CAMBRIDGE
International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/13**

Paper 1 Computer Systems **October/November 2025**

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 October/November 2025 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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This document consists of **10** printed pages.

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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 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.

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Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	Correct point
	Incorrect point
	Unclear response
FT	Follow through
REP	Repetition
I	Ignore
BOD	Benefit of doubt given
TV	Content of response too vague
NAQ	Not answered question
	Omission
	Section not relevant
	Section incorrect
Highlighter	Information copied from the text
SEEN	Page or response seen by examiner

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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.

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Question	Answer	Marks
1(a)	A	1
1(b)(i)	(000)11000	1
1(b)(ii)	(0)1100101	1
1(b)(iii)	19	1
1(b)(iv)	34	1
1(c)(i)	0101 0001	1
1(c)(ii)	1110 0011	1
1(c)(iii)	82	1
1(d)	**One** mark for correct method of working, for example flip and add 1 **One** mark for correct answer 11111011	2
1(e)(i)	A	1
1(e)(ii)	Any **three** from: • Microprocessor **compares** the value from the sensor to a **stored** value • If the values do not match, the microprocessor sends a **signal** to increase or decrease the temperature • If the values match, **no action** is taken	3
1(f)	Any **two** from: • It has a single/limited function • It is difficult to change its function // cannot be reprogrammed • It has dedicated hardware • It has a microprocessor	2

Question	Answer	Marks
2(a)	Program counter // PC	1
2(b)(i)	Any **three** from: • It sends control **signals** to other components • … using the control bus • … to manage the flow of data through the CPU • It decodes an instruction • … using an instruction set	3
2(b)(ii)	Current instruction register // CIR	1
2(c)(i)	C	1

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Question	Answer	Marks
2(c)(ii)	**One** mark for example of storage **One** mark for example of what it will store • RAM • Data/programs/software/instructions that are **currently in use** • ROM • Startup instructions • BIOS • Bootstrap • Firmware • Virtual memory • Pages from RAM that are not immediately needed • Data/programs/software/instructions that are **currently in use**	**2**
2(d)	**One** mark for each correct storage type • Optical • Solid-state • Solid-state • Magnetic • Optical • Solid-state	**6**

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Question	Answer	Marks
3(a)	**One** mark for each correct section **One** mark for each correct example of what it stores First section • Header • Originators/senders (IP) address • Destination/receivers (IP) address • Packet number Second section • Payload • The data itself Third section • Trailer • End of packet notification • Error checking data	**6**
3(b)(i)	**Four** from: • Data is sent one bit at a time • … down a single wire • Data can be sent in both directions … • … at the same time	**4**
3(b)(ii)	Any **Four** from: • Data is sent multiple bits at the **same time** • … down multiple wires • Data can be sent in both directions … • … not at the same time	**4**

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Question	Answer	Marks
4(a)	**One** mark for the security solution **Two** marks for a matching description • Strong/complex password • Requires a mixture of letters, number and symbols • Makes it very difficult for the hacker to guess • Limiting number of attempts for password • Cannot keep repeatedly guessing a password • Stops a brute-force attack being successful • Biometric device • Requires the hacker to have biometric data to access the data • It is very difficult to fake biometric data • Two-step verification // two-factor authentication • Requires the hacker to have additional data to access the data • The data is sent to the users registered device/account that the hacker would also need • Firewall • Examines **incoming** data/traffic • Can block any data that does not meet set criteria • Anti-spyware • Detects/removes any **spyware** present on the computer • Hacker cannot use **spyware** to get data to discover passwords	**6**
4(b)	**Two** marks for: • Involves manipulating/deceiving people • … with the aim of obtaining confidential/personal/valuable data Any **one** from: For example: • Phishing // by example • Baiting // by example • Shoulder surfing // by example	**3**
4(c)(i)	Any **one** from: • They are both small text files • They both store data about the user // by example • They are both **stored/managed** by the web browser • They are both downloaded on to a user's computer	**1**

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Question	Answer	Marks
4(c)(ii)	**Two** from (one mark for session, one mark for matching comparison to persistent): • Session cookies are deleted when the web browser is closed • … whereas persistent cookies are deleted by the user/expire after a certain time • Session cookies are only stored in RAM • … whereas persistent cookies are stored in the secondary storage	2

Question	Answer	Marks
5(a)	**One** mark for each correct term or description **Term** / **Description** character set — This stores all the characters and their unique binary values sample rate — This is the number of samples taken each second when recording sound. pixel — This is the **smallest** unit/part of an image resolution — This is the number of pixels that appear in an image/displayed on a screen // The number of pixels high by the number of pixels wide // the bit rate and sample rate of sound colour depth // bit depth — This is the number of bits used to represent a colour in an image.	5
5(b)	8000 (bits)	1
5(c)	4 (GiB)	1

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Question	Answer	Marks
6(a)	Any **three** from: • Simulation of intelligent behaviours by computers • Collection of data and rules for using that data • A computer that has the ability to learn • A computer that has the ability to adapt • A computer that has the ability to reason/make decisions	**3**
6(b)	Any **three** from For example: • It could use machine learning • It can collect data about the **players** actions • **Analyse/identify patterns** in the player's movements • … so it can learn how the player moves • … to help predict the next movement of the player • It can adapt its own movements to match the players // It can adapt its own processes • It can store successful/unsuccessful moves • It will learn the most efficient/optimal movements against a player	**3**
6(c)	**Two** from (one mark for high-level, one mark for matching comparison to low-level) • High-level language is written in English-like statements … • …low-level language is written using mnemonics/as machine code/in binary • High-level language is easier to read/write/debug … • … low-level language is more difficult to read/write/debug • High-level language is machine independent/portable … • …low-level language is not machine independent/portable • High-level language cannot directly manipulate the hardware … • … low-level language can directly manipulate the hardware • In high-level language, one line of code can perform multiple actions … • … in low-level language, one line of code performs a single action	**2**
6(d)(i)	Interpreter	**1**
6(d)(ii)	Compiler	**1**
6(d)(iii)	Compiler	**1**
6(d)(iv)	Interpreter	**1**

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