Cambridge Assessment International Education

Cambridge International AS & A Level

INFORMATION TECHNOLOGY **9626/12**

Paper 1 Theory **May/June 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.

Cambridge International is publishing the mark schemes for the May/June 2022 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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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.

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Question	Answer	Marks
1	**Five** from: By interviewing the family, the students will obtain up to date information/census is two years old/census data may be out of date More/detailed information will be obtained as the census may not contain all the information required/has limited information/fewer details They are able to collect only as much information as they require/the census may include information they do not need … …might take time to filter extra information out It may be cheaper to visit the streets than the school paying transport costs to get the students to city hall It may be too time consuming to collect direct data / to go to every house in these streets / only need to make one trip to city hall The study might be limited as it is only five streets/the census would allow them to extend the survey Residents might not be at home when the students call/nobody at home would not be a problem with the census Data may take time to collate and present in a meaningful way/census data is already collated and presented so it is easier to find the required information	**5**

Question	Answer	Marks
2	**Four** from: When a file is written to the disk, it can be automatically encrypted by encryption software Full disk encryption is when the data is encrypted as soon as it is saved to the hard disk When a file is read from the disk the decryption/encryption key/password is needed to decrypt it When a file is read from the disk, the software automatically decrypts it… … while in some types of hard disk encryption leaving all other data on the disk encrypted (All) the files on the disk are encrypted/ It's the encryption of data on that disk… …except in some cases the operating system Whether the disk stays in the computer or moved to another computer it is still encrypted Only the person/computer with the secret/decryption/encryption key/password can understand the data on the disk/data can't be read without the decryption/encryption key/unauthorised people cannot read the data	**4**

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Question	Answer	Marks
3(a)	**Four** from: **For even parity:** **Three max** from When data is transmitted the sending device/computer counts the number of ones in each byte Each byte is checked individually The parity bit is used to make sure the number of ones is even If the number of ones is even it sets the parity bit to 0 (and adds this on to the end of the byte) If the number of ones is odd it sets the parity bit to 1 (before adding it on) Every byte of data should have an even number of ones The receiving device/computer checks each byte to make sure that it has an even number of ones If the number of ones is odd there has been an error during the transfer of data **Two max** from In this example data is not being transferred from one device to another/data is not being transmitted She is only entering data to the computer so will need to use an alternative verification method **Accept answers which are odd parity answers (substitute odd for even in points above)**	**4**
3(b)	**Four** from *Similarities* Both involve comparing data that has been/is being entered with another copy Both involve checking that data has been entered correctly not that it is correct/pick up errors made during data entry *Differences* Visual verification is carried out by a human/user/yourself Double data entry is carried out by the computer/ computerised Visual verification involves comparing the entered data with the original source Double data entry involves comparing two versions of the entered data Visual verification will enable the user to see mistakes if they have been made With double data entry computer will alert user to the fact that a mistake has been made and they decide which version has been copied correctly/freezes keyboard to prevent data being entered until error is corrected **Must have at least one similarity and one difference to gain full marks**	**4**

Question	Answer	Marks
4	**Six** from: *Similarities* Both are used to measure performance speeds of computers/processors Both can be unreliable as the complexity of instructions can vary according to which benchmark program/test is used/complex instruction takes longer to process than a simple one *Differences* MIPS are used with mainframes (M)FLOPS used with supercomputers MIPS can be used with integers (M)FLOPS with real/floating point numbers MIPS measured in millions (M)FLOPS measured in quadrillions and higher MIPs is millions of instructions per second, FLOPs is floating point operations per second (must have both) MIPS used when measuring performance of computers involved in running application software… …whereas FLOPS used where scientific/complex calculations need to be carried out MIPS do not take into account input/output speeds… … whereas FLOPS do not take into account CPU's clock speed , bus speed, the amount of RAM available **Must have at least one similarity and difference to gain full marks**	**6**

Question	Answer	Marks
5	**Eight** from: *Advantages* Once it is compiled a program does not have to be translated again A compiled program can run faster than interpreted software Compiling a program is a much quicker process /translates it faster than interpreting… … as whole program is translated all in one go /all at once … …unlike interpreter translates one line at a time Once the program is already compiled into machine language, there is no translation software that the user has to keep up to date Compilers also improve security for programmers… …makes it much harder to copy code/machine code is difficult to understand and alter… …so fewer risks of copyright infringement… … with an interpreted program, the source code can always be seen so greater risk of software copyright infringement *Disadvantages* Can only be used on one operating system … source code can be interpreted on any operating system provided interpreter is present… …will need to use an interpreter if program is to be shared… It is slow/(more) difficult to debug the program/find errors… …the whole program needs to be compiled again after an error is corrected… …error messages are output at the end… …whereas with an interpreter error messages are output <u>as they are found</u> It uses up more memory than an interpreter… …as whole program has to be loaded… …interpreter only requires a few statements of the program to be in memory Unlike an interpreter, does not allow small pieces of code to be tested to make sure they work before continuing with the rest of the program More likely to crash the computer as it is running directly on the CPU **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
6(a)	Humidity sensor combination of moisture sensor and temperature sensor/measures how much moisture is in atmosphere together with temperature – 1 mark Used in weather stations to measure relative/absolute humidity /air humidity /any suitable example – 1 mark Sound sensor converts sound waves into voltages/electrical signals – 1 mark Used in environment monitoring systems to measure noise pollution /any suitable example – 1 mark	**4**
6(b)	**Two** from: The accuracy of all sensors reduces after a period of time... ...due to constant use in/exposure to the atmosphere/liquids that are being used Regular calibration helps to maintain the accuracy of the sensors/helps to make sure sensors produce accurate/correct/reliable readings Other devices within a monitoring system may deteriorate over time resulting in a need for recalibration	**2**
6(c)	**Five** from: Only one measurement point/reading with one point calibration whereas with two point calibration at least two readings are taken One point calibration is appropriate for sensors used to measure a value that is constant/never changes… …whereas two-point calibration is used with sensors that measure a constantly changing variable With one point calibration the offset only is calculated/ the sensor reading is subtracted from the known value only… …the offset is then added to every subsequent reading With two point calibration sensitivity needs to be included not just an offset Two point calibration is used where there is a linear relationship between the two readings The slope of the line connecting the two readings is compared with the slope of the line of the pre-calibrated sensor/the range values of the sensor is compared with the range values for the standard Two point calibration compensates for both offset errors and sensitivity/slope errors	**5**

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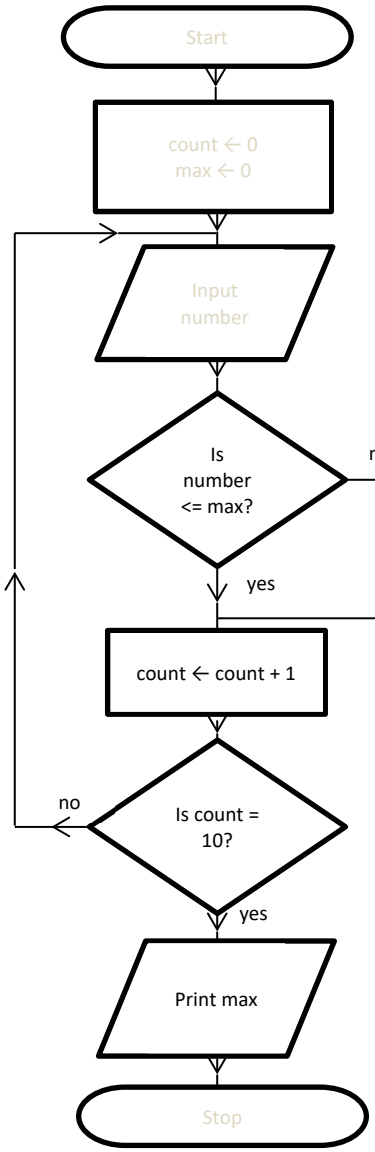
Question	Answer	Marks
7	 Is number <= max in 1st decision box – 1 mark Yes/no in correct positions at 1st decision box – 1 mark max ← number in correct box – 1 mark increment count in correct box – 1 mark is count = 10? in 2nd decision box – 1 mark yes/no in correct positions at 2nd decision box – 1 mark Print max in correct box – 1 mark	**7**

Question	Answer	Marks
8(a)	**Four** from: Hacker creates a fake website which looks like the actual bank's website/legitimate-looking website Fools the user into thinking they have gone to the correct website/have not been re-directed Hacker installs a piece of malicious software/code on customer's computer/ user downloads a piece of malicious software/code without realising it Software corrupts the Hosts file on the user's computer Software adds the URLs of banks together with IP address of the fake website Fraudster redirects genuine website's traffic to own website/ when user enters a bank's URL they are redirected to hacker's website … …user is now sending personal details to fraudster's website unknowingly / website asks customer to enter banking information/hacker gains personal information from website /customer types in personal details on website Hacker uses the acquired information from the website to log on to the user's bank account/make purchases/commit identity theft/withdraw cash	**4**
8(b)	**Three** from: Use up to date anti-virus software to prevent the downloading of malicious software Use firewalls to prevent malicious software entering the computer Use trusted DNS servers / don't enter personal data into sites without https The latest browsers alert users when a fake website has been loaded/users need to use the latest browser software updates Use a trusted, legitimate Internet Service Provider Check the digital certificate to make sure the site is legitimate Be suspicious and careful not to use websites which contain poor grammar or spelling Avoid using public Wi-fi systems	**3**

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Question	Answer	Marks

9(a)	*READ first record in transaction file*
	READ first record in old master file
	WHILE not end of transaction file
	  IF transaction file WorkerID = master file WorkerID
	  THEN
	  WagesSoFar ← WagesSoFar + (RateOfPay*HoursWorked)
	  WRITE updated master file record to new master file
	  READ next record in transaction file
	  ENDIF
	  READ next record in master file
	ENDWHILE
	
	Six from:
	
	Correct calculation – `RateOfPay*HoursWorked` – 1 mark
	Correct calculation - `WagesSoFar ← WagesSoFar + (RateOfPay*HoursWorked)` – 1 mark
	Correct update – 1 mark
	Read next transaction file record… – 1 mark
	…immediately before ENDIF – 1 mark
	ENDIF– 1 mark
	Read next master file record… – 1 mark
	… immediately after ENDIF – 1 mark
	ENDWHILE at end of algorithm – 1 mark
		6

Question	Answer	Marks
9(b)	**Eight** from: *Advantages* Batch processing does not require constant use of the computer when it might be needed for other tasks... ...the payroll only needs to be run at the end of the week/month… …whereas real time processing would require computer to be available all the time… …batch processing/payroll can be run at convenient times for the company/when the computing resources are less busy/when there is little demand for computer resources/can be run overnight Real-time processing requires immediate processing of data which is unnecessary with payroll... ...as hours worked would only be known at the end of each day so no point in using real-time processing Real-time processing is not usually capable of processing large volumes of data such as running a payroll whereas batch processing is Batch processing systems only need lower specification computers… …whereas real-time processing needs more complex computer systems Online processing requires more hardware making it more expensive than batch processing Batch processing only needs a few employees to enter the data… …so total wage bill is less… …whereas online processing systems can need employees to be constantly using the system In batch processing systems there are fewer/no transcription/update/data errors… …than human operators would produce in an online system *Disadvantages* With batch processing there is a time delay between collecting the input data and getting an output/data is not processed until the time specified With batch processing the information is only up to date after the master file has been updated by the transaction file… …whereas in real-time processing information is always up to date With batch processing systems errors are only revealed during processing/after batch process is complete which can be overnight and so cause delays/errors cannot be corrected until the batch process is complete… …in online processing errors are revealed, and can be acted upon, immediately Users cannot terminate a process during execution/have to wait until execution is completed **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**