Cambridge Assessment International Education

# Cambridge IGCSE™

**COMPUTER SCIENCE** **0478/12**

Paper 1 Theory **May/June 2022**

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 2022 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 **13** 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:<br><br>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:<br><br>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. |

**Please note the following further points:**

The words in **bold** in the mark scheme are important text that needs to be present, or some notion of it needs to be present. It does not have to be the exact word, but something close to the meaning.

If a word is underlined, this **exact** word must be present.

A single forward slash means this is an alternative word. A double forward slash means that this is an alternative mark point.

Ellipsis (…) on the end of one-mark point and the start of the next means that the candidate **cannot** get the second mark point without being awarded the first one. If a mark point has an ellipsis at the beginning, but there is no ellipsis on the mark point before it, then this is just a follow-on sentence and **can** be awarded **without** the previous mark point.

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| Question | Answer | Marks |
|---|---|---|
| 1(a) | **One** mark for each correct line<br><br>**Denary**: 41, 174, 86<br>**8-bit binary**: 00100001, 10100110, 00101001, 10000110, 10101110, 01010110 | **3** |
| 1(b) | **One** mark for correct working, **one** mark for correct answer<br><br>Working e.g.<br>• 256 + 64 + 16 + 4 + 2 + 1<br><br>Answer:<br>• 343 | **2** |

| Question | Answer | Marks |
|---|---|---|
| 2(a) | **Two** marks each correct conversion (**one** mark for the first four bits, **one** mark for the second four bits)<br><br>2F: 0 0 1 0 1 1 1 1<br>15: 0 0 0 1 0 1 0 1<br>D6: 1 1 0 1 0 1 1 0 | **6** |
| 2(b) | Any **two** from:<br>• IP address<br>• Error messages/codes<br>• Assembly language // low-level language<br>• URL // web address<br>• Memory dumps<br>• Locations in memory | **2** |
| 2(c) | **One** mark for a description, **one** mark for a correct example<br><br>**Structure**<br>• **Layout** of the web page<br>• e.g. Where text is placed<br><br>**Presentation**<br>• **Formatting** of the web page<br>• e.g. the colour of the font | **4** |

| Question | Answer | Marks |
|---|---|---|
| 2(d) | **Two** from:<br><br>• The **formatting** of the page can be changed/edited **without needing to alter the structure**<br>• … so, they can make regular updates without needing to check the structure<br><br>• The **formatting** document can be used again for a different website …<br>• If further content and web pages are added to the website, the necessary formatting can be easily applied …<br>• … so, this can save time when developing/updating a website<br>• Allows use of CSS to standardise formatting<br>• … so, CSS only needs to be created once (to be applied to each webpage) | **2** |

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(a)</td><td>One mark for the correct term or definition
<table>
<tr><th>Term</th><th>Definition</th></tr>
<tr><td>browser</td><td>Software/application that allows users to view web pages / render HTML</td></tr>
<tr><td>Internet Service provider // ISP</td><td>this is the company that provides a user with a connection to the Internet</td></tr>
<tr><td>HTTP // HTTPS</td><td>this is a protocol that is used to send data for web pages across the Internet</td></tr>
<tr><td>Uniform Resource Locator (URL)</td><td>a text-based version of a web address</td></tr>
<tr><td>cookie</td><td>a text file (stored by web browser) that contains data about a user’s browsing habits/details/preferences</td></tr>
</table></td><td>5</td></tr>
<tr><td>3(b)</td><td>• Hardware or software based</td><td>1</td></tr>
<tr><td>3(c)</td><td>Four from:<br><br>• (The parent can) set criteria for the websites she is allowed to visit<br>• … such as a whitelist/blacklist of websites<br>• The firewall will examine the data/traffic incoming and outgoing from her computer<br>• If data is sent from a website that is not allowed, it will be blocked</td><td>4</td></tr>
</table>

| Question | Answer | Marks |
|---|---|---|
| 4(a) | Any **three** from:<br><br>• It uses English-like statements<br>• It needs to be converted to **machine code** (to be processed by a computer)<br>• … using a translator<br>• It is portable<br>• One line of code can perform multiple commands | **3** |
| 4(b)(i) | **Two** from:<br><br>• The user is not allowed to access the **source code** …<br>• … so, they cannot tailor the software to their needs<br>• … so, they cannot fix any bugs in it<br>• The software is still covered by copyright<br>• The user must get the owner's **permission** to do anything beyond using it | **2** |
| 4(b)(ii) | **Two** from:<br><br>• The user can access the **source code** …<br>• … so, they can tailor the software to their needs<br>• … so, they can fix any bugs in it<br>• … so, the source code could be studied for educational purposes<br>• The user can redistribute the software/program …<br>• … but this must be done under the same terms as the original software | **2** |

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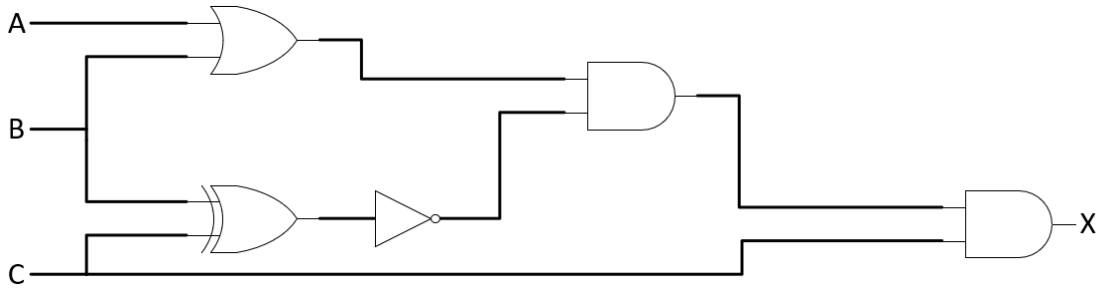
| Question | Answer | Marks |
|---|---|---|
| 5(a) | **One** mark for each correct logic gate with correct input(s)   | **5** |
| 5(b) | **Four** marks for 8 correct outputs<br>**Three** marks for 6/7 correct outputs<br>**Two** marks for 4/5 correct outputs<br>**One** mark for 2/3 correct outputs | **4** |

| A | B | C | Working space | X |
|---|---|---|---|---|
| 0 | 0 | 0 | | **0** |
| 0 | 0 | 1 | | **0** |
| 0 | 1 | 0 | | **0** |
| 0 | 1 | 1 | | **1** |
| 1 | 0 | 0 | | **0** |
| 1 | 0 | 1 | | **0** |
| 1 | 1 | 0 | | **0** |
| 1 | 1 | 1 | | **1** |

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| Question | Answer | Marks |
|---|---|---|
| 6(a) | **One** mark for identifying the attack, **two** marks for the description<br><br>• Phishing<br>• Email is sent to user to encourage them to click link<br>• … that takes user to fake website<br><br>Pharming<br>• Email is sent to user to encourage them to click link/download attachment<br>• … that triggers **download** of **malicious code** that will redirect user to fake website<br><br>Virus/malware<br>• Email is sent to user to encourage them to click link/download attachment<br>• … that triggers **download** of virus/malware<br><br>Denial of service // DoS<br>• A very large number of emails are sent to a **server/network at the same time**<br>• … crashing the **server/network** | **6** |
| 6(b) | Any **two** from:<br><br>• Encryption<br>• Password<br>• Two-step / Two-factor authentication/verification<br>• Biometric device<br>• Anti-malware // Anti-virus<br>• Proxy-server | **2** |

| Question | Answer | Marks |
|---|---|---|
| 6(c) | **One** mark for identifying an issue, **one** mark for suggesting a suitable prevention<br><br>– Power surge/loss (damages hardware)<br>– Use a UPS<br><br>– Water can be spilled on the device<br>– Don't have water near the device<br>– Keep device in a waterproof box when not is use<br><br>– Fire can destroy device<br>– Use electrics safety<br>– Keep device in a fireproof box when not is use<br><br>– Data is accidentally deleted<br>– Add verification method for data deletion<br>– Set access levels for data to limit who can delete the data<br><br>– Incorrect use of **storage** device<br>– Making sure device is ejected before removing<br><br>– Physical damage to hardware // hardware failure<br>– Correct care and maintenance of hardware<br><br>– Software failure<br>– Making sure it is always up to date // enable automatic updates | **6** |

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>7(a)</td><td>Three from:<br><br>• CD<br>• DVD<br>• Blu-ray</td><td>3</td></tr>
<tr><td>7(b)</td><td>One mark for each correct row
<table>
<tr><th></th><th colspan="3">Type of storage</th></tr>
<tr><th>Statement</th><th>Magnetic (✓)</th><th>Optical (✓)</th><th>Solid state (✓)</th></tr>
<tr><td>this storage has no moving parts</td><td></td><td></td><td>✓</td></tr>
<tr><td>this storage uses a laser to read and write data</td><td></td><td>✓</td><td></td></tr>
<tr><td>this storage uses a read/write head</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>this storage burns pits onto a reflective surface</td><td></td><td>✓</td><td></td></tr>
<tr><td>this storage uses NAND and NOR technology</td><td></td><td></td><td>✓</td></tr>
<tr><td>this storage stores data in tracks and sectors</td><td>✓</td><td>(✓)</td><td></td></tr>
</table></td><td>6</td></tr>
</table>

| Question | Answer | Marks |
|---|---|---|
| 8(a) | Any **four** from:<br><br>• Trial version of software<br>• … for a limited time / number of uses<br>• … with limited features<br>• … free of charge<br>• If full version is required need to pay fee / sign up // When trial over user is asked to pay / sign up<br>• Protected by copyright<br>• Type of software **licence** | **4** |
| 8(b) | Any **three** from:<br><br>e.g.<br>• Copyright<br>• Plagiarism<br>• **Production/distribution** of malware<br>• Intellectual property theft<br>• Privacy of data<br>• Age appropriation<br>• Offensive materials<br>• Environmental impact of distribution media e.g. CDs<br>• Accessibility of software<br>• Security of software<br>• Following guidelines of professional bodies e.g. ACM/IEEE/BCS | **3** |

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