

Cambridge IGCSE™

COMPUTER SCIENCE**0478/13**

Paper 1 Computer Systems

October/November 2024

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

This document consists of **8** printed pages.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Mark scheme abbreviations

/ separates alternative words / phrases within a marking point

// separates alternative answers within a marking point

underline actual word given must be used by candidate (grammatical variants accepted)

max indicates the maximum number of marks that can be awarded

() the word / phrase in brackets is not required, but sets the context

Note: No marks are awarded for using brand names of software packages or hardware.

Question	Answer	Marks
1(a)	B	1
1(b)	One mark for correct example. Two marks for matching explanation. • RAM • To store data/instruction that is currently in use • To store software/programs that are currently in use • For volatile storage // to store data temporarily • To allow data to be accessed directly by the CPU/processor // To allow data to be stored closer to the CPU/processor • ROM • To store the BIOS • To store the bootstrap/bootloader • To store start-up instructions • To store the firmware • For non-volatile storage // to store data permanently • To store data/instructions that should not change (unless needed) • Cache • To store frequently used instructions/data • For volatile storage // to store data temporarily	3
1(c)(i)	One mark for valid working, for example: $128 + 32 + 8 + 4 + 2 + 1$ One mark for correct answer: 10101111	2
1(c)(ii)	• 0001 0101 • 0010 1101 • 0000 1001 0001	3
1(d)	One mark for each correct nibble. One mark for method of working, for example: carries. One mark for identification of overflow. $ \begin{array}{r} 1 \\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 1 \\ +\ 1\ 1\ 0\ 0\ 1\ 1\ 0\ 0 \\ \hline 1\ 1\ 0\ 1\ 0\ 1\ 1\ 1\ 1 \end{array} $	4
1(e)	One mark for correct working, for example: flip and add One mark for correct denary. –114	2

Question	Answer	Marks
2(a)	The file size will be reduced	1
2(b)	Any two from: - It will be under the file size limit for the email - It will be uploaded/transmitted/downloaded faster - It will take less storage space (on computer) - It will use less data allowance (if mobile data used) - Requires less bandwidth	2
2(c)	Any three from: - Data will be permanently removed ... and that could be important/necessary data (The report will have text in it and) lossy is not suitable for text files ... as it will damage/corrupt the file - The report may have images in it and the quality of these will be reduced	3
2(d)(i)	Character set	1
2(d)(ii)	Any two from: - It can represent more characters - It can represent emojis/symbols - It can represent more languages	2
2(d)(iii)	Each character requires more storage space	1
2(e)(i)	- originator's address - destination address - packet number	3
2(e)(ii)	C	1
2(e)(iii)	Router	1
2(f)(i)	- A copy of the data is sent back to the employee's device/sender - The employee's device/sender compares the data sent to the data received back - If the original and the copy do not match, an error has occurred	3
2(f)(ii)	Any two from: - The checksum is calculated from/using the data ... using the same algorithm ... so, if the values are different the data must be different	2
2(g)(i)	Any one from: - To keep it secure - The data is sensitive/confidential - To make it meaningless	1

Question	Answer	Marks
2(g)(ii)	Any one from: - They both use a key - They both scramble the data // both make the data meaningless - They both turn plain text into cypher text	1
2(g)(iii)	Any two from: - Symmetric uses <u>one/public</u> key whereas asymmetric uses <u>two/public and private</u> keys - Symmetric can send the key with the data whereas asymmetric does not - Symmetric decrypts the data using the same key whereas asymmetric decrypts the data using a different key - Symmetric is less secure than asymmetric	2

Question	Answer	Marks
3(a)	Any two from: - Program counter // PC - Memory address register // MAR - Current instruction register // CIR	2
3(b)	One mark for each correct part of the diagram. The diagram shows: - Data/Instruction sent from the MDR to the CIR/CU ... using the data bus ... the CIR that is built into the CU - Data/instruction separated into operand and op code <u>Control unit/CU</u> decodes instruction ... using an instruction set For example: <pre> graph LR MDR[MDR] -- "Instruction sent using data bus" --> CU[Control unit] subgraph CU [Control unit] CIR[CIR] end CU -- "Decodes instruction using instruction set" --> CU </pre>	4

Question	Answer	Marks
4	One mark for each correct term or description in the correct place. Term - World wide web // WWW - IP (address) - Domain name server // DNS - Proxy server Description (Web browser) Software/application that allows users to view/access web pages by rendering HTML (Hacking) Gaining unauthorised access to a computer/system	6

Question	Answer	Marks
5(a)	(A system) that can perform actions without human intervention	1
5(b)	- It receives data from the sensor - It analyses the data // It checks if the data is within/out of a range // - It sends signals to trigger actions based on the data	3
5(c)	Any two from: For example: - It stops the farmer having to handle heavy equipment - It frees the farmer up to do other jobs - It doesn't need to take breaks // Can work 24/7 - It can perform boring repetitive tasks - Can save money on labour costs - May be more accurate at ploughing/planting - May be more efficient than the farmer at ploughing	2
5(d)	Any four from: For example: - It could make use of machine learning - It could gather data from ploughing ... and use this data to adapt its own process ... so that it will make fewer mistakes ... such as the dimensions of the field ... such as the landscape of the field ... such as where obstacles are in the field ... to create a map of the field ... to develop the most efficient route to take ... so, it knows what to avoid in future	4

Question	Answer	Marks
6(a)	One mark for each correct term in the correct order: • web browser • session • temporary • web browser // session • persistent • permanent • expire	7
6(b)	Any three from: For example: • User preferences // by example • Login details • Payment details • User's personal details e.g. address • Contents of a shopping cart • Targeted advertising	3

Question	Answer	Marks
7	Any four from: • It is a piece of software • ... used to write/develop/edit code • ... used test/debug the code • ... with features such as auto-completion // any suitable example • To translate the code to low level language/machine code	4