Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/13**

Paper 1 Computer Systems **May/June 2023**

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 May/June 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **10** printed pages.

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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 descriptors 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.

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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
<u>underline</u>	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.

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Question	Answer	Marks
1(a)	• 174	**1**
1(b)	• A • E	**2**
1(c)(i)	• 01110000	**1**
1(c)(ii)	• B	**1**
1(d)	**One** mark for each correct nibble **One** mark for correct carries (or other correct working method) **One** mark for identification of overflow error 1 1 • 1 0001 1111	**4**
1(e)	• 9	**1**
1(f)	• 12	**1**

Question	Answer	Marks
2(a)	Any **one** from: • To perform a fetch-decode-execute cycle • To **process** / **execute** an instruction	**1**
2(b)	**Two** from: • It may increase the performance • … because more instructions can be processed **simultaneously**	**2**
2(c)(i)	**Two** from: • To store / holds **data** / **address / instruction** • … temporarily	**2**

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Question	Answer	Marks
2(c)(ii)	**One** mark for correct name of bus. **Two** marks for matching description. Address bus Transmit / carries addresses … … between **components** in the CPU Data bus Transmit / carries data … … between **components** in the CPU Control bus Transmits control signals … … from the **control unit** to other **components** in the CPU	**3**
2(d)	Any **two** from: e.g. • Keyboard // Keypad • Mouse • Touchscreen • Digital camera • QR code scanner • Barcode scanner • 2D scanner • Microphone	**2**
2(e)	• Any **one** from: • Speakers • Headphones	**1**
2(f)	• random access memory (RAM) • read only memory (ROM)	**2**

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Question	Answer	Marks
2(g)	Any **three** from: • Receives data from the self-checkout system • Compares the book data received to stored book data • … that is a **database** of stock • If the book is found it decrements the book stock by 1 • If the book is not found an error message is displayed	**3**

Question	Answer	Marks
3	**One** mark for each correct missing term or definition:	**5**

Term	Definition
router	a device that forwards packets to their correct destinations in a network
IP address	this address is assigned by the network and used to identify a device on a network
network interface card (NIC)	this is a component in a device that enables it to connect to a network
MAC address	this address is assigned by the manufacturer and is used to uniquely identify the device
firewall // proxy-server	this can be hardware or software based and filters traffic coming into and out of a network

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Question	Answer	Marks
4(a)	• B	1
4(b)(i)	• Machine code // low-level language // object code	1
4(b)(ii)	• Interpreter	1
4(b)(iii)	• Compiler	1
4(b)(iv)	• Compiler	1

Question	Answer	Marks
5	The diagram demonstrates (**one** mark for each): • Packets sent through several routers • … taking different routes from device A to device B • Packets arrive out of order • Packets being reordered when all arrived at device B	4

Question	Answer	Marks
6(a)	Any **three** from: e.g. • Checking the spelling and tone of the email/website • Checking the URL attached to a link • Scanning a download with anti-malware • Only downloading data / software from trusted sources • Never providing personal details online • Install a firewall to check if the website is valid	3

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Question	Answer	Marks
6(b)	**Two** marks for description, **one** mark for example: • Manipulating / deceiving / tricking people … • … to obtain data // to force them to make an error • Any suitable example of social engineering	**3**
6(c)	Any **three** from: • Providing users with different **permission** for the data • Limiting access to reading data limiting the data that can be viewed • Limiting access to editing data // limiting the data that can be deleted / changed • Normally linked to a username •	**3**

Question	Answer	Marks
7(a)	• Interface • Knowledge base	**2**
7(b)	Any **two** from: • **Stores** the rules for the system • … for the inference engine to use • Used to link the facts in the knowledge base	**2**

Question	Answer	Marks
8	**One** mark for each correct term in the correct order: • Malware • Bot • Botnet • Web server • Website	**5**

Question	Answer	Marks
9(a)	Any **one** from: • They can both be used to identify a device (on a network) • They can both be static / dynamic • They are both unique (to a device on a network) • They can both be assigned by a router • They can both be public/private	**1**
9(b)	**Four** from: • IPv4 is usually written as denary • … IPv6 usually written as hexadecimal • IPv4 is separated using dots • … Pv6 is separated using colons • IPv4 is 32-bit • … IPv6 is 128-bit • IPv4 is 4 groups of digits • … IPv6 is 8 groups of digits • IPv4 digits are between 0 and 255 • … IPv6 digits are between 0000 and FFFF • IPv4 all 0s are displayed • … IPv6 can use double colons to replace repeated groups of 0000 • IPv4 has fewer available unique addresses • ... IPv6 has more available unique addresses	**4**
9(c)(i)	• Domain name server // DNS	**1**
9(c)(ii)	• Web browser	**1**

Question	Answer	Marks
10	Any **four** from: • The secondary storage / hard drive can be partitioned to create the virtual memory • … and page B sent to the virtual memory … • … which makes space for page D in RAM • … Once page A / C / D / another page is not required / has been processed • … page B can be sent from the virtual memory back to RAM when it is required	**4**

Question	Answer	Marks
11(a)	• Operating system	**1**
11(b)	Any **one** from: • Create a file • Copy a file • Open a file • Close a file • Move a file • Delete a file • Rename a file • Save a file • Sort files	**1**
11(c)	Any **two** from: e.g. • Keeping track of the status of each memory location • Managing the movement of data to and from RAM • Checks that processes have enough memory located to them • Makes sure that two processes don't try to access the same memory location • Manage the transfer of pages between virtual memory and RAM • Allows multitasking	**2**
11(d)	• Interrupt	**1**

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