Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8107622055

COMPUTER SCIENCE **0478/12**

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

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.

1 Output devices are used to output data from a computer.

Circle **three** devices that are output devices.

actuator	digital versatile disk (DVD)	keyboard
microphone	mouse	printer
scanner		
sensor	solid-state drive (SSD)	speaker

[3]

2 Binary numbers can be converted to hexadecimal.

(a) Convert the **two** binary numbers to hexadecimal.

10010011 .....

00001101 .....

[4]

Working space

.....

.....

.....

.....

(b) A value is stored as a binary number in a register.

0	1	1	1	1	0	1	0

A logical right shift of **three** places is performed on the binary number.

(i) Complete the binary register to show its contents after this logical right shift.

[1]

(ii) State **one** effect this logical shift has on the binary number.

.....

..... [1]

(c) Give **two** reasons why a programmer may use hexadecimal to represent binary numbers.

1 .....

.....

2 .....

.....

[2]

(d) Denary numbers can also be converted to hexadecimal.

Convert the denary number to hexadecimal.

301 ..... [2]

Working space

.....

.....

.....

.....

3 When keys are pressed on a keyboard, the text is converted to binary to be processed by the computer.

(a) Describe how the text is converted to binary to be processed by the computer.

.....

.....

.....

.....

.....

..... [3]

(b) Text that is input into a computer can be stored in a text file.

A text file can be compressed using lossless compression.

(i) State what effect this has on the file size.

.....

..... [1]

(ii) Describe how lossless compression compresses the text file.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(iii) Give **two** reasons why the text file may have been compressed.

1 .....

.....

2 .....

.....
[2]

4 A student uses a mobile phone to take photographs for a school project.

The student needs to transmit the photographs to their computer. They could use serial data transmission or parallel data transmission to transmit the photographs.

(a) (i) Describe how the photographs would be transmitted using serial data transmission.

.....

.....

.....

..... [2]

(ii) Give **two** benefits of transmitting the photographs using serial data transmission.

1 .....

.....

2 .....

.....
[2]

(iii) State **one** benefit of the student using parallel data transmission instead of serial data transmission.

.....

..... [1]

(b) The photographs are also transmitted across a network to cloud storage. A device on the network forwards the data towards its correct destination.

(i) State the name of this device.

..... [1]

(ii) Describe what is meant by cloud storage.

.....

.....

.....

..... [2]

(iii) Give **one** disadvantage of storing the photographs in cloud storage instead of storing them locally.

.....

..... [1]

5 A programmer writes a computer program using a high-level language.

(a) Tick (✓) **one** box to show which statement is correct about writing computer programs in a high-level language.

A Mnemonics are used to create instructions. ☐

B The computer program is harder to debug than a low-level language program. ☐

C The computer program is machine independent. ☐

D The hardware of the computer can be directly manipulated. ☐

[1]

(b) The programmer uses a compiler to translate the computer program.

(i) Describe how the compiler translates the computer program.

.....

.....

.....

.....

.....

..... [3]

(ii) Describe how the compiler reports errors.

.....

.....

.....

..... [2]

(c) The programmer uses an integrated development environment (IDE) to create the computer program.

One function of the IDE is that it has the built-in compiler.

Give **three** other common functions of an IDE.

1 .....

2 .....

3 .....

[3]

6 **(a)** Complete the statements about cookies.

Use the terms from the list.

Some of the terms in the list will **not** be used. Some terms may be used more than once.

compression	executable	hypertext markup language (HTML)
hypertext transfer protocol (HTTP)	image	internet protocol (IP) address
persistent	session	sound
text		
uniform resource locater (URL)	web browser	web server

Cookies are small ..... files that are sent between a ..... and a ..... .

..... cookies are stored in memory and **not** in the user's secondary storage.

When the web browser is closed a ..... cookie is lost, whereas a ..... cookie is **not** lost.

[6]

(b) Give **three** functions of a cookie.

1 .....

2 .....

3 .....

[3]

7 A distributed denial of service attack (DDoS) is a cyber security threat.

(a) Draw and annotate a diagram to represent the process of a DDoS.

[6]

(b) State **two** aims of carrying out a DDoS attack.

1 .....

.....

2 .....

.....

[2]

(c) Give **two** security solutions that can be used to help prevent a DDoS attack being successful.

1 .....

.....

2 .....

.....

[2]

8 A computer is connected to a network and assigned an IPv4 address.

(a) Tick (✓) **one** box to show which device would assign the IPv4 address to the computer.

A Domain name server (DNS) ☐

B Network interface card (NIC) ☐

C Router ☐

D Web server ☐

[1]

(b) Describe the characteristics of an IPv4 address.

.....

.....

.....

.....

.....

.....

.....

..... [4]

9 One component of an expert system is the inference engine.

(a) Identify the **three** other components in an expert system.

1 .....

2 .....

3 .....
[3]

(b) Describe the role of the inference engine in an expert system.

.....

.....

.....

..... [2]

10 A user has both system software and application software installed on their computer.

(a) Describe the difference between system software and application software.

Give an example of each software in your answer.

.....

.....

.....

.....

.....

.....

..... [4]

(b) State which component in the computer would store both types of software when the power is turned off.

..... [1]

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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.

[Turn over

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 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.

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	**One** mark for each correct device: • Actuator • Printer • Speaker	**3**

Question	Answer	Marks
2(a)	**One** mark per each correct character in the correct order: • 9 • 3 • 0 • D	**4**
2(b)(i)	• 00001111	**1**
2(b)(ii)	Any **one** from: • The value becomes incorrect/inaccurate as the right most bits are lost • It is divided by 8	**1**
2(c)	Any **two** from: • Easier/quicker to understand/read/write • Easier/quicker to debug • Less likely to make a mistake • Shorter representation // Takes up less **screen** space	**2**
2(d)	**One** mark for two correct characters, **two** marks for three correct characters in the correct order: • 1 • 2 • D	**2**

Question	Answer	Marks
3(a)	Any **three** from: • A character set is used • … such as Unicode/ASCII • Each character has a **unique binary** value	**3**
3(b)(i)	• It reduces the **file** size	**1**
3(b)(ii)	Any **four** from: • A compression algorithm is used • … such as RLE/run length encoding • **Repeating** words/characters/phrases are identified // Patterns are identified • … and indexed • … with number of occurrences • … with their position	**4**
3(b)(iii)	Any **two** from: e.g. • To save **storage** space • To make it quicker to transmit • To make it small enough to attach to an email • To reduce the bandwidth needed to transmit	**2**

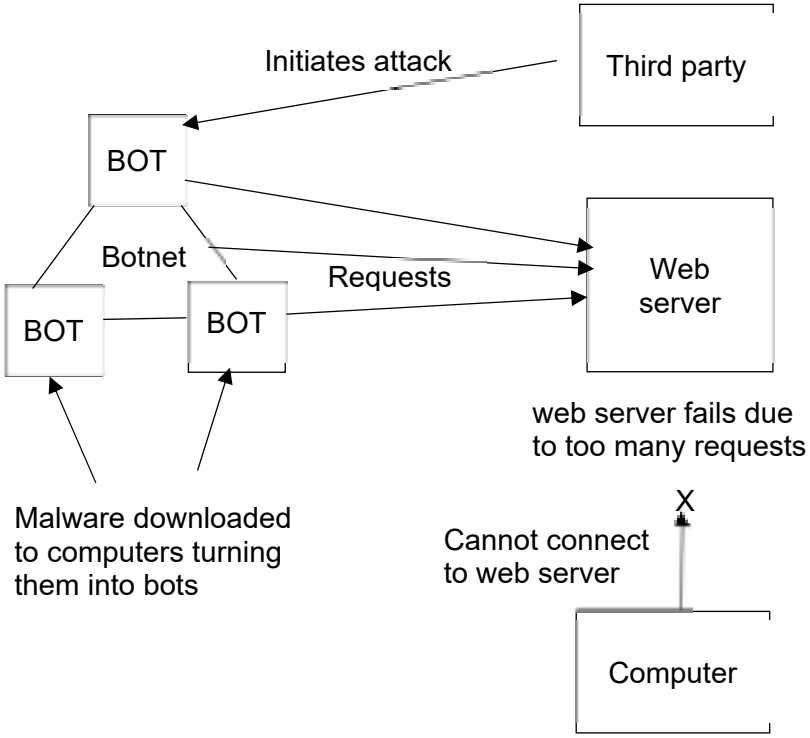
Question	Answer	Marks
4(a)(i)	**Two** from: • Data is sent **one bit at a time** • A **single** wire is used	**2**
4(a)(ii)	Any **two** from: • Data won't be skewed • Less chance of interference/crosstalk/corruption/error • Transmission speed is adequate	**2**
4(a)(iii)	• The data may be transmitted quicker	**1**

Question	Answer	Marks
4(b)(i)	• Router	**1**
4(b)(ii)	Any **two** from: • A collection of servers • … that store data in a remote location // that allows data to be accessed remotely • … that are (normally) accessed using an internet connection	**2**
4(b)(iii)	Any **one** from: e.g. • May be **less** secure // by example • May lose access to them if internet connection lost/not available • Reliant on a third party maintaining the hardware // by example • Could incur an extra/ongoing fee/cost	**1**

Question	Answer	Marks
5(a)	• C	**1**
5(b)(i)	Any **three** from: • It translates the (high-level language) to low-level language/object code/machine code • It translates **all** the code **before** it is executed • It creates an executable file	**3**
5(b)(ii)	Any **two** from: • It creates an error report after **trying to compile** • … displaying **all** errors in the code • … that require correction before execution can take place	**2**

Question	Answer	Marks
5(c)	Any **three** from: e.g. • Code editors • Run-time environment • Built-in interpreter • Error diagnostics • Auto-completion • Auto-correction • Prettyprint	**3**

Question	Answer	Marks
6(a)	**One** mark for each correct term. • Text • Web browser // web server • Web server // web browser • Session • Session • Persistent	**6**
6(b)	Any **three** from: e.g. • Saving personal details • Storing login details • Tracking user preferences • Holding items in an online shopping cart	**3**

Question	Answer	Marks
7(a)	**One** mark for each part of the diagram (MAX six). The diagram demonstrates: • Malware downloaded to several computers • … turning it into a bot/zombie • … creating a network of bots/zombies • Third party/hacker initiating the attack • **Bots** send requests to a web **server** at the same time • The web **server** fails due to the requests • Legitimate requests cannot reach the web server  	**6**

Question	Answer	Marks
7(b)	Any **two** from: e.g. • Revenge • To affect a company's reputation • Entertainment value • To demand a ransom to stop it • To test a system's resilience	**2**
7(c)	Any **two** from: • Proxy server • Firewall • Users scanning their computers with anti-malware	**2**

Question	Answer	Marks
8(a)	• C	**1**
8(b)	**Four** marks from: Any **FOUR** from: • It is denary based • … with numbers between 0 and 255 • It is 32 bits • 4 sets/groups of numbers • … **separated** by dots Any **TWO** from: • It is a **unique** address • It can be **static** or **dynamic** • It can be **public** or **private** • It contains the network prefix • … and the host number	**4**

Question	Answer	Marks
9(a)	**Three** from: • Rule base • Knowledge base • Interface	**3**
9(b)	Any **two** from: • It makes decisions • … by **applying** the rules/logic to the facts/knowledge … • … to provide a result/diagnosis	**2**

Question	Answer	Marks
10(a)	**Two** from: • System software provides services that the computer requires • … whereas application software provides services that the user requires **One** from (system software): • Utility software // by example e.g. defragmentation software, antivirus, firewall • Operating system **One** from (application software): • Any suitable example of an application e.g. word processor, web browser, video-editing software	**4**
10(b)	• Secondary storage // HDD // SSD	**1**