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CAMBRIDGE
International Education

Cambridge International AS & A Level

COMPUTER SCIENCE **9618/13**

Paper 1 Theory Fundamentals **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.

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[Turn over

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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
	Incorrect
	To indicate where a key word/phrase/code is missing.
	Not relevant or used to separate parts of an answer.
	Indicates a part of the answer that is incorrect.
Highlighter	To draw attention to a particular aspect or to indicate where parts of an answer have been combined.
	Too vague.
	Repetition
	No examples or not enough.
	Benefit of Doubt.
	Not Answered Question.
	Indicates that work or a page has been seen including blank answer spaces and blank pages.
	Follow through.
	Ignore

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)(i)</td><td>1 mark for correct working:

e.g.
2000000 * 16 / (8 * 1000 * 1000)

1 mark for answer:

4MB</td><td>2</td></tr>
<tr><td>1(a)(ii)</td><td>1 mark each

Image:
• There will be fewer shades of colour available
• so the image does not match the original as detail is lost

Image file:
• Fewer bits are used to store each pixel
• so less data is stored, therefore the file size is reduced</td><td>4</td></tr>
<tr><td>1(b)</td><td>1 mark for each correct term:

<table><tr><th>Description</th><th>Sound term</th></tr><tr><td>the number of times the amplitude is measured per time interval</td><td>Sampling rate</td></tr><tr><td>the number of bits used to store each amplitude measurement</td><td>Sampling resolution</td></tr><tr><td>the type of sound wave before it is recorded by a computer</td><td>Analogue</td></tr></table></td><td>3</td></tr>
<tr><td>1(c)(i)</td><td>1 mark each to max 2

• 8 / 16 / 32 / bits per character
• Represents 2^8 / 2^{16} / etc. characters
• Represents every language and other characters such as emojis</td><td>2</td></tr>
<tr><td>1(c)(ii)</td><td>1 mark for each correctly completed space

<table><tr><th>Character</th><th>Denary</th><th>8–bit Binary</th><th>Hexadecimal</th></tr><tr><td>!</td><td>33</td><td>0010 0001</td><td>21</td></tr><tr><td>L</td><td>76</td><td>0100 1100</td><td>4C</td></tr><tr><td>ü</td><td>252</td><td>1111 1100</td><td>FC</td></tr></table></td><td>3</td></tr>
</table>

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Question	Answer	Marks
2(a)(i)	**1 mark** each to **max 2 - max 1** for each set of marks • The control unit synchronises the actions of the processor • by sending a command / signal on each timing signal produced by the system clock • using / along the control bus	**2**
2(a)(ii)	**1 mark** each • MAR ← [PC] and PC ← [PC] + 1 • MDR ← [[MAR]] • CIR ← [MDR] • Correct order • For example: • MAR ← [PC] • PC ← [PC] + 1 • MDR ← [[MAR]] • CIR ← [MDR]	**4**
2(b)	**1 mark** each • Using cache memory improves system performance • because cache is fast access memory close to the CPU • which stores frequently used instructions / data • so that they can be accessed faster than from RAM	**2**
2(c)	**1 mark** each to **max 2** e.g. • HDMI transfers both audio and video using a single cable • HDMI has a high bandwidth • Data is transmitted in a stream • of uncompressed digital signals • HDMI uses a technology called Transition-Minimized Differential Signalling (TMDS)	**2**

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Question	Answer	Marks
3(a)	**1 mark** for each correctly completed term • **an executable file/.exe** • **source/program code** • **stops** • **immediately/in real-time** A compiler checks all of the code before attempting to translate the program. If any errors are found, they are all reported at the same time and the program does not translate or run. If there are no errors found, the compiler produces **an executable file/.exe** which can run without access to the **source/program code**. An interpreter translates one line of code and then runs it, before moving to the next line of code. If the line of code has an error, the interpreter **stops** and displays the error. The programmer can correct the error **immediately/in real-time** and then the interpreter continues translating from that point.	**4**
3(b)	**1 mark** for method and **1 mark** for corresponding description During transmission e.g. • Encryption // by example such as VPN • Jumble / encode data so it cannot be decrypted/understood without the key On computer e.g. • Firewall / proxy • Filter incoming transmissions and stop any that could be attempting unauthorised access • Anti-malware • Find and delete or quarantine any malware that could delete the data / files • Encryption • Jumble / encode data so it cannot be decrypted / understood without the key • Physical method // by example • For example, the computer storing the data cannot be accessed without the key to the room	**4**

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Question	Answer	Marks
3(c)	**1 mark** each to **max 4** • A webserver stores all the data for each player • Each player is on a client computer // The player's web browser is the client • that sends requests over the internet to the web server • the server performs the required action in the game • the server updates the data in the game • the server sends the results to the player	**4**
3(d)	**1 mark** each to **max 3** e.g. • There is no / limited access to legal advice • in case action is taken against them • There are fewer networking opportunities • so they could miss out on contacts / jobs • There would be less access to training • There would be no clear laid out ethical guidelines • and / or people to discuss potential ethical problems with • possibly leading to inappropriate / unethical actions • which might lead to legal proceedings / recourse	**3**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(a)</td><td>1 mark for each correct statement

X = B NOR (A NOR C)

Y = (B AND C) XOR NOT D</td><td>2</td></tr>
<tr><td>4(b)</td><td>1 mark for 1st 4 rows
1 mark for 2nd 4 rows

<table>
<tr><th>A</th><th>B</th><th>C</th><th>Working space</th><th>X</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td></td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td></td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td></td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td></td><td>1</td></tr>
</table>
</td><td>2</td></tr>
</table>

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>5(a)(i)</td><td>1 mark for each shaded section

<table>
<tr><td rowspan="2">Instruction address</td><td rowspan="2">ACC</td><td colspan="4">Memory address</td></tr>
<tr><td>50</td><td>51</td><td>52</td><td>53</td></tr>
<tr><td></td><td></td><td>47</td><td>48</td><td>49</td><td>50</td></tr>
<tr><td>500</td><td>50</td><td></td><td></td><td></td><td></td></tr>
<tr><td>501</td><td>49</td><td></td><td></td><td></td><td></td></tr>
<tr><td>502</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>504</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>501</td><td>48</td><td></td><td></td><td></td><td></td></tr>
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<tr><td>505</td><td></td><td>48</td><td></td><td></td><td></td></tr>
<tr><td>506</td><td>38</td><td></td><td></td><td></td><td></td></tr>
<tr><td>507</td><td></td><td></td><td>38</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td>3</td></tr>
<tr><td>5(a)(ii)</td><td>1 mark for addressing mode, 1 mark for matching description

• Direct
• The operand is the address of the data

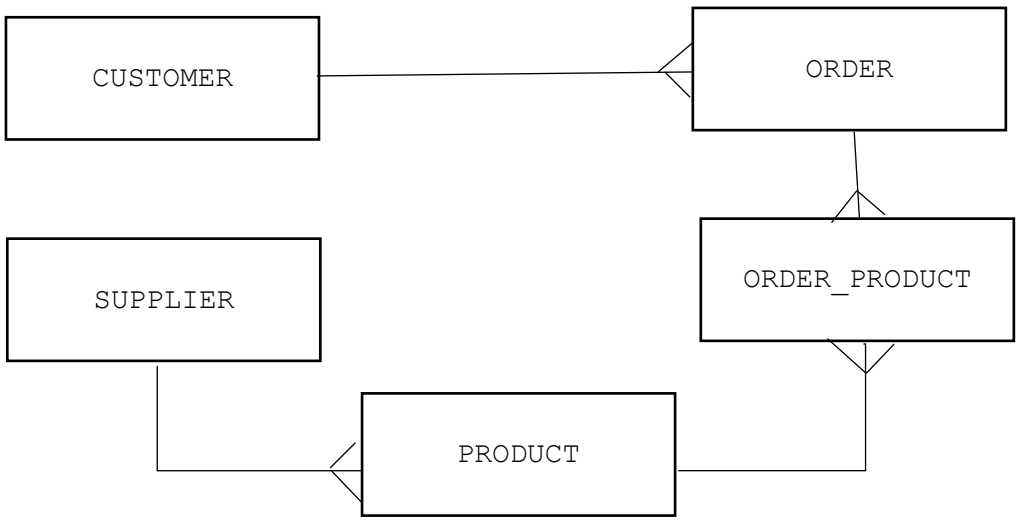
• Indirect
• The operand points to the memory location which is the address of the data

• Indexed
• The address of the data is formed by adding the contents of the Index Register (IX) to the operand</td><td>4</td></tr>
<tr><td>5(b)</td><td>1 mark for each correct instruction

e.g.
AND B00000000 / #0 / &0
OR B10000000 / #128 / &80</td><td>2</td></tr>
</table>

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Question	Answer	Marks
6(a)	**1 mark** for each correct relationship 	**4**
6(b)	**1 mark** each • INSERT INTO PRODUCT • VALUES with opening and closing brackets • Inserting ProductID, ProductName and SupplierID correctly as strings including quotation marks into correct fields • Inserting quantity and cost correctly into correct fields Example 1: INSERT INTO PRODUCT VALUES ("002323", "Blue ball point 2 mm", 50, 5.00, "SFX223"); Example 2: INSERT INTO PRODUCT (ProductID, ProductName, QuantityInBox, Cost, SupplierID) VALUES ("002323", "Blue ball point 2 mm", 50, 5.00, "SFX223");	**4**

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Question	Answer	Marks
6(c)	**1 mark** each • Selection of customer name and counting any field from ORDER as an appropriate identifier • Joining tables ORDER and CUSTOMER • AND (or WHERE) clause: Collected = FALSE • Grouping by customer ID or customer name Example 1: SELECT CustomerName, COUNT(OrderID) AS NotCollected FROM ORDER, CUSTOMER WHERE ORDER.CustomerID = CUSTOMER.CustomerID AND Collected = FALSE GROUP BY CUSTOMER.CustomerID Example 2: SELECT CustomerName, COUNT(OrderID) AS NotCollected FROM ORDER INNER JOIN CUSTOMER ON ORDER.CustomerID = CUSTOMER.CustomerID WHERE Collected = FALSE GROUP BY CUSTOMER.CustomerID	**4**
6(d)(i)	**1 mark** each to **max 3** e.g. • Relationships • Views • Data types • Validation rules	**3**
6(d)(ii)	**1 mark** each to **max 3** e.g. • To create / modify / delete database objects • To create a form for data input • To add tools to a form • for example, drop-down boxes / buttons etc. • To design a report to show the output in an organised manner • To add a menu to enable users to choose different actions / run different queries	**3**

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Question	Answer	Marks
7(a)(i)	**1 mark** for 0010 1000	**1**
7(a)(ii)	**1 mark** for 1111 0011	**1**
7(b)	**1 mark** for $\begin{array}{r} 1\ 1\ \ 1\ 1\ 0\ 1\ 0\ 1 \\ +_1\ 1_1\ 0_1\ 1_1\ 1\ \ 0\ \ 0\ \ 0_1\ 1 \\ \hline (1)\ 1\ \ 0\ \ 1\ 0\ 0\ 1\ 1\ 0 \end{array}$ Answer: (1) 1010 0110	**1**
7(c)	**1 mark** for showing binary subtraction (any method) Direct subtraction: $\begin{array}{r} 0\ 1\ 1\ {}^{1}0\ {}^{1}0\ {}^{1}1\ {}^{1}0\ \ 0 \\ -0\ \ 0\ \ 0_1\ 1_1\ 1_1\ 1_1\ 1\ \ 0 \\ \hline 0\ 1\ 0\ \ 0\ 0\ 1\ 1\ 0 \end{array}$ Adding the two's complement: $\begin{array}{r} 0\ 1\ \ 1\ 0\ 0\ 1\ 0\ 0 \\ +_1\ 1_1\ 1_1\ 1\ \ 0\ \ 0\ \ 0\ \ 1\ \ 0 \\ \hline (1)\ 0\ \ 1\ \ 0\ 0\ 0\ 1\ 1\ 0 \end{array}$ **1 mark** for answer 0100 0110	**2**

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