Mark Scheme (Results)

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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.

- Mark 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 mark grid, not according to their perception of where the grade boundaries may lie.

- All marks on the mark grid should be used appropriately.

- All the marks on the mark 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 mark grid.

- Where judgement is required, a mark grid will provide the principles by which marks will be awarded.

- When examiners are in doubt regarding the application of the mark grid to a learner's response, a senior examiner should be consulted.

Specific marking guidance

The mark grids have been designed to assess learners' work holistically.

Rows in the grids identify the assessment focus/outcome being targeted. When using a mark 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	Award **one** mark for the identification and **one** additional mark for the appropriate expansion to a maximum of **four** marks. Camera (1) so they can **scan** the QR code (1) Apps (1) so they can **decode** the QR code (1) Data Connection (1) so they can check the ticket against the booking database (1) Portable / light weight / easily carried (1) so staff can check tickets at the door/at seats (1) On-screen keyboard / **touch** screen (1) to manually enter booking ref (1) **Additional guidance** Accept examples of 'data connections' for MP3 identification Allow 'barcode' for QR code	
		4

Question Number	Answer	Mark
1b	A diagram showing a potential system. Award **one** mark for inclusion of each of: 1. Suitable user devices (e.g. customer device, printer, server etc) (1) 2. Appropriate connection types (1) 3. Issuing e-ticket via email (1) 4. Issuing of physical ticket (1) 5. Sensible data flow **direction** between systems (1) 6. Sensible actions/data/ information shared between system components (e.g. Checking database for availability/reserving ticket) (1) **Additional Guidance** For MKPT6 'sensible data flow' should be awarded for understanding of both direction of data flow and the data/requests that would pass between them	
		6

Question Number	Answer	Mark
1c	An explanation such as: Data only travels in one direction (1) from the microphone to the receiver/speakers (1) A microphone is only used for input (1) so data only has to travel in one direction (1)	2

Question Number	Answer	Mark
1d	Any **three** from: • Image/picture quality is retained (1) • No data is lost (1) • Can re-build original file (1) • Can include meta data (e.g. subtitles) (1) • Reduced/smaller file size (than original) (1) **Additional guidance** Allow examples of contents of meta data for mark point 4 e.g. subtitles, location data, camera settings info.	3

Question Number	Answer	Mark
1e	An explanation such as: File sizes are usually larger (compared to lossy) (1) which will take longer to transfer/compress/decompress (the video file) (1) There is more data to decompress (1) which can cause lag when processing (1) **Accept any other appropriate response** **Additional Guidance** For 'lag' marking point allow examples of issues caused by lag. E.g. not syncing with live performance	2

Question Number	Answer	Mark
1f	An explanation such as: FEC will correct errors **automatically** (1) so data does not have to be resent / delayed (1) which means that the video will stay in sync with the performance (1) **Accept any other appropriate response.** Accept reverse arguments (e.g. why ARQ is LESS appropriate)	3

Question Number	Answer	Mark
2a	Award **one** mark for the identification and **one** additional mark for the appropriate expansion to a maximum of **four** marks. Use email (1) and include questionnaire as an attachment / provide it **directly** to targeted sample group (1) Post on social media (1) as an online poll/so it can be shared/in special interest group (1) Provide a link (1) to an online survey/form (1) Use share tools (within application/office software) (1) to upload to cloud storage / send via distribution list (1) Use web browser (1) to upload to a website/platform (1) **Accept any other appropriate response.** Allow brand names for social media platforms	4

Question Number	Answer	Mark
2b	Award **one** mark for the identification and **one** additional mark for the appropriate expansion to a maximum of **four** marks. Must have an **active** data connection to (recover/back up data) (1) which may mean data is not always available (1) Large files may be slow to back up (1) as they will have to be transferred over different networks / due to bandwidth limits (1) Others have control over your data (1) which may cause privacy concerns / support issues (1) May need to pay an ongoing fee (1) which may become expensive (1) Limited **free** storage (1) may not be able to back up all data (1) He may have upload/download limits (ISP) (1) which may restrict access (1) Data may be less secure (1) due to man-in-the-middle attacks/targeted attacks on the cloud provide (1)	4

Question Number	Answer	Mark
2c	Award **three** marks for correct answer 4.83 to 4.85Mb – Using 1024 and depending on rounding 5.06 to 5.08 Mb – using 1000 and depending on rounding **Additional guidance** Award 2 marks for at least two out of three conversions correct but incorrect total Award 1 mark if one or fewer conversions correct but then total added correctly based on **learner's** converted values	3

Question Number	Answer	Mark
2d	An explanation such as: Arrays should only hold a single data type/all data should only be numbers (1) but array 2 contains a string (1) which cannot be used in a calculation (1)	3

Question number	Indicative content

2 (e)	An analysis of how Luciano could make use of validation when collecting and processing his data.
	
	Checks he may wish to carry out:
	• limiting the number of options (e.g. fox is either adult or pup, the area in which the data was collected etc)
	• data type restriction (e.g. number only for sightings, time and date formats)
	• format restrictions (e.g. may code some information such as adult/pup to 'A' and 'P', area codes)
	
	The learner may make reference processes and validation in relation to the information being collected in the scenario:
	• Number of foxes seen over a seven-day period
	• The areas in which foxes are sighted
	• The time of day foxes are sighted
	• If the fox seen is an adult or pup
	
	Processes and collection that learners may make reference to:
	• Forms and questionnaires from members of the public
	• Processing/analysing the data:
	   o Checking data that is being fed into a program (e.g. type checks)
	   o Checking that results are sensible

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	Answer	Mark
3a	A description to contain **four** from: 1. Cache is fast access memory/ faster than RAM (1) 2. Works as a buffer / speed matches (1) 3. between processor and storage (1) 4. make use of prefetching (1) 5. queues adjacent/most likely/frequently used data (1) 6. frees up the processor / reduces bottlenecks (1) 7. reduces **load** times (1)	4

Question number	Indicative content
3b	An analysis of how Anaya could increase the execution speed of her computer and the implications that this may have. **Methods of increasing execution speed**: • Overclocking • Replace/upgrade processor • Make use of more and/or RAM with better read/write speeds • If using HDD make use of solid state drives instead • If using HDD defragment her drive • Update her operating system/software • Run anti malware programs • Free up space on her drive **Implications that could be covered:** • Costs – replacing/buying new parts etc • Compatibility – new hardware and software may result in older HW/SW no longer being compatible with the system • Damage to computer – overclocking can cause the processor to overheat which can damage the chip • Additional HW/SW – Overclocking or replacing the chip may require additional hardware such as cooling **Reference to the scenario may include (but not limited to):** • Unstable software such as emulation software • Performance – improved performance or attempt to simulate how programs may run o different hardware • Unreliable tests – artificially clocked processors may perform inconsistently compared to a processor designed to run at higher speeds or may appear to run better than it would on other computers with a similar specification. • Likely to require multiple programs running simultaneously – replacing the processor with a higher clocked multi-core processor and adding extra RAM is likely to to give better performance

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

3c	A discussion of thee data transmission protocols that would be used when completing Anaya's daily tasks
	
	Protocols that could be covered:
	• HTTP
	• HTTPS
	• POP3
	• IMAP4
	• SMTP
	• VoIP
	• FTP
	• TCP/IP
	
	Reference to the scenario:
	• Writing programming code –
	    o HTTP/HTTPS – use of online code repositories or online IDES
	• Producing assets for use in the software she develops –
	    o HTTP/HTTPS – Collecting 3rd party content to include, use of online software
	• Transferring files to web-based servers –
	    o FTP
	• Communicating with clients –
	    o POP3/IMAP4/SMTP – email with clients
	    o VoIP – video chat with clients
	• Building and maintaining e-commerce sites (webstores) for clients
	    o FTP – transfer the system files to the server
	    o HTTPS – ensure data is encrypted

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	1–3	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
Level 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
Level 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	Indicative content

4 (a)	A discussion of how Lucy could use software to protect data
	
	Areas that could be discussed:
	• Operating systems features:
	    ○ Usernames and passwords to restrict access to the system
	    ○ access settings (levels of access etc)
	    ○ timed sessions (e.g. not logging in out of work ours)
	    ○ disabling concurrent logons form the same username
	• Utilities
	    ○ Encryption
	    ○ Firewalls
	    ○ Two factor authentication processes
	    ○ Anti-malware
	    ○ Anti-phishing
	    ○ Data back-up and recovery
	    ○ VPN
	
	Discussion should be related to the use of data listed in the scenario which includes:
	• Personal information such as name, date of birth, address
	• Passport information
	• Bank and payment card details
	
	Areas of discussion may include:
	• Transfer of data between customer, company and third parties for making bookings
	• Limiting access to the data to only these that need to see it
	• The sensitivity of the data

Level	Mark	Descriptor
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 choice to use a virtual server rather than a physical server. Responses should consider the benefits and drawbacks of each option and then reach a supported judgment as to the decision **Physical server:** **Potential Benefits** • Not reliant of internet connection • Under your own control • Potentially more secure due to not being hosted, therefore less likely to be targeted **Potential Drawbacks** • Initial start up cost can be high • Lucy would be responsible for the maintenance and running of the server • May need to employ a specialist technician • Will need a dedicated space, cooling etc which may cause problems/disruption, or require moving to a new office. **Virtual Cloud based server:** **Potential Benefits** • 'instant' start up – no need to wait for server etc to be installed • Maintenance, backup etc is taken care of by the hosting company • Potentially better support/easier for a non specialist • No need to upgrade hardware etc as it gets old • Scalability (ease, cost, reactivity) • Easier for remote access **Potential Drawbacks** • Hosting companies are more likely to be targeted by hackers as they are considered 'high value' • Ongoing monthly costs often based on usage/traffic so if it is used a lot it can become more expensive than running a physical server • Lucy can't access any data or systems if the internet connection is down • If the company goes out of business she will lose access to all her files

	• Performance can be slower than a physical machine – cheaper options from hosting companies share hardware (processors etc) in a data centre rather than using dedicated hardware. • Depending on where the data is stored, she will need to check data protection policies to ensure that she is not in breach of UK legislation.

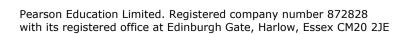| **Mark scheme (award up to 12 marks)** refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1–4	Technical vocabulary is used but is not used appropriately to support arguments in relation 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.