Pearson BTEC

Mark Scheme (Results)

January 2022

Pearson BTEC Nationals
In Computing (31769H)
Unit 2: Fundamentals of computer systems

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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.

BTEC Next Generation Mark Scheme

Question Number	Answer	Mark
1a	Any **three** from: • Connected to the internet (1) • Prevent remote/unauthorised connections/access (1) • He is holding sensitive/personal data (1) • Legal requirement (to provide adequate protection) (1) • Can filter connections/specific data/ specific devices/traffic (1) **Additional Guidance** Accept examples of personal/sensitive data for MKPT 3 Allow 'prevent hackers' for unauthorised access	3

Question Number	Answer	Mark
1b	Award **one** mark for the identification and **one** additional mark for the appropriate expansion to a maximum of **four** marks. Encryption (1) so data is unreadable (without a key) (1) Anti-virus/anti-malware (1) to prevent/detect malicious code/software (1) Back-up (1) so if data s lost/corrupt it can restored (1) Set access levels / protect with a password (1) so only authorised users can see/edit data (1) Additional user level security (e.g. biometrics, two-factor authentication) (1) to secure staff accounts (1) Physical security measures (1) to protect the company server (1) **Additional guidance** Allow "security software" for anti-virus/anti-malware.	4

Question Number	Answer	Mark
1c	Award **one** mark for the identification and **one** additional mark for the appropriate expansion to a maximum of **four** marks. Scanner/camera (1) read/scan the QR code on the ticket (1) (onscreen) Keyboard/keypad (1) enter booking reference (1) OCR (reader) (1) to read the booking reference number (1)	4

Question Number	Answer	Mark
1d	Award **one** mark for each correct row. **Sensor A** / **Sensor C** / **Safety gate** ON / ON / ON OFF / OFF / OFF OFF / ON / OFF ON / OFF / OFF **Additional guidance.** Accept 1/0 and true/false for gate and sensor logic Accept open/closed for gate logic.	4

Question Number	Answer	Mark
1e	An explanation to contain **two** from: • Higher image quality • Can be manipulated more easily • Need to be used for different purposes/sizes • Customers more likely to buy / better customer satisfaction	2

Question Number	Answer	Mark
1f	An explanation such as: Range (1) camera is likely to be far away from the booth (1) and out of the effective range of a wireless connection (1) Bandwidth (1) pictures are uncompressed/large file size (1) so there will be lots of data to transfer (1) Signal Reliability / wireless signals may drop out (1) and data corrupted/lost (1) picture cannot be retaken (1) Transmission speed / image will be transferred quickly (1) so images will be ready when customer finished the ride (1) which will avoid long wait times/reduce queues (1) Security (1) reduce man-in-the-middle attacks (1) to prevent unauthorised access/malicious code injection/data theft (1)	3

Question Number	Answer	Mark
2a	An explanation to contain **three** from: • A temporary data store (1) • for active programs/instructions (1) • ready for the processor to access • to speed up execution (1)	3

Question Number	Answer	Mark
2b	An explanation such as: More data/instructions can be preloaded (1) which reduces delay/lag (1) when executing/processing (1) Improved multi-tasking (1) as more programs can be loaded (1) without drop in performance (1) **Additional guidance** Accept alternative wording Accept any appropriate benefit associated with greater memory available	3

Question Number	Answer	Mark
2c	A description such as: Data buffer (1) between storage and processor (1) Speed matching (1) between fast processor and slower memory/storage (1) Read-ahead/read-behind (1) stores adjacent data /data that is likely to be accessed next (by the operating system) (1). High speed memory location (1) stores recent/next instructions (ready for the CPU) (1) **Additional guidance** Allow 'Stores **temporary** data for the processor', or similar response.	2

Question Number	Answer	Mark
2d	A description to contain **four** from: • The kernel (1) • Handles program interrupts (1) • Schedules tasks (1) • Decides how much CPU time/resources to allocate (to each task/program) (1) • Based on importance (1) • Idle / less important tasks receive less CPU time (1) • Rapidly switches processing time between different tasks (1)	4

Question Number	Answer	Mark
2e	**An explanation of a benefit such as:** Usually more powerful (1) which will support more effective multi-tasking/multimedia processes (1) Often have more threads per core (1) which makes data processing more efficient (1) **And an explanation of a drawback such as** Larger than mobile chips (1) which will make the overall device larger/more difficult to fit in the car (1) Require additional cooling (1) which impacts on the size of the device (1) Less power efficient (1) which may cause greater drain on the car's battery (1) **Additional Guidance** Award a maximum of two marks for a drawback and a maximum of two marks for benefit.	4

Question Number	Answer	Mark
2f	Award **one** mark for the identification and **one** additional mark for the appropriate expansion to a maximum of **four** marks. Provide each with its own processor (1) so Unit A doesn't need to multi-task (1) Provide Unit A with a dedicated GPU (1) to reduce strain on main CPU (1) Provide more RAM / cache / system memory (1) so more data can be loaded ahead of time (1) Provide a faster/wired data connection (1) between Unit A and Units B and C (1) Upgrade the processor (higher clock speed/more cores) (1) so that instructions are executed more quickly / to ensure better multitasking (1) Use video compression/reduce video quality (1) to reduce the amount of data being sent to the devices (1)	4

Question Number	Answer	Mark
3a	A description to include **four** from: • Packets are numbered • Packets can be rearranged (in to correct order) • Missing packets can be identified • Contain IP Addresses • Sender and receiver clearly identified • Protocol is defined • The packet tells the system how the data should be transmitted and processed • Contains error checking data • Missing/corrupted packets can be resent **Additional Guidance** Allow 'sequence' for packet numbers	4

Question Number	Answer
3b	An analysis of how protocols govern and control data transmitted over a network **Indicative content** **General:** • Protocols set the rules and procedures for transmission of data • Allows each computer/system to be aware how data will be transmitted, in what format and how it should be processed • Data for different purposes will have different protocols. • For example, the OSI model determines the structure of data and how it is transmitted over a network. **Example Protocols** HTTP –used to control the transmission and receiving of web pages HTTPS – Secure version of HTTP that uses encryption to protect data during transmission POP/IMAP – used control of receiving/incoming emails – POP will download to target device and erase from server. IMAP will keep a copy on the server SMTP – used to control the sending /outgoing emails FTP – used for transferring files directly to a device or server TCP/IP – A set of protocols used to allow devices to connect and communicate over a network

Level	Mark	
	0	No rewardable material
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
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.
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	Answer
3c	A discussion of benefits and drawbacks of using open-source security software **Indicative content** **Benefits** Cost – Open source may be significantly cheaper than proprietary software. However, open-source systems for "enterprise" and servers may require additional support. Code is viewable so can be audited for flaws/issues so issues can be identified more quickly. Can be edited/modified so it can better fit client/user needs. Possibly a wider range of choice, when people make their own modifications and variations to a program, they often make it available to the public. **Drawbacks** Compatibility – There may be some issues of compatibility especially if a proprietary OS is being used. Similarity/difference to systems users are familiar with – clients for whom he has installed the network may be unfamiliar with the software and so will require extra training. Some open-source software is slow to be developed/updated as they are often a hobby/project. Lack of formal support – some open source does not have a formal support structure from the developer and users have to rely on community support. Open access to the code may allow people to spot/develop/exploit weaknesses.

Level	Mark	
	0	No rewardable material
1	1-3	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
2	4-6	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
3	7-8	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		Answer
4a		A discussion of the types of computer systems that Marvin could choose. Learner responses may be quite varied. The question allows for learners to approach the question in many ways. Content here is designed as a guide and is not an exhaustive list. **Computer systems that may be discussed:** • servers • personal computers (Desktops and laptops) • single board computers • mobile devices (smartphones, modular smartphones, specialist phones, tablets, laptops, wearable computers) • digital cameras • navigation aids • Cloud based services **Discussion** Learner discussion and choice of system should be appropriate for the given scenario. Key factors learners should consider include: • Small Business (three people) • Small office and travelling required • New business – costs, availability of equipment, speed of deployment etc. • Networked systems vs stand-alone systems
Level	Mark	
	0	No rewardable material
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
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
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		Answer
4b		An Evaluation of choice of spreadsheet software rather than database software for data storage and manipulation **For:** • A range of built-in formulas and functions to allow detailed and complex analysis • Would be good for analysing energy data, showing trends etc • Can easily generate graphs etc. to visualise data • Ease of use – typically easier for less experienced users than DBMS software • Availability – spreadsheets are usually packaged with most office suites whereas DBMS is often an additional extra. **Against:** • Data redundancy – storing data in a spreadsheet can lead to greater replication of data, which may cause errors, compared to a database that can create related data tables and enforce integrity • Not recommended for personal data (formatting, security etc) • Searching and sorting become less efficient the larger the data set gets, compared to a database where data will be more compartmentalised. • Often less secure than a DBMS which can provide more granular control over access to specific parts of the data **Evaluation** Learners should present a conclusion supported by the points they have made. They should reference the appropriateness (or not) of the choice in relation to the tasks that the company has to perform.
Level	Mark	
	0	No rewardable material
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

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.
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.