Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

1875991136

COMPUTER SCIENCE **0478/12**

Paper 1 Theory **May/June 2021**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **12** pages. Any blank pages are indicated.

DC (DH/SG) 202677/4

1 A denary value can be converted into hexadecimal and binary.

(a) Complete the table to show the hexadecimal and 8-bit binary values of the given denary values.

Denary	Hexadecimal	8-bit binary
49		
123		
200		

[6]

Working space

.....

.....

.....

.....

.....

(b) Give **two** benefits, to users, of converting binary values to hexadecimal.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(c) Hexadecimal is used to represent Hypertext Markup Language (HTML) colour codes in computer science.

Identify **three** other ways that hexadecimal is used in computer science.

1 .....

2 .....

3 .....

[3]

2 Data storage can be magnetic, solid state or optical.

(a) **Six** statements are given about data storage.

Tick (✓) to show if the statement applies to magnetic, solid state or optical storage. Some statements may apply to more than one type of storage.

Statement	Magnetic (✓)	Solid state (✓)	Optical (✓)
no moving parts are used to store data			
pits and lands are used to store data			
data is stored on platters			
flash memory is used to store data			
parts are rotated to store data			
data can be stored permanently			

[6]

(b) **(i)** Give **one** example of magnetic storage.

..... [1]

(ii) Give **one** example of optical storage.

..... [1]

(iii) Identify which type of storage would be the most suitable for use in a web server and justify your choice.

Type of storage .....

Justification .....

.....

.....

.....

[3]

(c) Describe the operation of USB flash memory and how it stores data.

.....

.....

.....

.....

.....

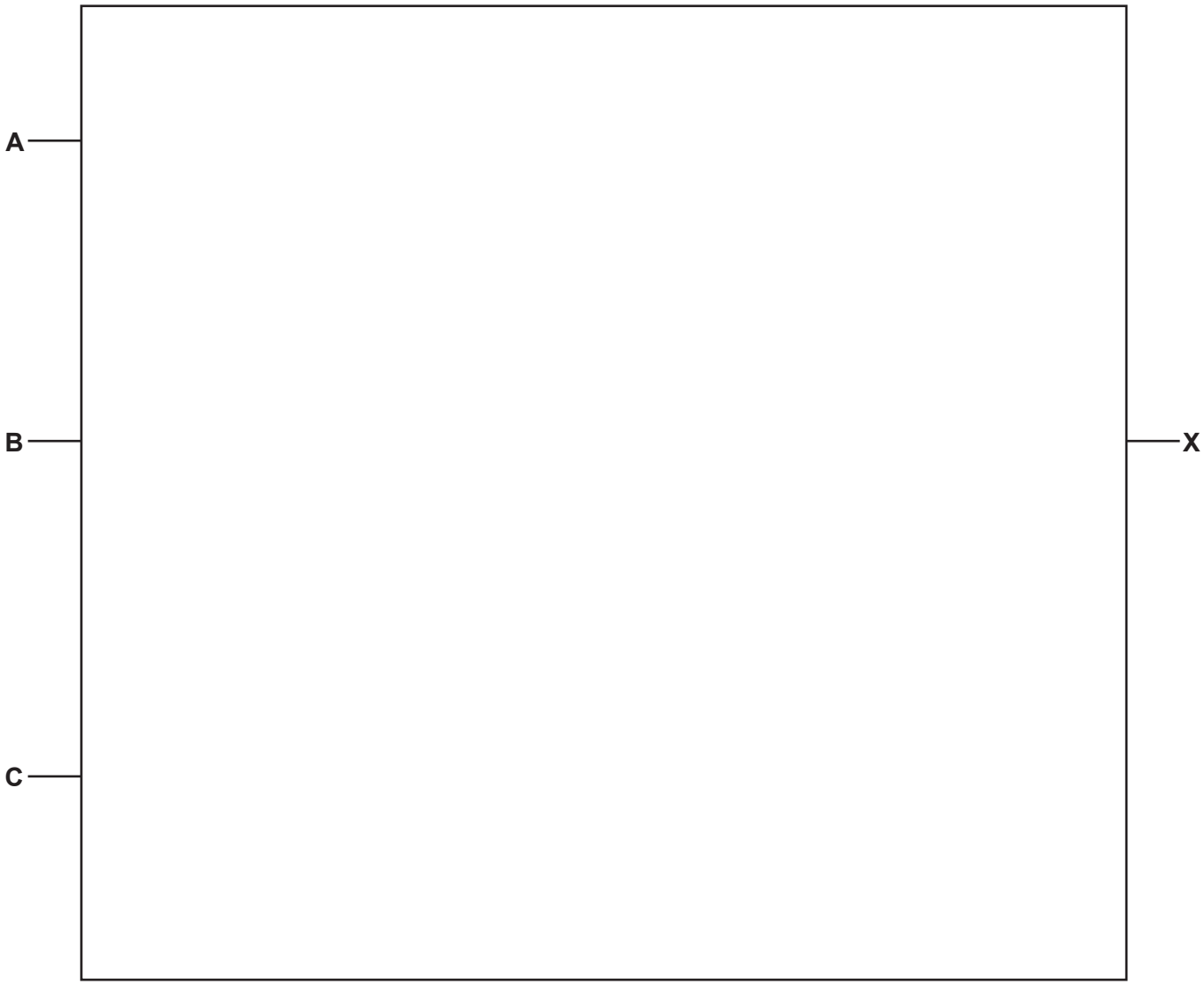
..... [3]

3 Consider the logic statement:

X = ((((NOT **A** AND **B**) OR **C**) AND **B**) NOR (**B** OR **C**))

(a) Draw a logic circuit to represent the given logic statement.

Do **not** attempt to simplify the statement. All logic gates must have a maximum of **two** inputs.



[6]

(b) Consider the completed truth table for the given logic statement.

Row number	A	B	C	Working space	X
1	0	0	0		**1**
2	0	0	1		**1**
3	0	1	0		**1**
4	0	1	1		**0**
5	1	0	0		**1**
6	1	0	1		**0**
7	1	1	0		**1**
8	1	1	1		**1**

There are four errors in the truth table in the output (X) column.

Identify the **four** incorrect outputs.

Write the row number to identify each incorrect output.

Row .....

Row .....

Row .....

Row .....

[4]

4 Three types of Internet security risk are virus, spyware and denial of service (DoS) attack.

(a) **Six** statements are given about Internet security risks.

Tick (✓) to show whether the statement applies to virus, spyware or denial of service. Some statements may apply to more than one Internet security risk.

Statement	Virus (✓)	Spyware (✓)	Denial of service (✓)
captures all data entered using a keyboard			
can be installed onto a web server			
prevents access to a website			
is malicious code on a computer			
is self-replicating			
damages the files on a user's hard drive			

[6]

(b) Identify **three** other types of Internet security risks.

1 .....

2 .....

3 .....

[3]

(c) Some Internet security risks can maliciously damage data. Data can also be damaged accidentally.

State **three** ways that data could be accidentally damaged.

1 .....

2 .....

3 .....

[3]

5 A security light system is used by a factory. The light only comes on when it is dark and when movement is detected. The light will stay on for 1 minute before switching off.

Sensors and a microprocessor are used to control the security light system.

(a) Identify **two** sensors that would be used in the security light system.

Sensor 1 .....

Sensor 2 .....
[2]

(b) Describe how the sensors and the microprocessor control the security light system.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [8]

6 Cookies can be used to store a user's personal data and online browsing habits.

(a) A cookie could be used to automatically enter a user's payment details when the user makes a purchase online.

Describe how cookies can be used to store and automatically enter a user's payment details.

.....

.....

.....

.....

.....

..... [3]

(b) Explain why a user may be concerned about their personal data and online browsing habits being stored in cookies.

.....

.....

.....

.....

.....

.....

.....

..... [4]

7 Jolene uses HTML to create a website. She separates the HTML into structure and presentation.

(a) (i) Give **one** example of HTML structure.

..... [1]

(ii) Give **two** examples of HTML presentation.

1 .....

2 .....
[2]

(b) Explain why Jolene separates the HTML into structure and presentation.

.....

.....

.....

..... [2]

8 A keyboard is a type of input device that can be used to enter data into a computer.

Complete the paragraph that describes one method of operation for a keyboard, using the most appropriate terms from the given list. **Not** all terms in the list need to be used.

- Binary
- Breaks
- Calculated
- Character
- Circuit
- Current
- Information
- Network
- Press
- Processor
- Signal
- Switch

A keyboard has a key matrix underneath the keys. When a key is pressed, it presses a

..... that completes a ..... . This allows

..... to flow. The location of the key pressed is

..... . The location of the key pressed is compared to a

..... map to find the ..... value for the key that

has been pressed.

[6]

BLANK PAGE

BLANK PAGE

BLANK PAGE

Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/12**

Paper 1 **May/June 2021**

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 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

[Turn over

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.

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.

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.

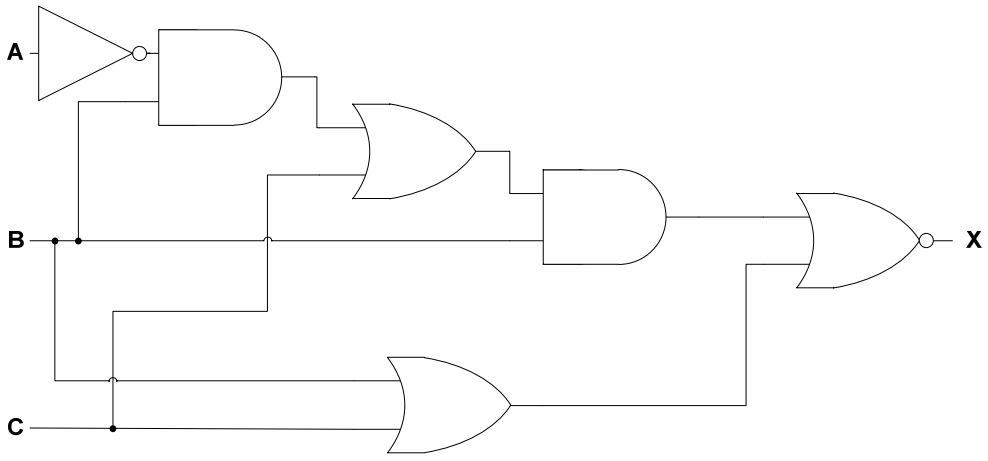
Ellipsis (…) on the end of one-mark point and the start of the next means that the candidate **cannot** get the second mark point without being awarded the first one. If a MP has ellipsis at the beginning, but there is no ellipsis on the MP before it, then this is just a follow-on sentence and **can**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

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>One mark per each correct binary value.
One mark per each correct hex value.

<table><tr><th>Denary</th><th>Hexadecimal</th><th>8-bit binary</th></tr><tr><td>49</td><td>31</td><td>00110001</td></tr><tr><td>123</td><td>7B</td><td>01111011</td></tr><tr><td>200</td><td>C8</td><td>11001000</td></tr></table></td><td>6</td></tr>
<tr><td>1(b)</td><td>Any two from:
– Easier/quicker to read/write/understand
– Easier/quicker to identify errors/debug
– Takes up less screen/display space
– Less chance of making an error</td><td>2</td></tr>
<tr><td>1(c)</td><td>Any three from:
– MAC address
– URL
– Assembly language
– Error codes // error messages
– IP addresses
– Locations in memory
– Memory dumps</td><td>3</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)</td><td>One mark per each correct row.

<table><tr><th>Statement</th><th>Magnetic (✓)</th><th>Solid state (✓)</th><th>Optical (✓)</th></tr><tr><td>no moving parts are used to store data</td><td></td><td>✓</td><td></td></tr><tr><td>pits and lands are used to store data</td><td></td><td></td><td>✓</td></tr><tr><td>data is stored on platters</td><td>✓</td><td></td><td></td></tr><tr><td>flash memory is used to store data</td><td></td><td>✓</td><td></td></tr><tr><td>parts are rotated to store data</td><td>✓</td><td></td><td>✓</td></tr><tr><td>data can be stored permanently</td><td>✓</td><td>✓</td><td>✓</td></tr></table></td><td>6</td></tr>
<tr><td>2(b)(i)</td><td>Any one from:
– Hard disk drive // HDD
– Magnetic tape</td><td>1</td></tr>
</table>

Question	Answer	Marks
2(b)(ii)	Any **one** from: – CD – DVD – Blu-ray disk	**1**
2(b)(iii)	**One** for type of storage**, two** for matching justification from: – Magnetic // HDD – (Web server) is likely to receive many requests a day – (Web server) will likely need to store a lot of data and magnetic is high capacity – Magnetic is **cheaper** to buy for **storage per unit** than solid state – Magnetic is capable of more of read/write requests **over time** // has more **longevity** // SSD has more limited number of read/write requests (before it is no longer usable) – No requirement for it to be portable, so moving parts does not matter – Solid-state // SSD – (Web server) is likely to receive many requests a day – (Web server) will likely need to store a lot of data and solid-state is high capacity – Solid-state is more energy efficient – Solid-state runs cooler so will not overheat – Solid state has faster read/write speeds to handle volume of traffic	**3**
2(c)	Any **three** from: – Data is flashed onto (silicon) chips – Uses NAND/NOR technology // can use flip-flops – Uses transistors/control gates/floating gates … – … to control the flow of electrons – It is a type of EEPROM technology – When data is stored the transistor is converted from 1 to 0 / 0 to 1 – Writes (and reads) sequentially	**3**
3(a)	One mark for each correct logic gate with correct input.  	**6**

Question	Answer	Marks
3(b)	One mark per each correct row. – Row 2 – Row 3 – Row 7 – Row 8	**4**

Question	Answer	Marks
4(a)	One mark per each correct row.	**6**

Statement	Virus (✓)	Spyware (✓)	Denial of service (✓)
captures all data entered using a keyboard		✓	
can be installed onto a web server	✓	✓	
prevents access to a website			✓
is malicious code on a computer	✓	✓	
is self-replicating	✓		
damages the files on a user's hard drive	✓		

4(b)	Any **three** from: – Phishing – Pharming – Hacking // cracking	**3**
4(c)	Any **three** from: – Human error – Power failure/surge – Hardware failure – Software failure – Fire – Flood	**3**
5(a)	– Light sensor – Motion sensor // infra-red sensor	**2**

Question	Answer	Marks
5(b)	**Eight** from: – Sensors send data to microprocessor – Data is converted to digital (using ADC) – Microprocessor compares data to stored value(s) … – … if one value or neither values are within range/out of range/match no action is taken – … If **both** values are out of range/in range/match microprocessor sends **signal** to switch light on … – … 1-minute timer is started – Actuator used to switch on/off light – When timer reaches 1 minute, microprocessor sends **signal** to switch light off – **Whole** process is continuous	**8**
6(a)	Any **three** from: – Webserver sends (cookie) file to user's **browser** – User's payment details stored in **encrypted** text file // data is encrypted to be stored – Cookie file is stored by **browser/on user's HDD/SSD** – When user revisits website, **webserver** requests cookie file // **webserver** can access the data stored in the cookie file (to automatically enter details) – … and **browser** sends cookie file back to **webserver** (to automatically enter the details)	**3**
6(b)	**Four** from: – User does not see what information is stored // might collect data that user does not know about … – … so, user may feel their privacy is affected – A profile could be built about the user … – … that could expose a user's identity // lead to identity theft – Sensitive information stored in cookies could be intercepted in transmission … – Other websites could gain access to the cookies stored on a user's computer … – Computer could be hacked to obtain data stored in cookies … – … so, payment information could be stolen and used by a third party	**4**

Question	Answer	Marks
7(a)(i)	Any **one** from: – Placement of text/image – Margins – Line break – Padding NOTE: Any relevant example of structure can be awarded	**1**

Question	Answer	Marks
7(a)(ii)	Any **two** from: – Font colour – Font style – Font size – Background colour – Image size – Border properties NOTE: Any relevant example of presentation can be awarded	**2**
7(b)	Any **two** from: – Can easily change/edit the style of the webpage – So, CSS can be used to create a template/style sheet – Can add new content and apply the same style easily – Can re-use the presentation/style for other websites	**2**
8	One mark for each correct term in the correct order – Switch – Circuit – Current – Calculated – Character – Binary	**6**