Cambridge International AS & A Level

INFORMATION TECHNOLOGY **9626/12**

Paper 1 Theory **February/March 2022**

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.

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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 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)	**Four** from: Data on its own has no meaning and there is no meaning to this data This data is just raw facts and figures Data has to be processed to become information and there is little evidence that any of this data has been processed as it has no meaning Data needs to have a context in order to become information/we don't know the context for this data… …description using an example of why there is no meaning giving two alternative contexts Data can be in the form of numbers, characters, symbols as shown in the example	**4**
1(b)	**Three** from: 1989 could be a year, such as the year somebody joined a company Paolo could represent somebody's first name √ could be the square root symbol used in Maths ₹ could represent a currency symbol such as is used in India ≠ could be the not equal to sign used in Maths OR could be a Boolean operator used in IT/Computer Studies	**3**

Question	Answer	Marks
2	**Four** from: Translates a high-level language program... ...into an intermediate stage Translates a line of source code and then executes that line/statement Translates instructions one at a time Reports on errors as lines of source code are processed An interpreter has to be resident in memory in order for the program to run Only a few lines of the program need to be in memory at any one time	**4**

Question	Answer	Marks
3(a)	**Three** from: A transaction processing system's performance is measured by the number of transactions it can process in a given period of time The system must be continuously available The system must be able to maintain the integrity of the data and overcome hardware or software problems It must also be possible to individually upgrade hardware and software components without shutting down the system There should be controlled access, allowing only authorised users to use the system	**3**

Question	Answer	Marks
3(b)	**Eight** from: *Advantages* They can perform hundreds of MIPS/have faster processing than PCs, laptops and other devices. They have a high value of mean time between failures (MTBF) so usually do not have any time where the system is down … …PCs/laptops/other computing devices can crash more often They have greater fault tolerance than other systems… …they can transfer processing from one core to another… …so hardware and software upgrades can occur while the system is still in operation They can run different operating systems so can handle different types of database They are more secure than most other types of computer as they use complex encryption systems. *Disadvantages* They are very expensive to buy/install … …some organisations are changing to using the cloud rather than buying a mainframe… …there is a higher cost for the people needed to manage them… …which is not the case with cloud-based computing The software required to run a mainframe is more expensive to buy than using cloud computing Mainframes need large rooms to accommodate them They generate a lot of heat… …cooling systems are expensive to buy, install and run **Must have at least two of each to gain full marks** **Must be a proper discussion to obtain full marks** **Max. six marks if bullets/list of points** **Must have expansions or comparisons to be a proper discussion**	8

Question	Answer	Marks
4	**Three** from Temperature sensors measure ambient temperature Pressure sensors measure atmospheric pressure Humidity sensors measure absolute and relative humidity Light sensors measure sunlight/light levels Reed switch and tipping bucket measure rainfall Analogue data needs to be converted into digital data/data that a computer understands – 1 mark	4

Question	Answer	Marks
5	**Three** from: An inference engine using forward chaining searches the inference rules... ...until it finds one where the IF statement is known to be true When such a rule is found, the inference engine uses the 'THEN' part to cause the addition of new information/facts The inference engine will repeat this process until a goal is reached The data entered determines which rules are selected and used and so this method is called data-driven	3

Question	Answer	Marks
6(a)	**Three** matched pairs (all must be different): A length check could be performed on the Student_number data Each data item must be exactly 5 characters long/no more and no less than 5 characters A format check could be performed on the Date_of_birth data Each date must consist of two digits followed by a slash, followed by two digits, followed by a slash, followed by four digits A length check could be performed on the Date_of_birth data Must be exactly 10 characters A consistency check could be performed on the Student_number and Date_of_birth data The first two digits/year group must relate to the Date_of_birth	6

Question	Answer	Marks
6(b)	**Six** from: **Four from:** Common errors when copying data are transcription and transposition errors Verification would pick up a transposition error, but most validation checks (except a check digit) would not Verification would pick up transcription errors, but validation might not Verification is checking that data that has been/is being entered into a computer has been <u>copied correctly</u> from the data source Validation is checking that the data entered is reasonable/sensible <u>Neither</u> method checks that data is accurate/correct **Examples from:** A format check might show that the Date_of_birth is in the correct format of dd/mm/yyyy but verification would pick up errors… …Jonathon Odoki's Date_of_birth, for example, might have been incorrectly copied as 12/07/2004/month and day have been swapped A length check might show that the Student_number is the correct length but verification would pick up a transposition error… …For example Sven Johansson's Student_number could have been copied as 09312/two digits have been swapped A length check might show that the Student_number is the correct length but verification would pick up a transcription error… …For example Sven Johansson's Student_number has been copied as 09S32/text has been entered instead of a digit A consistency check might show that the Date_of_birth is consistent with the Student_number but Manjit Sangherra's Student_number may have been copied as 11102… …and Date_of_birth as 11/03/2006 **Allow follow through from part (a)**	6

Question	Answer	Marks

7	**Eight** from:
	
	Input number of numbers
	Initialise count
	Initialise total
	Loop that works involving REPEAT… UNTIL (e.g. count = n)
	Input number within loop
	Increment count within loop
	Update total within loop
	Calculation of average
	output average
	
	Possible solution could be:
	INPUT n
	count ← 0
	total ← 0
	REPEAT
	    INPUT number
	    count ← count + 1
	      total ← total + number
	UNTIL count = n
	average ← total / n
	PRINT average
		8

Question	Answer	Marks
8	**Four matched pairs** from examples such as: It is important to use anti-phishing software often found within web browsers or email software to prevent emails from even arriving… …but not all web browsers provide this facility so it is very important to use one that does… …but unless the software is updated at regular intervals it may not be able to prevent attacks Look for grammatical and/or spelling mistakes in emails as this will cause receivers to be reluctant to reply… …however, it may be possible that users could see minor grammatical and/or spelling mistakes in genuine emails and users may delete them unnecessarily Users should never trust emails that come from people whose names they do not recognise so if any email looks suspicious it is important to delete it… …but sometimes, emails may come from people whose names they do not recognise but they may still be genuine If an email starts 'Dear customer' rather than using the receiver's name, this can be viewed with suspicion and it is important to delete it… …however, some companies use this method of communication for general emails so if the emails is not asking for personal information there may be no need to delete it. Emails requesting personal or financial information are likely to need deleting as it is important to know that personal and financial information should never be sent in an email… … check with sender/company if email asks for personal information as it may be genuine If the email contains a message that the receiver is entitled to a large amount of money it is likely to be fake and deletion is probably needed… …however, it is possible that a distant relative has left the user a lot of money so it is important to read these messages carefully before considering deletion Users need to treat links within emails with suspicion… … but if a user decides never to click on links within emails this can lead to important emails not being acted upon **Must be a proper evaluation to obtain full marks** **Max. four if points not matched** **Must have expansions to be a proper evaluation**	8

Question	Answer	Marks
9(a)	**Three** from: Spyware is a type of malware that collects information about a computer user's activities without their knowledge... ...but a user might notice a reduction in processing power and bandwidth Data such as web browsing habits are collected Data such as user's personal data are collected… …such as the user's credit card numbers/usernames and passwords A keylogger can be used to collect a record of the user's keystrokes Data is sent to the hacker It does not replicate like a virus or worm	3
9(b)	**Four** from: Hackers can sell the personal/financial information to other criminals Hackers can impersonate the user/commit identity theft Hackers can use the user's financial data to ask the bank for a new PIN Hackers can ask the bank for an extra bank card Hackers can buy goods through internet shopping using the credit card details they have obtained Hackers can withdraw large sums of money from the user's bank account	4

Question	Answer	Marks
10(a)(i)	Both tables can have only one record on either side of the relationship	1
10(a)(ii)	A table contains individual records that each relate to many records in the related table	1
10(a)(iii)	A compound key is a primary key that combines more than one foreign key to make a unique value	1
10(b)	**Three** from: A many-to-many relationship has to be broken down into two/several one-to-many relationships... ...using a third table, a "join table"... ...each record in the "join table" would have the foreign key fields… …linked to the primary keys of the two tables it is joining together	3