to the three tasks from the pre-release (rowing boat hire) 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.

Successful candidates declaring and using variables, constants and arrays as part of a response ensured that the identifier declared could be used consistently in a program. Identifiers must not contain spaces or other punctuation. Once an identifier is declared or used it must remain the same throughout the response to the question. Candidates are advised to read through each written response to ensure that no changes or errors have been made.

Successful candidates showed practical experience of designing, setting up and querying a database table to provide accurate answers to the database question. Once a field is named, the name must remain the same throughout the response to the question. Candidates are advised to read through each written response to ensure that no changes or errors have been made.

Successful candidates showed evidence of good examination technique by answering the question as set on the examination paper in the space provided for the answer or clearly signposting where the answer was to be found on the examination paper.

A 'Pseudocode Guide for Teachers' is available from the 'Teaching Materials' tab on the TeacherSupport site, or from customer services for those teachers that do not have access to the TeacherSupport site.

## General comments

Nearly all candidates attempted all the questions on the paper.

## Comments on specific questions

### **Section A**

#### **Question 1**

- (a) (i) Many candidates correctly declared a variable 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, stating an incorrect data type or choosing a variable from Task 2. An example of a correct answer is:

Variable Name	HoursHired
Type	Real
Use	To store the running total of hours the boats was hired during a day.

- (ii) Some candidates correctly named a constant and stated its value. Common errors included putting spaces in constant names, incorrectly stating a range of values, including an imprecise name for example not being specific about the length of time paid for, or indicating in the use that the value could change as the program was running. An example of a correct answer is:

Constant Name	HourPrice
Value	20

- (b) Responses that identified validation checks for inputs to Task 1 and include reasons and test data for Task 1 were awarded good marks. Common errors included incorrectly choosing an input for Task 2 or an input not related to the pre-release material.
- (c) Responses providing pseudocode, program code or flowcharts for Task 3 were usually awarded good marks. Responses that incorrectly provided pseudocode, program code or flowcharts for Task 1 or Task 2 only were not creditworthy.
- (d) Responses providing an explanation of programming statements that were used to find out how many boats were available to hire, part of Task 2, were awarded good marks.

Unlike **Question 1(c)**, this response required an explanation of how the programming code used by the candidate would provide a solution. Any programming statements included in the response needed to be explained in order to be creditworthy.

## Section B

### Question 2

Many responses seen were excellent algorithms written in pseudocode. Responses needed to be written using a flowchart or pseudocode. Programming code was not asked for and candidates writing in a programming language sometimes did not include the required statement structures for example missing out the `NEXT` from `FOR ... NEXT` loop.

### Question 3

Most candidates were awarded good marks. A common error seen was incorrectly matching the array description with the table and vice versa.

### Question 4

Candidates found this question challenging with some candidates not identifying that a `CASE` statement was required. A common error seen was to incorrectly include an example instead of a description.

### Question 5

- (a) Most candidates correctly completed the columns for the variables in the trace table. Completing the `OUTPUT` column proved more challenging for many candidates with the incorrect inclusion of variable names or punctuation as part of the output.
- (b) Many responses correctly identified the change required for testing the `COUNT` variable; some candidates also identified the removal of the decision about the overweight sacks.

### Question 6

- (a) Most candidates correctly identified some of the fields required. The `Engine Class` field proved the most challenging with some candidates not following the example given in the question, and incorrectly splitting class and power.
- (b) Most candidates correctly identified the `Engine Number` field as suitable for the primary key.
- (c) Completion of the query-by-example grid required good attention to detail and using the information provided to answer **part (a)** of the question. The criteria used needed to be suitable for the data type chosen by the candidate, common errors included not using a wildcard character for `Engine Class` or providing a date for the `Date of Service`.

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Paper 2210/23  
Paper 2

## Key messages

Candidates who had previously completed the tasks for the pre-release (flying club) 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 the methods chosen.

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 material that their response is related to that task and not generic to the overall pre-release material. Also, when declaring variables, constants and arrays, it is important that the identifier declared could be used 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, 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 syllabus perform better than those who do not. A 'Pseudocode Guide for Teachers' is available from the 'Teaching Materials' tab on the TeacherSupport site, or from customer services for those teachers that do not have access to the TeacherSupport site.

## General comments

Very few questions were left unanswered.

## Comments on specific questions

### **Section A**

#### **Question 1**

- (a) (i) Many candidates correctly named up to three appropriate arrays and some of these candidates correctly declared their responses in an acceptable array format. A small number of these candidates correctly defined up to three correct arrays to cover all three types of plane. Common mistakes included declaring variables instead of arrays, not using meaningful names, leaving spaces within the name. An example of a correct answer for three marks is:

```
Array_2Seater[ ]  
Array_4Seater[ ]  
Array_Historic[ ]
```

- (ii) Many correct answers were seen for this question. However, as with part (i), the main reason for not awarding marks was the inclusion of spaces within the variable and constant names. Some marks were not awarded if the variable or constant wasn't suitable for Task 1 of the pre-release material. Also, marks were not awarded if a suggested constant was actually a variable. An example of a correct answer for four marks is:

Variable name	NumFlights
Variable purpose	to store the number of flights in a day
Constant name	FlightCost2Seat30
Constant purpose	to store the cost of a 30-minute flight in a 2-seater plane

- (b) Algorithms were seen in pseudocode, program code in a range of languages, or as a flowchart. Many good responses were seen demonstrating a range of suitable solutions to the task. Candidates generally performed well on providing suitable annotated inputs. A range of methods were seen for applying the correct values for number of flights to the program, including direct programming of the correct numbers through to calculations involving the length of the day and the length of the flight, and for applying the relevant cost of a specific type of flight, by directly programming the correct values, through to the use of CASE statements.
- (c) This question allowed candidates a degree of flexibility as to how they answered it, as it asked about how the inputs for Task 1 could be tested and validated. Candidates were therefore awarded marks for describing the inputs and the various types of validation check required for each. They were also awarded marks for describing types of test data that were suitable to ensure the inputs worked correctly. Some candidates also explained how their particular program validated inputs for this task, which was another valid approach.
- (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 checking and displaying whether any of the planes were available at a given time. Common mistakes included candidates concentrating on booking a particular timeslot or showing when a specific plane was available, neither of which are required by the question. Candidates, however, were able to demonstrate checking their arrays for available timeslots, inputting the required timeslot and giving appropriate output.

## Section B

### Question 2

The full range of marks was seen for this question. A common mistake seen as a correction for the error in line 4 involved the AND in the checking range just being replaced with an OR. This would not work in this case; an OR together with correcting the actual range was needed. For line 7, some candidates did not spot that a variable was needed to ensure the number was inserted into the correct array element. For line 9, some candidates did not spot that the line given was not the correct end statement for the FOR loop in the program. Candidates generally understood how line 10 could be corrected.

### Question 3

- (a) Candidates generally were awarded one or two marks for this question; however, the common errors seen included candidates giving specific types of validation or verification check, e.g. Range check for validation, as the answer, instead of explaining the difference between the checks. Another common error involved candidates using the words valid to describe validation and verify to explain verification, which was not enough.
- (b) Many candidates were able to name or give an example of a verification check and a high proportion of these candidates were able to explain the check. A common mistake involved some candidates naming and describing a validation check.
- (c) There were a number of correct ways to answer this question and some candidates wrote enough to achieve one of the marks. Very few expanded their answer to achieve the second mark. A common mistake involved candidates believing this was related to a library where books are borrowed.

#### Question 4

- (a) Most candidates achieved some marks for this question, but very few achieved all four marks. It was a matching type question involving a number of pseudocode statements.
- (b) Candidates who read the question and attempted to provide code matching the question were generally awarded marks. However, candidates often added an interpretation that wasn't required and concentrated on loading data into an array, rather than reading from it, as asked.

#### Question 5

- (a) Candidates who were able to provide a complete or near complete trace table, demonstrating the sorting algorithm that was given in the flowchart were awarded marks. The full range of marks was seen.
- (b) Candidates who recognised that a sort was being performed were awarded marks, however, a common misinterpretation was for candidates to assume the algorithm was comparing the number of letters in the names, rather than how they compared alphabetically. Another misinterpretation was that some candidates assumed that the number of flags a candidate had was being counted, rather than recognising the term 'flag' as a programming device.

#### Question 6

- (a) Most candidates were awarded at least one mark, with a very high proportion of candidates being awarded both marks. A good range of alternative fields, with associated information was supplied. A few errors were, however, seen. A common error was candidates specifying one of the fields already in the database table.
- (b) Some candidates were awarded high marks 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 didn't match the data types e.g. missing out the quotes for text data types, or using quotes for numeric data types. Some marks were not awarded 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.