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CAMBRIDGE
International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/13**

Paper 1 Theory **May/June 2026**

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

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General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: • the specific **content** defined in the mark scheme • the specific **skills** defined in the mark scheme or in the level descriptions • the **standard of response** required as exemplified by the standardisation scripts.
2	Examiners must award **whole marks** (not half marks, or other fractions).
3	Examiners must award marks **positively**. This means that: • marks are not deducted for errors or omissions • marks are awarded for correct/valid answers as defined in the mark scheme and also for **other valid answers** which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate • the quality of spelling, punctuation and grammar are judged **only** when the mark scheme indicates that these features are **specifically assessed** in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must **consistently** apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the **full range of marks** defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and **must not** award marks with grade thresholds or grade descriptions 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
NBOD	Benefit of doubt not given
TV	Content of response too vague
NAQ	Not answered question

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Annotation	Meaning
	Omission
	Section not relevant
	Section incorrect
Highlighter	Information copied from the text
	Page or response seen by examiner

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
MP	mark point

Note: No marks are awarded for using brand names of software packages or hardware.

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Question	Answer	Marks	Guidance
1(a)	C	**1**	
1(b)(i)	Any **two** from: Examples: • SD card • USB drive • SIM card • RAM	**2**	Do not accept 'SSD' as already given in the question
1(b)(ii)	• magnetic • optical	**2**	
1(c)(i)	• 97 • 116	**2**	
1(c)(ii)	Unicode	**1**	Accept answers outside the syllabus such as: • Extended ASCII • UTF-8 • UTF-16 … etc • ISO-8859 • Ebcdic • GB2312

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Question	Answer	Marks	Guidance
1(c)(iii)	**One** mark for: • Lossless // by example e.g. RLE Any **three** from: • No data is **permanently** removed // It can be restored to the **original** (when decompressed) • A text file normally does not have any **unnecessary** data // A text file would need **all** the data • If any text was removed the file would not make sense • Lossy would **corrupt** the file // The file would no longer **open** if lossy was used • The text file may already be quite small (so doesn't need a lot of compression)	**4**	The justification should be for why the method should be used and not how the method works.

Question	Answer	Marks	Guidance
2(a)	packets	**1**	
2(b)	router	**1**	

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Question	Answer	Marks	Guidance
2(c)	Any **six** from (**one** mark for benefit (MAX 3), **one** mark for expansion (MAX 3)): • Data is sent one bit at a time • … so bits are less likely to be skewed • … so it can be safely sent across a longer distance • Data is sent along a single wire • … so less chance of interference/crosstalk • … so bits are less likely to be lost • Data is sent in **both** directions **at the same time** • … so there is no delay between computers sending and receiving data // the exchange of data between computers will happen faster	**6**	Mark whole answer.
2(d)	Any **three** from: • The checksum value is sent with the data • The receiving device uses the **same** algorithm to calculate the checksum value // The checksum value is **recalculated** by the receiver • The checksum values are **compared** • If the checksum values are the same no error has occurred // If the checksum values are different an error has occurred	**3**	
2(e)(i)	• Symmetric // synchronous • Asymmetric // asynchronous	**2**	Mark first answer given. MP1 – BOD Single key encryption MP2 – BOD public key and private key encryption

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Question	Answer	Marks	Guidance
2(e)(ii)	Any **two** from: • A string of **characters/numbers** used to encrypt data … • Used by an **algorithm**/**cipher** (to encrypt/decrypt the data)	**2**	MP2 – Accept 'It is an algorithm/cipher'

Question	Answer	Marks	Guidance
3(a)(i)	microphone	**1**	
3(a)(ii)	Any **one** from: • button • touchscreen • sensor • touch pad • camera	**1**	
3(a)(iii)	Any **one** from: • speaker • LED // light • actuator	**1**	
3(b)	Any **four** from: • The analogue sound is sampled • … by measuring the amplitude/height (of each sound wave) • … at a set sample rate // by description • … at a set sample resolution // by description • The **sample** value is converted to **binary** • The **binary** for each sample is stored in **sequence**	**4**	

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Question	Answer	Marks	Guidance
3(c)(i)	instruction set	**1**	
3(c)(ii)	Any **four** from: • It has a faster clock speed … • It may process more instructions/FDE cycle/FE cycles per second … • … which may mean its performance better • It has fewer cores … • It cannot process as many instructions/FDE cycle/FE cycles **simultaneously** … • … which may mean its performance is worse • Communication between the cores is not as complex … • … which may mean it has a better performance	**4**	Tasks/processes/code/information/commands /actions/data is TV for instructions MP2 and MP5 – BOD clock ticks/pulses in place of cycles
3(d)	Any **two** from: • For **authentication** // **authenticate** the user • To help keep the device **secure** • To use as a **login** method for the device/accounts • To allow the user to use a **biological password**	**2**	MP4 – BOD use biological data to access an account/the device

Question	Answer	Marks	Guidance
4	accumulator // ACC current instruction register // CIR program counter // PC	**3**	

Question	Answer	Marks	Guidance
5(a)	compiler interpreter	**2**	

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Question	Answer	Marks	Guidance
5(b)	Any **four** from (Max 2 per language type): • A high-level language cannot **directly** manipulate the hardware … • … but a low-level language can **directly** manipulate hardware • A high-level language program is portable/machine independent … • … but a low-level language program is not portable/machine independent • A high-level language is easier for humans to read/write/understand/debug … • … but a low-level language is harder for humans to read/write/understand/debug • A high-level language may be slower to **execute** (as it has to be transmitted to low-level language) … • … but a low-level language is faster to **execute** (as it closer to the language used by the computer) • A high-level language can have several instructions in one line/statement … • … but a low-level language normally has one instruction per line • A high-level language uses English-like statements … • … but a low-level language uses language like mnemonics	**4**	Mark whole answer.

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Question	Answer	Marks	Guidance
5(b)	• High-level language programs take up more storage space … • … compared to an equivalent low-level language program that would take up less storage space • High-level language is less memory efficient … • … whereas low-level language is more memory efficient		
5(c)(i)	Any **one** from: • history • address bar	**1**	
5(c)(ii)	Any **two** from: • protocol • domain name • web page/file name // path	**2**	

Question	Answer	Marks	Guidance
6(a)	Any **one** from: • It collects data • It applies rules to the data • It has the ability to reason	**1**	
6(b)	A program that has the ability to **automatically** adapt its **own** data and processes	**1**	

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Question	Answer	Marks	Guidance
6(c)	**Two** from: For example: • It could **analyse** the **input** actions from the player • It could **analyse** past extra **characters** that performed well • Create/adapt the actions of an extra character based on past characters/gameplay	**2**	
6(d)	Any **three** from: • It takes/uses the data input by the user about the problem • … search for similar knowledge in the knowledge base • … applies it to the rule base (to find the solution) • … decide which question to ask next (if needed)	**3**	

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Question	Answer	Marks	Guidance
7	**One** mark for each correct term in the correct place: • trojan horse • virus • worm • bandwidth • encrypting A **trojan horse** is used to disguise malware. Once it is downloaded onto a computer it releases the malware that it contains. A **virus** replicates itself to corrupt the data stored on a user's hard drive or uses up their available memory. A **worm** also replicates itself but with the aim of clogging up the **bandwidth** of a network. Ransomware is downloaded onto a computer with the aim of **encrypting** data to stop the user gaining access to it. There is often a demand for payment before the user is given access to the data again.	**5**	

Question	Answer	Marks	Guidance
8(a)	0100 0111 1100 1000	**2**	
8(b)	41 180	**2**	

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Question	Answer	Marks	Guidance
8(c)	Any **three** from: • The microprocessor compares the denary number received to the stored value/preset code • if the denary numbers **match** a correct code has been entered • If the denary numbers **do not match** the code is not correct	**3**	
8(d)(i)	• 35 • −22	**2**	
8(d)(ii)	0000 1110	**1**	Leading zeros must be present

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