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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 **10** 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)	A group of facts which are used in context is called a set of data.		**1**
	Data can only consist of text and numbers.		
	Understanding that Paris, London and Berlin are capital cities of countries in Europe makes this a set of data.		
	Data cannot be interpreted until it has a context.	✓	
1(b)	Data without a context is called information.		**1**
	Data is the result of processing information, usually by computer.		
	Data that has meaning becomes information.	✓	
	Information, when arranged to make meaningful output, becomes data.		
1(c)	**Four** from: It ensures the data is relevant to the study The size of the data sample can be as big or small as needed Phoebe has full control over the method used to collect the data There may be an opportunity to sell the data to other people for them to use The source of the data is known, exactly making it easier to judge its reliability		**4**
1(d)	**Four** from: Buying data loggers may be very expensive Compared to indirect data sources using direct data sources may be very expensive in preparing and carrying out the gathering of data. It takes longer to gather data than to acquire data from an indirect data source The amount of data gathered may be inadequate and not give representative results The pollution could be seasonal and the time of year readings are taken may not provide the required results		**4**

Question	Answer		Marks
2(a)	A sensor is used to store data for later use.		**1**
	A magnetic chip reader is used to enter text directly from a bank card.		
	A bar code reader is used to read magnetic ink characters.		
	A touchpad is used to simulate the behaviour of a mouse when using a laptop computer.	✓	

Question	Answer		Marks
2(b)	A laser printer can only be used to output low volumes of high-quality documents		**1**
	A dot matrix printer can use continuous stationery	✓	
	A plotter is used to output multi-part stationery		
	An inkjet printer is used to output high volumes of low-quality documents		

Question	Answer	Marks
3	**Eight** from: *Advantages* Account details cannot be read by another user … … unless they possess appropriate permissions As modern technology becomes more sophisticated, so do hackers … … so taking security precautions is essential Passwords to access accounts are not enough Without encryption a person/malware could potentially see someone else's account details Does not matter which device (mobile phone/computer) is being used; data is encrypted Reassures bank customers that their data is secure *Disadvantages* If the password is lost or reset, it becomes impossible to gain information from the account Encryption uses a lot of server resources … … requiring processing power and memory In some circumstances it can cause delays in accessing bank's web site Need to buy an SSL certificate … … issued by certificate authorities Encryption means the systems that maintain data encryption must have capacity and upgrades… … which can be quite costly **Must have at least two of each to obtain full marks** **Must be a proper evaluation to obtain full marks** **Max. six marks if bullets/list of points** **Must have expansions to be a proper evaluation**	**8**

Question	Answer	Marks
4	**Six** from: System software acts as an interface between application software and hardware of the computer Application software acts as an interface between user and system software System software is designed to manage the system resources and provides a platform for application software to run Application software is designed for the users to perform their specific tasks System software takes care of memory management/protection/security of the system System software starts running when the system is turned on, and runs till the system is shut down Application software runs as and when the user requests A system is unable to run without system software Application software is not required to run the system; it is user specific and is designed to meet the requirements of the user System software is general purpose whereas application software has a specific purpose System software examples: operating systems, utilities, compilers, interpreters, linkers, device drivers (must have at least two) Application software examples: spreadsheets, databases, word processing, animation software, video editing software etc. (must have at least two) **Must have gained mark for examples of application and mark for system software to gain full marks** **Must have features of both to gain full marks**	6

Question	Answer	Marks
5(a)	**Three** from: It is designed specifically for the task There will be no unnecessary features It does not have to be adapted for use Programmers are available to make any required modifications to the software Programmers will ensure that it is compatible with the existing system and software	3

Question	Answer	Marks
5(b)	**Three** from: Software is cheaper to buy as it is mass produced It will be available straight away <u>Testing has been rigorously carried out by the developers</u> so there are unlikely to be any bugs There will be many sources of support ... ... including helplines with operators who will already have had to deal with a wide range of problems	**3**

Question	Answer	Marks
6	**Six** from: *Advantages* Computer-controlled devices in the home allow people to have more leisure /free time … … instead of doing household work Burglar alarms give people a greater sense of security Do not need to be in the house/devices can be switched on remotely … … when food is cooking/when clothes are being washed/to switch on central heating/air conditioning/to check security/cameras Can leave home to go shopping/to work at any time of the day … … rather than staying in to control the devices Greater social interaction/more family time Can encourage a healthy lifestyle … … because of smart fridges analysing food constituents *Disadvantages* Can lead to people becoming lazy/over reliant on computer-controlled devices in the home There has been a loss of manual household skills … … due to increase in use of computer-controlled devices in the home Devices tend to be more expensive to buy/install than manual devices Devices tend to be difficult/expensive to repair/maintain Hackers can use the devices to monitor the homeowner's behaviour/what they are doing/spy on the home owner Hackers can reprogram locks/doors <u>to enable burglary</u> **Must have one of each to gain full marks** **Must be a proper evaluation to obtain full marks** **Max. six marks if bullets/list of points** **Must have an expansion to be a proper evaluation**	**6**

Question	Answer	Marks
7	**Three** matched pairs from: RSI in the fingers/wrists/carpal tunnel syndrome from continual typing/clicking of mouse Use wrist rests/use ergonomic keyboard Headaches/eyesight problems from eyestrain caused by staring at the monitor for sustained periods Focus on distant objects from time to time/use anti-glare screen /sit at suitable distance from computer screen/use anti-glare dark glasses Upper back/neck problems caused by continually staring at the monitor from below/above Position monitor at eye height and appropriate distance Lower back pain caused by sitting in same position/ having poor posture for sustained periods Use ergonomic furniture/ sit up straight/use a back support/foot rests	**6**

Question	Answer	Marks
8	**Six** from: It uses the Internet or another WAN to transmit data The data remains encrypted throughout transmission Data is only decrypted at the destination computer The process used is called tunnelling (as it uses a secure means to tunnel through a publicly accessible network) Uses public telecommunication systems Normally consists of LANs that may be remote from each other ... ... such as different branches of an organisation It enables organisations to communicate over a large area It is cheaper than creating a conventional WAN The security used consists of firewalls/encryption/the use of IP security (IPsec)	**6**

Question	Answer	Marks
9(a)	**Two** from: It is the global system of interconnected computer <u>networks</u> It uses the Internet protocol suite/packet switching (TCP/IP) to link devices It is a network of networks linked by an array of electronic, wireless, and optical networking technologies	**2**

Question	Answer	Marks
9(b)	**Four** from: Equipment/broadband has become affordable to the general public Hardware has improved in quality Availability of freeware has made software-based video-conferencing accessible to many Can stay at home to communicate with friends/family when it's difficult to travel People have had to use it for work when they have been required to work from home.	**4**

Question	Answer	Marks
10(a)	**Eight** from: Absolute referencing is used by including a $ sign within a cell reference/range Absolute referencing is required when cell references/data/values need(s) to remain constant/stay the same/unchanged/locked after replication If absolute referencing is used cell references/data/values that should increment will not increment Relative referencing is when there are just letters and numbers in a cell reference/range If relative referencing were used, cell references/data/values that should remain constant/unchanged will change/increment SUMIF function consists of a range, the criterion and the sum_range When the formula in D4 is replicated the values in the range/CCode2/G$4:G$11 must remain constant in the cells below When the formula in D4 is replicated the values in the criterion/B4 must change in the cells below/to B5 When the formula in D4 is replicated the values in the sum_range/number of visitors must remain constant in the cells below If relative referencing were used for the range G4:G11 the formula in cell D5 would use the range G5:G12 … … NI (B5) is the fifth element of the range G5:G12 and so the formula sums the fifth element of the range H4:H11 which is actually the value for En If absolute referencing was used for the criterion (B4), the only totals that would be printed would be those for En as B4 doesn't change/no other country would be looked for If relative referencing were used for the sum_range H4:H11, the formula in cell D5 would use the sum_range H5:H12 The first value for NI is in H4 so it would not add 0.53 (the value in H4) and only give the total 0.61	**8**

Question	Answer	Marks
10(b)	**Four** from: Allows what if questions to be asked e.g. the effect on column D of changing individual values in column H Cell protection makes sure that the cells you want do not change by accident such as A3:B7 User interface forms makes it easier to input values into the model (such as F4:H11) Automatic re-calculation means it is not necessary to evaluate a formula every time you change it, such as in D4:D7 if further values were added in columns F, G, H Conditional formatting allows you to highlight certain values that match specific criteria, such as totals in D4:D7 Graphs/charts to detect trends such as number of visitors per month	4

Question	Answer	Marks
11	**Four** from: Any change to one record which is needed can instantly be made to any related records The database does not have redundant data making the file size smaller so less money needs to be spent on storage There is no data duplication so there are fewer errors in the data There is no data duplication so there is less chance of storing incorrect copies of the data Modifying a table is easier as there is less data to modify	4

Question	Answer	Marks
12(a)	**Three** from: The technician would enter the symptoms using an interactive user interface Questions based on these would be asked of the technician by the expert system/user interface The technician would enter answers to these questions The technician would see the probabilities of diagnoses output from the system	3
12(b)	**Three** from: The knowledge engineer is responsible for maintaining the system The knowledge engineer edits/adds the facts in the knowledge base The knowledge engineer edits/adds the rules in the rules base part of the knowledge base The knowledge engineer deletes unused rules from the rules base	3

Question	Answer	Marks
13	**Six** from: There is no single primary key field to uniquely identify each record as there could be other students with the same Second_name A compound key consists of more than one field which collectively uniquely identifies a record It consists of fields, each of which us a simple/foreign key in its own right Studentid and Coursecode would form a compound key in the table It can lead to unnecessary data duplication If a compound key consists of 3 fields there will need to be the same 3 fields in every table where it is used as a foreign key Searches can take longer than if there was a single key field Sorting a table can become more complex In order to avoid using a compound key an additional field would be needed to uniquely identify each record requiring extra storage	**6**

Question	Answer	Marks
14(a)	**Three** from: To remove unwanted/unnecessary parts of the video Convert a long film into a small soundbite/trailer Cut the beginning of the training video/a film that had the camera running before the action started Pulling out a key part of the training video/a video conference Cut the training video/a webinar into bite-sized chunks On the Timeline position the cursor over the in/start or out/end point When the trim handles appear drag the handle to trim the clip then action the trim	**3**
14(b)	**Three** from: To provide additional information/better understanding for viewers – Accessibility for viewers with hearing disabilities If the language used in the video is foreign to the viewer To watch videos in places where audio is unavailable/in a public place Click on the frame/Select the frame/position Select 'caption'/insert text box and type in text	**3**