



# Cambridge International AS & A Level

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**INFORMATION TECHNOLOGY**

**9626/11**

Paper 1 Theory

**May/June 2023**

MARK SCHEME

Maximum Mark: 70

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**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.

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This document consists of **10** 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 descriptors 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>One</b> from:</p> <ul style="list-style-type: none"> <li>Data is scrambled/jumbled up (1)</li> <li>Converting information so that it is impossible to interpret/understand (1)</li> </ul>	<b>1</b>
1(b)	<p><b>Up to THREE marks:</b></p> <p>e.g.</p> <ul style="list-style-type: none"> <li>Can be used for identity theft (1) plus one example (1)</li> <li>Can be used for identity fraud (1) plus one example (1)</li> <li><b>Company</b> secrets could be sold by hackers to rival companies (1)</li> <li><b>National</b> secrets could be used by rival powers (1)</li> <li><b>Secrets/personal data</b> could be used for <b>blackmail</b> purposes (1)</li> <li>Private details could be used to <b>pass</b> (bank) security tests (1st) <ul style="list-style-type: none"> <li>Accept any suitable extension for passing security tests (1) <ul style="list-style-type: none"> <li>e.g. <ul style="list-style-type: none"> <li>And so access (e.g.) bank accounts (1)</li> </ul> </li> </ul> </li> </ul> </li> </ul>	<b>3</b>

Question	Answer	Marks
2	<p><b>Four</b> from:</p> <ul style="list-style-type: none"> <li>Aspects of the home are <b>controlled</b> from Smartphone/Voice <b>control</b> device/computer system/remotely (1)</li> <li>Devices/appliances in the home are connected (1)</li> <li>TWO types of devices (in the home) that can be <b>controlled</b>: <ul style="list-style-type: none"> <li>e.g. <ul style="list-style-type: none"> <li>lighting,</li> <li>heating</li> <li>air conditioning (accept “temperature” once only)</li> <li>television</li> <li>kettle</li> <li>plugs (1)</li> </ul> </li> </ul> </li> <li><b>Controlled</b> by issuing (voice) commands/setting up routines (1)</li> <li>The commands can be given by voice/sound/ remote control/ tablet/ smartphone (1)</li> <li>Uses Wi-fi/home network (1)</li> <li>Uses <b>internet</b> to <b>access</b> devices when outside the home (1)</li> </ul>	<b>4</b>

Question	Answer	Marks
3	<p><b>Three</b> from:</p> <ul style="list-style-type: none"> <li>• A compiled program will <b>only run</b> (on a computer with) <b>the same operating system (1st) as it was originally translated on</b> (1)</li> <li>• The (other) computer system it is transferred to <b>may not have the same</b> operating system (1)</li> <li>• Cross compilers can be used but the compiled program will no longer run on the host computer/computer the program was written on (1)</li> <li>• Cross compiler produces more errors and mistakes than a native compiler (1)</li> <li>• The cross compiled code can run slower than if it had been originally compiled on the target machine (1)</li> </ul>	3

Question	Answer	Marks
4(a)	<p><b>Three</b> from:</p> <ul style="list-style-type: none"> <li>• The <b>quality</b> of connection to the Internet may vary (1)</li> <li>• <b>Speed</b> of access to the Internet may vary (1)</li> <li>• Some countries may not have a well-developed broadband (infrastructure)/rely on dialup connections (1)</li> <li>• Lack of <b>incentive</b> to invest in the country/nation (as a whole) (1)</li> <li>• In less developed countries they might have <b>less</b> infrastructure (may exemplify) (1)</li> <li>• Not all countries are able to keep up with the constant changes in technology (1)</li> </ul>	3
4(b)	<p><b>Three</b> from:</p> <ul style="list-style-type: none"> <li>• The digital divide gets wider (1)</li> </ul> <p>Award ANY three implications of a digital divide:</p> <p><b>For example</b></p> <ul style="list-style-type: none"> <li>• higher/lower quality on education (1st)</li> <li>• higher/lower quality on health (1st)</li> <li>• higher/lower quality on access to resources (1st)</li> <li>• higher/lower quality on lifestyle (1st)</li> <li>• higher/lower quality on opportunities (1st)</li> <li>• higher/lower quality on work/employment opportunities (1st)</li> <li>• higher/lower quality on trade (1st)</li> <li>• reduced access to social media (1st)</li> <li>• higher/lower access to information (1st)</li> </ul> <p>A further mark can be awarded for an explanation of the impact (1)</p> <p>A final mark may be given for the alternative comment – such as MP3 in the example below. <b>Note: can ONLY be given as a 3rd mark.</b></p> <p>E.g., reduced access to education (1) means lower skill level (1) whilst those in industrial societies have better access (1)</p>	3

Question	Answer	Marks
5(a)	Validation and sorting (1)	1
5(b)	<p><b>Eight</b> from:</p> <ul style="list-style-type: none"> <li>• First record//2210 <b>in the transaction file</b> (1)</li> <li>• First record <b>in the master file/1965</b> is read/checked (1)</li> <li>• <b>These</b> (previously identified) two records are <b>compared</b> (ALLOW FT if attempt at identifying both records) (1) (Award 'the' instead of 'these' where MP1 AND MP2 given)</li> <li>• Records don't match (1st) <ul style="list-style-type: none"> <li>– computer writes master file record to new master file (1)</li> </ul> </li> <li>• Next record of <b>master file/2210 in the master file</b> is read/checked (1)</li> <li>• Transaction file record/2210 is compared with this record (1)</li> <li>• It <b>matches</b> so the <b>Numbersold</b> is subtracted from <b>NumberinStock</b> (1)</li> <li>• Using NumberinStock of 12000 <b>from master file</b> (1)</li> <li>• Using Numbersold of 6500 <b>from transaction file</b> (1)</li> <li>• NumberinStock is now 5500 (1)</li> <li>• Processed record/NumberinStock is written <b>to new master file</b> (1)</li> <li>• Next record/3356 <b>in the transaction file</b> is read/checked (1)</li> <li>• Next record/2976 <b>in the master file is read/checked</b> (1)</li> </ul>	8

Question	Answer	Marks
6(a)	<p><b>Five</b> from:</p> <ul style="list-style-type: none"> <li>• Manager checks the space <b>on the target drive/location</b> (1st) <ul style="list-style-type: none"> <li>– to make sure there is <b>sufficient</b> space for the data (that will be moved) (1)</li> </ul> </li> <li>• Manager selects the time they want the back-up to take place (1st) <ul style="list-style-type: none"> <li>– manager can select to carry out the back up immediately... (1)</li> <li>– <b>BECAUSE</b> the back-up takes place at a time convenient to the manager/when the system is quiet (may explain why timing is convenient) (1)</li> </ul> </li> <li>• Manager selects type of back-up (1st) <ul style="list-style-type: none"> <li>– backing up only the specified data/files (1)</li> <li>– <b>BECAUSE</b> may want to back up whole device OR new files (1)</li> </ul> </li> <li>• Manager selects how regularly the back-up is to take place (1st) <ul style="list-style-type: none"> <li>– <b>BECAUSE</b> to minimise data loss (1)</li> </ul> </li> <li>• Manager will decide where back-up is to be stored (1st) <ul style="list-style-type: none"> <li>– <b>BECAUSE</b> to make sure back-up will be secure (1)</li> </ul> </li> <li>• Manager selects whether to verify the back-up or not (1st) <ul style="list-style-type: none"> <li>– <b>BECAUSE</b> to make sure the backup has been completed correctly (1)</li> </ul> </li> <li>• Manager chooses whether or not to encrypt the back-up (1st) <ul style="list-style-type: none"> <li>– <b>BECAUSE</b> adds an extra level of security (1)</li> </ul> </li> </ul> <p><b>Must have at least TWO reasons to obtain full marks</b></p>	5

Question	Answer	Marks
6(b)	<p><b>MAX three</b> from:</p> <ul style="list-style-type: none"><li>• Can be either lossy or lossless. (1)</li><li>• Lossless compression <b>reduces</b> number of bits (1st)<ul style="list-style-type: none"><li>– ...by identifying repeated patterns of data. (1)</li></ul></li><li>• No <b>information</b> is lost in <u>lossless</u> compression. (1)</li><li>• <u>Lossy compression</u> reduces number of bits (1st)<ul style="list-style-type: none"><li>– ...by identifying unnecessary information. (1)</li></ul></li></ul> <p><b>Effects max three:</b></p> <ul style="list-style-type: none"><li>• <b>Quality</b> of audio is <b>the same</b> when using <u>lossless compression</u> (1)</li><li>• <b>Quality</b> of audio is <b>lower</b> when using <u>lossy compression</u> (1)</li><li>• <b>File size</b> is <b>smaller</b> for <b>lossy</b> than <b>lossless (accept converse)</b> (1)</li></ul>	<b>4</b>

Question	Answer	Marks
7	<p><b>Six from:</b></p> <p><b>Collection</b></p> <ul style="list-style-type: none"> <li>• <b>Sensor(s)</b> are used to <b>gather data (DO NOT ACCEPT ‘COLLECT’)</b> (1)</li> <li>• Naming of <b>TWO</b> physical values that would be gathered: <ul style="list-style-type: none"> <li>– temperature</li> <li>– pH</li> <li>– CO<sub>2</sub></li> <li>– O<sub>2</sub></li> <li>– Gas (BOD)</li> <li>– <u>UV</u> light</li> <li>– infrared (1)</li> </ul> </li> </ul> <p><b>Note: where candidate states (e.g.) temperature sensor, this may be taken as identification of a physical variable.</b></p> <p><b>Processing</b></p> <ul style="list-style-type: none"> <li>• (Collected) data is sent to ADC (1)</li> <li>• <b>Analogue</b> data is <b>converted</b> into <b>digital</b> (data) (1)</li> <li>• <b>Digital(ised)</b> data is sent to <b>microprocessor/computer/CPU</b></li> <li>• Computer stores readings in a table/database/file/spreadsheet (1)</li> <li>• Naming of <b>TWO</b> results being calculated. E.g. <ul style="list-style-type: none"> <li>– <b>Max</b> temperature</li> <li>– <b>Min</b> temperature</li> <li>– <b>Average</b> temperature (1)</li> </ul> </li> <li>• ONE mark for any description of how one result has been calculated. (1)</li> </ul> <p><b>Display</b></p> <ul style="list-style-type: none"> <li>• Computer plots graphs showing <b>trend of pollution</b> variables ... (1st) <ul style="list-style-type: none"> <li>– ...over a period of time (1)</li> </ul> </li> <li>• Computer plots graphs <b>automatically</b> (1)</li> <li>• Computer outputs the results/graphs on <b>screen/printer</b> (1)</li> <li>• Results may (also) be shown on a website (1)</li> </ul>	6

Question	Answer	Marks
8	<pre> graph TD     Start([Start]) --&gt; Init[OT ← 0 ET ← 0 count ← 0]     Init --&gt; LoopStart(( ))     LoopStart --&gt; CountInc[count ← count + 1]     CountInc --&gt; InputN[/Input N/]     InputN --&gt; XCalc[X ← N / 2]     XCalc --&gt; IsInt{Is/If X = INT(X)?}     IsInt -- Yes --&gt; ETInc[ET ← ET + N]     IsInt -- No --&gt; OTInc[OT ← OT + N]     ETInc --&gt; Count10{count = 10?}     OTInc --&gt; Count10     Count10 -- Yes --&gt; Print[/Print OT, ET/]     Print --&gt; Stop([Stop])     Count10 -- No --&gt; LoopStart     </pre>	8



Question	Answer	Marks
9	<p><b>MAX five from:</b></p> <ul style="list-style-type: none"> <li>• <b>Call back/phone</b> the number (1)</li> <li>• Do not call back <b>on the same number</b> (1)</li> <li>• Do not call back <b>on the same phone</b> (1)</li> <li>• Ask to speak to the <b>SAME</b> person as just spoke to you (1)</li> <li>• <b>TWO FROM:</b> <ul style="list-style-type: none"> <li>– Never give out PIN</li> <li>– Never give out password</li> <li>– Never give out Login ID (1)</li> </ul> </li> <li>• Never share security question <b>AND</b> answer (1)</li> <li>• Do not answer calls <b>from unknown callers</b>//hang up calls from unknown caller//set phone to only accept calls from numbers in contact list (1)</li> <li>• Use number checking//suspected spam checking software (1st) <ul style="list-style-type: none"> <li>– to block suspected vishing numbers (1)</li> </ul> </li> <li>• (Customers) block numbers suspected of being vishing (1)</li> <li>• Keep blocking software updated <b>regularly</b> (1)</li> </ul> <p>Any generic <b>evaluative</b> comment on methods as a whole (1) e.g. These could also block genuine numbers.</p> <p><b>MAX five from ANY evaluative comment as an extension to any point from above.</b></p> <p>e.g.  ...to check that the call was a genuine call from the bank (1)  ...so that vishing calls can't be placed/reduce the chance of you accidentally answering the call (1)  ...so that list of numbers is up to date (1)</p> <p><b>MAX six marks if a list of bullet points</b></p>	8

Question	Answer	Marks
10	<p><b>Five</b> from:</p> <ul style="list-style-type: none"> <li>• Sampling resolution is the <b>number of bits</b> (1st) <ul style="list-style-type: none"> <li>– per sound sample (1)</li> </ul> </li> <li>• The higher the sampling resolution (1st) <ul style="list-style-type: none"> <li>– the more accurately the (final) outcome (of the process) will represent the sound made (<b>accept converse argument for whole answer</b>) (1)</li> </ul> </li> <li>• The higher the sampling resolution/the greater the resolution the greater the size of the file (accept converse) (1)</li> <li>• Modern day digital audio is normally found in 16 bit/24 bit resolutions</li> <li>• 8-bit resolution can take one of 256 different values (1st) <ul style="list-style-type: none"> <li>– which is not generally considered enough resolution to accurately represent music audio (1)</li> </ul> </li> <li>• 16-bit resolution can have one of 65 536 different values (1)</li> <li>• 24-bit stores 16 777 216 different values (1)</li> <li>• the difference between 24 and 32- bit cannot be discerned by human hearing (1)</li> <li>• These values are all per channel (1)</li> </ul>	<b>5</b>

Question	Answer	Marks
11	<p><b>Eight</b> from:</p> <ul style="list-style-type: none"> <li>• Any correct <b>definition</b> of direct data sources, such as: <ul style="list-style-type: none"> <li>– Direct sources are where Isabella asks people <b>in person//primary</b> source of data (must be an attempt to define) (1)</li> </ul> </li> <li>• Can gain/gather qualitative <b>AND</b> quantitative data (1)</li> <li>• Data gathered is more <b>up to date/recent</b> (1)</li> <li>• Data is (guaranteed to be) relevant <b>to the study/question</b> (1)</li> <li>• Interviewer can base further questions on answer given (1)</li> <li>• Interviewer can ask a more in-depth/follow up questions (1)</li> <li>• Can interpret body language (1st) <ul style="list-style-type: none"> <li>– such as (e.g.) facial expressions//nervous movement of hands (1)</li> </ul> </li> <li>• Interviews tend to be taken seriously by people (1st) <ul style="list-style-type: none"> <li>– whereas questionnaires may be ignored (1)</li> </ul> </li> <li>• It ensures the data is relevant to the study//you get a better view of what is going on//get a better understanding (1st) <ul style="list-style-type: none"> <li>– whereas indirect sources are <b>not specific</b> to the study (1)</li> </ul> </li> <li>• You are in control of the sample size//can be as big/small as needed (1st) <ul style="list-style-type: none"> <li>– whereas Isabella has no control over the amount of data collected from an indirect source (1)</li> </ul> </li> <li>• The source of the data is known exactly (1st) <ul style="list-style-type: none"> <li>– making it easier to judge its reliability (1)</li> </ul> </li> <li>• Isabella could <b>sell/pass/share</b> the data on (to interested companies) (1st) <ul style="list-style-type: none"> <li>– indirect data <b>is not hers</b> to sell/pass/share (1)</li> </ul> </li> </ul> <p><b>MAX 6 marks for a bulleted list</b></p>	<b>8</b>