CAMBRIDGE
International Education

Cambridge International AS & A Level

COMPUTER SCIENCE **9618/11**

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.

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
	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

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>1 mark each:
X = Q AND (NOT P OR R)
Y = S XOR (Q NOR R)</td><td>2</td></tr>
<tr><td>1(b)</td><td>1 mark for first 4 rows, 1 mark for second 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>0</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td></td><td>1</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>0</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>

Question	Answer	Marks
2(a)	**1 mark** each to **max 4** • Video is transmitted continuously • as a series of bits • The video is uploaded to a media server • The users download from the media server • On download, the media server sends the data to a buffer on the user's device • buffer is used when there is a difference in speed between transmission and receipt • Buffer stores data from server until recipient can receive it • Recipient views bit stream from the buffer	**4**
2(b)(i)	**1 mark** each to **max 4** e.g. • Video is data-intensive • The file size needs reducing in order to • reduce the amount of bandwidth used • and reduce buffering • This means people are not behind in the conversation • and people with lower bandwidth can still take part	**4**
2(b)(ii)	No mark for choice but lossy is **most** appropriate **1 mark** each to **max 3** e.g. • Reduces file size more than lossless • so significantly less bandwidth / data is needed • so buffering is reduced even more than with lossless • Data can be removed which cannot be seen • reducing quality without impacting experience • for example, because resolution of video can be reduced // sample rate of audio can be reduced	**3**
2(c)	**1 mark** each modems: • Converts digital data into analogue for transmission down phone lines // Converts analogue data into digital after transmission down phone lines dedicated lines: • Used to provide a direct / private connection which therefore provides faster transmission	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(a)</td><td>1 mark for each correct answer
<table>
<tr><th>Statement</th><th>Answer</th></tr>
<tr><td>The term for the smallest element that makes up an image.</td><td>pixel</td></tr>
<tr><td>The largest number of different colours that can be represented with a bit depth of 8 bits.</td><td>256 // 2^8</td></tr>
<tr><td>The term for the dots per inch (dpi) when an image is displayed.</td><td>Screen resolution</td></tr>
</table></td><td>3</td></tr>
<tr><td>3(b)(i)</td><td>1 mark each to max 2

• A wider range of characters can be represented
• so characters from more languages can be represented
• and symbols such as emojis can be used</td><td>2</td></tr>
<tr><td>3(b)(ii)</td><td>1 mark for:

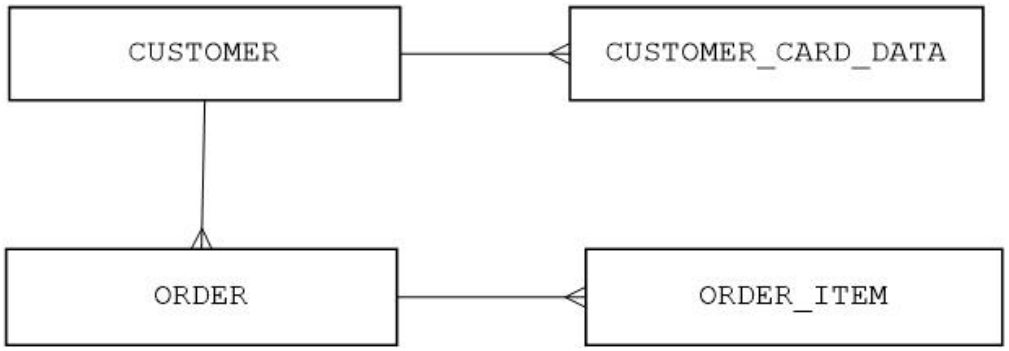
10,094</td><td>1</td></tr>
<tr><td>3(b)(iii)</td><td>1 mark for:

8,512</td><td>1</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(a)</td><td>1 mark each to max 4

e.g.
• Uses image recognition / facial recognition
• Measures the distance between facial features of the customer
• and stores the values in a database of user information
• An image is captured using the digital camera
• the AI identifies that the image is a face
• by analysing the pixels to find patterns
• the distance between features is calculated and compared to those in database</td><td>4</td></tr>
<tr><td>4(b)</td><td>1 mark for sensor, 1 mark for corresponding use

e.g.
<table>
<tr><th>Sensor</th><th>Use</th></tr>
<tr><td>Pressure</td><td>Detects when the pressure of an item is removed from a shelf / put back on a shelf</td></tr>
<tr><td>Infrared</td><td>Detects when the beam is broken for an item removed / added</td></tr>
</table></td><td>2</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>5(a)</td><td>1 mark for each relationship. Max 2 if any extra
 
</td><td>3</td></tr>
<tr><td>5(b)</td><td>1 mark for:

CardNumber</td><td>1</td></tr>
<tr><td>5(c)</td><td>1 mark per row to max 2

<table>
<tr><th>Table</th><th>Foreign key</th></tr>
<tr><td>ORDER_ITEM</td><td>OrderID</td></tr>
<tr><td>ORDER</td><td>CustomerID</td></tr>
<tr><td>CUSTOMER_CARD_DATA</td><td>CustomerID</td></tr>
</table></td><td>2</td></tr>
<tr><td>5(d)</td><td>1 mark each to max 3

e.g.
• Each order would only be able to have one item
• or the database would not be normalised
• it would not be in 1NF
• due to repeated groups of attributes
• in the ORDER table</td><td>3</td></tr>
</table>

Question	Answer	Marks
5(e)	**1 mark** each • Selecting the customer ID, customer name and sum of TotalCost with appropriate identifier • FROM clause with suitable join of tables (ON or WHERE) • ORDER.Paid = FALSE condition (with correct key word) • GROUP BY condition e.g. SELECT CUSTOMER.CustomerID, CUSTOMER.Name, Sum(ORDER.TotalCost) AS TotalOwed FROM CUSTOMER INNER JOIN ORDER ON CUSTOMER.CustomerID = ORDER.CustomerID WHERE ORDER.Paid = FALSE GROUP BY CUSTOMER.CustomerID; Alternative JOIN Statement SELECT CUSTOMER.CustomerID, CUSTOMER.Name, Sum(ORDER.TotalCost) AS TotalOwed FROM CUSTOMER,ORDER WHERE CUSTOMER.CustomerID = ORDER.CustomerID AND ORDER.Paid = FALSE GROUP BY CUSTOMER.CustomerID;	**4**

Question	Answer	Marks
6(a)(i)	**1 mark** for each correctly completed space • **platters** • **spindle** • **read/write head** • **magnetic field** The magnetic hard disk has one or more **platters** that can be magnetised. These are mounted on a **spindle** and rotate at high speed. A **read/write head** is moved across the surface on an arm. When data is read the changes in the **magnetic field** produce a change in the electric current.	**4**
6(a)(ii)	**1 mark** each to **max 3** • More RAM means more currently running data and instructions can be stored • without needing to use virtual memory • without having to fetch the data from secondary storage first • which has a slower access time • Less latency / delay waiting for instructions / data	**3**
6(a)(iii)	**1 mark** each to **max 2** e.g. • Wider data bus means more data can be transferred between components at a time • there is less delay / latency when fetching data for a running process • Wider address bus means larger memory addresses can be used • allowing more memory locations to be accessed directly • so less likely to run out of memory	**2**
6(b)	**1 mark** each to **max 5** e.g. • To provide a user interface • so that the user is able to communicate with the hardware • To manage memory • so that data can be stored and accessed • and multitasking is possible • To manage files • allowing the user to create, edit, update and delete files and folders • To manage inputs and outputs from hardware/peripherals • To handle processes • to make sure each process has fair access	**5**

Question	Answer	Marks
7(a)	**1 mark** for a correct method: **1 mark** each to **max 2** for a corresponding description Method: Encryption Description: • Data is encoded/scrambled using a key to create cipher text • if intercepted it cannot be understood • without being decrypted using a key	**3**
7(b)	**1 mark** each to **max 5** • The sender hashes the document / message • to produce a digest • The sender encrypts the digest to create the digital signature • The message and the signature are sent to the banker / receiver • The receiver decrypts the signature to reproduce the digest • The receiver uses the same hashing algorithm on the document received to produce a second digest • The receiver compares this digest with the one from the digital signature • If both of the receiver's digests are the same the document has not changed	**5**
7(c)	**1 mark** each to **max 3** • The data is put through an algorithm to create a checksum value • The data and checksum are sent to the receiver • The receiver performs the same algorithm on the data • if both checksums match the data is verified	**3**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>8(a)</td><td>1 mark for each shaded section

<table>
<tr><th rowspan="2">Instruction address</th><th rowspan="2">ACC</th><th colspan="4">Memory address</th></tr>
<tr><th>80</th><th>81</th><th>82</th><th>83</th></tr>
<tr><td></td><td></td><td>10</td><td>8</td><td>80</td><td>81</td></tr>
<tr><td>200</td><td>8</td><td></td><td></td><td></td><td></td></tr>
<tr><td>201</td><td>9</td><td></td><td></td><td></td><td></td></tr>
<tr><td>202</td><td></td><td></td><td></td><td></td><td>9</td></tr>
<tr><td>203</td><td>10</td><td></td><td></td><td></td><td></td></tr>
<tr><td>204</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>206</td><td>9</td><td></td><td></td><td></td><td></td></tr>
<tr><td>207</td><td>19</td><td></td><td></td><td></td><td></td></tr>
<tr><td>208</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>210</td><td></td><td></td><td>19</td><td></td><td></td></tr>
</table></td><td>4</td></tr>
<tr><td>8(b)(i)</td><td>1 mark for:

OR B0000 0001 // OR #1 // OR &1</td><td>1</td></tr>
<tr><td>8(b)(ii)</td><td>1 mark for:

1010 1011</td><td>1</td></tr>
<tr><td>8(b)(iii)</td><td>1 mark for:

0000 0011</td><td>1</td></tr>
</table>

