Cambridge Assessment International Education

Cambridge International AS & A Level

INFORMATION TECHNOLOGY **9626/12**

Paper 1 Theory **October/November 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 October/November 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

[Turn over

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	**MAX** four marks: Max **three** from: • Information is data which has a context/meaning/has been processed// this data can become information if meaning/context is added (accept any indication that meaning or context is key to data being information) (1) • **This** data**/it has** no context/meaning//it doesn't explain what each symbol means (must clearly refer to the set of data here)//it is raw (1) • Any valid context//The context for this set of data could be that it can be used in search criteria in spreadsheets ... (1) ... the symbols would then be given meaning (1) Max **two** from: • 1 mark for 2 correct meanings (1) OR • 2 marks for 4 correct meanings (2) > means greater than < means less than = means equal to >= means greater than or equal to <= means less than or equal to	**4**

Question	Answer	Marks
2	**Five** from: • Describes the robustness/durability of mainframe computers (1) • **Reliability is** the chance of the system behaving as intended (1) • **Accessibility refers to** the mainframe being operational at all times//the operating time as a percentage of total time (1) • **Serviceability means** it can be **easily fixed** within a **short period of time** (1) • Mainframes are reliable as the system will use alternative methods to carry out tasks (if there is a failure) (1) • The system's software is reliable as it is extensively tested and updates are made quickly to overcome problems (1) • Mean time between failures (MTBF) is quite long for mainframes (1) • Mainframes give months/years between system downtimes (1) • Even when unavailable (due to failure) a mainframe is unavailable for a very short time (1) • Spare components/CPU are often included in mainframes so that if one component/CPU fails another takes over (1) • The mainframe can determine why a failure occurred (1) • This enables hardware and software components to be replaced without affecting the mainframe's operations (1) • Can be serviced while the system is still running (1)	**5**

Question	Answer	Marks
3(a)	**Two matched pairs** from: • Phishing involves sending **an email** (to gather personal details) ... (1) ... whereas vishing involves a phone/voice **call** (to gather personal details) (1) (**Candidate MUST have referred to personal data//details being gathered by either method within the body of the answer**) • Phishing involves sending a website link/email address, **asking the receiver to email back/click on link** ... (1) ... whereas vishing involves getting the victim to give out their details verbally / leaves a number on their answerphone / tells them over the phone the bank's supposed phone number the victim can call to check the call is authentic (1) • With phishing the link takes the victim to a (fake) website ... (1) ... whereas with vishing the phone number causes the victim to be put through to the hacker's own phone/answerphone (1) • Vishing involves the customer having to respond immediately to the caller ... (1) ... whereas phishing allows the user more time to check whether the email is authentic (1) **One mark may be awarded for unmatched statement** **Two marks may be awarded for one unmatched statement from each side**	**4**
3(b)	**Three** from: • Fraudster sends a (cell phone) text message (or VERY close alternative) **to persuade customer to divulge their personal information** (accept any reference to personal information/data in the body of the answer) ... (1st) ... includes a link to **fraudster's/fake/replicated** website (1) ... Example of message that could be used (must be more than 'please send information') (1) ... the target's **immediate** attention/action is demanded (accept any reference to peril or scaring the target into immediate action) (1) • They include a telephone number in the message that connects to an automated voice response system (1)	**3**

Question	Answer	Marks
4(a)	**Three** from: • They could increase/change (the number of customers by increasing/changing**)** the value in cell D1 ... (1) • They could increase/change (the number of snacks by increasing/changing) the value in cell C6 ... (1) (accept decrease answer) ... • They could increase/change (the number of drinks by increasing) the value in cell C5 ... (1) (accept decrease answer) ... • They could increase/change (the cost of souvenir supplies by increasing) the value in cell D17 ... (1) (accept decrease answer) ... ... The value in D21/profit would change (showing the new profit/loss//profit would change) (1)	**3**
4(b)	**Four** marks available Max **three** from: • The organisers would select the cell **containing the formula** that returns the result they want/D21, **and select goal seek** (1) They input the value they want the formula to return/5000 (1) They enter the cell reference of the input value that the spreadsheet can change to reach the target/D1 (1) Max **one** from**:** • The number could be to several decimal places and needs to be a whole number of concert goers (1) • If other assumptions are incorrect (e.g. the number of snack/drinks bought per concert goer), the number produced by goal seek would be inaccurate (1) • Venue may not be able to hold that many people (not 'number too large' on its own) (1)	**4**

Question	Answer	Marks
5(a)	**Three** matched pairs: • A length check could be performed (on the data) **in the ISBN field** (1) Each data item must be 13 characters/numbers/digits long (1) • A lookup check can be performed (on the data) **in the Book_type field** (1) Each data item is compared with the lookup list of P and H to see it exists//The code must be P or H **only** (1) • A range check could be performed (on the data) **in the Copies field** (1) Each value must not be less than the minimum/2 **and** must not be greater than the maximum/5//between 1 and 6 (1)	**6**

Question	Answer	Marks
5(b)	**Three** marks available: • Generic statement about why both required (no reference to fields). MUST be more than a statement about what each does. (1) • Verification would identify if P had been typed in the Book_type field for the first record//if it was relevant (accept any letter and book combination from the sample) (1) • A lookup check/validation would accept P or H (1) • Verification would identify if (e.g) 5/wrong number had been entered (into the first record) (1) • A range check/validation would accept 5 (1) • Verification would identify if two digits had been transposed in the ISBN field//the ISBN number was incorrect (1) • Length check/Validation would accept any 13 characters (1)	**3**

Question	Answer	Marks
6	**Four** from: • A supercomputer is fast/powerful/run at several petaflops **enough to carry out the calculations that are required** for weather forecasting (1) • A supercomputer can process **huge** amounts of data// a supercomputer is needed because a **huge** amount of data is collected (1) • Weather forecasting is based on the use of very complex/scientific computer models (which only supercomputers can handle) (1) • A sophisticated/three-dimensional model of the earth's atmosphere/ocean/space has to be created (which needs the processing power of a supercomputer) (1) • (A supercomputer is needed) because a large number of calculations have to be carried out//a supercomputer can do a large number of calculations (1) • Needs to do complex/scientific calculations (1) Max **two** marks for the data that has to be collated: e.g. • records **of previous** weather conditions (1) • weather measurements from weather stations (candidate may exemplify) (1) • observations from radar/satellites (1) • information from ships /aircraft (1)	**4**

Question	Answer	Marks
7(a)	**Four** marks available: • Malware can be downloaded without realising when an employee (e.g.) clicks on adware (1) • Spyware/Trojan is an example of malware **that can be used** ... (1) ... the data collected is sent back to the hacker (Allow once only) (1) • Malware can gain access to **computers/network/database** (NOT – the business) **to get files/secrets** ... (1) ... such as (e.g.) intellectual property/research projects/future business plans (1) ... the data collected is sent back to the hacker (Allow once only) (1) • Malware is used to exploit weaknesses in software to gain access ... (1) ... the data collected is sent back to the hacker (Allow once only) (1) • Types of spyware target specific computers for industrial espionage ... (1) ... to spy on a particular company (1)	**4**
7(b)	**Four** marks available: • (Allows a hacker to) install a set of tools (in a computer) (1) • Allows (continuous) remote access (to the computer) (1) • It allows **the hacker**/third party to gain **administrator** access to a victim's **computer**//gain (full) control of a **computer** (1) • It's **buried deep** within the operating system (1) • The user **is unaware** that their computer has been infected//secretly gains access (1) • Designed to stay hidden/to avoid detection **by anti-malware software** (1) • **The attacker/a third party** can access/steal the information/data/files **on the computer** (1) • It changes any **anti-virus software** so it thinks the rootkit is not inside the computer (1) • It can remove anti-virus software (1) • It can hide illegal files on a computer (1) • It can be difficult to get rid off (1)	**4**

Question	Answer	Marks
8(a)	**Four** from: • When a message/information is intercepted//accessed **it is unreadable/ can't be understood** ... (1) ... so, therefore, it is **useless** (1) ... to a hacker (accept alternative examples of 3rd party or just 'third party') (1) • It protects customers when they bank/shop online/any other suitable example from any area of use (MUST BE protecting data) ... (1) ... as the data cannot be used for identity theft (1) • Data can only be decrypted by the receiving computer if it has the private/decryption key (1) **Max. three marks if bullets/list of points**	**4**

Question	Answer	Marks
8(b)	**Up to FOUR marks available:** ***Advantages (MAX 3)*** • It is a faster process//quicker **to encrypt compared to asymmetric** (1) ... ... as it has less mathematical complexity (1) • It requires less computational power **than asymmetric** (1) ***Disadvantages (MAX 3)*** • Does not have a different key for encryption and decryption//sender and receiver use the same key (1) ... ... therefore only one key needs to be stolen (1) ... making it less secure (1) • The encryption key cannot be generally published (1) • The encryption key must be sent to the receiver of the message (1) • Key could be intercepted/stolen (by a hacker) **whilst being sent** ... (1) ... who can then decrypt any message encrypted by the sender (accept any reasonable implication) (1) **Must have at least one of each to gain full marks** **Max. three marks if bullets/list of points**	**4**

Question	Answer	Marks

9(a)	`PROCEDURE AfterTax(WagesBeforeTax)`
	`  TaxPaid ← WagesBeforeTax * 35%`
	`  WagesAfterTax ← WagesBeforeTax - TaxPaid`
	`ENDPROCEDURE`
	
	• `PROCEDURE` and Appropriate name as first statement (ignore any gaps) (1)
	• `WagesBeforeTax` in brackets on first line (1)
	• Calculations and assignments within the procedure result in the correct numerical outcome for the question (Ignore errors with variable names, as long as it is clear which variable is being referred to) (1)
	• Sensible variable names **with no gaps** (`WagesBeforeTax` has been given, must be at least TWO extra variables) (1)
	• `ENDPROCEDURE` as last statement (1)
		4

Question	Answer	Marks
9(b)	*count ← 0* *INPUT NumberOfWorkers* *REPEAT* • `INPUT Hours, Rate` (1) (Candidate may do this in two steps) • `INPUT Hours, Rate` **as first line/before `BeforeTax` is called** (allow follow through) (1) • **(**`CALL`**)** `BeforeTax(Hours, Rate)` (1) • **(**`CALL`**)** `AfterTax(WagesBeforeTax)` (1) • `BeforeTax before WagesAfterTax` (1) • `PRINT/OUTPUT WagesAfterTax` (1) (Must be in correct place) • `count ← count + 1` (1) (can be anywhere) • *`UNTIL`* `count = NumberOfWorkers` (1)	**6**

Question	Answer	Marks
10	***Advantages Max 6 marks*** ***e.g*** • Computers are able to take readings at more frequent intervals ... (1) ... as students take time writing down readings/values (allow once only)(1) • Taking readings manually takes time//time consuming (not slower) ... (1) ... because students have to write down the readings/values (allow once only) (1) • Computers can read several physical variables at the same time ... (1) ... whereas students would only be able to read one at a time (1) • Computers can take continuous readings ... (1) ... whereas students find it difficult to continually take readings/students may need to take breaks (1) • Students wouldn't be able to take readings during school holidays ... (1) ... but computers can take readings every day//computers work 24/7 (1) • (Readings taken by computers) tend to be **more** accurate ... (1) ... and so are more reliable//students can make mistakes **when tired/due to human error** (1) • Training is not required ... (1) ... to collect accurate data (1) ***Disadvantages Max six marks*** ***e.g.*** • Monitoring systems/computers can be expensive **to buy** ... (1) ... but students do not have to be paid (1) • Monitoring systems/computer maintenance costs are expensive ... (1) ... whereas there is none with students (1) • Sensors can lose accuracy **over time** ... (1) ... which would lead to inaccurate readings being taken (1) • Sensors may not be calibrated properly ... (1) ... so any measurements will be inaccurate (1) **Max. six marks if bullets/list of points** **Max six marks if no attempt at expansion**	**8**