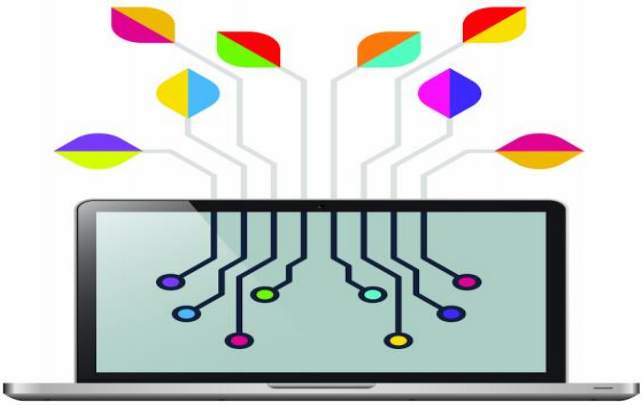
Mark Scheme (Results)

January 2019

Pearson BTEC Level 3 - Computing

Unit 2: Fundamentals of Computer Systems (31769H)



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Unit 2: Fundamentals of Computer Systems

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- All marks on the mark scheme should be used appropriately.
- All marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if a candidate's response is not worthy of credit according to the mark scheme.
- Where some judgment is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt about applying the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed-out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Phonetic spelling should be accepted.

Specific marking guidance

The marking grids have been designed to assess learner work holistically. Rows in the grids identify the assessment focus/outcome being targeted. When using a marking grid, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner's response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer, in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band, depending on how they have evidenced each of the descriptor bullet points.

Question Number	Answer	Mark
1a	A description of two functions to be performed by a server such as: Control access (to the network) (1) by managing user accounts (1) Manage /backup local files (1) by controlling central storage/domain control (1) Maintenance tasks (1) such as rolling out updates to client machines (1) Security (1) by controlling the firewall settings (1) Resource management (1) controlling access to shared resources (1) Internet proxy (1) filtering content / access to the internet (1) Website hosting (1) redirecting/storing files sent by the customer (through the website) (1) Control communication on the network (1) by controlling client machines (1) **Additional Guidance** Accept any other valid response. Typical answer structure – Task (1) description of the process carried out (1) Allow alternative examples for maintenance tasks expansion	4

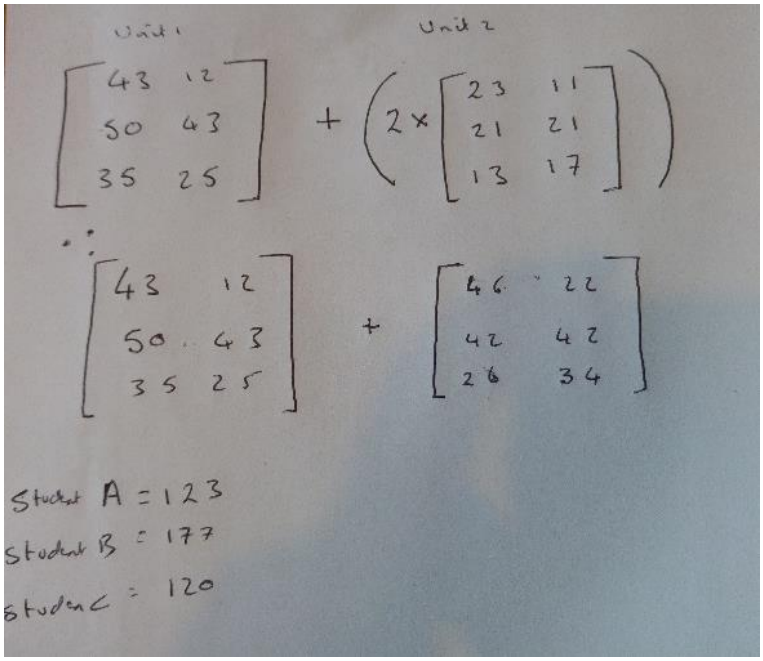
Question Number	Answer	Mark
1b	An explanation to contain two from: 1. Multiple programs (1) 2. Complex processes/rendering (1) 3. Large files (1) 4. Uncompressed/ high-quality image format (1) 5. Prevent dropping performance / improved efficiency (of designer's PCs) (1)	2

Question Number	Answer	Mark
1c	An explanation that contains two from: • The store is networked (1) • Files are likely to be stored on the server (not the computer) (1) • so much of the storage is likely to be redundant / drive is only needed for programs (1) • work will only be stored temporarily (1) **Additional guidance** Allow reference to 'stored on website' or customer SD cards for mark point two.	2

Question Number	Answer	Mark
1d	An explanation of a benefit to the **designers** such as Desk top processors are more powerful (than mobile ones) (1) which will reduce lag/system slow down (1) when editing large files / improving productivity (1) Often have larger screens (1) which makes editing (complex) graphics easier (1) as more of the image can be seen at any one time (1) Can be upgraded/customised (1) such as adding graphics cards to desktop PCs (1) so complex graphics can be process more efficiently / to better meet the designer's needs (1) **Additional Guidance** Accept any other valid response that would be a benefit to a **designer.** Expansions can be combined from different marking points if the linked response makes sense. Identification of two distinct separate benefits e.g. desk top processors are more powerful and often have larger screens is not a linked response and would only gain one mark.	3

Question Number	Answer	Mark
1e	An explanation of a benefit to **David** such as Parts can be replaced (more easily than laptops) (1) so can be upgraded / repaired (1) instead of buying a complete new system (1) They are used in a set location / not regularly moved (1) so are less likely to get damaged/lost/stolen (1) which reduces ongoing maintenance costs / results in fewer repairs (1) Desktops are cheaper to buy (1) so you can get more power for your money (1) so have to be upgraded/replaced less frequently (1) **Additional Guidance** Accept any other valid response Identification of two distinct separate ways and would only gain one mark.	3

Question Number	Answer	Mark
1f	Award **one** mark for correct identification of each OS and a maximum of **two** marks each for suitable explanation. **Till** OS**:** Single-user Single task (1) Reason **two** from: • Only one person goes through a check out at a time (1) • one after the other/sequentially (1) • device is designed for one specific job (1) **Server** OS: Multi user (1) Reason **two** from: • multiple users/clients accessing data (1) • at the same time/simultaneously (1) • performing different tasks (1)	6

Question Number	Answer	Mark
2a	Example answer:  	
	Award **one** mark for each of: • Unit 1 score represented correctly as a matrix • Unit 2 score represented correctly as a matrix Award **two** marks if all three final scores correct A = 123 B = 177 C = 120 **Additional Guidance** One mark can be awarded for final scores if 2 of 3 correct **or** if Unit totals are correct but not added together i.e. A= 89, 34 B =92, 85 C= 61,59 Allow follow through in calculation of final score if matrix representation is incorrect	4

Question Number	Answer	Mark
2b	Example answer: Scores = [23, 33, 56, 91, 87, 76, 12, 17, 10, 33, 54, 54]	
	Award **two** marks for all data correctly written as an array in column major order **Additional Guidance** **One** mark can be awarded if minor transcriptions errors occur but data has clearly been written in column major order. Allow with or without delimiting commas Allow with or without Array Identifier/name Ignore [ ]	2

Question Number	Answer	Mark
2c	Award one mark for each correct binary number • 2 = 00000010 (1) • -24 = 10011000 (left most digit) OR 11101000 (two's complement) (1)	2

Question Number	Answer	Mark
2d	An explanation to contain **four** from: • data redundancy will be reduced (1) • which increases accuracy/reliability of data (1) • data can be normalised (1) • data can be split (into separate tables) (1) • changes to data are applied to linked tables (1) • data can be related to / associated with other data in different ways (1) • allows more complex/customised searches (1) • data can be searched/found more easily (1) • results can show associated information (1) • can be output using reports / customised output formats (1) **Additional Guidance** For Mark point 6 allow examples/descriptions of relationships/links For Mark point 7 allow examples of complex or customised searches	4

Question Number	Answer	Mark
2e	An explanation of the impact on **access** to data to contain a maximum of **four** from: • Some data may not be available (when needed) (1) • May need (to set up a remote) connection to college server/laptop (1) • Need an active network connection more often (1) • Network may not always be accessible (1) • Technicians/college unwilling to provide remote access (1) **AND** An explanation of the impact on **productivity** to contain a maximum of **four** from: • (Remote) processes may take longer (1) • **Reduced** productivity • Hard to locate/access data (due to being stored in multiple locations) (1) • Multiple copies of the same data (1) • Version control/working with out of date data (1) • Retrieving large amounts of data remotely may be slow (bandwidth restrictions) (1) **Additional guidance** To gain the maximum six marks, both access and productivity must be covered	6

Question Number	Answer	Mark
3a	A description of how VoIP allows voice calls to be made to include **four** from: • Convert analogue to digital (and back) • Use of CODEC • (to) Compress/decompress data • Breaks up converted data in to packets • Use of call signalling protocols (Session Initiation Protocol) / creates a 'hand shake' • **routes** the call over the internet/a network • in real time • provides simultaneous (2-way) communication **Additional Guidance** Allow 'full duplex' for mark point 8	4

Question number	Indicative content
3 (b)	An analysis of how packet data is used in transmitting data. **Contents of data packet** The packet is structured into Header, Payload and Footer/trailer **Header** Packet number - allows computer to reassemble packets in to correct order Sender and recipient IP Addresses Protocol to be used in order to identify the type of data being sent and ensure it is handled correctly **Footer** Contains data to show it is the end of the packet, so the system can start to process it. This includes flags to show it is the end of the packet and error correction information Error check/error correction data to automatically identify any corruption so resending of packet can be requested if needed without interaction from the intended user/recipient. **Payload** The main data being transmitted, in the case of large files this will be a 'chunk of the data that will be reassembled when it arrives. **Packet Switching** • Large files are broken down in to smaller packets. • Each packet may take different routes to the intended destination. • As data arrives at each node the route to the destination/route is analysed • If there is a broken link or heavy data traffic the packet will take a different route. • Data packets arrive at different times depending on the route they took. • Data is reassembled using the packet number • The Senders IP address identifies is origin and can be used to request data be resent if there is a problem. • Errors are identified packet by packet. • Only packets where there is error need to be resent.

Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.

Level	Mark	Descriptor
Level 0	0	No rewardable material
Level 1	1–2	Demonstrates isolated knowledge and understanding, there will be major gaps or omissions

		Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question Limited analysis which contains generic assertions rather than interrelationships or linkages
Level 2	3–4	Demonstrates some accurate knowledge and understanding, with few minor omissions/any gaps or omissions are minor Breaks the situation down into component parts and some of the points made will be relevant to the context in the question Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained.
Level 3	5–6	Demonstrates mostly accurate and thorough/detailed knowledge and understanding Breaks the situation down into component parts and most of the points made will be relevant to the context in the question Displays a well-developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner

Question number	Indicative content
3(c)	A discussion of the benefits and drawbacks of using symmetric key encryption Discussion may include: **Benefits** • Offers performance advantages over some public key encryption systems (encryption and decryption can happen more quickly) • Protects data from being read by anybody that doesn't have the key. • Provides reasonable security on a personal file level and adds an extra level of security beyond a user name and password on the user's computer • A relatively simple system, does not need the use of public key servers, complex protocols etc. **Drawbacks** • Simpler to crack than a public key/asymmetric system – can more easily be 'brute force attacked' especially if a short/simple key or less complex hashing algorithm is used • Can be read by anybody that has the key. Therefore if the key is broken or stolen data is still susceptible to man in the middle attacks • The two parties have to agree on and share a 'key' this is much harder to do safely if the two parties cannot meet in person as the key will need to be sent in plain text/unencrypted which makes it susceptible to being stolen. Application to scenario: Responses should consider how this will affect Grant and his clients. They may make reference to issues such as: • Client location (all over the world) • Types of files being shared • VoIP – possibly to discuss/agree the shared key • Levels of security he may need

Mark scheme (award up to 10 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1-4	Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions Few of the points made will be relevant to the context in the question Limited discussion which contains generic assertions rather than considering different aspects and the relationship between them
Level 2	5-7	Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions Some of the points made will be relevant to the context in the question, but the link will not always be clear Displays a partially developed discussion which considers some different aspects and some consideration of how they interrelate, but not always in a sustained way
Level 3	8-10	Demonstrates mostly accurate and detailed knowledge and understanding Most of the points made will be relevant to the context in the question, and there will be clear links Displays a well-developed and logical discussion which clearly considers a range of different aspects and considers how they interrelate, in a sustained way

Question number	Indicative content
4 (a)	A discussion of the suitability of the 'Stored program model' for the suggested system which may include: • Allows a system to be multifunctional • Allows use of multiple different software programs to complete different tasks • The system can be modular – each program will be loaded as needed so not all programs need to be in memory at the same time giving a performance boost. • Conversely there may be poorer performance compared to a device that has just a single function • Parts and programs can be installed/removed/upgraded as needed giving greater flexibility with the way that device is used • Sarwar can use commercially available hardware to build the system (and the available drivers) so will not have to manufacture specific hardware and program all the software needed. • Sarwar would need to consider the size of storage required carefully to allow installation of programs and downloaded content etc Application to the scenario: Responses should refer to the tasks that are required and how the stored program model will aid these: • Streaming music, TV and films from popular web services • Internet browsing • Playback of music and video from optical media • Digital TV recording and playback • Playing games produced by game development companies.

Mark scheme (award up to 10 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1-4	Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions Few of the points made will be relevant to the context in the question Limited discussion which contains generic assertions rather than considering different aspects and the relationship between them
Level 2	5-7	Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions Some of the points made will be relevant to the context in the question, but the link will not always be clear

		Displays a partially developed discussion which considers some different aspects and some consideration of how they interrelate, but not always in a sustained way
Level 3	8-10	Demonstrates mostly accurate and detailed knowledge and understanding Most of the points made will be relevant to the context in the question, and there will be clear links Displays a well-developed and logical discussion which clearly considers a range of different aspects and considers how they interrelate, in a sustained way

Question number	Indicative content

4(b)	An evaluation of the appropriateness of a desktop CPU compared to a Mobile CPU for use within the identified system
	
	Reasons for using a microcomputer CPU
	• Greater performance than mobile CPU due to:
	  ○ Higher clock speeds
	  ○ High number of cores/multithreading
	• Mobile CPU is designed to run on a battery source so is designed with power efficiency in mind rather than performance
	• Ability to allow overclocking to gain extra performance
	• More likely to be able to run modern games
	• May be more easily replaced/upgraded – Mobile CPU's are usually integrated/soldered directly in to the circuit board
	• CPU is unlikely to be integrated with GPU (as with mobile CPUs) which means a higher quality GPU/graphics card can be used
	• Can use/upgrade the cooling systems to ensure greater efficiency of the processor
	
	Reasons against using a microcomputer CPU
	• Due to requiring more cooling (fans etc) the device is likely to be noisier than if a Mobile CPU is used
	• Larger CPU size, additional GPU, cooling etc will make the whole system larger
	• Cost – high powered CPU's are will mean the cost of production (and purchase) will be higher than if a lower powered mobile CPU/system on a chip is used
	• Less energy efficient
	
	Responses should refer to the tasks that are required and how the choice of CPU will impact on these:
	
	• Streaming music, TV and films from popular web services
	• Internet browsing
	• Playback of music and video from optical media
	• Digital TV recording and playback
	• Playing games produced by game development companies.
	
	There should be reference to how the implications impact on the user and the system, these may include reference to:
	
	• Cost
	• Noise (being used in a living room, fans etc)
	• Size of the system/space used
	• Quality of playback/user experience
	
	Learners should include a conclusion that summarises the appropriateness of the decision.

Mark scheme (award up to 12 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1–4	Technical vocabulary is used but is not used appropriately to support arguments in relation to the issues of the question. Few of the points made will be relevant to the context in the question. Limited evaluation which contains generic assertions leading to a conclusion (if present) that is superficial or unsupported
Level 2	5-8	Accurate technical vocabulary is used to support arguments but not all are relevant to the issues of the question Some of the points made will be relevant to the context in the question, but the link will not always be clear. Displays a partially developed evaluation which considers some different competing points, although not always in detail, leading to a conclusion which is partially supported.
Level 3	9-12	Fluent and accurate technical vocabulary is used to support arguments that are relevant to the issues of the question Most of the points made will be relevant to the context in the question, and there will be clear links Displays a well-developed and logical evaluation which clearly considers different aspects and competing points in detail, leading to a conclusion that is fully supported.

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