CAMBRIDGE
International Education

Cambridge O Level

COMPUTER SCIENCE **2210/11**

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.

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 standard isation 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

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)	D	1
1(b)	2048	1
1(c)(i)	(Data) Compression	1
1(c)(ii)	Any **one** from: • Less bandwidth required to transmit the file • Less **storage** space needed to store the file • To meet email file size **limit** • To use less data allowance	1

Question	Answer	Marks
2(a)	Printer	1
2(b)(i)	0001 0100 1011 1001 0111 1010	2
2(b)(ii)	Any **two** from: • Easier/quicker for the customer to understand/read/remember • Takes up less space on the ticket // Shorter representation	2
2(c)(i)	44 267	2
2(c)(ii)	(0)6D 19F	2

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3</td><td>One mark for each correct term or definition.

<table>
<tr><th>Term</th><th>Definition</th></tr>
<tr><td>pixel</td><td>It is the smallest component of an image.</td></tr>
<tr><td>resolution</td><td>The number of pixels high by the number of pixels wide // The number of pixels in an image</td></tr>
<tr><td>colour depth // bit depth</td><td>This is the number of bits that are used to create each colour in an image.</td></tr>
<tr><td>metadata // header</td><td>This is additional data that is stored with an image that can provide information such as the time and date the image was taken.</td></tr>
</table>
</td><td>4</td></tr>
</table>

Question	Answer	Marks
4(a)(i)	**Two** from (one mark for serial, one mark for full-duplex): **serial** • Serial is suitable as data may be travelling a long distance (over 5 metres). • Serial is suitable to make sure that bits don't arrive skewed/arrives in order. • Serial is suitable as there is less chance of error. • Serial has sufficient transmission speed as not much data being sent. **full-duplex** • Full-duplex is suitable as data needs to go between customer and kitchen computer // data needs to go in both directions // so notification of errors can be sent back to customer.	**2**
4(a)(ii)	The data may be transmitted faster.	**1**

Question	Answer	Marks
4(b)(i)	Any **five** from: • The checksum is **calculated** from/using the **data**. • … using an algorithm // by example. • The (checksum) value is transmitted with the data. • The (checksum) value is recalculated **after transmission**/**by recipient**. • If the **checksum values** do not match, an error is detected // If the **checksum values** match, no error is detected … • … request for data to be resent if there is an error.	**5**
4(b)(ii)	Any **one** from: • Parity byte/block check • Echo check	**1**
4(c)(i)	D	**1**
4(c)(ii)	Any **Two** from: • The packets **arrive** in the wrong order. • Each packet could take a different route. • Some packets may take longer than others to be transmitted. • Some packets may not arrive/be corrupted and need to be requested again.	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>5(a)</td><td>
<table>
<tr><th>Term</th><th>Definition</th></tr>
<tr><td>current instruction register (CIR)</td><td>stores the instruction that is being decoded/executed</td></tr>
<tr><td>core</td><td>This is a processing unit within the CPU that can fetch, decode and execute instructions.</td></tr>
<tr><td>instruction set</td><td>This is a list of all the commands that can be processed by the CPU.</td></tr>
<tr><td>cache</td><td>stores frequently used data/instructions</td></tr>
<tr><td>accumulator</td><td>stores the result of interim calculations</td></tr>
</table>
</td><td>5</td></tr>
<tr><td>5(b)</td><td>Control unit // CU</td><td>1</td></tr>
<tr><td>5(c)</td><td>Three from:

• On each clock pulse, an FDE cycle is performed.
• The clock speed is the number of FDE cycle performed in a second // The clock speed is the number of times the clock pulses per second/per unit of time.
• If clock speed is increased more FDE cycles can be performed in a second // If clock speed is decreased fewer FDE cycles can be performed in a second.
• If clock speed is increased, it can improve the performance of the CPU // If clock speed is decreases it decreases the performance of the CPU.</td><td>3</td></tr>
</table>

Question	Answer	Marks
6(a)	**One** mark for each correct term in the correct position • algorithm • plain text • cipher text • meaningless • public/private • private/public (must be opposite of MP5) • public • private Data is encrypted using an encryption key. This is a type of **algorithm** that scrambles the **plain text** and turns it into **cipher text**. This makes the data **meaningless**. A **public/private** key is used to encrypt the data. This key cannot be used to decrypt the data. A **private/public** key is used to decrypt the data. Any device is able to request the **public** key, but only your device knows the **private** key.	**8**
6(b)	Any **one** from: • The process is more secure. • Do not need to worry about key exchange.	**1**

Question	Answer	Marks
7(a)	Any **one** from: • Read only memory // ROM • Cache	**1**
7(b)	Any **three** from: • RAM is directly accessed by the CPU. • … whereas secondary storage is not directly accessed by the CPU. • All secondary storage is non-volatile storage. • … whereas RAM is volatile storage.	**3**
7(c)	Any **three** from: • Virtual memory can act as an extension to the RAM . • The secondary storage device is **partitioned** to create the virtual memory. • Pages can be **transferred** from the RAM to the **virtual memory** … • … to stop the RAM getting full // … when the RAM is full.	**3**
7(d)(i)	Any **two** from: • It has no moving parts. • It uses semiconductor chips. • It uses NAND/NOR/Flip-flops technology. • It uses cells and transistors (that are laid out in a grid). • It uses control gates and floating gates. • **Stores** data as **electrical** charges.	**2**
7(d)(ii)	Any **two** from: • Solid-state drive // SSD • USB flash memory drive • SD card	**2**

Question	Answer	Marks
8(a)	Any **one** from: • It has electrical components. // by example • It is programmable. • It can move.	**1**
8(b)	Any **one** from: • Permanent **instructions**/**software** that are programmed into/stored in the ROM. • **Instructions**/**software** that allow hardware to be controlled/managed. • **Instructions**/**software** that provides the operating system with a platform to run on.	**1**
8(c)	Any **two** from: Examples: • user input // by example • encountering an obstacle • emergency stop • hardware error • software error • battery low • component overheating • two processes accessing the same location	**2**
8(d)	Any **two** from: Examples: • Workers don’t need to lift **heavy** machinery • The workers are less likely to injure themselves • The workers don’t need to be in any dangerous environments in the factory • The workers don’t need to perform boring/repetitive tasks such as moving car parts • Workers can focus on having higher expertise skills • Create new jobs for workers to maintain the robots.	**2**

Question	Answer	Marks
8(e)	Machine learning	1

Question	Answer	Marks
9(a)	Any **three** from: Examples: • To make sure memory is used efficiently • Allocates/deallocates memory to processes • Checks that the processes being actioned have enough memory available • Moves data to and from memory/between memory and storage • Makes sure that two processes do not try and access the same memory location • Creates a memory partition • Creates virtual memory • Transmits pages between RAM and VM	3
9(b)(i)	Any **two** from: • Try to **find out**/**guess** a **password** • **…** by **repeatedly** entering different **combinations/passwords** • Could use **software** to do it **automatically**	2
9(b)(ii)	Any **three** from: • **Strong** passwords // passwords that are long and have a combination of letters, numbers and symbols • Two-step verification // two-factor authentication • Biometric password • Limiting the number of login attempts	3
9(c)(i)	A currency that only exists electronically/virtually	1
9(c)(ii)	Blockchain	1