CAMBRIDGE
International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/13**

Paper 1 Theory **May/June 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 May/June 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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PUBLISHED

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)	8	1
1(b)	2048	1
1(c)	nibble	1

Question	Answer	Marks
2(a)	16 bits used to represent **each** colour in the image	1
2(b)	The file size will decrease	1

Question	Answer	Marks
3(a)(i)	**One** mark for each correct nibble, in the correct order. 1010 0010 1111	3
3(a)(ii)	2607	1
3(b)(i)	**One** mark for each correct character, in the correct order. 1 9 B	3
3(b)(ii)	411	1
3(c)	Any **one** from: • It is easier/quicker to read/understand/debug • It is a shorter representation of binary // It takes up less **screen** space	1

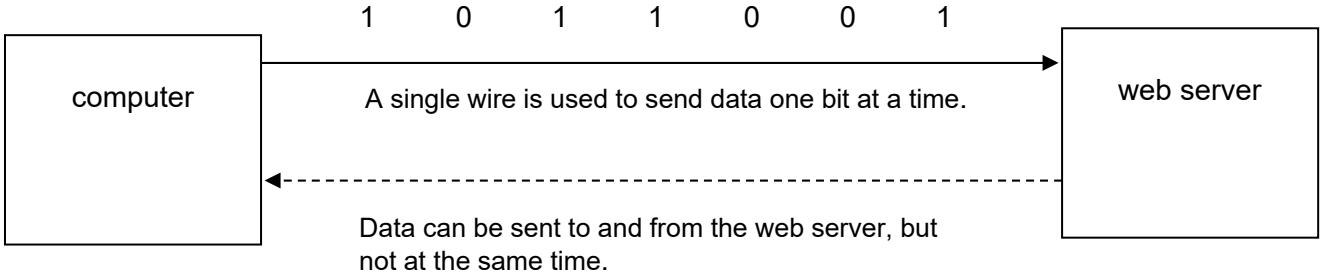
Question	Answer	Marks
3(d)	Any **two** from: Example: • **HTML** colour codes • URL • Memory dump • IP address • MAC address • Assembly language • Error codes/messages • ASCII/Unicode	**2**
3(e)	**One** mark for correct working: Example: flip and add **One** mark for correct answer. 11100111	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4</td><td>One mark for each correct type of storage.

<table>
<tr><th>type of secondary storage</th><th>statement</th></tr>
<tr><td>optical</td><td>Pits and lands are created on a reflective surface.</td></tr>
<tr><td>solid-state</td><td>NAND or NOR technology is used.</td></tr>
<tr><td>magnetic</td><td>Platters are spun that are divided into tracks and sectors.</td></tr>
<tr><td>magnetic</td><td>Electromagnets are used to read and write data.</td></tr>
<tr><td>solid-state</td><td>Transistors are used as control gates and floating gates.</td></tr>
<tr><td>optical</td><td>A red or blue laser is used to read and write data.</td></tr>
</table></td><td>6</td></tr>
</table>

Question	Answer	Marks
5(a)	**C**	**1**
5(b)	It is directly accessible by the CPU	**1**

Question	Answer	Marks
6(a)	touch screen microphone keyboard	**3**
6(b)	Any **two** from: Example: • **Data** can be **collected** without human intervention • Gathers **data** faster than a human • It will be accurate at taking readings • It can take readings continuously (24/7) • It can take readings in dangerous environments	**2**
6(c)	**One** mark for each use (**Max 1**) per sensor: Example: Temperature • Checking whether the water in a kettle is boiling • Monitoring the temperature in a room that is climate controlled Humidity • Checking whether the air is dry enough in a spray-painting garage • Checking whether the air is moist enough in a greenhouse Infra-red • Detecting motion in a room for a security system • Detecting whether a person is approaching automatic doors Magnetic field • Counting vehicles that cross a bridge • Monitoring vehicles that enter a car park	**4**

Question	Answer	Marks
7(a)	**One** mark for each correct part of the diagram. The diagram shows: • Bits beings sent one at a time • Bits being sent over a single wire • Data can be sent to and from the web server/network component/computers … • … **not** at the same time For example:  	**4**
7(b)	Any **two** from: • Bits will not be skewed // Bits are sent in order • Less chance of error • Less crosstalk/interference • Data can be sent over a long distance (if needed) • It is possible to download and upload data to the web server • Higher bandwidth than full duplex	**2**
7(c)	Any **one** from: • The transmission of data may be relatively slow • Data cannot be sent and received at the same time • May be more data collisions	**1**

Question	Answer	Marks
7(d)(i)	Any **three** from: • DDoS // DoS • Hacking • Malware // by example • Brute-force attack NOTE: three different examples of malware can be awarded.	**3**
7(d)(ii)	Any **two** from: • Can **limit** the **number of requests** sent to the web server at a time • Can process **common requests** that will not need to enter the network • Act as a firewall • Examine incoming data to the webserver/network • Can have set rules/criteria for data to meet • Can have a blacklist/whitelist/list of IP addresses to block • **Blocks** traffic that **doesn't meet criteria** • Closing certain ports	**2**
7(e)	Any **six** from: • The users type the **URL** into the **address bar/web browser** • The web browser sends the **URL** to the **DNS** • The **DNS** searches for the **matching IP address** • The **DNS** returns the **IP address** to the web browser • If the DNS cannot find the IP address it sends the URL to the next DNS • The web browser sends a **request to the IP address/web server** • The **web server** sends the data for the web page to the web browser • The web browser **renders the HTML** data to display the web page	**6**

Question	Answer	Marks
8(a)	To process instructions/data To **run** the fetch–decode–execute **cycle**	**2**
8(b)(i)	Any **one** from: • To **temporarily** store data/instruction/address • To allow **immediate access** to data during the FDE cycle	**1**
8(b)(ii)	Any **three** from: • Memory address register // MAR • Memory data register // MDR • Accumulator // ACC • Program counter // PC • Current instruction register // CIR	**3**
8(c)	Any **three** from: • To execute **instructions** • To perform calculations // by example • To perform logical operations // by example • To store interim **results** of calculations • Stores/reads/writes data to/from the accumulator	**3**
8(d)	Any **Four** from: • It could have more cores • … increasing the **number of FDE cycles/instructions** it can perform **at the same time** • It could have a higher clock speed • … increasing the **number of FDE cycles/instructions per second** it can perform • It could have a greater cache size • … meaning more **frequently used** data can be accessed faster	**4**

Question	Answer	Marks
9(a)	**One** mark for each correct term in the correct place. • printer • computer • priority level • fetch–decode–execute cycle • interrupt queue • higher • interrupt service routine (ISR)	**7**
9(b)	Example: • Memory management • Multitasking	**2**