

# Cambridge International AS & A Level

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**INFORMATION TECHNOLOGY****9626/11**

Paper 1 Theory

**October/November 2024**

MARK SCHEME

Maximum Mark: 70

**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 October/November 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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This document consists of **9** printed pages.

**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.

Question	Answer	Marks
1(a)	<p><b>THREE</b> marks available</p> <p><b>Max TWO marks:</b></p> <ul style="list-style-type: none"> <li>• To prepare a data storage medium for <b>initial use</b> (1)</li> <li>• The purpose of low-level formatting is to prepare the disk surface to receive data/allow the user to save data/files (1)</li> <li>• High-level formatting creates a file system on the disk (1)</li> <li>• Allows the operating system to use the disk space to store and access files (1).</li> </ul> <p><b>Max TWO marks:</b></p> <ul style="list-style-type: none"> <li>• Low-level formatting divides the disk surface into tracks/sectors/cylinders (1)</li> <li>• Write heads magnetise the disk areas (1)</li> <li>• Tracks are numbered starting from <b>0</b> (1)</li> <li>• A gap is left between tracks (1)</li> <li>• Each track is organised into numbered sectors, starting at 1 and separated by gaps (1)</li> </ul>	<b>3</b>
1(b)	<p><b>THREE</b> marks available:</p> <ul style="list-style-type: none"> <li>• Identifies Lossless and identifies Lossy compression (1)</li> </ul> <p><b>Max TWO marks</b></p> <ul style="list-style-type: none"> <li>• Reduces the overall number of bits/bytes (in a file)//reduces file size (1)</li> <li>• To <b>increase</b> available <b>storage</b> space on a hard drive (1)</li> <li>• File compression programs remove redundancy (1)</li> </ul> <p><b>Max TWO Marks</b></p> <ul style="list-style-type: none"> <li>• A lossless file compression program uses codes to represent repeated Information (1)</li> <li>• Lossless compression removes meta data (1)</li> </ul>	<b>3</b>
1(c)	<p><b>THREE</b> marks available:</p> <p><b>Max TWO marks:</b></p> <ul style="list-style-type: none"> <li>• It speeds up the access time to a file (1).</li> <li>• To create larger <b>regions</b> of (contiguous) free space (1)</li> </ul> <p><b>Max TWO marks:</b></p> <ul style="list-style-type: none"> <li>• Organises the contents of the disk into the smallest number of contiguous regions/fragments (1)</li> <li>• The data blocks of a file/defragmented files are moved around to bring whole/all the parts of a file together (1)</li> </ul>	<b>3</b>

Question	Answer	Marks
2(a)	<p><b>THREE</b> from:</p> <ul style="list-style-type: none"> <li>Mainframes have peripheral processors that deal with all input and output operations (1st)</li> <li>this leaves the CPU to concentrate on the processing of data (1)</li> </ul> <p><b>Volume of Input (Max 1)</b></p> <ul style="list-style-type: none"> <li>Mainframe computers deal with a very high level of input (1)</li> </ul> <p><b>Volume of Output (Max 1)</b></p> <ul style="list-style-type: none"> <li>Mainframe computers deal with a very high level of output (1)</li> </ul> <p><b>Throughput (Max 1)</b></p> <ul style="list-style-type: none"> <li>This refers to how many processes can be carried out per day (1)</li> <li>Mainframes can carry out many transactions <b>per day</b>//have a fast <b>rate</b> of processing (1)</li> <li>Throughput is a discrete mainframe characteristic. (1)</li> </ul>	<b>3</b>
2(b)	<p><b>THREE</b> from:</p> <ul style="list-style-type: none"> <li>Mainframe computers are more secure than other types of computer systems (1)</li> <li>Mainframe has many layers of security (1)</li> <li>Uses different levels of access (1st)</li> <li>depends on a user's level of security as to which sets of data they can access (1)</li> <li>Data that is transmitted and data within the system are encrypted//mainframe computers use encryption to protect data (1)</li> <li>System is continually monitored for unauthorised access attempts (1)</li> </ul>	<b>3</b>

Question	Answer	Marks
3	<p><b>SIX</b> from:</p> <ul style="list-style-type: none"> <li>MIS is used in decision making (1)</li> <li>MIS is used to coordinate/control data in a business. (1)</li> <li>MIS software can provide past, present and predictive (TWO FROM) information (1)</li> <li>MIS software can be used with project management (1)</li> <li>MIS system may be based on a database (1st)</li> <li>which can be queried (1)</li> <li>Can be used to gather/analyse/assess information (1st)</li> <li>e.g. personnel/sales/inventory/production/employee performance (1)</li> <li>MIS software could be used to create reports. (1)</li> <li>By comparing reports to previous reports, trends can be identified (1)</li> <li>Can produce graphs/charts (1)</li> </ul>	<b>6</b>

Question	Answer	Marks
4(a)(i)	<b>ONE</b> mark: <ul style="list-style-type: none"> <li>Each record in <b>one table</b> relates to <b>only</b> one record in <b>another</b> table (1).</li> </ul>	<b>1</b>
4(a)(ii)	<b>ONE</b> from: <ul style="list-style-type: none"> <li>Each record in <b>one table</b> can relate to <b>many</b> records in <b>another</b> table (1)</li> </ul>	<b>1</b>
4(b)	<b>THREE</b> from: <ul style="list-style-type: none"> <li>Need to create a link table (1)</li> <li>Is created using two one-to-many relationships (1)</li> <li><b>Each</b> primary key must exist as a <b>foreign</b> key (1<sup>st</sup>) in the link table (1) (Only award once)</li> <li>The primary key(s) link(s) to the foreign key(s) (1<sup>st</sup>) in the link table (1) (only award once)</li> <li>Not possible to create a single many-to-many relationship (1)</li> <li>Only a theoretical type of relationship//cannot exist (1).</li> </ul>	<b>3</b>

Question	Answer	Marks
5(a)	<b>THREE</b> marks available:  Max <b>TWO</b> <ul style="list-style-type: none"> <li>Data is collected for a specific purpose/task (1)</li> <li>Provides original data/first hand data (1)</li> </ul> Max <b>TWO</b> e.g. <ul style="list-style-type: none"> <li>Observation could be used, by the scientist <b>going to the farmland</b> and looking (1)</li> <li>Questionnaires could be distributed amongst <b>farmers/3rd party linked to scenario</b> (1)</li> <li>Interviews could be carried out with <b>farmers/3rd party linked to scenario</b> (1)</li> <li>Data logging/sensors could be used to gather pollution data (1).</li> </ul>	<b>3</b>
5(b)	<b>THREE</b> marks available:  Max <b>TWO</b> <ul style="list-style-type: none"> <li>An indirect data source is when data is obtained from a <b>third party/is second hand</b> (1)</li> <li>Means data that was collected for a <b>particular reason</b> but is then used for <b>another purpose</b> (award concept of data being used for a different purpose) (1)</li> </ul> Max <b>TWO</b> <ul style="list-style-type: none"> <li>Could collect data from local government agencies (1)</li> <li>Could use information presented in scientific journals (1)</li> </ul>	<b>3</b>

Question	Answer	Marks
6	<p><b>FOUR</b> from:</p> <ul style="list-style-type: none"> <li>• Verification is checking that data has been <b>copied</b> correctly from the data source (1)</li> <li>• Validation is checking that the data entered is reasonable/sensible/follows rules (1)</li> <li>• Verification will not pick up the fact that the original data might be invalid (1)</li> <li>• Verification would pick up a transposition error/most validation checks (except a check digit) would not (1)</li> <li>• <b>Neither</b> validation nor verification <b>on their own</b> will pick up all errors//need both to cover all possible errors. (1)</li> </ul>	<b>4</b>

Question	Answer	Marks
7	<p><b>EIGHT marks available</b> e.g.</p> <p><b>Benefits max 6</b></p> <ul style="list-style-type: none"> <li>• Compilation process only needs to be done once (1)</li> <li>• Once the program is already compiled into machine language, there is no translation software that the user has to keep up to date (1)</li> <li>• Compiled software can run faster than interpreted software (1)</li> <li>• Compiling a program is a much quicker process than interpreting the code (1)</li> <li>• Compilers compile the code all at once/interpreters converts the code line by line (1)</li> <li>• Do not need to share source code (1)</li> <li>• Compilers also improve security for programmers (1st) by making it much harder to copy the code (1)</li> </ul> <p><b>Drawbacks max 6</b></p> <ul style="list-style-type: none"> <li>• Can only be used on the operating system it was compiled upon (1)</li> <li>• Only produces error list <b>once whole process has been completed</b> (1)</li> <li>• It is slow/more difficult to debug the program (1)</li> <li>• The whole program needs to be compiled again after an error is corrected (1)</li> <li>• It uses up more memory than an interpreter as the whole program has to be loaded (1)</li> <li>• Once compiled, any changes to the original high-level code will require the program to be compiled again (1).</li> </ul>	<b>8</b>

Question	Answer	Marks
8(a)	<p><b>THREE marks available</b> e.g.</p> <ul style="list-style-type: none"> <li>• Motion sensor detects movement (1)</li> <li>• Infrared sensor to detect heat (1)</li> <li>• Sound sensor to detect level of sound/unexpected sound (may exemplify) (1)</li> <li>• Pressure sensor (placed under a rug/carpet) to detect increase in weight by burglar standing on it (1)</li> <li>• Light sensor to detect a break in a light beam. (1)</li> </ul>	<b>3</b>
8(b)	<p><b>THREE</b> from:</p> <ul style="list-style-type: none"> <li>• Microprocessor may be programmed to have (a range of) acceptable levels (1)</li> <li>• If sensor is activated/sensor readings are outside the expected levels/range (1)</li> <li>• Data is sent from sensor to Analogue to Digital Converter (ADC) (1)</li> <li>• ADC converts the data to digital (1st) <ul style="list-style-type: none"> <li>– so can be understood by the microprocessor (1)</li> </ul> </li> <li>• It sets off an audible alarm sounds/activates lights/alerts police or alarm company or key holder. (1)</li> </ul>	<b>3</b>

Question	Answer	Marks
9	<p><b>EIGHT</b> marks available</p> <p><b>EIGHT</b> from:</p> <p><b>Pros max SIX:</b></p> <ul style="list-style-type: none"> <li>• Computers never forget to take readings (1)</li> <li>• They take readings constantly (accept 24/7) (1)</li> <li>• No need for human intervention to take readings (1)</li> <li>• The readings are more accurate//can detect readings that humans may not (1)</li> <li>• Readings of several variables can be taken simultaneously (1)</li> <li>• Computers can take readings in dangerous areas for humans to be (1)</li> <li>• Transmission of data can be in real time (not quicker) (1)</li> <li>• Data can be stored for later collection to save electrical power/to reduce human impact (1)</li> </ul> <p><b>Cons max 6:</b></p> <ul style="list-style-type: none"> <li>• The monitoring equipment will have to be placed by humans (1)</li> <li>• Sensors/computers have to be repaired/maintained by humans (1)</li> <li>• Environment can affect the <b>signal</b> (1)</li> <li>• Geographical events can affect or move the equipment (1)</li> <li>• The presence/maintaining of the system can affect pollution itself (1)</li> <li>• Humans still have to plan/decide where to place sensors and which sensors to use/which variables to monitor. (1)</li> </ul> <p><b>Conclusion</b></p> <ul style="list-style-type: none"> <li>• Valid conclusion based on points made (1)</li> </ul>	<b>8</b>



Question	Answer	Marks
10	<p><b>EIGHT</b> from:</p> <p>Max five if only first points</p> <ul style="list-style-type: none"> <li>• <b>Knowledge base</b> comprises a database of facts and a rules base (1st) <ul style="list-style-type: none"> <li>– It is the information used to make the decision (1)</li> <li>– Database of facts gathered from experts (1)</li> </ul> </li> <li>• <b>Rules base</b> is a set of rules/statements (1st) <ul style="list-style-type: none"> <li>– usually of the form IF . . . THEN//description of IF ...THEN in practice <b>in context</b> (outcomes based on what is seen/observed/measured) (1)</li> </ul> </li> <li>• <b>The shell</b> includes the user interface, explanation system, inference engine and knowledge base editor (THREE FROM) (1)</li> <li>• <b>Inference engine</b> is the reasoning part of the system (1st) <ul style="list-style-type: none"> <li>– That uses forward chaining or backward chaining (1)</li> </ul> </li> <li>• <b>User interface</b> is how the computer interacts with the user, (1st) <ul style="list-style-type: none"> <li>– displays questions/information (1)</li> <li>– enables the user to type in answers to the questions (1)</li> </ul> </li> <li>• <b>Knowledge base editing software/knowledge base editor</b> enables the knowledge engineer to edit rules and facts (1)</li> <li>• <b>Explanation system</b> explains to a user the chain of reasoning used to arrive at a particular conclusion. (1)</li> </ul>	<b>8</b>

Question	Answer	Marks
11	<p><b>FOUR</b> from:</p> <ul style="list-style-type: none"> <li>• Identifies Lossless and identifies Lossy compression (1)</li> </ul> <p><b>Max 3</b> for Lossless:</p> <ul style="list-style-type: none"> <li>• Does not reduce the quality of the audio file (1)</li> <li>• Audio file can be recreated exactly as it was when first created (1)</li> <li>• Algorithms used to perform this compression mainly look for repeating patterns (1)</li> </ul> <p><b>Max 3</b> for Lossy:</p> <ul style="list-style-type: none"> <li>• Reduces quality of the audio file (1)</li> <li>• Creates smaller file sizes than lossless compression (1)</li> <li>• The data that is removed can never be replaced (1)</li> <li>• Some lossy compression software will remove frequencies that are outside the range of human hearing. (1)</li> </ul>	<b>4</b>