Mark Scheme (Results)

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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.

BTEC Next Generation Mark Scheme Template

Question Number	Answer	Mark
1a	A description to contain **two** from: • Uses a stylus / touch screen (1) • Similar to using pen and paper (1) • Pressure sensitive (1) • More precise (than mouse) (1) **Additional Guidance** Allow - integrated (touch) screen (1) allows user to see the result as they are drawing (1)	2

Question Number	Answer	Mark
1b	A description to contain **two** from: • Performs rendering / (1) • Texture mapping (1) • geometric/(complex) mathematical calculations (1) • Provides a frame buffer (1) • Reduces load on CPU (1) **Additional Guidance** Allow "generates pixels" for mark point 1 Allow 'Pipelining' Allow examples of geometric/mathematical calculations for mark point 3	2

Question Number	Answer	Mark
1c	A description to include **four** from: • Breaks the process down (in to smaller steps) (1) • Queues processes / instructions (1) • Different part of the CPU/GPU used at the same time (1) • More calculations can be performed (at the same time) (1) • Frames are drawn faster / increases frame rates (1) • Reduces delay while instructions are fetched (1) **Additional Guidance** Allow 'reduces lag/bottlenecking' for mark point 6	4

Question Number	Answer	Mark
1d	Award **one** mark for any of the following up to a maximum of two marks: Uses a matrix structure (1) with each square/pixel representing a small part of the image (1) A grid/map of colours (1) which matches bit for bit how it will be displayed (1) Each pixel is stored (1) along with its colour value (1)	2

Question Number	Answer	Mark
1e	An explanation such as: There are fewer pixels in the image (1) which means less data has to be stored (1)	2

Question Number	Answer	Mark
1f	Award **two** marks for the correct string: 3Y 6B Y 2R 4Y 4B Award **one** mark for 5 out of 6 runs correct. **Additional guidance** Allow for other acceptable for demonstrating RLE. E.g. letter then number or represented as two separate arrays, character delimitators for runs Accept with or without the number '1' for single Y	2

Question Number	Answer	Mark
1g	Award **one** mark for the identification and **two** additional marks for the appropriate expansions to a maximum of **six** marks. Bandwidth must be shared (1) between all guests in the hotel (1) which will result in lag/slow loading times (when using large files) (1) The connection is not secure (1) which means data can be intercepted (1) which places his company's server at risk (1) Wi-Fi may provide limited bandwidth / be unstable (1) which may make editing files difficult (1) due to slow data transfer speeds (1)	6

Total for Question 1 = 20 Marks

Question Number	Answer	Mark
2a	Award **one** mark for the identification and **one** additional mark for the appropriate expansion up to a maximum of **four** marks **A – Automated gun trigger** Simplex (1) the trigger/sensor will only ever send data to the gun / the gun will never send information to the trigger (1) **B – Pack communication** Half-Duplex (1) Two way communication is needed (but only in one direction at a time) (1)	4

Question Number	Answer	Mark
2b	An explanation to contain **three** from: • Each players' data can be stored in a separate array / multiple sets of data can be stored (1) • There are three distinct data sets (for each player) • Data sets are separate but related (1) • Allows for data to be found/accessed/extracted more easily (1) • Data can be processed as a whole or individually (1) • The data will be grouped together in memory (1) • The data can be processed more quickly (1) • The data is temporary/is replaced with each new game (1) • Allows more than one data type to be stored (1) • Scalable / number of players per game may change (1) **Additional Guidance** To award 'quicker', 'easier' etc (MKPTs 4 & 7) there must be clear understanding of the actions involved e.g. 'processed, located etc.	3

Question Number	Answer	Mark
2c	Award **one** mark for the identification and **one** additional mark for the appropriate expansion to a maximum of **four** marks. Range check (1) make sure the result of the calculations is in an expected range (e.g. not exceeding 100%) Type check (1) ensure imported data/data to be processed is numerical (1) Presence check (1) ensure that results/processed data is in required location/field/record (1) Format/picture check (1) ensure that entered data meets a pre-set format (e.g. set to a certain number of decimal places (1)	4

Question Number	Answer	Mark
2d	Award **one** mark for the identification and **one** additional mark for the appropriate expansion The index (of the array) is just a number (1) so will need to be assigned to a specific person to make sense. (1) The array positions will apply to a different person each game (1) so will need to be put in a form that assigns the points to the correct person (over a number of games) (1) To convert the data to different data types (e.g. integer, float etc.) (1) so percentage calculation can be done. (1) Change the format (1) so that it matches / can be added to the table. (1)	4

Question Number	Answer	Mark
2e	**Example flowchart:**	

Example flowchart:

```
                              ┌─────────┐
                              │  Start  │
                              └────┬────┘
                                   ↓
                         ┌──────────────────┐
                         │ While game active=│
                         │      True        │
                         └────────┬─────────┘
                                  ↓
                         ┌──────────────────┐
                         │ Disarm auto gun  │
                         └────────┬─────────┘
                                  ↓
                         ┌──────────────────┐
                         │  Wait 1 minute   │
                         └────────┬─────────┘
                                  ↓
                         ┌──────────────────┐
                         │  Arm auto gun    │
                         └────────┬─────────┘
                                  ↓
        No                    ╱╲         Pressure
      ╱────╲      No        ╱    ╲       sensor
Yes ╱ Gun   ╲ ←────── ←    ╱      ╲      pressed?
 ← ╲ hit?   ╱            ╲        ╱
    ╲      ╱              ╲      ╱
     ╲    ╱                ╲    ╱
      ╲  ╱                  ╲  ╱
       ╲╱                    ╲╱
                              ↓ Yes
                         ┌──────────────────┐
                         │  Shoot 5 times   │
                         └────────┬─────────┘
                                  ↓
                         ┌──────────────────┐
                         │ Disarm auto gun  │
                         └────────┬─────────┘
                                  ↓
                         ┌──────────────────┐
                         │ Wait 45 seconds  │
                         └────────┬─────────┘
```

7

Award one mark for each of the following included in the flow chart:

- Gun is unarmed for first minute of the game (1)
- Decision box showing correct logic for if sensor is triggered with labelled 'yes' and 'no' routes leading to correct logical processes (1)
- Gun fires 5 shots after being triggered AND then recharges for 45 seconds (1)
- Decision box showing correct logic for if gun is shot by player with labelled 'yes' and 'no' routes leading to correct logical processes (1)
- Correct logic for checking if recharging/not allowing the gun to be hit when recharging (1)
- Correct logic for checking if game has ended (with appropriate outcomes) (1)
- Use of suitable looping structure to keep gun operating for whole game (1)

Total for Question 2 = 20 Marks

Question Number	Answer	Mark
3a	A description to include four from: • improve compatibility (1) • enable devices to communicate (with the operating system) (1) • identifies the hardware/device (1) • translate program instructions (1) • provides device specific commands (1) • allows user to alter specific/advanced settings/properties (of the device) (1) **Additional Guidance** Allow 'code in a format the computer/device understands' or similar as an alternative wording for mark point five.	4

Question Number	Answer	Mark
3b	An analysis of how the choice of file system would affect the use of the computer system **Indicative content** **General** – The file system controls how data is stored and retrieved by the operating system. Controls 'indexing' which identifies where the data is stored on a computer system, gives it an identifier and relates it to other data so that the correct data can be retrieved when needed. The choice of file system may be dependent on the choice of operating system but also on other devices. Carl uses a range of devices so the most compatible may be needed **Compatibility** Some operating systems and/or programs do not support some file systems (e.g. ext4 a linux file system is not readable by windows) Some devices/media can only use specific file systems e.g. external drives/memory cards are typically formatted to FAT32. Optical media use the ISO file system **Usage** The file system can affect a number of ways it can be used such as: • Limits to the size of file that can be used • Different levels of security and file usage permissions • Levels of encryption, compression etc	

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	Mark
3c	A discussion of the benefits of CLI and GUI for the identified tasks **Indicative content** **GUI** It is to be used by children so suitable because: • Generally more intuitive • Less skill required to use it (point and click) • Information can be supported by images/icons to aid understanding – useful if children are younger and/or have less developed literacy skills Suitable for learning applications because: • Learning can be supported by images, animations etc.	

	• Children will not have to learn the commands as well as the music software which will make it more accessible **CLI** Will be suitable for Carl's maintenance tasks because: • Tasks can be carried out quickly using a single (or very few) commands. • The number of steps for completing tasks is reduced as Carl does not have to go through a number of menus, programs etc. • System software/utilities will not take up as much space on the computer's hard drive as they will not need to have a graphical interface installed • Requires much less processing power which can be saved for the learning/creation tasks – may allow him to run actions in the background • Suitable for remote maintenance of a system as no graphical data needs to be sent over the network.

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

Total for Question 3 = 18 Marks

Question Number	Answer	Mark

4a	A discussion of the implications of enabling the staff to communicate with the company server when travelling
	
	Indicative content
	
	Positive impacts on work/business
	    • Remote access to and sharing of resources
	    • Can sync shared data when on the move
	    • Better version control of shared documents (update when travelling not just when at office)
	
	Connection methods
	A discussion of the types of connection that may be used by the travelling staff such as:
	    • Use of the smartphone to provide an internet connection, sharing data between the two devices etc.
	    • Use of ad-hoc networks such as public wi-fi or internet connection provided by customers/suppliers
	
	Implications of the connection methods such as:
	    • Relative speeds/bandwidth and impact on productivity
	    • Reliability of connection
	    • Security implications
	    • Costs to the company of mobile data plans
	
	Security considerations:
	Coverage of the security concerns with travelling and accessing the work server remotely:
	    • Need to ensure a secure connection to the server
	    • Possible use of tunnelling/VPN to provide a secure connection when using ad-hoc networks
	    • Ensure the connection cannot be exploited when by others on the same ad-hoc network
	    • Use of encryption on data in case data is intercepted during transmission	

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	Mark
4b	An evaluation of how the decision to use local back up will impact on backup and recovery procedures **Indicative content** The learners response should cover the positive and negative aspects of the decision and be supported by issues relevant to given scenario i.e. local vs third party hosted back-up, such as: **Volume of data to be backed up** • Choice of media – something that can cope with the amount of data generated now and in the future • Scalability – if initial thoughts are incorrect (i.e. the chosen media provides too much or not enough space) is it scalable? • Impact on when and how often data is backed up and the implications for this on the company **Security** • If the back up is local/on site how is the data protected against fire or disaster that physically affects the rest of the system • What are the security procedures for the data, e.g. is the data to be encrypted when backed up? Does this add complexity to the process or slow it down? **Archiving** • Out of date/non essential data archived to reduce size of backup and protect data **Portable devices** • How is the data on the portable devices (laptops and smartphones) backed up? • How is duplication/out of date data dealt with and included/excluded from the backup? **Data recovery** • Considerations for accessing the backup in a timely fashion • Searching a backup for a specific piece of data/file • Policies for data recovery times and procedures – who is responsible etc. **Evaluation** The learner should consider the use of local against the use of cloud and may cover areas such as: • Cost – paid for service vs paying for own equipment and staff • Trust – requirement of trust in a third party to keep your data safe	

		• Infrastructure – data connection and bandwidth issues with using off site provision vs locally hosetd provision
		• Data centres vs own servers – redundancy, mirroring etc
		• Remote works/travelling staff –
		     o ease of syncing to work server vs use of a cloud service. Security provisions for these two options.
		     o If work server is backing up to a cloud server it may be easier o make the laptops backup directly to the cloud service
		
		A conclusion is expected that draws upon their discussion to state if they think use of local is a better option or not for the given scenario.

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.

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