Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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COMPUTER SCIENCE **0478/12**

Paper 1 Theory **February/March 2019**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
No marks will be awarded for using brand names of software packages or hardware.

Any businesses described in this paper are entirely fictitious.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The maximum number of marks is 75.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **11** printed pages and **1** blank page.

DC (KN/FC) 168931/3

Cambridge Assessment International Education

[Turn over

1 **(a)** Elle has a file stored on her computer that is 20 MB in size. Jordan has a file that is 10 GB in size.

Tick (✓) to show which is the **larger** file.

File size	Tick (✓)
20 MB	
10 GB	

[1]

(b) Bob has a file stored on his computer that is 3500 kB in size. Gerty has a file that is 3 MB in size.

Tick (✓) to show which is the **larger** file.

File size	Tick (✓)
3500 kB	
3 MB	

[1]

2 Many computer systems have an input device and an output device.

(a) **(i)** State what is meant by an input device.

.....

..... [1]

(ii) Give an example of an input device.

..... [1]

(b) **(i)** State what is meant by an output device.

.....

..... [1]

(ii) Give an example of an output device.

..... [1]

3 **(a)** A long distance running race uses an electronic counter that counts each competitor who finishes the race.

The count is stored as binary in a **12-bit** register.

A denary value of the count is displayed on a screen above the finish line.

(i) The screen currently displays:

0	0	3	9

State the binary value that is currently stored to display the count shown.

.....

..... [2]

(ii) More competitors cross the finish line and the screen now displays:

0	3	5	0

State the binary value that is currently stored to display the count shown.

.....

..... [2]

(iii) At the end of the race the binary value stored is:

011011000111

Give the denary value that would be displayed on the screen at the end of the race.

Show your working.

.....

.....

.....

.....

Screen display:

[2]

(b) Sensors are used at the finish line to identify the number of competitors who finish the race.

(i) Identify **two** different sensors that could be used to identify the number of competitors.

Sensor 1 .....

Sensor 2 .....
[2]

(ii) The sensors are used with a microprocessor to count how many competitors finish the race.

Explain how the sensor and the microprocessor are used.

.....

.....

.....

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.....

..... [6]

4 Darius is writing a computer program that allows binary values to be calculated.

Darius chooses to write the program in a high-level language rather than a low-level language.

(a) Explain why Darius chooses to write the program in a high-level language.

.....

.....

.....

..... [2]

(b) Darius will use a translator to translate the program. He could use a compiler or an interpreter.

Five statements are given about compilers and interpreters.

Tick (✓) to show if the statement applies to a **Compiler** or an **Interpreter**. Statements may apply to both.

Statement	Compiler (✓)	Interpreter (✓)
A report of errors is produced at the end of translation.		
The program is translated one line at a time.		
The program is translated from high-level language into machine code.		
An executable file is produced.		
The program will not run at all if an error is detected.		

[5]

[Turn over

Darius is sending several programs that he has created to his friend Selma.

(c) He wants to compress the files to send them as he needs to attach them to an email.

Darius tells Selma he is going to use lossy compression. Selma tells him that he should use lossless instead.

Explain why Selma tells Darius to use lossless compression instead of lossy.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(d) Errors can occur when data is transmitted, stored or entered into a system.

Darius could use an error detection method to find whether errors have occurred.

One error detection method he could use is a checksum.

(i) Describe how a checksum detects errors.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(ii) State **three** other error detection methods that Darius could use.

Method 1 .....

Method 2 .....

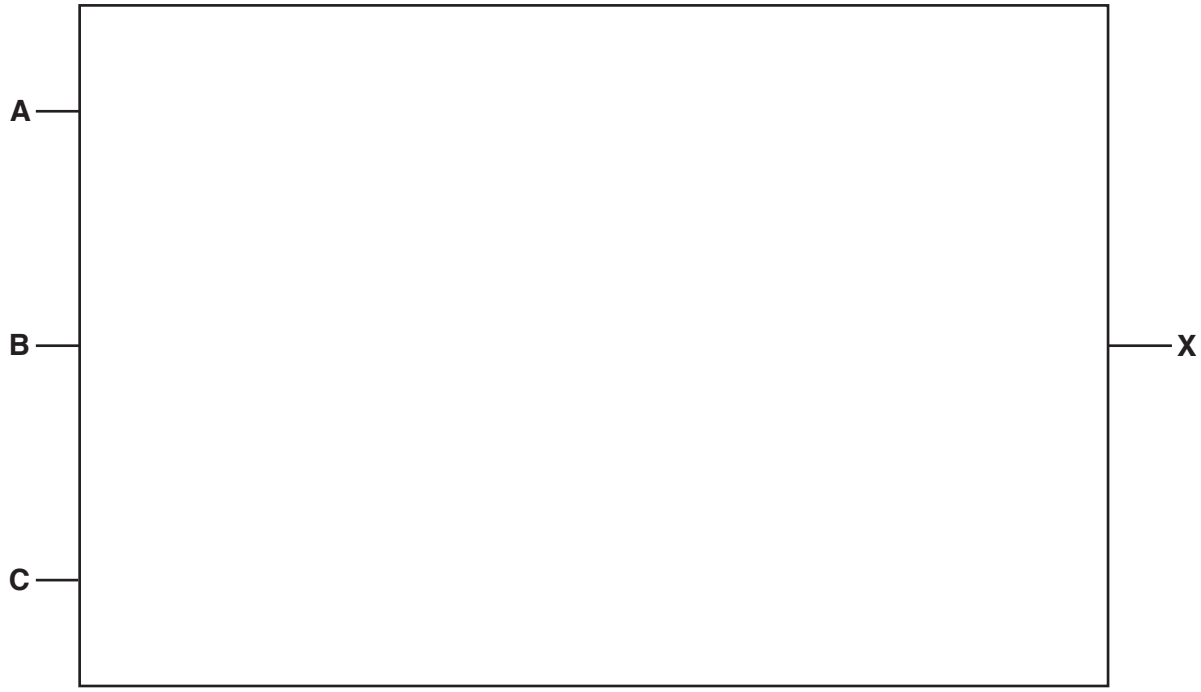
Method 3 .....

[3]

5 Consider the following logic statement:

X = 1 if ((A is 1 NAND C is 1) NOR A is NOT 1) OR (B is 1 AND C is NOT 1)

(a) Draw a logic circuit that represents the given logic statement. Your logic gates must have a maximum of two inputs. Do **not** simplify the logic statement.



[6]

(b) Complete the truth table for the given logic statement.

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

6 Nadia purchases a printer to print out her homework.

She connects the printer to her computer using USB.

(a) Explain what is meant by USB.

.....

.....

.....

.....

.....

..... [3]

(b) Nadia's printer uses powdered toner rather than liquid ink.

(i) State the type of printer Nadia has purchased.

..... [1]

(ii) Give **two** benefits of using this type of printer.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(iii) Give **one** drawback of using this type of printer.

Drawback 1 .....

..... [1]

[Turn over

(c) Nadia uses several types of computer storage for her homework and other projects.

(i) **Five** examples of computer storage are given.

Tick (✓) to show if the computer storage is **Primary**, **Secondary** or **Off-line**.

Storage example	Primary (✓)	Secondary (✓)	Off-line (✓)
Solid state drive (SSD)			
Blu-ray disc			
USB flash memory			
Random access memory (RAM)			
Read only memory (ROM)			

[5]

(ii) Nadia is considering purchasing a magnetic storage device.

Describe how a magnetic storage device stores data.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

(iii) Give **two** advantages of using a magnetic storage device rather than a solid state storage device.

Advantage 1 .....

.....

Advantage 2 .....

.....

[2]

7 Arya regularly uses the Internet as a research tool for her school projects.

Identify **and** describe **three** risks to Arya's computer when she is using the Internet for research.

Risk 1 .....

Description .....

.....

.....

Risk 2 .....

Description .....

.....

.....

Risk 3 .....

Description .....

.....

.....

[6]

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Cambridge Assessment International Education
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COMPUTER SCIENCE **0478/12**

Paper 1 **March 2019**

MARK SCHEME

Maximum Mark: 50

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 March 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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.

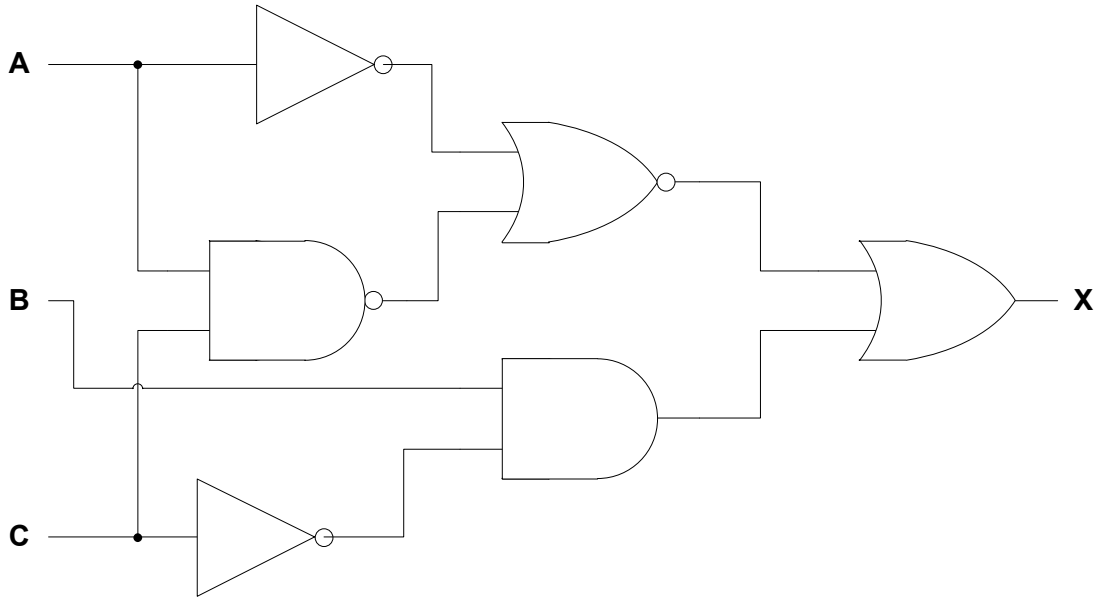
<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>
<table>
<tr><th>File size</th><th>Tick (✓)</th></tr>
<tr><td>20 MB</td><td></td></tr>
<tr><td>10 GB</td><td>✓</td></tr>
</table>
</td><td>1</td></tr>
<tr><td>1(b)</td><td>
<table>
<tr><th>File size</th><th>Tick (✓)</th></tr>
<tr><td>3500 kB</td><td>✓</td></tr>
<tr><td>3 MB</td><td></td></tr>
</table>
</td><td>1</td></tr>
</table>

Question	Answer	Marks
2(a)(i)	– (A device that allows) **data** to be entered (into a computer system)	**1**
2(a)(ii)	**One** from e.g.: – Keyboard – Mouse – Microphone – Sensor – Touch screen	**1**
2(b)(i)	– (A device that allows the user to) view/hear the **data** (that has been entered into a computer system)	**1**
2(b)(ii)	**One** from e.g. : – Monitor – Speaker – Headphones – Printer	**1**

Question	Answer	Marks
3(a)(i)	– 000000100111 1 mark 1 mark	**2**
3(a)(ii)	– 000101011110 1 mark 1 mark	**2**
3(a)(iii)	1 mark for working, 1 mark for correct answer – 1024 + 512 + 128 + 64 + 4 + 2 + 1 – 1735	**2**
3(b)(i)	**Two** from: – Pressure sensor – Light sensor – Motion sensor – Magnetic field (can be used if competitors are wearing a compatible chip)	**2**
3(b)(ii)	– Sensor sends signal to microprocessor – Signal is analogue and is converted to digital (using ADC) – Data is compared to stored value // Check for signal – If data does not match / is out of range/ in range // signal detected … – … counter is incremented by 1 – Continuous process	**6**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(a)</td><td>Two from:
– Closer to English statements / human language
– Easier / quicker to write / read / understand / remember
– Easier / quicker to debug
– Less likely to make errors
– One line of code can carry out multiple commands
– Portable language</td><td>2</td></tr>
<tr><td>4(b)</td><td>1 mark for correct tick(s) for each statement
<table><tr><th>Statement</th><th>Compiler</th><th>Interpreter</th></tr><tr><td>A report of errors is produced at the end of translation</td><td>✓</td><td></td></tr><tr><td>The program is translated one line at a time</td><td></td><td>✓</td></tr><tr><td>The program is translated from high-level language into machine code</td><td>✓</td><td>✓</td></tr><tr><td>An executable file is produced</td><td>✓</td><td></td></tr><tr><td>The program will not run at all if an error is detected</td><td>✓</td><td></td></tr></table></td><td>5</td></tr>
<tr><td>4(c)</td><td>– Lossy would remove data
– Lossless does not remove data // No data can be lost …
– Can be restored to original state …
– … otherwise will not run / work correctly</td><td>4</td></tr>
<tr><td>4(d)(i)</td><td>– Sending device creates value from calculation on data // By example
– Value is transmitted with the data
– Receiving device performs same calculation
– Values are compared after transmission // If values do not match …
– … an error is detected</td><td>5</td></tr>
</table>

Question	Answer	Marks
4d(ii)	– Parity check – Check digit – Automatic repeat request	**3**

Question	Answer	Marks
5(a)	1 mark for each correct logic gate with correct input(s)  	**6**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>5(b)</td><td>4 marks for 8 correct outputs
3 marks for 6/7 correct outputs
2 marks for 4/5 correct outputs
1 mark for 2/3 correct outputs

<table>
<tr><th>A</th><th>B</th><th>C</th><th>Working space</th><th>X</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td></td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td></td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td></td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td></td><td>0</td></tr>
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<tr><td>1</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td></td><td>1</td></tr>
</table>
</td><td>4</td></tr>
</table>

Question	Answer	Marks
6(a)	**Three** from: – Universal Serial Bus – Data transmission method – Uses serial transmission // bits of data are sent one at a time – Universal standard // common interface	**3**
6(b)(i)	– Laser printer	**1**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>6(b)(ii)</td><td>Two from:
– Cheaper printing cost per page
– It prints at a faster speed
– It prints text at a high quality
– Colour fast</td><td>2</td></tr>
<tr><td>6(b)(iii)</td><td>One from:
– Expensive to purchase printer
– Toner is expensive
– Print images at a lower quality
– Can be quite large in size</td><td>1</td></tr>
<tr><td>6(c)(i)</td><td>1 mark per each correct tick
<table>
<tr><th>Storage example</th><th>Primary</th><th>Secondary</th><th>Off-line</th></tr>
<tr><td>Solid state drive (SSD)</td><td></td><td>✓</td><td></td></tr>
<tr><td>Blu-ray disc</td><td></td><td></td><td>✓</td></tr>
<tr><td>USB flash memory</td><td></td><td></td><td>✓</td></tr>
<tr><td>Random access memory (RAM)</td><td>✓</td><td></td><td></td></tr>
<tr><td>Read only memory (ROM)</td><td>✓</td><td></td><td></td></tr>
</table></td><td>5</td></tr>
</table>

Question	Answer	Marks
6(c)(ii)	**Six** from: – Storage device has platters – Platters/disk divided into tracks – Storage platter / disk is spun – Has a read/write arm that moves across storage media – Read/writes data using electromagnets – Uses magnetic fields to control magnetic dots of data – Magnetic field determines binary value NOTE: Marks can be awarded for an alternative description e.g. magnetic tape	**6**
6(c)(iii)	– Magnetic is cheaper **per unit of data** – Magnetic has more longevity // Magnetic can perform more read/write cycles	**2**

Question	Answer	Marks
7	For each of **three** risks Naming the risk – 1 mark, describing the risk – 1 mark: – Hacking … – … when a person tries to gain unauthorised access to a computer system – … data can be deleted/corrupted by hacker – Malware … – … a software program designed to damage data / disrupt the computer system – … replicates itself and fills the hard disk – Virus … – … a program that replicates itself to damage / delete files NOTE: Multiple kinds of malware can be awarded if listed and given a matching description e.g. trojan horse, worm.	**6**