

Principal examiner reports for teachers

Principal examiner reports for teachers summarise what candidates did well and what candidates needed to improve for this examination series only.

This report is to be used in conjunction with the question paper and mark scheme.

For guidance on teaching and learning we provide resources for many of our syllabuses.

Resource	Where to find it
Grade descriptions – Grade descriptions describe the level of performance typically demonstrated by candidates achieving the different grades awarded for a qualification.	School support hub Select: Subject > Resource finder > Syllabus and specimen materials
Schemes of work – Schemes of work are designed to support you in your teaching and lesson planning.	School support hub Select: Subject > Resource finder > Teaching and learning
Lesson planning – Guidance on how to plan a lesson.	Lesson planning
Resource plus – There may be additional resources such as teaching packs containing lesson plans, resources and worksheets and videos for aspects of your syllabus.	School support hub Select: Subject > Resource finder > Teaching and learning
Teaching tools	Teaching Tools
Exemplar candidate responses	School support hub Select: Subject > Resource finder > Teaching and learning
Learner guide – A guide for students to help them understand what the course involves.	School support hub Select: Subject > Resource finder > Teaching and learning
Community forums – Do you have a question or something to share? Our online forums are great way to keep up to date with your subject and the global Cambridge community.	Community forum on the school support hub
Access to scripts for this series.	Access to scripts service
Results analysis is available for some syllabuses.	Results analysis
Test maker is available for some subjects.	Test maker

Other services from Cambridge International Education

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COMPUTER SCIENCE

Paper 2210/11 Computer Systems

Key messages

What candidates did well

- Candidates are able to convert between number systems and perform binary addition.
- Candidates can provide answers that require knowledge recall, such as identifying input devices, output devices and the components of a computer.

What candidates needed to improve

- Candidates need to improve the level of technical language shown in questions.
- Candidates need to improve the level of accuracy when describing technical processes.
- Candidates also need to apply the context given in a question to the response that they provide.

Comments on specific questions

Question 1

(a) Comprehensive responses

- Most candidates selected exbibyte as the largest unit of measurement.

Limited responses

- Some candidates confused tebibyte to be the largest unit of measurement.

(b) Comprehensive responses

- Some candidates calculated 3 kibibytes as the correct number of kibibytes.

Limited responses

- Some candidates misunderstood that a division of 1024 must be used when calculating data storage units and gave the answer 3.072. This showed they had divided by 1000 instead.

(c) Comprehensive responses

- Most candidates understood that data is processed by logic gates and ticked this as the correct statement.

Limited responses

- Few candidates stated that binary is one type of data a computer can store and did not recognise that binary is the only type of data a computer can store.

Question 2

(a) (i) Comprehensive responses

- Most candidates understood that either program counter or the memory address register could be the first register to be used in the fetch-decode-execute cycle.

Limited responses

- Few candidates stated that the memory data register is the first register to be used. This showed that they interpreted the location in memory as the instruction itself rather than the address of the instruction.

(ii) Comprehensive responses

- Some candidates described the whole process in technical detail using technical terminology such as instruction set. Candidates also referred to several components used in the process and their role.

Limited responses

- Some candidates understood the beginning actions of the memory data register as sending the instruction to the current instruction register. Candidates then described the current instruction register as decoding the instruction without technical understanding.

(iii) Comprehensive responses

- Most candidates identified a component used at the execute stage. A wide variety of components could be chosen.

Limited responses

- Few candidates identified the current instruction register without understanding that this register is used only in the decode stage.

(b) Comprehensive responses

- Most candidates described the processor as executing more instructions per second and more instructions at the same time.

Limited responses

- Some candidates stated it would execute more instructions without reference to a time period or this happening simultaneously.

(c) (i) Comprehensive responses

- Most candidates identified two input devices.

Limited responses

- Few candidates identified an onscreen keyboard without understanding that this is software.

(ii) Comprehensive responses

- Most candidates identified two output devices.

Limited responses

- Few candidates identified headphone without understanding that these are not a built-in device.

Question 3

(a) Comprehensive responses

- Most candidates identified denary as another example of a number system.

Limited responses

- Few candidates repeated number systems that had already been given in the question.

(b) Comprehensive responses

- Most candidates converted the hexadecimal number into the correct 8-bit binary number.

Limited responses

- Few candidates converted the number into a binary number without the leading zeros to make it contain 8 bits.

(c) Comprehensive responses

- Most candidates converted the hexadecimal number into the correct 12-bit binary number.

Limited responses

- Few candidates converted the number into a binary number without the leading zeros to make it contain 12 bits.

(d) Comprehensive responses

- Most candidates converted the binary number to the correct hexadecimal number.

Limited responses

- Few candidates converted the binary number to a denary number.

(e) Comprehensive responses

- Most candidates converted the binary number to the correct hexadecimal number.

Limited responses

- Few candidates miscalculated the central value as the value 'C' or 'E'.

(f) Comprehensive responses

- Some candidates showed the correct binary value, the correct working carries and the overflow error.

Limited responses

- Some candidates just showed the correct binary value and the overflow error without showing their working carries.

Question 4

(a) Comprehensive responses

- Most candidates described the purpose of the mouse which is to click items on the screen.

Limited responses

- Few candidates just described it as an input device.

(b) Comprehensive responses

- Most candidates described how many bits of data are transmitted at a time and how many wires are used in the process. They also described how directions the data can be sent and whether this can happen at the same time.

Limited responses

- Few candidates stated that one bit of data is sent down a single wire without referring to the bits of data being sent one at a time.

(c) Comprehensive responses

- Most candidates understood a wide variety of benefits of using the USB cable.
- Most candidates described its ability to power the mouse, that it cannot be plugged in the wrong way round and that it is a universal connection.

Limited responses

- Few candidates stated that it works well over long distance without consideration for the context of the question.

(d) Comprehensive responses

- Some candidates identified the missing function names. They described the interface as allowing the user to communicate with the computer and managing interrupts mainly as checking the priority of an interrupt.

Limited responses

- Some candidates identified missing memory and tried to name the second function as managing users.
- Candidates sometimes gave an example of what would be included in an interface, such as it has windows and icons, rather than describing the role.

Question 5

(a) Comprehensive responses

- Most candidates referred to both high-level and low-level language.

Limited responses

- Few candidates just referred to code or programs being converted to binary without referring to a high-level language.

(b) Comprehensive responses

- Most candidates stated that another translator would be an assembler.

Limited responses

- Few candidates stated a translator that has already been given in the question.

(c) Comprehensive responses

- Some candidates stated the letter for the correct statement and a viable correction for each.

Limited responses

- Some candidates identified statements B or C. The corrections provided were a complete rewrite of the statement to a different meaning rather than a correction to the statement given.

(d) Comprehensive responses

- Some candidates stated a function and gave a technical description of the role of the function.

Limited responses

- Some candidates stated correct functions and gave descriptions that were missing key technical elements. For example, candidates gave auto-correction as the function and stated that it corrects errors in the code.

Question 6

(a) Comprehensive responses

- Most candidates selected the correct missing terms.

Limited responses

- Some candidates used the term web server in place of web browser.

(b) Comprehensive responses

- Few candidates completed and annotated a technically correct diagram.

Limited responses

- Most candidates demonstrated the request for a digital certificate and the sending of the digital certificate. The key elements that were not included related to the authentication of the certificate and the encryption of the data.

Question 7

(a) Comprehensive responses

- Some candidates identified the correct sensor.

Limited responses

- Some candidates gave a sensor that needed more technical reference such as a sound sensor.

(b) Comprehensive responses

- Most candidates gave two suitable sensors.

Limited responses

- Few candidates gave a sensor that needed more technical reference such as a motion sensor.

(c) (i) Comprehensive responses

- Most candidates identified another characteristic of a robot.

Limited responses

- Few candidates gave an example component that had already been given in the question.

(ii) Comprehensive responses

- Some candidates referred to the context provided in the question and included reference to the values given.

Limited responses

- Some candidates gave a generic response without referring to the context provided in the question and including reference to the values given.

(d) Comprehensive responses

- Some candidates included reference to the use of machine learning and how that could create a map of the room to store where the objects are in the room. These candidates showed technical understanding of how AI can be used in the given context.

Limited responses

- Most candidates stated that machine learning could be used and repeated that the robot animal could learn where the objects are in the room.

Question 8

(a) Comprehensive responses

- Some candidates provided a description of the process of the computer representing text using key technical language.

Limited responses

- Some candidates tried to describe the operation of a keyboard or stated their understanding that the text is converted to binary.

(b) (i) Comprehensive responses

- Few candidates gave both the missing terms and accurate missing descriptions. The descriptions showed clear and accurate technical understanding of key terminology for sound and images.

Limited responses

- Most candidates gave the correct missing terms without being able to include accurate and technical understanding for the missing descriptions.

(ii) Comprehensive responses

- Most candidates gave two methods of compression.

Limited responses

- Few candidates gave file formats such as MP4 instead of compression methods.

COMPUTER SCIENCE

Paper 2210/12 Computer Systems

Key messages

What candidates did well

- Candidates are able to convert between number systems and understand units of measurement for data storage.
- Candidates can provide answers that require knowledge recall, such as identifying input devices, output devices and the components of a computer.

What candidates needed to improve

- Candidates need to improve the level of technical language shown in questions.
- Candidates need to improve the level of accuracy when describing technical processes.
- Candidates also need to apply the context given in a question to the response that they provide.

Comments on specific questions

Question 1

(a) Comprehensive responses

- Most candidates selected that a microphone is an input device.

Limited responses

- Few candidates selected that a microphone is an output device.

(b) Comprehensive responses

- Most candidates stated that a bit is the smallest unit of data.

Limited responses

- Few candidates stated that a byte or a kibibyte is the smallest unit of data.

(c) (i) Comprehensive responses

- Most candidates selected that two's complement is a base 2 system.

Limited responses

- Few candidates selected that two's complement is a base 10 system.

(ii) Comprehensive responses

- Some candidates recognised that a two's complement binary number for the value 32 is the same as converting the value 32 to binary.

Limited responses

- Some candidates tried to represent the value 32 as the negative value -32 showing a misconception that two's complement values can only be negative.

(iii) Comprehensive responses

- Most candidates gave the correct binary number for the negative value -14 .

Limited responses

- Few candidates gave the binary number after flipping the bits without adding 1.

(d) Comprehensive responses

- Most candidates gave a suitable sensor that would be built into the smartwatch.

Limited responses

- Few candidates gave examples of sensors that were inaccurate for use in a smartwatch, such as motion sensor and a sound sensor.

Question 2

(a) Comprehensive responses

- Most candidates showed a clear understanding of the role of the CPU.

Limited responses

- Few candidates did not use accurate terminology. For example, describing its role as 'to process tasks or programs' rather than instructions.

(b) Comprehensive responses

- Most candidates accurately identified two other registers that would be present in the CPU.

Limited responses

- Some candidates gave the registers that had already been provided in the question. Few candidates identified units of the CPU rather than registers. For example, the control unit.

(c) Comprehensive responses

- Most candidates explained the process of how the registers are used in full and accurate detail.

Limited responses

- Few candidates tried to explain without enough technical detail. For example, stating the MAR has the address, rather than stores the address.

(d) Comprehensive responses

- Most candidates could accurately describe how many fetch-decode-execute cycles per second the CPU can complete.

Limited responses

- Few candidates recognised that 3 billion cycles would be completed without referring to these being completed per second.

Question 3

(a) Comprehensive responses

- Some candidates selected the statement that was meant to be incorrect.

Limited responses

- Some candidates selected the first statement that was correct about hexadecimal without understanding that the question required the incorrect statement to be selected.

(b) Comprehensive responses

- Most candidates converted the hexadecimal error code to binary.

Limited responses

- Few candidates converted the hexadecimal codes and gave the answer without including the necessary leading zeros.

(c) Comprehensive responses

- Most candidates converted the binary numbers to hexadecimal error codes.

Limited responses

- Few candidates miscalculated the letter-based characters in the codes. For example, gave AD8 rather than AE8.

(d) Comprehensive responses

- Some candidates converted the hexadecimal error codes to denary numbers.

Limited responses

- Some candidates converted the hexadecimal error codes to binary numbers. Some candidates misunderstood how to calculate the denary values from the hexadecimal error codes. For example, 0A2 was calculated using $0 + 10 + 2 = 12$.

(e) (i) Comprehensive responses

- Most candidates named the remaining two parts of the packet.

Limited responses

- Some candidates gave items of data that would be included in the part of the packet, rather than naming the part of the packet. For example, they gave destination IP address instead of naming the header.

(ii) Comprehensive responses

- Some candidates fully described the role of the router in packet switching using technical language and accuracy.

Limited responses

- Some candidates gave a brief description mostly based around the router selecting the fastest path.

(f) (i) Comprehensive responses

- Some candidates gave two accurate features of magnetic storage.

Limited responses

- Some candidates gave features without the use of technical terminology. For example, they stated that it uses magnets rather than electromagnets.

(ii) Comprehensive responses

- Most candidates gave solid state as the most suitable type of storage.

Limited responses

- Few candidates gave an example of a solid-state device that would not be suitable such as a USB drive.

(g) (i) Comprehensive responses

- Most candidates recognised that the video would be of a higher quality.
- Some candidates also recognised that the video streaming service would also retain the original version of the video.

Limited responses

- Some candidates described how lossless compression operates rather than giving reasons why lossless compression would be chosen.

(ii) Comprehensive responses

- Most candidates identified that it would make the file size smaller.

Limited responses

- Few candidates were inaccurate and stated that it would make the video smaller.

(iii) Comprehensive responses

- Few candidates used technical language and demonstrated accuracy when explaining how videos are compressed using lossless compression.

Limited responses

- Most candidates gave a generic description of lossless compression rather than one tailored to the context of the question.
- Candidates gave responses such as repeating data or patterns were identified, without reference to contextual detail that it would be repeating frames that would be identified.

Question 4

(a) Comprehensive responses

- Most candidates gave the three correct parity bits.

Limited responses

- Few candidates wrote odd or even rather than giving a parity bit of 1 or 0.

(b)(i) Comprehensive responses

- Some candidates understood that a transposition error would not be detected and were able to explain why.

Limited responses

- Some candidates tried to describe that it would be a different kind of error, such as the sender has written something incorrect.

(ii) Comprehensive responses

- Most candidates were able to provide two other appropriate error detection methods.

Limited responses

- Few candidates gave an inappropriate response such as a check digit. Some candidates gave a response repeated from the question, for example, a parity check.

(c)(i) Comprehensive responses

- Most candidates stated a suitable method of encryption.

Limited responses

- Few candidates gave a protocol that would use encryption rather than encryption method, for example SSL.

(ii) Comprehensive responses

- Some candidates understood that an encryption key is used by an algorithm.

Limited responses

- Few candidates understood that an encryption key is a string of characters.

(iii) Comprehensive responses

- Most candidates stated that the encrypted data is called cypher text.

Limited responses

- Few candidates gave an incomplete answer of cipher without understanding that this is a separate part of the encryption process.

Question 5

(a) Comprehensive responses

- Some candidates provided the correct terms and descriptions. The description for spyware included reference to it recording some kind of specific activity for the user, such as key presses or capturing data through a webcam.

Limited responses

- Some candidates stated the correct terms and gave descriptions that needed more technical reference. For example, some candidates described spyware as monitoring what a user does on a computer without reference to specific ways that the user can be monitored.

(b) Comprehensive responses

- Few candidates demonstrated understanding of what access levels are and how they can be used to help prevent a cyber security attack.

Limited responses

- Most candidates described the use of privacy settings on platforms such as social media.

Question 6

(a) Comprehensive responses

- Some candidates explained how an image is converted using technical terminology such as pixel. They demonstrated understanding that each pixel has a single colour.

Limited responses

- Some candidates described the process inaccurately. For example, stating the pixels in the image have colours.

(b) Comprehensive responses

- Few candidates used technical language and gave information relevant to the context when explaining how AI could improve the process of identifying the flower.

Limited responses

- Most candidates referred to the use of machine learning without being able to provide further reference to the context of the question.

(c) (i) Comprehensive responses

- Most candidates referred to the application being accessible from any device.

Limited responses

- Few candidates referred to reasons that were not relevant to the context. For example, stating that they would not need to maintain the hardware.

(ii) Comprehensive responses

- Most candidates understood that an internet connection would be required to access the data and that there could be security risks if the app stored any of their personal data.

Limited responses

- Few candidates described that they would need to pay a cost to store the data in the cloud storage without understanding that this was not relevant to the context.

Question 7

(a) Comprehensive responses

- Some candidates knew that a low-level language is close to the language processed by a computer.

Limited responses

- Some candidates stated that a low-level language is binary without recognising that not all low-level languages are binary.

(b) Comprehensive responses

- Most candidates gave two examples of low-level language.

Limited responses

- Few candidates just gave binary as their example of low-level language.

(c) Comprehensive responses

- Most candidates knew that an assembler is the translator that would be used.

Limited responses

- Few candidates gave either a compiler or an interpreter.

(d) Comprehensive responses

- Some candidates understood that the programmer can directly manipulate the hardware and that the program would take less storage space.

Limited responses

- Some candidates made inaccurate statements such as it takes less time to translate.

(e)

Comprehensive responses

- Most candidates recognised all three functions of an IDE.

Limited responses

- Few candidates selected protocol identifier or binary converter.

COMPUTER SCIENCE

Paper 2210/21 Algorithms, Programming and Logic
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Key messages

What candidates did well

- Many candidates showed a good knowledge of Computer Science topics with good application to a range of scenarios.
- Many candidates used correct terminology when responding to questions requiring this.
- Many candidates used correct pseudocode for short-answer questions.
- Many candidates demonstrated a good understanding of a logical flow of a program.
- Most candidates demonstrated a good understanding of databases.
- Most candidates demonstrated a good understanding of Boolean Algebra.

What candidates needed to improve

- Candidates should stop using programming code in their responses to the short-answer questions as it is only permissible in the long-answer question.
- Some candidates need to read the question carefully to ensure the answers match the requirements of the question.
- Candidates should understand the differences between programming datatypes and database datatypes.
- Candidates should understand how to apply library routines, such as, `SUBSTRING` and `UCASE`.

Comments on specific questions

Question 1

Comprehensive responses

- Most candidates identified the range check.

Limited responses

- A few candidates identified the common incorrect answer of a length check.

Question 2

Comprehensive responses

- Most candidates demonstrated a good understanding of mathematical operators identifying the logical operators within the list.

Limited responses

- A few candidates identified `DIV` and `MOD`, although library routines are arithmetic operators.
- A few candidates identified non-arithmetic operators that were not in the list.

Question 3

Comprehensive responses

- Most candidates identified the correct data type for `Age` and `Teenager`.

Limited responses

- A few candidates chose the data type integer for `TelephoneNumber` when it started with a `+`.
- A few candidates used database datatypes for `TelephoneNumber` such as, text or alphanumeric.

Question 4

Comprehensive responses

- Some candidates demonstrated an overall clear understanding of an efficient bubble sort algorithm, completing the gaps correctly.

Limited responses

- Some candidates initialised `Last` to 49 or 51, despite the array being 50.

Question 5

(a) Comprehensive responses

- Some candidates correctly used the `RANDOM` function with correct parameters and correctly assigned the result.

Limited responses

- Most candidates successfully assigned a result.
- Some candidates used a parameter of 1000 instead of 999 and adding 1 to the result.
- Some candidates used actual code for the random function instead of pseudocode.

(b) Comprehensive responses

- Some candidates correctly used the `UCASE` and `SUBSTRING` functions and assigned the result to the variable.

Limited responses

- Some candidates successfully made an attempt to extract letters from `LastName`.
- Some candidates incorrectly used `UCASE` and `SUBSTRING` functions by not assigning the result to a variable.
- A few candidates used actual code for the functions instead of pseudocode.

(c) Comprehensive responses

- A few candidates were able to open, the file, store the contents and close the file correctly using the correct pseudocode.

Limited responses

- Most candidates omitted the quote marks around the file name.
- Most candidates omitted either part of the command word, such as `CLOSE` instead of `CLOSEFILE` or the variable name in the `WRITEFILE` line.

(d) Comprehensive responses

- Some candidates were able to give the two types of verification checks and comprehensive descriptions.

Limited responses

- A few candidates identified validation checks.
- A few candidates' descriptions were limited, such as entering the data twice for double entry and not expanding that the two are compared to see if they match or how the two sets of data are checked using visual check by looking at the entered data and matching it to the original.

Question 6

Comprehensive responses

- Most candidates correctly identified the types of loops and provided good descriptions.

Limited responses

- A few candidates identified a `WHILE` loop.
- A few candidates gave an incomplete description of the `FOR` loop by not stating that it has a fixed number of iterations.

- A few candidates gave an incomplete description of a REPEAT loop, describing that it ran until a condition was met without stating that the condition was at the end of the loop and that the loop would run at least once.

Question 7

Comprehensive responses

- Most candidates identified the errors and gave the correct pseudocode corrections.

Limited responses

- A few candidates used the incorrect datatype `FLOAT` instead of the pseudocode datatype `REAL`.
- A few candidates used the wrong symbol for not equal to, for a correction, using `!=` instead of `<>`.

Question 8

(a) Comprehensive responses

- Some candidates gave the full expression for the logic circuit.

Limited responses

- Some candidates gave an incomplete expression by not assigning it to X.

(b) Comprehensive responses

- Most candidates completed the truth table correctly.

Limited responses

- A few candidates were unable to determine the correct output for the logic circuit.

Question 9

(a) (i) Comprehensive responses

- Most candidates identified that members may have the same name and therefore it is not unique.

Limited responses

- A small number of candidates were unable to understand the term primary key.

(ii) Comprehensive responses

- Most candidates chose the most appropriate primary key.

Limited responses

- A small number identified `MemberName` as a primary key.

(b) Comprehensive responses

- Most candidates identified three different database datatypes.

Limited responses

- A few candidates incorrectly used the same datatype for more than one field.
- A few candidates incorrectly the programming datatype string.
- A few candidates incorrectly identified the datatype Integer for the date field.

(c) Comprehensive responses

- Most candidates correctly gave the correct structured query language (SQL).

Limited responses

- A few candidates included the word metres in the `WHERE` clause.
- A few candidates put quote marks around `1500`.
- A few candidates used an incorrect comparison operator, `≥` or `=>` instead of `>=`.

Question 10

(a) Comprehensive responses

- Some candidates drew a correct flowchart for the algorithm using correct symbols.

Limited responses

- Some candidates missed arrowheads on the lines making them incomplete flow lines.
- A few candidates did not terminate all paths in the flowchart at a `STOP`.
- A few candidates did not use conditions and loops for the flowchart, resulting in a large number of symbols and making the flow diagram less clear.

(b) Comprehensive responses

- A few candidates correctly discussed the changes in terms of the flowchart.

Limited responses

- Most candidates incorrectly discussed the changes in terms of an algorithm instead of the context of a flowchart.

Question 11

Comprehensive responses

- A few candidates were able to correctly define the function with return type, identify the parameters with correct datatypes and return the correct calculation.

Limited responses

- Some candidates missed the return from the function definition.
- Some candidates identified the parameters without giving them the datatype.
- A few candidates used `OUTPUT` instead of `return`.
- A few candidates used the keyword `CALL` for calling the function.

Question 12

Comprehensive responses

- Most candidates were able to meet requirement 1.
- Most candidates were able to input a year, calculate whether it was a leap year using the `MOD` function and update the array.
- Most candidates were able to input one of the first three months.
- Some candidates were able to meet most requirement 2.
- Some candidates correctly used the month to access the array for the number of days.
- Some candidates used correct validation for the input of daily sunshine.
- Most candidates who entered the daily sunshine were able to calculate the highest value.
- Some candidates were able to meet requirement 3.
- Some candidates correctly used `DIV` and `MOD` (or equivalent calculation) to calculate the number of hours and minutes of total sunshine.
- Most candidates attempting requirement 3 were able to output the required values.

Limited responses

- A few candidates used `DIV` instead of `MOD` to find the leap year which would have resulted in an incorrect result.
- Some candidates chose incorrect parameters for looping through the days of a month, either by using direct numbers instead of the value stored in the array or by referencing the array with an index.
- A few candidates used an `IF` statement for the validation where this required a loop as an `IF` statement only gives one chance to enter data correctly before proceeding.
- A few candidates attempted to validate the input of a number by comparing it to a null value (`""`) which is a string/character.
- A few candidates did not calculate the minutes and hours correctly.
- A few candidates did not comment on their code.
- A few candidates did not add an output message before their inputs or with their outputs of data.

COMPUTER SCIENCE

Paper 2210/22 Algorithms, Programming and Logic
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Key messages

What candidates did well

- Most candidates demonstrated good knowledge of the theoretical aspects of the subject, such as the testing stage of the program life cycle.
- Most candidates were able to draw a correct logic circuit for a given logic expression.
- Most candidates were able to complete a truth table for a given logic expression.
- Many candidates were able to find errors in a given algorithm and suggest appropriate corrections.
- Many candidates demonstrated a good understanding of how to complete the extended programming question, mostly using pseudocode or Python.

What candidates needed to improve

- Some candidates did not answer the questions to match the command word, for example, by not providing sufficient detail for 'explain' questions.
- Some candidates used Python statements for questions that required a response written using pseudocode.
- Some candidates did not write sufficient comments in their final program to explain what the different sections were doing.

Comments on specific questions

Question 1

Comprehensive responses

- The majority of candidates ticked option **C** to correctly identify two types of iteration.

Limited responses

- Option **A** was a common incorrect answer.

Question 2

Comprehensive responses

- The majority of candidates correctly identified option **B** as the data type described in the question.

Limited responses

- Some candidates chose other options.

Question 3

(a) (i) Comprehensive responses

- Most candidates correctly identified presence check as a validation check used to ensure data has been input and not left blank.

Limited responses

- Some candidates gave names for validation checks that did not exist.

(ii) Comprehensive responses

- Most candidates correctly named check digit as the value, calculated from all the other values before it, placed at the end of a sequence of numbers in the code.

Limited responses

- Some candidates incorrectly named different types of validation check, such as type check or range check.

(b) Comprehensive responses

- Many candidates gave a partially complete explanation of the purpose of a format check.
- Many candidates gave an appropriate example of where a format check could be used.

Limited responses

- Some candidates used the word 'format' to explain the purpose of format check, for example, 'to check that data is entered in the correct format'.

(c) Comprehensive responses

- Most candidates wrote appropriate pseudocode to meet some of the requirements for the required algorithm.
- Many of these candidates wrote a complete or near complete algorithm.

Limited responses

- Some candidates did not use pseudocode as set out in the syllabus and incorrectly added elements of program code, such as Python, to their algorithm.

Question 4

Comprehensive responses

- Most candidates understood that coding is the stage of the program development life cycle where the program is written in a programming language.
- Many of these candidates were also aware that iterative testing takes place during the coding stage.
- The majority of candidates were aware that during testing, the whole program is tested for errors and if any are found, they are fixed.
- Many candidates were aware that test data is used in the testing stage, with some of these candidates being more specific about the type of test data used and its expected outcome.

Limited responses

- Some candidates did not give sufficient distinct points in their responses to cover the number of marks that were available.
- Some candidates mixed up iterative testing, which is part of the coding stage, with the final testing stage.

Question 5

(a) Comprehensive responses

- Most candidates identified and corrected at least one of the errors in the given pseudocode.
- Many of these candidates corrected all or nearly all of the errors.

Limited responses

- Some candidates identified lines of codes as erroneous that were actually already correct lines of pseudocode.

(b) Comprehensive responses

- Many candidates correctly identified the given pseudocode as being a linear search.

Limited responses

- Some candidates incorrectly identified the type of algorithm as pseudocode.
- Some candidates did not give a type of algorithm, but identified a process within the algorithm, such as inputting data.

(c) Comprehensive responses

- Many candidates identified the correct parts of the algorithm, for example, by giving line numbers, where changes would be required to meet the required changes to the algorithm.
- Many of these candidates also included appropriate pseudocode statements to meet the new criteria.

Limited responses

- Some candidates incorrectly added pseudocode to the existing loop, although it would inform the user that the account number has not been found, would do this after each iteration and the account number could still be found in a later iteration. This did not meet the requirements of the question.

Question 6

(a) Comprehensive responses

- The majority of candidates traced the algorithm shown in the flowchart and completed the trace table.
- Many of these candidates completed the trace table with few or no errors.

Limited responses

- Some candidates needed to follow the flowchart and complete the table as they go, until the whole trace is complete.

(b) Comprehensive responses

- Many candidates understood the purpose of the algorithm shown in the flowchart and gave answers accordingly.

Limited responses

- Some candidates did not give enough detail in their response to completely cover the overall purpose of the algorithm in the flowchart, for example, some candidates stated the purpose of one or two of the statements in the flowchart.

Question 7

(a) Comprehensive responses

- The vast majority of candidates stated a correct reason to store data in a file.

Limited responses

- Some candidates gave reasons that were not appropriate, such as 'so it can be compressed'.

(b) Comprehensive responses

- Many candidates wrote pseudocode that at least partially met the criteria of the question in relation to file handling.
- Some of these candidates wrote a fully or nearly correct set of pseudocode statements.

Limited responses

- Some candidates did not use the pseudocode file handling commands as listed in the syllabus and used program code instead.
- Some candidates did not correctly follow the pseudocode syntax, such as missing out the quotation marks that should surround the file name.

Question 8

(a) Comprehensive responses

- The majority of candidates drew appropriate diagrams of logic circuits to represent the given logic expression that were at least partially correct.
- Many of these candidates drew fully correct logic circuit diagrams.

Limited responses

- Some candidates added extra logic gates in different parts of the logic circuit that were not meant to be there.
- Some candidates needed to take more care when drawing logic gates to make sure each gate has its own distinctive shape that matches the guidance given in the syllabus.

(b) Comprehensive responses

- Most candidates completed their truth table to accurately match the given logic expression.

Limited responses

- A small number of candidates gave a response that was the exact opposite to the expected answer.
- Some candidates made errors in their working which led to some errors in their final output column.

Question 9

(a) Comprehensive responses

- The majority of candidates completed the given table to show appropriate data types for at least some of the given fields.
- Many candidates made few or no errors in the completion of their table.

Limited responses

- Some candidates incorrectly used data types that were not given in the list of available data types in the question.

(b) Comprehensive responses

- Many candidates wrote a complete SQL statement with all the required features.

Limited responses

- Some candidates made errors in the `WHERE` clause by using an incorrect field name, or by not including quotation marks in the search query.

(c) Comprehensive responses

- Most candidates were aware that the `NumberInStock` field could serve the same purpose as the `InStock` field.
- Many of these candidates were able to expand their answer to say why this was the case.

Limited responses

- Some candidates only identified the field that could replace the `InStock` field without further expansion.

Question 10

Comprehensive responses

- The vast majority of candidates gave their response using either pseudocode or Python.
- Most candidates declared their variables at the start of the program.
- Many candidates initialised their array at an appropriate place in the program.
- Most candidates allowed correct inputs to take place within their program, and included input prompts.
- Many candidates stored their input data in the array as required.
- Most candidates totalled the rainfall either as it was input or as a separate operation.
- Many candidates found the average daily rainfall in mm and the total rainfall in cm, and rounded these values appropriately.
- Most candidates counted the number of days without rainfall.
- Many candidates attempted to count the number of consecutive days without rainfall and find the longest dry spell.
- Many candidates worked out if there had been a drought based on their longest dry spell.
- Most candidates output the appropriate statistics with output messages.
- Most candidates added comments to their program.

Limited responses

- Some candidates declared the array as integer instead of real.
- Some candidates declared their rainfall input variable as integer instead of real.
- Some candidates inappropriately converted their totalling calculation to cm, worked out the average rainfall, and rounded these values after every iteration of the input loop.
- Some candidates did not initialise their totalling and/or counting variables.
- Some candidates attempted to count consecutive days without rain by checking their array using the loop counter as an index, as well as the next element in the array as the loop counter plus one, even though their loop iterated same number of times as there were elements in the array. This would have gone out of bounds.
- Some candidates needed to include more comments within their program to explain what it was doing.