



Mark Scheme (Results)

June 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 learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Marking grids should be applied positively. Learners must be rewarded for what they have shown they can do, rather than be penalised for omissions.
- Examiners should mark according to the marking grid, not according to their perception of where the grade boundaries may lie.
- All marks on the marking grid should be used appropriately.
- All the marks on the marking grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks, if the learner's response is not rewardable according to the marking grid.
- Where judgement is required, a marking grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the marking grid to a learner's response, a senior examiner should be consulted.

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	<p>A explanation such as:</p> <p>Restricts/limits access (to specific data) (1) so only permitted/appropriate users can read/edit (1)</p> <p>Reduces the chances of malicious/accidental damage (1) by restricting what some users can do with the data (1)</p>	2

Question Number	Answer	Mark
1b	<p>Award one mark for identification of a feature and one mark for an explanation of its use up to a maximum of four marks.</p> <p>Limit number of concurrent logons (from the same username) (1) and log them out if detected (1)</p> <p>Restrict logon time (1) to prevent users accessing the system at unusual times / outside of expected working hours (1)</p> <p>Use auto log-out/prompt for in active users (1) in case the user has forgotten to log out (1)</p> <p>Filter IP address / use a firewall (1) to prevent remote log-on / restrict access to known connections (1)</p> <p>Additional guidance Award a maximum of two marks per explanation</p>	4

Question Number	Answer	Mark
1c	<p>Award one mark for each of:</p> <p>A – (User 2's) Public key B – (User 2's) Private key</p>	2

Question Number	Answer	Mark																																																																																										
	<table border="1"> <tr> <td>Encrypted message</td> <td>I</td><td>L</td><td>E</td><td>E</td><td>W</td><td>K</td><td>C</td><td>G</td><td>S</td><td>C</td><td>V</td><td>K</td><td>G</td><td>V</td><td>H</td> </tr> <tr> <td>Key</td> <td>P</td><td>E</td><td>A</td><td>R</td><td>S</td><td>O</td><td>N</td><td>P</td><td>E</td><td>A</td><td>R</td><td>S</td><td>O</td><td>N</td><td>P</td> </tr> <tr> <td>Plain text</td> <td>T</td><td>H</td><td>E</td><td>N</td><td>E</td><td>W</td><td>P</td><td>R</td><td>O</td><td>C</td><td>E</td><td>S</td><td>S</td><td>I</td><td>S</td> </tr> </table> <table border="1"> <tr> <td>Encrypted message</td> <td>Z</td><td>E</td><td>I</td><td>Q</td><td>S</td><td>S</td><td>U</td><td>M</td><td>C</td><td>Z</td><td>W</td><td>B</td><td>G</td> </tr> <tr> <td>Key</td> <td>E</td><td>A</td><td>R</td><td>S</td><td>O</td><td>N</td><td>P</td><td>E</td><td>A</td><td>R</td><td>S</td><td>O</td><td>N</td> </tr> <tr> <td>Plain text</td> <td>V</td><td>E</td><td>R</td><td>Y</td><td>E</td><td>F</td><td>F</td><td>I</td><td>C</td><td>I</td><td>E</td><td>N</td><td>T</td> </tr> </table>	Encrypted message	I	L	E	E	W	K	C	G	S	C	V	K	G	V	H	Key	P	E	A	R	S	O	N	P	E	A	R	S	O	N	P	Plain text	T	H	E	N	E	W	P	R	O	C	E	S	S	I	S	Encrypted message	Z	E	I	Q	S	S	U	M	C	Z	W	B	G	Key	E	A	R	S	O	N	P	E	A	R	S	O	N	Plain text	V	E	R	Y	E	F	F	I	C	I	E	N	T	
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1d	<p>Award:</p> <p>one mark for correctly entering the key (pearson) and three marks for plain text completely correct</p> <p>Additional guidance</p> <p>At least 4 or 5 words correct (2 marks) 2 or 3 out of 6 words correct (1 mark)</p> <p>Allow follow through for incorrect placement of key word</p>	4																																																																																										

Question Number	Answer	Mark
1e	<p>Any four from:</p> <ol style="list-style-type: none"> Multi alphabetic cipher / more steps to encrypt/decrypt (1) Each letter of the message shifts by a different amount (1) Generates a greater number of permutations for each letter (1) More resistant to frequency analysis (1) Repeated letters are disguised (1) More resistant to brute force attacks (1) The key can vary (in length and complexity) for each message / Caesar can only use a numerical shift of 1-26 <p>Additional guidance Accept reverse arguments i.e. why Caesar cipher is less secure</p>	4

Question Number	Answer	Mark
1f	<p>A description to contain four from:</p> <ol style="list-style-type: none"> 1. Monitors incoming traffic/remote connections (1) 2. Monitors ports (1) 3. Checks IP addresses of data/connections (1) 4. compares (IP addresses) with (user defined) list/rules (1) 5. denies access to unknown/suspicious connections/traffic (1) 6. uses packet filtering (1) <p>Additional guidance Allow 'whitelist' for mark point 4 and 'blacklist' for mark point 5.</p>	4

Total for Question 1 = 20 marks

Question Number	Answer	Mark
2a	<p>An explanation such as:</p> <p>RAM will process data more quickly than secondary storage (1) so the processor can access it more quickly (1) which prevents lag/bottlenecking (1)</p> <p>RAM stores data/programs currently being used (1) faster/better quality RAM allows data to be accessed more quickly (1) which makes games run more smoothly (1)</p> <p>RAM and CPU communicate directly (1) so RAM read/write speed needs to match the processor (1) to meet demands placed on it by the processor (1)</p> <p>Games have multiple/complex instructions (1) Which can be processor/memory intensive (1) faster read write speeds will reduce lag (1)</p> <p>Additional Guidance Allow 'process more information/data' as alternative wording for 'data accessed more quickly'</p> <p>Do not award 'Improves/better performance'</p>	3

Question Number	Answer	Mark
2b	<p>An explanation to contain three from:</p> <ul style="list-style-type: none"> • Adjusting the clock speed (1) • to one higher than that intended by the manufacturer (1) • by altering the voltage (1) • so that it performs instructions more quickly (1) <p>Additional guidance Do not allow 'improves performance'.</p>	3

Question Number	Answer	Mark
2c	<p>An explanation of a drawback of overclocking such as:</p> <p>The processor can overheat (1) as it is running at a speed not intended by the manufacturer (1)</p> <p>The processor may become unstable (1) causing the computer to crash (1)</p> <p>The chip may become damaged (1) because the processor is consuming more power (than intended) (1)</p> <p>Will shorten the effective lifespan of the chip (1) as the processor is running outside the limits that it has been tested (1)</p> <p>The CPU will get hot (1) so additional cooling will be needed (1)</p> <p>Additional Guidance Accept other appropriate responses</p>	2

Question Number	Answer	Mark
2d	<p>A description to contain four from:</p> <ol style="list-style-type: none"> 1. an additional software layer (1) 2. creates a virtual environment 3. sits between the game/guest and the OS/host computer (1) 4. translates instructions (1) 5. adjusts system performance /mimics system architecture(1) 6. allows the host machine to behave in a way similar to the emulated system (1) <p>Accept other appropriate responses</p>	4

Question number	Indicative content	
2e	<p>An analysis of the role of system interrupts when playing computer games</p> <p>Interrupt – A signal from either hardware or software that requires immediate attention.</p> <p>Possible hardware interrupts:</p> <ul style="list-style-type: none"> • Player input such as Keystroke/gamepad to control an in game character • Inter-processor interrupt – if the system uses more than one processor one processor would interrupt the other (e.g. if instructions are being processed by different processors the most vital instruction will take over) <p>Possible software interrupts:</p> <ul style="list-style-type: none"> • System critical information/monitoring information (e.g. Processor overheating, virus alerts etc) • In game processes that are flagged as more important such as: <ul style="list-style-type: none"> ○ Player pressing 'pause' ○ Instructions relating to 'in game' action would be of higher importance than background action ○ Player to player messages <p>Analysis should be in relation to computer games</p>	
<p>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*.</p>		
Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1–2	<p>Demonstrates isolated knowledge and understanding, there will be major gaps or omissions</p> <p>Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question</p> <p>Limited analysis which contains generic assertions rather than interrelationships or linkages</p>
Level 2	3–4	<p>Demonstrates some accurate knowledge and understanding, with few minor omissions/any gaps.</p> <p>Breaks the situation down into component parts and some of the points made will be relevant to the context in the question</p> <p>Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained.</p>
Level 3	5–6	<p>Demonstrates mostly accurate and thorough/detailed knowledge and understanding</p> <p>Breaks the situation down into component parts and most of the points made will be relevant to the context in the question</p> <p>Displays a well-developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner</p>

Total for Question 2 = 18 marks

Question Number	Answer	Mark
3a	<p>A description to contain four from:</p> <ol style="list-style-type: none">1. Uses a straw/tube/wand2. Use mouth (instead of hand)3. Removes need for keyboard/mouse4. Breath in and out / changes in airflow5. Provides (alternative) system input6. Varied breath strength7. Navigate GUI/menus <p>Additional guidance Allow examples of input and navigation for mark points 5 and 7</p>	4

Question number	Indicative content
3b	<p>An analysis of how issues of compatibility might affect TechAssist and their customers</p> <p>Tech assist:</p> <ul style="list-style-type: none"> • Assistive tech is quite specialised so getting drivers may be difficult. • OS may not include the drivers as the drivers are only usually included for common devices • Set up may take a while as thorough testing may need to be carried. • Assistive tech is often produced by small specialised companies that may not have the resources to test on a range of devices so the devices may perform erratically when connected to the computer systems TechAssist use. • May need to provide more technical support which has time and cost implications. <p>Customers:</p> <ul style="list-style-type: none"> • If a piece of technology performs erratically it may endanger the user • There may be a delay in the client receiving much needed assistance while the company test the technology • Users may not be able to afford to buy different technology if the system they currently use is not compatible with the new tech • A new computer system that is compatible with new tech may not run some of their current software/assistive apps • Purchasing a new system that is compatible with the tech may take longer to learn to use for a user who has additional needs (e.g. users with loss of sight will need to learn the where icons or physical buttons are now located) • Assistive tech takes a long time to set up, transferring their current systems and settings to a new machine may take some time

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	
3c	<p>Indicative content</p> <p>A discussion of the uses of hardware and software in a smartphone to support users with sight loss:</p> <p>Software:</p> <ul style="list-style-type: none"> • Text to speech features • Voice recognition • Mapping software – voice directed navigation • Automated alerts • Device drivers to support connection and control of assistive peripherals • OS accessibility features e.g. reading caller ID instead of just displaying, customisable audio alerts etc <p>Hardware</p> <ul style="list-style-type: none"> • Haptic feedback /vibration function • GPS – voice directed navigation • Camera • Microphone • Speaker <p>Assisting users with sight loss The discussion should cover a range of ways in which a smartphone provides support for users with sight loss. This may include:</p>

	<ul style="list-style-type: none"> • Character recognition – ability to scan a physical document with the camera of the smartphone which can be converted to a text document by the phone and then read aloud • Object recognition – recent developments in AI has led to the development of phone apps which allow users to capture a device with the camera and then the device can tell the user what it is. This is beneficial particularly for pictures of objects or physical objects that the user can not touch • Importance of convergence – all the hardware needed is contained in one easy to carry device <p>Reference to standard smartphone functions (e.g. calls, text, internet) should only be accepted if clearly related to support of users with sight loss and not just general benefits/uses</p>
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<p>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*.</p>		
Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1-4	<p>Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions</p> <p>Few of the points made will be relevant to the context in the question</p> <p>Limited discussion which contains generic assertions rather than considering different aspects and the relationship between them</p>
Level 2	5-7	<p>Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions</p> <p>Some of the points made will be relevant to the context in the question, but the link will not always be clear</p> <p>Displays a partially developed discussion which considers some different aspects and some consideration of how they interrelate, but not always in a sustained way</p>
Level 3	8-10	<p>Demonstrates mostly accurate and detailed knowledge and understanding</p> <p>Most of the points made will be relevant to the context in the question, and there will be clear links</p> <p>Displays a well-developed and logical discussion which clearly considers a range of different aspects and considers how they interrelate, in a sustained way</p>

Question number	Indicative content
4 (a)	<p data-bbox="501 159 1390 226">A discussion of how Jared could use software to help manage and maintain the laptops the digital artists use.</p> <p data-bbox="501 257 619 286">Manage</p> <ul data-bbox="550 322 1401 685" style="list-style-type: none"><li data-bbox="550 322 1321 389">• User level settings to only allow admin to install/alter software<li data-bbox="550 398 1385 465">• Use system firewall to allow remote access from the office server/technicians computer only<li data-bbox="550 474 1401 542">• Ensure computers have unique names/identifiers and use a database to log their issue, update, maintenance etc.<li data-bbox="550 551 1278 618">• Use of calendars etc to schedule the maintenance, upgrades etc for laptops<li data-bbox="550 627 1310 685">• Use of back-up software to schedule backups for the system. <p data-bbox="501 721 632 750">Maintain</p> <ul data-bbox="550 786 1409 1149" style="list-style-type: none"><li data-bbox="550 786 1409 925">• Automatic updates enabled – set the laptop to automatically update with standard updates when internet connection available OR set up so that targeted updates are install when connected to the office network.<li data-bbox="550 934 1394 1037">• When setting up the laptops, set up one laptop with all the programs etc. Create a ghost image of this machine and use this to roll set up all other laptops.<li data-bbox="550 1046 1409 1149">• Use network management software to roll this image out to multiple computers at the same time, or individual computers as needed.

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)	<p>An evaluation back up policy outlined in Figure 3.</p> <p>The evaluation should consider extent to which the policy would protect the data, how recovery may be affected and how the policy could be improved.</p> <p>Areas of policy that may be covered:</p> <p>System to be backed-up – This only covers the server. There is no inclusion of how data held on the laptops is synced with the server or backed-up.</p> <p>Type of back-up: A full back-up will ensure n data on the server is missed, however full back-ups can be inefficient as any data that has not been altered is also backed-up. Backing up data that has previously backed up results in very large back up files and takes significantly longer than only backing up data that has changed.</p> <p>The staff also produce digital graphics etc. which are typically large files which will mean a full back up for 100 people will be very large</p> <p>Time of back up: Every Friday – Only backing up once per week for a business is not a good idea. If a system crash occurs then up to a full weeks worth of work can be lost. Therefore data is smaller more frequent back-ups would be a better idea to ensure a higher chance of data being recoverable in the event of a disaster</p> <p>Doing a single back-up also results in a much larger back-up</p> <p>Storage medium: Solid State Drive – SSD should provide a sufficient storage space for a system back up (max size as of 2019 = 100TB) However it is good practice to have multiple generations of back up. A single drive may not provide sufficient space for this, it is also bad practice to store all generations on the same drive. There for the system may require multiple back-up drives (it is not clear form the policy if only one or multiple are being used)</p> <p>Solid state drives would provide good read-write speeds but are very expensive.</p> <p>Location of backup: Office server room - Server Rack 2. It is bad practice to keep the back-up in the same physical location as the system being backed-up/ Although this makes data recovery easier (not reliant on location of a removable medium or use of remote services/data connections), in the event of physical damage to the server room such as fire, flood etc. the backup is also in danger of being damaged.</p>

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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