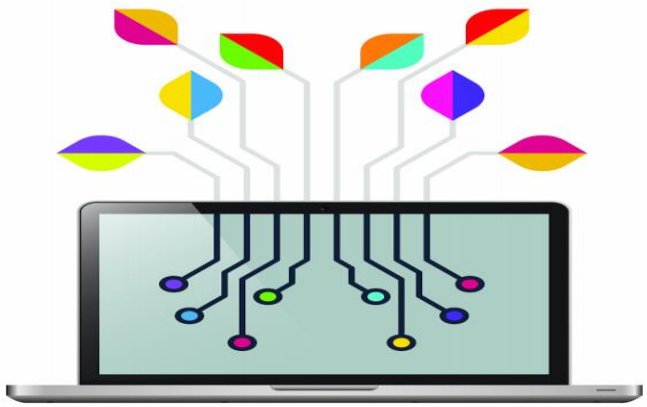
Mark Scheme

January 2020

Pearson BTEC Level 3 - Computing

Unit 2: Fundamentals of Computer Systems (31769H)



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Unit 2: Fundamentals of Computer Systems – sample marking grid

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: 1. Greater bandwidth 2. Allows more simultaneous connections 3. Faster **data transfer** speed 4. Greater signal range 5. Will need fewer connection/access points 6. Wi-Fi is (generally) more secure 7. Wi-Fi more appropriate for server/network access **Additional Guidance** Do not accept 'faster' on its own. Accept faster communication/connection for mark point 3.	3

Question Number	Answer	Mark
1b	An explanation such as: The system cannot get a (GPS) signal / signal is weak (1) due to the walls of the building/being indoors (1) The GPS signal is interrupted (1) as it needs 'line of sight' / direct line of communication (to the satellite) (1)	2

Question Number	Answer	Mark
1c	An explanation such as: Place QR codes /barcodes (around the museum) (1) which the device could scan (1) using a (built in) camera (1) Wi-fi (1) identify network access point (NAP) being used (1) auto load suggestions (about that area) (1) Display a map (on device) (1) which is interactive (1) users can select their location (1) Bluetooth (1) device would automatically receive information (1) when in range (1) **Additional Guidance** Accept examples of specific information that could be loaded e.g. 'may load a webpage' as part of learners' explanations.	3

	Accept "load specific/relevant information" only as part of a linked response.	

Question Number	Answer	Mark
1d	A description such as: (Audio) tour guide / narration/alternative languages (1) explaining/describing items in the museum (1) Provide directions (1) to places of interest (1) Accessibility feature (1) providing verbal feedback to the user (e.g. reading out menu options) / descriptions of locations (1) Provide an alert (1) when a point of interest is nearby (1) **Additional Guidance** Accept other uses of audio that are appropriate to the given scenario. Accept examples of how sound can be used as an accessibility feature e.g. text to speech	2

Question Number	Answer	Mark
1e	An explanation such as: It is a busy/public place (1) so sound will be difficult to hear (from a speaker) (1) because there is lots of back ground noise (1) Audio is provided to that user only (1) allowing users to select if they want to hear it or not (1) so other visitors are not disturbed/audio is not mixed up (1)	3

Question Number	Answer	Mark
1f	Award **one** mark for the identification and **one** additional mark for the appropriate expansion to a maximum of **four** marks. Less accessible (than GUI) (1) as relies on text / less likely to use icons (1) Can be difficult to find information (1) as user may have to go through sub menus / regularly change menus/sections (1) Can't access a feature/information directly (1) which may annoy/frustrate/confuse users (1) Can be inefficient (1) for **experienced** users (1)	4

Question Number	Answer	Mark
1g	An explanation such as: Device (can be) locked as a standard user / admin user blocked/hidden (1) to restrict tasks/access/permissions (1) so system settings cannot be altered (1) Restricts the number of tasks it can perform (simultaneously) (1) so only the information system will run (1) to prevent malicious software/actions (1)	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. Card Reader (1) to allow payments to be made (1) Touch screen/keyboard/microphone (1) so drivers can enter their licence plate before paying (1) Key pad (1) to type in PIN when paying (1) NFC reader (1) to allow contactless payments (1) Cash input slots/note reader (1) to accept cash payments (1)	4

Question Number	Answer	Mark
2b	An explanation such as: All data will be of the same type (1) and used for limited number of operations/functions (1) so you can store them using a single identifier (1) Length of the array can be fixed (1) length set as maximum number of parking spaces (1) which will help calculate when full/no of spaces available (1) Dynamic access (1) Data can be removed from the array/edited in any order (1) as people won't pay/leave in the order they arrived (1) They could be stored in adjacent memory locations (1) which is more efficient (1) and will improve the performance of the system (1)	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. To connect to banks/access payment details (1) to confirm/verify/process payments (1) To allow back up (1) to a remote server (1) To allow remote connection (1) for system maintenance/updates / to a database (of license plates) (1) To send diagnostic/use data (1) to the company management/head office (1) To send alerts/alarm (1) to (third party) security firm (1)	4

Question Number	Answer	Mark
2d	An explanation such as: Resolution may be reduced (1) which would affect the quality of the image (1) Image will be less clear (1) making it harder to automatically read / recognise the number plate (1)	2

Question Number	Answer	Mark
2e	Award **one** mark for each of: • **Box A** - <=30 min / <31 min • **Box B -** <=60 min / <61 min Award **two** marks for: **Box C** – £0.50 + ((duration – 1 hr)*£0.70) **Additional guidance** Award 1 mark for a partially correct formula in box C that attempts to calculate the initial 0.50 charge + 0.70 rate but does not deduct the first hour at 0.50. Accept calculations that do not allow for partial hours.	4

Question Number	Answer	Mark
2f	Award **one** mark for each of: • Decision box showing a logical check of sensor triggered (1) • Decision box showing checking number plate against paid (1) • Correct and logical outcomes from all decisions (1) **Additional guidance** Correct outcomes are: • Sensor triggered – Check number plate • Sensor not triggered – loop • Number plate = paid – open barrier • Number plate = not paid – error For mark point 3 allow follow through for logical errors or omissions in Mark points 1 and 2	3

Question Number	Answer	Mark
3a	A description to contain **four** from: • A collection of opcodes (1) • In low level programming language (1) • Creates link between software and hardware of the system (1) • By providing specific commands (to the processor) (1) • Tells the computer how to perform actions (1) • Each command will control one action (1)	4

<table>
<tr><th colspan="2">Question Number</th><th>Answer</th></tr>
<tr><td colspan="2">3b</td><td>An analysis of how the function of registers impact on the way computer systems work

Indicative content

General:
• Small high speed memory locations
• Part of/linked to the processor
• Designed to hold data for the processor when the computer is functioning
• May be read only/write only
• May have specific functions

General purpose registers:
• Can be used for different purposes such as storing data or instructions
• Used to store data in the event of an ‘interrupt’ being triggered so it is ready for when the computer restarts

Special registers:
• Accumulator – can be used as general purpose register but is mostly used to store intermediate results of a process or series of calculations
• Instruction register – holds the current instruction being executed
• Memory address register (MAR) – holds the address(es) of data that is being stored in memory so that it can call/retrieve it when needed
• Memory data register (MDR) – holds data that has been called from memory so that it can be used/executed by the processor
• Program counter – holds the memory address of the next instruction</td></tr>
<tr><td>Level</td><td>Mark</td><td></td></tr>
<tr><td></td><td>0</td><td>No rewardable material</td></tr>
<tr><td>1</td><td>1-2</td><td>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</td></tr>
<tr><td>2</td><td>3-4</td><td>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</td></tr>
</table>

		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 how the stored program model revolutionised computing and a key factor in making computer systems available to all. **Indicative content** • Instructions can be stored in memory and can be accessed/changed as required by the user or by another program • Computers can be used for more than one task • Previously computers had a single purpose and had to be physically remodelled in order to complete a new task • Storing data and instruction means the user doesn't have to re-configure or program the computer themselves. Programs can be installed that tells the computer what to do. • All modern computers use this principle • The basis of multi-functional devices, without this we would have to have a single device for every single task. • Without the stored program model the concept of convergence (as with modern smartphones) would not be possible. • Allows for mass production as one device can be put to multiple uses. • Standardises the way in which devices operate which allows for more people to write programs and expands their usage	
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	Mark
4a	A discussion of the factors Ramesh should consider so that the hardware he chooses gives a good user experience. **Indicative content** Ease of use • Device will be used when user is active so complicated input not advised • Input devices/mechanisms that allow simple operation, e.g. touch screen, simple touch/home button voice control • Standard connections such as Bluetooth/USB – no need to find proprietary cables, familiar pairing process to other devices etc. • Screen – o Small enough to be sensible for wearing when exercising but large enough to display required information o resolution/clarity Performance • Type of processor and memory to be chosen – trade-off between performance and weight • Power efficiency of components/Battery life – may be worn all day/night needs to not require charging every day • Range of features to give a more readily meet user needs e.g. GPS, Accelerometer etc. • Consider how to avoid accidental activation/deactivation by clothing, movements in exercise being etc. • Moisture proofing – does it need to be full waterproof (i.e. for swimming) or just rain repellent? Availability • Decision to use more cutting edge hardware that may provide better performance but may be more expensive and harder to source or with more main stream hardware. • Harder to source/newer components may have compatibility issues with some other components. Users may have to 'update' firmware more often • Using more readily available component means manufacture and repair of device would be cheaper Accessibility • Hardware should be useable by all • Considering accessibility would ensure a greater number of users would be happy to use the product	

		• Some accessibility features could also enhance the product for all users when exercising e.g. Voice control.
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

<table>
<tr><th colspan="2">Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td colspan="2">4b</td><td colspan="2">A discussion of how hardware and software would be used to collect and process data.

Indicative content

Hardware
• Use of a range of sensors (Heart rate,
• Collect live information
• Use of storage on the tracker to store data until it can sync with a device (SmartPhone/Computer) to link information
• USB or wireless to sync data with the device - connection will need to provide enough bandwidth to communicate efficiently
• Live/permanent connection may be needed – decide between GPS built in or using a connection to make use of GPS built in to smart phone

Software
• Some minor data analysis/calculations carried out by the trackers firmware – e.g. converting steps in to distance
• App to provide more sophisticated data analysis such as target weigh, BMI etc.
• App can provide more visual data representation of data such as graphs, route maps etc.
• Ability to convert/export data for use in other programs and/or social media integration</td></tr>
<tr><td>Level</td><td>Mark</td><td colspan="2"></td></tr>
<tr><td></td><td>0</td><td colspan="2">No rewardable material</td></tr>
<tr><td>1</td><td>1-4</td><td colspan="2">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</td></tr>
<tr><td>2</td><td>5-8</td><td colspan="2">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</td></tr>
</table>

3	9-12	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