



## Cambridge International AS & A Level

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INFORMATION TECHNOLOGY

9626/13

Paper 1 Theory

May/June 2021

MARK SCHEME

Maximum Mark: 90

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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.

Cambridge International is publishing the mark schemes for the May/June 2021 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 **12** 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)	<table border="1"> <tr> <td>Searching the World Wide Web to find weather data</td> <td></td> </tr> <tr> <td>Interviewing residents living on a street to find out how busy the traffic on the street is</td> <td>✓</td> </tr> <tr> <td>Examining the census results for previous years</td> <td></td> </tr> <tr> <td>Looking at a list of names and addresses of everyone who is registered to vote</td> <td></td> </tr> </table>	Searching the World Wide Web to find weather data		Interviewing residents living on a street to find out how busy the traffic on the street is	✓	Examining the census results for previous years		Looking at a list of names and addresses of everyone who is registered to vote		1
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1(b)	<table border="1"> <tr> <td>Dynamic data is data that never changes.</td> <td></td> </tr> <tr> <td>Data on a hard disk is an example of dynamic data.</td> <td>✓</td> </tr> <tr> <td>'Canada has a border with the United States' is an example of dynamic data.</td> <td></td> </tr> <tr> <td>Dynamic data is never checked for accuracy before publication.</td> <td></td> </tr> </table>	Dynamic data is data that never changes.		Data on a hard disk is an example of dynamic data.	✓	'Canada has a border with the United States' is an example of dynamic data.		Dynamic data is never checked for accuracy before publication.		1
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Dynamic data is never checked for accuracy before publication.										
1(c)	<p><b>Six</b> from:</p> <p>Transmitted data is encrypted so that a third party cannot eavesdrop and view the data  Only the user's computer and the secure server can recognise the data  Websites often use SSL/TLS certificates to verify their authenticity  SSL/TLS use two keys to encrypt data...  ...a public key known to everyone and a private key known only to the recipient  When a web browser tries to connect to a website using SSL/TLS, it requests the web server to identify itself  The web server sends the browser a copy of the SSL/TLS Certificate  Certificate Authorities are used to ensure the authenticity of the certificate  The browser checks to see if the SSL/TLS Certificate is trusted  If the SSL/TLS Certificate is trusted, then the browser sends a message to the Web server  The server then responds to the browser with a digitally signed acknowledgement to start an SSL/TLS encrypted session  SSL/TLS requires a handshake to be carried out/the browser and the website carry out a (SSL/TLS) handshake</p>	6								

Question	Answer	Marks								
2(a)	<table border="1"> <tr> <td>It is a cheaper method than any other form of storage.</td> <td></td> </tr> <tr> <td>Data is more secure than when stored than any other form of storage.</td> <td></td> </tr> <tr> <td>Users have an unlimited amount of free storage.</td> <td></td> </tr> <tr> <td>You can store data wherever you are, as long as there is an internet connection.</td> <td>✓</td> </tr> </table>	It is a cheaper method than any other form of storage.		Data is more secure than when stored than any other form of storage.		Users have an unlimited amount of free storage.		You can store data wherever you are, as long as there is an internet connection.	✓	1
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2(b)	<table border="1"> <tr> <td>It is an optical method of storage.</td> <td></td> </tr> <tr> <td>It can be used to store operating systems.</td> <td>✓</td> </tr> <tr> <td>It cannot store movies.</td> <td></td> </tr> <tr> <td>It does not consist of moving parts.</td> <td></td> </tr> </table>	It is an optical method of storage.		It can be used to store operating systems.	✓	It cannot store movies.		It does not consist of moving parts.		1
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Question	Answer	Marks
2(c)	<p><b>Six</b> from:</p> <p><i>Advantages</i>            The cost of storage per GB in the long term is cheaper with a magnetic tape drive than with an SSD drive            The cost of a tape cartridge is much cheaper than the same size SSD            Tape cartridges can store more than an external SSD drive            Magnetic tape has a longer lifespan...            ... The NAND flash used in SSDs can only be used for a finite number of writes            It is more difficult to hack into a magnetic tape drive than an external SSD drive            Tape storage density is growing faster than SSD drives</p> <p><i>Disadvantages</i>            The cost of a tape drive is initially more expensive than an SSD drive            If the data is stored near a strong magnetic field or a large speaker, the tape can be damaged.            It is necessary to keep older tape equipment just to be able to read the stored data            Access to data on a magnetic tape drive is slower as data is stored sequentially...            ...to get to the data needed, it is necessary to start at the beginning of the tape and read all the preceding data prior to reaching the required data...            ... whereas all parts of the SSD can be accessed at once            If huge amounts of data are stored, different cartridges may need to be loaded, which takes time            Tape drives are more susceptible to shock and damage...            ...as there are moving parts            SSDs use significantly less power than tape drives            With no moving parts, SSDs run at near silent operation unlike tape drives</p> <p><b>At least one of each required to obtain full marks</b>  <b>Must be a proper evaluation to obtain full marks</b>  <b>Max. five marks if bullets/list of points</b>  <b>Must have expansions or direct comparisons to be a proper evaluation</b></p>	<b>6</b>

Question	Answer	Marks
3(a)	<p><b>Three</b> from:</p> <p>Data compression reduces the overall number of bits and bytes in a file            A lot of data in computer files is redundant, with the same information listed over and over again            File compression programs remove the redundancy            A lossless file compression program uses codes to represent repeated information            When decompressed, the codes are replaced with the original text            Compression can be either lossless or lossy, where repeated parts are deleted</p>	<b>3</b>

Question	Answer	Marks
3(b)	<p><b>Three</b> from:</p> <p>Low-level formatting divides the disk surface into tracks, sectors and cylinders</p> <p>This is done by magnetising the disk areas using the write heads</p> <p>Tracks are numbered starting from 0</p> <p>When the head goes from one track to the next, it leaves a gap</p> <p>Each track is organised into numbered sectors, starting at 1 and separated by gaps</p> <p>The purpose of low-level formatting is to prepare the disk surface to receive data/allow the user to save data/files</p> <p>High-level formatting creates a file system on the disk</p> <p>This allows the operating system to use the disk space to store and access files</p>	<b>3</b>
3(c)	<p><b>Three</b> from:</p> <p>Deleting a file consists of removing the file name and address from a table which stores data about the file</p> <p>The space on the disk where the file was located is now available for future use by other files</p> <p>Moving a file to trash/recycle bin simply alters the directory path to indicate that the file has been temporarily deleted</p> <p>It is only deleted in as much as the software shows it in the trash can/recycle bin rather than in a normal folder</p> <p>Only when the file is deleted from the trash/recycle bin is the file removed from the table and the file's disk space is marked as available for reuse</p>	<b>3</b>

Question	Answer	Marks
4	<p><b>Eight</b> from:</p> <p><i>Advantages</i>  Video monitoring is more likely to deter theft, thus maintaining security  Video monitoring can monitor employee productivity/check that work is up to standard/check that employees are working efficiently  Video monitoring provides an opportunity to watch for mistakes and errors throughout the workday...  ...to help an employee cut down on their mistakes in the future by...  ...pointing out ways they can improve  The employer can more easily catch those who willingly violate company policy...  ...and immediately employ disciplinary action  Video monitoring can increase productivity if employees know they are being monitored constantly  Software can also be used to monitor or track employee activity and productivity</p> <p><i>Disadvantages</i>  Software/hardware is expensive to purchase...  ...and to set up  More likely to lend itself to lawsuits for infringement of privacy  More likely to make employees resentful and less productive...  ...because of infringement of privacy  More likely to lead to mistrust of their employer...  ...causing some workers to leave...  ...and thus creating increased turnover of employees</p> <p><b>At least two of each required to obtain full marks</b>  <b>Must be a proper evaluation to obtain full marks</b>  <b>Max. six marks if bullets/list of points</b>  <b>Must have expansions or comparisons to be a proper evaluation</b></p>	8

Question	Answer	Marks
5	<p><i>Issue:</i> Overloading sockets causing overheating and therefore fire  <i>Prevention:</i> Have CO<sub>2</sub> fire extinguisher in the room/Have separate sockets for each plug</p> <p><i>Issue:</i> Water spilt on to live wires/handling bare wires can cause electric shocks or electrocution  <i>Prevention:</i> Do not allow food and drink into the computer room/keep computers away from water supply/ensure regular inspection by electrician/ensure all wires are properly insulated</p> <p><i>Issue:</i> Heavy objects can fall off tables <u>and cause injury</u>  <i>Prevention:</i> Ensure sturdy desks or tables are used/ heavy objects are placed in in the centre of tables</p>	6

Question	Answer	Marks
6(a)	<p><b>Six</b> from:</p> <p>In a peer-to-peer network computers pool their resources/A client-server network has many of its resources on one server            Unlike clients in a client–server network, peers communicate with each other directly            If a computer becomes unavailable in a peer-to-peer network, the other peers can still share resources            If the server crashes in a client-server network, all resources become unavailable            In a client-server network the server controls security of the network/In a peer-to-peer network each computer is responsible for its own security            Data is all backed up by the server in a client-server network/In a peer-to-peer network each computer has to be backed up            It is easier to set up a peer-to-peer network than a client-server network as it does not need specialist knowledge            Peer-to-peer networks are not centralised so are difficult to administer/manage            Peer-to-peer network security is expensive as each peer has to have its own virus scanner            Computers in a peer-to-peer network may be fulfilling more than one role ...they may be printing or file sharing...            ...so performance can be slower            With peer-to-peer networks, each computer being accessed by others can slow down the performance for the user unlike in client-server networks            Ensuring that viruses are not introduced to the network is the responsibility of each individual user/client-server has central virus protection distributed to each computer            Upgrading the network is easier with a client-server network as it is easier to just upgrade the server</p>	<b>6</b>
6(b)	<p><b>Three</b> from:</p> <p>Products and services have potential access to a global/wider market/increased number of customers            Social media sites allow low-cost marketing/advertising            It opens up opportunities to have staff working from home, <u>reducing the cost of having an office building</u>            It enables companies to share knowledge and information/documents quickly and easily            Business information and details about products and services can be accessed by any company/customer ...            ...no matter where the customers/businesses are...            ...or what time of day it is            Bank transfers are quicker using online banking            Money does not have to be transported to the bank, leading to increased security            Companies can receive customer payments more quickly online            Companies know that customer payments have been guaranteed            Companies can send <u>orders/invoices</u> more quickly to other companies</p>	<b>3</b>



Question	Answer	Marks
6(c)	<p><b>Four</b> from:</p> <p>Workers can get distracted by other websites/personal emails/social networking and not do their work</p> <p>Employees can infect their computers, and the entire office network, by downloading and installing malicious software (disguised as legitimate applications) which can affect the working of the company</p> <p>When sending emails to external clients/posting in forums/social networking sites, employees could be putting their company's endorsement on their electronic communications</p> <p>If a company is given bad reviews on review sites by disgruntled employees/rival companies, it is difficult to remove them</p> <p>Potentially there are lower profit margins as customers can shop around</p> <p>Lose human interaction of face-to-face meetings with colleagues and customers</p> <p>Customers have easy access to social media to complain and this can damage the reputation of a company</p>	<b>4</b>

Question	Answer	Marks
7(a)	<p><b>Three</b> from:</p> <p>ISDN stands for Integrated Services Digital Network</p> <p>It allows simultaneous digital transmission of voice, video, data, and other network services...</p> <p>...over public switched telephone network</p> <p>It is a circuit-switched telephone network system which also provides access to packet-switched networks</p> <p>It results in potentially better voice quality than an analogue phone can provide</p> <p>High definition is achievable using a Primary Rate Interface (PRI)</p>	<b>3</b>
7(b)	<p><b>Three</b> from:</p> <p>SDSL stands for Symmetric/Synchronous Digital Subscriber Line</p> <p>Bandwidth and bit rate in the downstream direction/from the network to the subscriber is identical to the bandwidth in the upstream direction/from the subscriber to the network/upload and download speed are the same/balanced</p> <p>SDSL is generally aimed at business customers/ADSL is marketed at private as well as business customers</p> <p>SDSL is a good choice for high-quality video conferencing as it allows high bandwidth</p>	<b>3</b>

Question	Answer	Marks
8(a)	<p><b>Three</b> from:</p> <p>=ROUND(C2*10%,0) is a formula  A formula can provide representations of mathematical operations  A formula is something that is user-created and can include spreadsheet functions  A formula can be as simple or as complex as the user wants  A formula can contain a function, but it is possible to write a formula without a function</p>	<b>3</b>
8(b)	<p><b>Three</b> from:</p> <p>ROUND(...) is a function  A function is also a formula  The parts have been predefined by the spreadsheet software/ready-built formula  Instead of having to accurately type out the details of the formula, a function acts as a shortcut to carry them out  Most functions have criteria but not always as with RAND()</p>	<b>3</b>
8(c)	<p>Select A2:D15  First sort ascending by Car Make/Column A...  ...Then sort descending by Car model/Column B...  ...Then sort ascending by Car value/column C</p>	<b>4</b>

Question	Answer	Marks
9	<p><b>Five</b> from:</p> <p>The csv file size is smaller/the file takes up less storage space  As the csv file size is smaller, the processing time is shorter  The csv file can be opened by more applications than if saved as a specific spreadsheet file format  Data can be exchanged more easily between different kinds of applications  Data can be exchanged more easily between different computers and operating systems  It is human readable and easier to edit manually</p>	<b>5</b>

Question	Answer	Marks
10	<p><b>Six from:</b></p> <p><i>Advantages</i>            In real life large numbers of people must be taken off work to act out an evacuation...            ...leading to lack of productivity during that time            There is no risk of stampedes occurring...            ...which could result in injuries to the participants            Emergency procedures can be more quickly produced or recreated in a computer simulation            There is less time wasted on training the people as to what is expected of them            The number of people involved in a trial may not be representative of a real-life evacuation</p> <p><i>Disadvantages</i>            There may be too many variables...            ...to exactly simulate the evacuation            The cost of employing experts to create the simulation may be more expensive than carrying out a human simulation            The time taken to create the computer simulation is likely to be greater than with planning a human simulation            It may be difficult to accurately predict which exit doors would be chosen by individuals</p> <p><b>At least one of each required to obtain full marks</b>  <b>Must be a proper evaluation to obtain full marks</b>  <b>Max. five marks if bullets/list of points</b>  <b>Must have expansions or comparisons to be a proper evaluation</b></p>	<b>6</b>

Question	Answer	Marks
11	<p><b>Six from:</b></p> <p>Normalisation involves breaking down a flat file/table so there is less redundancy ...            ...more tables            The stages in the breaking down process are referred to as normal forms such as 0NF, 1NF, 2NF and 3NF</p> <p><i>2NF characteristics</i>            The database has the characteristics of 1NF            Related data has been separated into different tables            Each table has a primary key            The fields in each table are dependent on the primary key</p> <p><i>3NF characteristics</i>            The database has the characteristics of 2 NF            The database has no non-key dependencies/attributes</p>	<b>6</b>

Question	Answer	Marks
12	<p><b>Five from:</b></p> <p>MIS is a computer-based system that provides managers with the tools to organise, evaluate and efficiently manage departments within an organisation</p> <p>It provides past, present and prediction information</p> <p>It includes software that helps in decision making</p> <p>It includes (many data resources such as) databases (plural)</p> <p>It includes the hardware resources of a system</p> <p>It includes decision support systems, people management and project management applications</p>	<b>5</b>