

Cambridge IGCSE™

COMPUTER SCIENCE**0478/13**

Paper 1 Theory

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

This document consists of **15** printed pages.

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 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.

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
	Follow through
	Repetition
	Ignore
	Benefit of doubt given
	Benefit of doubt not given
	Content of response too vague
	Not answered question

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

Annotation guidance:

- / separates alternative words or 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(a)	Microphone	1								
1(b)	A	1								
1(c)(i)	<ul style="list-style-type: none"> • 25 • 180 	2								
1(c)(ii)	<ul style="list-style-type: none"> • 19 • B4 	2								
1(c)(iii)	00101001	1								
1(d)	<p>One mark for correct method of working e.g. flip and add 1 One mark for correct answer</p> <p>–55</p>	2								
1(e)	<p>One mark for each correct missing term or definition.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Term</th> <th style="text-align: center;">Description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">(sound) sampling/sample</td> <td>This is the measurement of the height (amplitude) of a sound wave at regular time intervals.</td> </tr> <tr> <td style="text-align: center;">sample rate</td> <td>The number of samples recorded each second</td> </tr> <tr> <td style="text-align: center;">sample resolution</td> <td>The number of bits that are used to record each sample</td> </tr> </tbody> </table>	Term	Description	(sound) sampling/sample	This is the measurement of the height (amplitude) of a sound wave at regular time intervals.	sample rate	The number of samples recorded each second	sample resolution	The number of bits that are used to record each sample	3
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Question	Answer	Marks												
2(a)	Virtual memory	1												
2(b)	Any three from: Examples: <ul style="list-style-type: none"> • Platters are divided into tracks/sectors. • Platters rotate (to allow data to be read) // has moving parts. • Has a read/write head. • Uses an electromagnet. • Data stored as magnetised dots. 	3												
2(c)	<ul style="list-style-type: none"> • It is not directly accessed by the CPU. • It stores data permanently until it is deleted by the user // non-volatile. 	2												
3(a)	<p>One mark for each correct missing term or description.</p> <table border="1" data-bbox="336 798 1541 1398"> <thead> <tr> <th data-bbox="336 798 734 865">Term</th> <th data-bbox="734 798 1541 865">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="336 865 734 967">MAC address</td> <td data-bbox="734 865 1541 967">This is the address given to a network interface card (NIC) when it is manufactured.</td> </tr> <tr> <td data-bbox="336 967 734 1066">register</td> <td data-bbox="734 967 1541 1066">A component in the central processing unit (CPU) that is used to temporarily store data.</td> </tr> <tr> <td data-bbox="336 1066 734 1165">clock</td> <td data-bbox="734 1066 1541 1165">It controls the number of fetch-decode-execute cycles that are performed per second.</td> </tr> <tr> <td data-bbox="336 1165 734 1295">control unit</td> <td data-bbox="734 1165 1541 1295">A component in the CPU that manages the flow of data around the CPU // A component that decodes the instructions</td> </tr> <tr> <td data-bbox="336 1295 734 1398">core</td> <td data-bbox="734 1295 1541 1398">This is a processing unit within the CPU that can fetch, decode and execute instructions.</td> </tr> </tbody> </table>	Term	Description	MAC address	This is the address given to a network interface card (NIC) when it is manufactured.	register	A component in the central processing unit (CPU) that is used to temporarily store data.	clock	It controls the number of fetch-decode-execute cycles that are performed per second.	control unit	A component in the CPU that manages the flow of data around the CPU // A component that decodes the instructions	core	This is a processing unit within the CPU that can fetch, decode and execute instructions.	5
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Question	Answer	Marks
3(b)	Any three from: <ul style="list-style-type: none">• Program counter // PC• Memory address register // MAR• Memory data register // MDR• Current instruction register // CIR	3
3(c)	<ul style="list-style-type: none">• Control bus• Data bus	2

Question	Answer	Marks
4(a)	Any two from: <ul style="list-style-type: none"> • It assigns a priority to an interrupt. • It uses an interrupt handler / interrupt service routine to process the interrupt. • Maintains/organises the interrupt queue 	2
4(b)	Any two from: Examples: <ul style="list-style-type: none"> • managing files • providing an interface • managing peripherals and drivers • managing memory • managing multitasking • providing a platform for running applications • providing system security • managing user accounts 	2
4(c)(i)	Any one from: Examples: <ul style="list-style-type: none"> • key press on a keyboard • button clicks on a mouse • printer out of ink 	1
4(c)(ii)	Any one from: Examples: <ul style="list-style-type: none"> • division by zero • two processes trying to access the same memory location 	1

Question	Answer	Marks
5(a)	Any two from: <ul style="list-style-type: none">• storing a database of URLs and matching IP addresses• search its database for the matching IP address.• send the URL to another DNS if URL cannot be found.• return the IP address to the web browser	2
5(b)	D	1

Question	Answer	Marks
<p>5(c)(i)</p>	<p>One mark for each part of the diagram that shows:</p> <ul style="list-style-type: none"> • A perpetrator/third party sending malware // user downloads/installs malware • Each computer is turned into a bot ... • ... to create a botnet. • Third party initiates the attack. • All the bots send a request at once to the web server. • ... crashing the web server. <p>Example:</p>	<p>5</p>
<p>5(c)(ii)</p>	<ul style="list-style-type: none"> • Hide a public IP address • Caching 	<p>2</p>
<p>5(d)(i)</p>	<p>B</p>	<p>1</p>

Question	Answer	Marks
5(d)(ii)	Any three from: Examples: <ul style="list-style-type: none">• Store user's login details.• Store user's payment details.• Store user's preferences.• Use for targeted advertising.	3
5(d)(iii)	Any two from: Examples: <ul style="list-style-type: none">• Storing bookmarks/favourites• Recording user history• Allowing use of multiple tabs• Providing navigation tools• Providing an address bar	2

Question	Answer	Marks
6(a)	Any one from: Examples: <ul style="list-style-type: none"> • Microprocessor • Actuator • Storage/memory 	1
6(b)	Any one from: Examples: <ul style="list-style-type: none"> • Humidity • Light • Level • Infrared 	1
6(c)(i)	Any three from: <ul style="list-style-type: none"> • A microprocessor is used. • Microprocessor received data from the sensor. • Microprocessor compares data against preset data of 40. • If the data is greater than 40 the microprocessor sends a signal to trigger the alert. 	3
6(c)(ii)	Any three from: <ul style="list-style-type: none"> • Data is sent one bit at a time. • ... down a single wire. • Data can only be sent in one direction. 	3

Question	Answer	Marks
6(d)	Any two from: Examples: <ul style="list-style-type: none"> • Employees don't need to carry out a mundane/repetitive task. • Employees don't need to work overnight. • Employees don't need to work outside in adverse weather conditions. • Creates maintenance jobs for system 	2
6(e)	Any one from: Examples: <ul style="list-style-type: none"> • May de-skill the employees • May replace employees and take their job 	1
6(f)(i)	Artificial intelligence // AI	1
6(f)(ii)	Any three from: Examples: <ul style="list-style-type: none"> • It can adapt its own processes/data. • It could analyse the data for trends/patterns. • ... and predict future weather patterns based on the patterns. • Feedback is given on weather predictions. • ... changes future predictions based on this feedback. • It could learn what weather occurs at certain times of year. • ... and use this to predict what the weather would be like at the same time of year . • ... and adapt its rules/processes for weather predictions. 	3

Question	Answer	Marks
7(a)	<ul style="list-style-type: none"> • It can suffer Interference/crosstalk. • ... that could have caused data loss/gained/changed. 	2
7(b)	<p>One mark for each correct term in the correct place.</p> <ul style="list-style-type: none"> • odd/even • even/odd (must be opposite of MP1) • bit • echo check • automatic repeat query (ARQ) • timeout • positive/negative or negative/positive <p>A parity check is set to be odd or even. A parity bit is added to each byte before transmission to make it match the set parity.</p> <p>An echo check involves comparing the data sent to the data received back from the receiving device.</p> <p>An automatic repeat query (ARQ) uses acknowledgement and timeout. The acknowledgement system can be positive or negative.</p>	8