Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

INFORMATION TECHNOLOGY **9626/12**

Paper 1 Theory **May/June 2019**

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.

Cambridge International is publishing the mark schemes for the May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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	It is often referred to as public key encryption	✓	**4**
	It uses a pair of keys, a public key and a private key	✓	
	The public key and the private key are published to everyone who wants to send a message		
	Anyone with a copy of the public key can read encrypted data		
	It is possible to deduce the private key from the public key		
	SSL is a protocol that uses asymmetric encryption	✓	
	Keys used in symmetric encryption are longer, compared to asymmetric keys		
	Asymmetric encryption is slower to convert than symmetric encryption and requires far more processing power	✓	
	Digital certificates are not used with asymmetric encryption		
	The use of asymmetric key algorithms always ensures security of a message		

Question	Answer		Marks
2	A virus corrupts files but does not delete them		**4**
	Ransomware continually deletes files until a ransom is paid		
	One purpose of releasing a worm is to occupy as much bandwidth in a network as possible	✓	
	Ransomware is often initiated by means of a trojan horse	✓	
	A trojan horse is a type of malware within an e-mail attachment that is downloaded without the user understanding the consequences	✓	
	Spyware is a type of software that removes key loggers from a hard disk		
	Adware is additional software attached to a virus when it is downloaded		
	Malicious bots are never used to instigate a SPAM attack		
	A rootkit enables a hacker to gain administrator rights in a victim's computer	✓	
	A trojan horse just enables a virus to be transmitted as it never deletes data itself		

Question	Answer	Marks
3	**Five** *from:* Place sensors upstream and downstream from the factory Temperature / light / turbidity sensors would be connected to computer (Analogue) data is converted into digital using an analogue to digital converter / ADC Conversion / use of ADC enables the computer to understand the data Computer receives data from sensors / ADC Readings from above the factory are compared with those from below the factory by the computer Differences / results are printed out / displayed on screen Graphs are automatically produced by the computer showing values from below and above the factory Computer stores readings in a table ready for processing.	**5**

Question	Answer	Marks
4	**Four** *from:* Max **three** *from:* Data consists of raw facts and figures as it does not have any meaning until it is processed and given a context Information is data that is assigned a meaning / presented within a context that gives it meaning, relevance and purpose Knowledge is know-how and learning of contextualised information Max **three** *from:* The example does not have a meaning / context The context could be they form an IP address which makes this information Only when it is apparent that IPv4 addresses always consist of four numbers separated by full stops and each number must be between 0 and 255 does this become knowledge Or equivalent statements for their own example (1 for example explained as data, 1 for context explained, 1 for explanation of how it can become knowledge).	**4**

Question	Answer	Marks
5(a)	**Two** *from:* To enable organisations to communicate over a large area securely To enable employees to transmit data securely To enable employees to access the company's computer network remotely / from home securely To restrict which external users are able to use the company's network To restrict the resources the external user is permitted to use.	**2**
5(b)	**Four** *from:* This process is called tunnelling as it uses a secure means to tunnel through a publicly accessible network It uses encryption … … involves the use of private and / or public keys … … scrambles data so that only the key holder can decrypt / understand it … data remains encrypted throughout transmission and is only decrypted at the destination computer It can use IPsec … … is a network protocol suite that encrypts packets of data sent over a network … … protects data flows between a pair of hosts (host-to-host) / between a pair of security gateways (network-to-network) / between a security gateway and a host (network-to-host) It uses a firewall … … which (monitors and) controls the incoming and outgoing network traffic … … establishes a barrier between a trusted, secure internal network and another outside network or computer It uses authentication, authorisation, and accounting / AAA … … AAA server is a program that handles user requests for access to computer resources … … AAA server typically interacts with network access and gateway servers / with databases and directories containing user information It can use TLS / SSL … … uses asymmetric encryption to establish the session … … symmetric encryption for the main conversation.	**4**

Question	Answer	Marks
6	**Six** *from:* *Legislators* **Two** *from:* Local government representatives would no longer have to attend a meeting far from their home leading to savings in travel expenses Representatives can take part in and observe a meeting happening in more than one location Problems with video transmissions could lead to misunderstandings / delays in passing laws Saves the task of booking a room for a meeting *Business people* **Two** *from:* Do not have to pay for air / train tickets / car running costs to meet with customers Do not have to pay for hotel accommodation to meet with customers Saves the cost of hiring a venue for a meeting When vital workers in a business have to travel, the business is left short- handed, possibly for days Flight cancellations, airport delays, traffic jams will no longer be reasons or excuses for missing meetings and conferences Can increase productivity as a worker who has a sick child, for example, may be able to hold an important meeting even if they have to stay home for the day Workers can easily share a word-processed document / spreadsheet with a manager Much less personal interaction *Television news presenters* **Two** *from:* • Can hold discussions with more than one person who normally would not travel just for an interview • Can speak with correspondents based in different countries <u>simultaneously</u> • Do not have to wait for eye-witnesses to travel to the tv centre • Presenters do not have to travel to dangerous areas • Interviewees do not have to travel and risk arrest / terrorists / attack.	**6**

Question	Answer	Marks
7(a)	A primary key is a field in a table which is unique and enables you to identify every record in that table.	**1**
	A foreign key is used to link tables together and create a relationship / it is a field in one table that is linked to the primary key in another table.	**1**
	A compound key is a primary key that combines more than one foreign key to make a unique value.	**1**
7(b)	**Three** *from:* Prevents the entry of duplicate data Prevents records being added to a related table if there is no associated record in the primary table Prevents the changing of values in a primary table that result in orphaned records in a related table Prevents the deletion of records from a primary table if there are matching related records.	**3**

Question	Answer	Marks
8	Advantages – **Two** *from:* The bank will have an electronic copy of the cheque to refer in case of customer complaints Can read all the data on the cheque / not limited to MICR characters Cheques can be processed after being deposited at ATMs Cheques can be processed having been sent by phone (camera) Disadvantages **– Two** *from:* Cheques will be easier to forge / less secure New OCR equipment / software will need to be purchased If cheques are written over OCR will not be able to read it OCR is less accurate than MICR.	**4**

Question	Answer	Marks
9	**Five** *from:* Knowledge base consists of a database of facts / factual data and a rules base Inference engine uses the rules base to reason through the symptoms Inference engine uses the data or facts in the knowledge base to reason through the symptoms Inference engine compares symptoms to those in the knowledge base Inference engine uses the rules base of IF…THEN… rules / comparisons Knowledge base editor enables the knowledge engineer to edit rules and facts within the knowledge base.	**5**

Question	Answer	Marks
10(a)	=INT((G$2-C4)/365.25)	
	INT()	**1**
	(G$2	**1**
	-C4)	**1**
	/365.25	**1**
10(b)(i)	16	**1**
	4	**1**
10(b)(ii)	16	**1**
	3	**1**
10(c)	=COUNTIFS(D4:D23,17,E4:E23,3)	
	=COUNTIFS()	**1**
	(D4:D23	**1**
	,17, immediately after D4:D23	**1**
	E4:E23 (and must come) after D4:D23 within same function	**1**
	,3) immediately after E4:E23 within the same function as D4:D23	**1**
10(d)	=COUNTIFS(D4:D23,16,E4:E23,4)	
	=COUNTIFS(D4:D23….)	**1**
	,16,E4:E23	**1**
	,4) immediately after E4:E23	**1**

Question	Answer	Marks
11(a)	**Five** *from:* Select query design In the table row select Borrowers/add Borrowers table In the field row, select the fields FamilyName, FirstName, Mobilephone and Residence In Show row untick Residence In criteria row under FamilyName enter Like G* In criteria row under Residence enter Midtown	**5**
11(b)(i)	**Three** *from:* Select query design, in the table row select Books/add Books table and in the field row, select the fields Title, Author, Publisher and ReplacementCost In Show row untick Publisher and ReplacementCost In criteria row under Publisher enter Panda Books In criteria row under ReplacementCost enter <20	**3**
11(b)(ii)	**Three** *from:* Select query design Use of [ ] in either prompt In criteria row under Publisher enter [appropriate prompt] In criteria row under ReplacementCost enter [appropriate prompt].	**3**
11(c)	**Three** *from:* There is no field in the Borrowers table which contains similar data to any field in the Books table A field needs to be added to the Borrowers table containing the ISBN number of the book borrowed A link / relationship would need to be created between ISBN number in the Books table and this new field in the Borrower table ISBN in the borrowers table will be the foreign key Or a field needs to be added to the Books table containing the ID of the borrower A link / relationship would need to be created between ID in the Borrowers table and this new field in the Books table ID in the books table will be the foreign key.	**3**

Question	Answer	Marks
12	**Eight** *from:* Max **Five** *from:* A range check is used to check that data is within the boundaries of a given range and could be used on the value of the order placed / the date the order was placed Data must be greater than a lower limit and less than an upper limit / day must be greater than 0 and less than 32 / month must be greater than 0 and less than 13 / year must be greater than… and less than… (accept any reasonable example) A type check is used to check that data is of the correct data type and could be used on the value of the order placed / individual components of the date the order was placed Value of order placed must be numeric / components of date must be numeric A format check is to check that the data is in the correct format and could be used on Customer id number / date order placed Customer ID might be in the form of one letter followed by 6 digits / date order placed might be 2 numbers followed by a dash followed by 2 numbers followed by a dash followed by 4 numbers (accept any reasonable example) A length check is to check that data is of the correct length and could be used on the Customer ID number / date order placed Any reasonable example of a length check Max **Five** *from:* A range check would not be appropriate for the Customer ID number as it is likely to consist of alphanumeric characters A range check would trap any values outside the range but might not pick up transposition errors A type check would not be appropriate on Customer ID number as the values might not solely consist of digits A type check would trap letters typed instead of numbers but might not pick up values outside a range or transposition errors A format check would not be appropriate on value of order placed as the values in the numeric part might vary in length considerably A format check would trap incorrect formats but might not pick up transposition errors A length check would not be appropriate on value of order placed as the values might vary in length considerably A length check would check the correct length of the data item but would not pick up data of the wrong format or transposition errors.	**8**

Question	Answer	Marks
13	This question to be marked as levels of response: **Level 3 (7–8 marks)** Candidates will include the advantages and disadvantages of simulations. The information will be relevant, clear, organised and presented in a structured and coherent format. There may be a reasoned conclusion / opinion. Specialist terms will be used correctly and appropriately. **Level 2 (4–6 marks)** Candidates will include the advantages and disadvantages of simulations. Although development of some of the points will be limited to one side of the argument. For the most part, the information will be relevant and presented in a structured and coherent format. Specialist terms will be used appropriately and for the most part correctly. **Level 1 (1–3 marks)** Candidates will present advantages or disadvantages of simulations. There will be little or no use of specialist terms. Answers may be simplistic with little or no relevance. **Level 0 (0 marks)** Response with no valid content. Examples may include: *Advantages:* Driving schools can test all aspects of driving without worrying about damaging an expensive car Can provide results that are generally difficult to measure such as reaction times Computer simulation can allow you to see how a system might respond before you design or modify it avoiding mistakes It is safer to use a model and simulation for car driving Can be slowed down to study behaviour more closely Is easier to create a simulation of a critical event rather than waiting for it to happen in real life Is easier to create a simulation of different driving conditions rather than waiting for it to happen in real life *Disadvantages:* Sometimes there is not sufficient data to produce a mathematical model Sometimes it is impossible to create simulations that can accurately predict the occurrence / effects of human behaviour The formula and functions that are used may not provide an accurate description of the system resulting in inaccurate output from the simulation Sometimes simulations can require the use of a computer system with a fast processor and large amounts of memory which are very expensive May give drivers a false sense of security regarding their ability to drive.	**8**