



Cambridge International AS & A Level

INFORMATION TECHNOLOGY

9626/12

Paper 1 Theory

May/June 2021

MARK SCHEME

Maximum Mark: 90

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 **11** 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 data-bbox="311 241 1230 309">It returns an error message if a data item is not in a lookup list.</td> <td data-bbox="1230 241 1313 309"></td> </tr> <tr> <td data-bbox="311 309 1230 409">It checks to make sure a data item is within an upper limit and a lower limit.</td> <td data-bbox="1230 309 1313 409"></td> </tr> <tr> <td data-bbox="311 409 1230 510">It checks that a data item consists of a set number of characters, not more or less.</td> <td data-bbox="1230 409 1313 510">✓</td> </tr> <tr> <td data-bbox="311 510 1230 577">It is only used to check numbers.</td> <td data-bbox="1230 510 1313 577"></td> </tr> </table>	It returns an error message if a data item is not in a lookup list.		It checks to make sure a data item is within an upper limit and a lower limit.		It checks that a data item consists of a set number of characters, not more or less.	✓	It is only used to check numbers.		1
It returns an error message if a data item is not in a lookup list.										
It checks to make sure a data item is within an upper limit and a lower limit.										
It checks that a data item consists of a set number of characters, not more or less.	✓									
It is only used to check numbers.										
1(b)	<table border="1"> <tr> <td data-bbox="311 600 1230 667">It is used to check that the data in two fields correspond.</td> <td data-bbox="1230 600 1313 667"></td> </tr> <tr> <td data-bbox="311 667 1230 734">It checks the number of digits.</td> <td data-bbox="1230 667 1313 734"></td> </tr> <tr> <td data-bbox="311 734 1230 835">It is the digit added to the end of a long number after a calculation has been performed.</td> <td data-bbox="1230 734 1313 835">✓</td> </tr> <tr> <td data-bbox="311 835 1230 902">It checks that a number is above a certain limit.</td> <td data-bbox="1230 835 1313 902"></td> </tr> </table>	It is used to check that the data in two fields correspond.		It checks the number of digits.		It is the digit added to the end of a long number after a calculation has been performed.	✓	It checks that a number is above a certain limit.		1
It is used to check that the data in two fields correspond.										
It checks the number of digits.										
It is the digit added to the end of a long number after a calculation has been performed.	✓									
It checks that a number is above a certain limit.										
1(c)	<p>Eight from:</p> <p>Examples:</p> <p>A type check checks that all data items are of the same type of character... ...either letters or numbers A type check on the Weight could be carried out as the data must be numeric A type check on the Year patented could be carried out as the data must be numeric... ...there are no letters in the Weight/Year patented fields A type check would not prevent numbers out of range/incorrect numbers being entered for Weight... A type check would not prevent numbers out of range/incorrect numbers being entered for Year patented...</p> <p>A format check checks that a string follows a certain pattern... ...such as dd/mm/yyyy for somebody's date of birth A format check could be carried out on the Product number as it must be two letters followed by three numbers A format check would not pick up a non-existent/incorrect Product number ...as long as it was two letters followed by a three numbers... A format check could possibly be carried out on Weight as it has to be a digit followed by one single decimal number A format check could possibly be carried out on Year patented as it has to be four digits... ...but it would still accept an out of range/incorrect year...</p> <p>Must be a proper analysis to gain full marks Max. six marks if bullets/list of points Must have expansions to be a proper analysis</p>	8								

Question	Answer		Marks
2(a)	Readings from sensors are not processed before being output.		1
	A sound sensor is the sensor most frequently used in a weather station.		
	Rainfall is measured using a computerised measuring stick.		
	Graphs can be produced automatically from a weather monitoring system.	✓	
2(b)	An actuator is the most important input device in such a system.		1
	The timing sequence of the traffic lights is randomly generated.		
	An induction loop is used to detect the presence of an automobile.	✓	
	Traffic light systems use moisture sensors to detect the presence of pedestrians.		

Question	Answer	Marks
2(c)	<p>Six from:</p> <p>The start time of the cooking is set using buttons/switches/remote control</p> <p>The required temperature is set using buttons/switches/remote control</p> <p>The length of cooking time/end time is set using buttons/switches/remote control</p> <p>The start time/cooking time/end time/temperature are stored as preset values</p> <p>The microprocessor continuously checks the start time against its internal clock/timer</p> <p>If the start time is equal to the internal clock time, the microprocessor sends a message to an actuator...</p> <p>...The actuator switches on the heater (and fan)</p> <p>If the start time is not equal to the internal clock time, the microprocessor takes no action</p> <p>The temperature sensor reads the temperature inside/of oven...</p> <p>... ADC converts analogue data from sensor to digital data...</p> <p>...and sends/inputs temperature of oven to microprocessor</p> <p>The microprocessor continuously compares the temperature of the oven against the required temperature/preset value</p> <p>If the temperature of the oven is equal to/greater than the required temperature, the microprocessor sends a message to an actuator...</p> <p>... the actuator switches off the heater (and fan)</p> <p>If the temperature of the oven is not greater than the required temperature and the heater (and fan) is/are off, the microprocessor sends a message to an actuator...</p> <p>...the actuator switches on the heater (and fan)</p> <p>The end time can be calculated by adding the length of the cooking time to the start time</p> <p>The microprocessor continuously checks the end time against its internal clock/timer</p> <p>If the end time is equal to the internal clock time, the microprocessor sends a message to an actuator...</p> <p>...The actuator switches off the heater (and fan)</p> <p>The time/temperature output goes to the (LED) display</p>	6

Question	Answer	Marks
3(a)	<p>Three from:</p> <p>It is quicker to type/input coded data (e.g. G) than it is to type uncoded data (e.g. Light green)</p> <p>Codes such as S require less <u>storage</u> space than shirt</p> <p>Fewer mistakes will be made when <u>entering</u> data such as S instead of 25–30</p> <p>When data has been coded it makes it easier to use validation such as for A or D or U or G than typing in Astio or Dasiap or Utap or Gumho</p>	3

Question	Answer	Marks
3(b)	<p>Three from:</p> <p>Light and dark green are both coded as G, so it is difficult to know which shade of green is being referred to</p> <p>Shirt and skirt are both coded as S, so it is difficult to know which type of garment is being referred to</p> <p>Coding can obscure the meaning of the data, e.g. S in size is difficult to judge waist size/range is quite large</p> <p>There may be other brands beginning with A, D, etc. so it may be difficult to convert the coded data back into uncoded data</p> <p>The size codes use different lengths of code, e.g. S is 1 character, but XXL is 3 characters</p>	3
3(c)	<p>Two from:</p> <p>Use the second letter in addition to the first to code the Colour/Type of clothing/Brand, e.g. SH – Shirt, SK – Skirt</p> <p>Use narrower ranges for size, e.g. 25–27, 28–30</p> <p>Use the bottom end of the range for size so only 2 characters are used</p>	2

Question	Answer	Marks
4(a)	<p>Three max from:</p> <p>A malicious program that replicates itself...</p> <p>...until it fills all of the storage space on a drive or network</p> <p>Exploits <u>security</u> holes in networks</p> <p>Usually a small self-contained program that <u>invades</u> computers on a network</p> <p>A worm locates a computer's vulnerability and spreads within its connected network</p> <p>Worms often originate from e-mail attachments that appear to be from trusted senders</p> <p>Worms then spread to a user's contacts via their e-mail account and address book.</p> <p>Worms can slow down a network...</p> <p>...by consuming bandwidth</p>	3
4(b)	<p>Three from:</p> <p>Programs that secretly record what a user does on their computer</p> <p>Spyware is software that is installed on a computer without the user's knowledge</p> <p>Often the first indication is a noticeable reduction in processor speeds</p> <p>Can gather information like Web browsing habits</p> <p>Can capture e-mail messages</p> <p>Can capture a user's personal data...</p> <p>...such as usernames and passwords as well as credit card information</p> <p>Transmits this data to a third party over the internet</p>	3

Question	Answer	Marks
5	<p>Six from:</p> <p>Max 4 from: Bar charts show data with blocks of different heights... ...with the height of the block corresponding to the quantity being represented Sales(\$) values would be the height of the block... ...and the Months of the year would be the labels along the x axis in a bar chart Line graphs show a series of points connected by straight lines... ...with the horizontal axis normally representing time In a line graph the Sales (\$) would be the y axis... ...The Months of the year would be along the x axis of a line graph</p> <p>Max 6 from: Bar charts are used for comparisons of categories of data Bar charts are better for comparing the sales of different months... ...but not the trend Line graphs are better for showing trends over time... ...it's easier to see small changes on line graphs than bar charts... ...<u>although</u> bar charts can be used to show trends... ...the line in a line graph makes the overall trends very clear There would be no need to have the y axis starting at zero in this line graph... ...so the trend would be more obvious A bar chart has to have the y axis starting at zero... ...and so the trend for this data would be more difficult to determine</p> <p>Must be a proper analysis to gain full marks Max. five marks if bullets/list of points Must have expansions to be a proper analysis</p>	6

Question	Answer	Marks
6(a)	<p>Six from:</p> <p>LAN stands for local area network LAN covers a small <u>geographic</u> area LAN is used within a home, office, school, or group of buildings (must have at least 2) LANs have a high data transfer rate/WANs have a lower data transfer rate compared to LANs LANs use Layer 1, layer 2 and layer 3 devices One LAN can be connected to other LANs over any distance via telephone lines and radio waves A system of LANs connected in this way is called a Wide Area Network Ethernet and WiFi are the two most common technologies in use for local area networks Most LANs use a switch/hub to link the network and manage all the connected devices In businesses and schools one computer/a server may also be the central access point of a LAN</p>	6

Question	Answer	Marks
6(b)	<p>Four matched pairs from:</p> <p>Email: electronic mail where they could write letters to each other Narinder may not be sure that her parents have received the message/it may take a long time to receive a reply/no video/audio interaction</p> <p>Vide-conference/call where Narinder and her parents could use laptops with cameras and microphones to speak to each other Parents receiving the call must also have video conferencing software running in order to listen/can be affected by bandwidth issues/needs a lot of planning before hand/lag due to poor internet connection</p> <p>VoIP: Voice Over Internet Protocol. Narinder would use a microphone connected to a computer/speak using a VoIP phone (and the software would convert it into a format that can be sent over the internet) Parents receiving the call must also have VoIP application running/installed in order to listen/can be affected by bandwidth issues</p> <p>Social networking sites where Narinder could post a message with pictures/video on her page/area/can update her posts Can later regret posting pictures or comments that were thought funny at the time/possible for hackers to use her photos without permission/ Parents might not be skilled social network users/ it may take a long time to receive a reply</p> <p>Chat rooms: Narinder could meet her parents in a chat room and chat to them by typing a message Parents might not be skilled chatters and not know how to keep conversation private/Other people apart from parents may be able to enter the room, thereby losing privacy/strangers could eavesdrop</p> <p>Text messaging: Narinder and her parents could send messages to each other It may take a long time to receive a reply/need to have phone switched on</p>	8

Question	Answer	Marks
7	<p>Eight from:</p> <p>Rajvinder sends emails to every person being invited informing/reminding them of the conference/sends reminders/sends date and time of meeting</p> <p>Rajvinder sends log in details to members of the sales team</p> <p>He uploads any necessary documents for the meeting</p> <p>He sends a link to the website</p> <p>He enters his user name and password (obtained from the provider)</p> <p>He selects a start time/end time/time/date</p> <p>In the meeting area, he types an agenda</p> <p>He uses the software to select participants</p> <p>He selects an appropriate <u>meeting space/room</u></p> <p>He selects/types in those team members who can enter the room automatically and those who have to be invited</p> <p>He chooses which participants can be presenters/can modify documents</p> <p>He limits the participation of team members/mute volume/disables messaging/disables cameras</p> <p>The participants click on the link to enter the conference</p> <p>The participants enter the password/log in</p> <p>The participants wait until Rajvinder allows them to enter</p>	8

Question	Answer	Marks
8	<p>Six from:</p> <p><i>Advantages</i></p> <p>It is easier for users to navigate around the database using one... ... especially for users who are not familiar with a particular database... ...than if they had to select tools from an unfamiliar/complex tool bar</p> <p>The administrator of the database can prevent other users from accessing specific sections of a database... ... to avoid them corrupting the data</p> <p>A click-based interface makes it easier for people to access specific datasets/reports/other forms... ...all the user has to do is simply click on the buttons provided... ...instead of selecting tools from an unfamiliar tool bar</p> <p>This is more useful when users are just going to <i>use</i> the database... ...and not create new tables/forms/reports</p> <p><i>Disadvantages</i></p> <p>As a database becomes bigger, the design of a switchboard can become quite complex</p> <p>There is a limit to the number of buttons that can be placed on a switchboard/switchboards are restrictive... ...so users may not be able to create <i>new</i> tables/forms/reports as easily as with a database not using one</p> <p>If more features are required, further switchboards need to be added increasing the complexity</p> <p>At least one of each required to obtain full marks Must be a proper evaluation to obtain full marks Max. five marks if bullets/list of points Must have expansions or comparisons to be a proper evaluation</p>	6

Question	Answer	Marks
9(a)	The transaction file must be validated	1
9(b)	<p>Eight from:</p> <p>The computer reads the first record in the transaction file belonging to 25306</p> <p>The computer reads the first record in the old master file belonging to 13487</p> <p>The record from the transaction file is compared to the record from the master file</p> <p>If the records don't match, the computer writes the master file record to the new master file</p> <p>The records don't match so the next record of the master file is read, 25306</p> <p>If it matches, the transaction is carried out/weekly pay is calculated</p> <p>The records match so the computer calculates the hourly rate x hours worked, 25 x 35...</p> <p>...using the hourly rate, 25, from the master file and the hours worked, 35, from the transaction file</p> <p>The processed record is written to the new master file</p> <p>The next record, 25376, is read from the transaction file...</p> <p>...then compared to next master file record, 25376</p> <p>This continues until the last record from the transaction file, record 39286, is read/all the transaction file records are read</p> <p>After processing the last record of the transaction file, 39286, all the remaining old master file records are written to the new master file...</p> <p>...in this case one record, 39875</p>	8

Question	Answer	Marks
10(a)	<p>Three from:</p> <p>Testing nuclear reactions using computer models avoids safety problems such as explosions/meltdowns/environmental problems</p> <p>Testing nuclear reactions using computer models cuts costs as the testing company doesn't have to pay as much money for materials</p> <p>Results can be obtained in a short period of time regarding reactions that take a long time in real life</p> <p>Re-designing computer models is cheaper than re-creating a nuclear reaction</p> <p>Computer model can be designed to allow for extreme conditions/natural disasters</p>	3
10(b)	<p>Two from:</p> <p>Models can't always recreate exactly the real-world experiment</p> <p>Not every possible variable may be included in the model, leading to inaccurate results</p> <p>It costs money to hire computer experts to create the models</p>	2

Question	Answer	Marks
11(a)	<u>Column B</u> will widen to the width necessary for the largest piece of text/number to fit within the cell.	1
11(b)	The height of <u>Row 3</u> will increase to the height necessary for the largest piece of text/number to fit within the cell.	1
11(c)	Set to currency, 2 decimal places and symbol set to \$ (must have at least 2)	1
11(d)	Limit check 1 mark Checks that values in B2:B5 are greater than or equal to 0.8	2

Question	Answer	Marks
12(a)	Three from: Proprietary software is software that is owned by an individual or a company, usually the one that developed it There are almost always major restrictions on its use A software vendor delineates the specific terms of use in an end-user license agreement Its source code is almost always kept secret Usually covered by copyright, which provides a legal basis for its owner to establish exclusive rights	3
12(b)	Two from: Can be used and implemented/accessed by anyone An open-source file format can be used by both proprietary and open-source software Anyone may use them at no monetary cost for any desired purpose They can be opened by most types of software There is a published specification for storing digital data, usually maintained by a standards organisation	2