GCSE 9-1

Computer Science

Mark Scheme for Mixed Paper 1

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| **Question** | **Answer** | **Mark** | **Guidance** |
| 1 | a |  | 1 mark ber bullet, max 2* Faster transmission speeds
* Connections not obstructed by walls
* More secure (as a physical connection is needed)
* Max distance for reliable communication is longer
* Higher bandwidth
* No interference
* Not very mobile
 | 2 |  |
| 1 | b |  | 1 mark ber bullet, max 2* Easier setup
* Easy to connect devices into network
* Cheap (do not need to purchase wires, only WAP)
* Very mobile
 | 2 |  |
| 1 | c | i | * Covers a small/local geographical area
* Uses internal/has its own infrastructure/cables/hardware for connections
 | 2 |  |
| 1 | c | ii | * Covers a large geographical area
* Uses external hardware/infrastructure/cables for connections
 | 2 |  |
| 1 | d |  | 1 mark for reason, 2 marks for explanation* No. of devices
* ...large number of devices reduces performance
* ...as devices must share bandwidth
* ...more devices means higher chance of collisions
* Bandwidth
* ...smaller bandwidth, less data can be transferred per second/unit of time
* ...smaller bandwidth reduces performance
* Hardware used
* ...fibre optic wires have higher bandwidth/can transmit data faster
* ...using fibre optic wires increases performance
* ...hub-based network has higher latency than switch-based network
* ...so using a hub results in poorer performance
* Latency
* ...higher latency means larger delay between when data is sent and received
* ...higher latency results in poorer performance
* Error rate
* ...more errors means data has to be resent, taking time
* ... higher error rate reduces performance
* Interference
* ...thick walls can result in weak Wi-Fi connection
* ...interference from devices with an electro-magnetic signal can cause dropped connections
* ...high levels of interference result in poorer performance
 | 6 |  |
| 2 | a |  | 2 marks per component, 1 for naming, 1 for explaining its purpose* Control Unit
* ...decodes instructions
* ...issues control signals to hardware
* ...moves data around system
* ...controls execution of instructions in correct sequence
* ...contains system clock which controls processor timing using regular pulses
* Cache
* ...stores frequently used instructions/programs/data
* ...increases access speed improving performance
* ...data does not need to be fetched from RAM
 | 2 |  |
| 2 | b |  | FULL name of register needs to be entered1 mark per correct name

|  |
| --- |
| **Name of Register** |
| Memory Address Register |
| Memory Data Register |
| Program Counter |
| Accumulator |

 | 4 |  |
| 2 | c | i | 1 mark per bullet, max 2* Small computer system that forms part of a larger system
* Has a limited number of tasks
 | 2 |  |
|  |  |  | * Any suitable example, e.g. dishwasher, microwave
 | 1 |  |
| 3 | a |  | * Non-volatile
* Contains BIOS/bootstrap
 | 2 |  |
| 3 | b | i | * 8 \* 1000 \* 1000
* 8,000,000 Bytes
 | 2 |  |
| 3 | c | i | * Solid state box ticked
 | 1 |  |
| 3 | c | ii | 1 mark for benefit of solid state, 1 mark for linking to situation* Faster access speeds
* ...his projects will load/open faster
* Very portable/small physical size
* ...can transport files/projects very easily
* Very durable
* ...projects will not be lost easily
* ...no moving parts
* Not sensitive to being moved
* ...Ruben can transport his projects easily
* Reliable
* ...Low chance of his projects being lost accidentally
* Sufficient/large capacity
* ...can store many projects without needing multiple USBs
 | 4 |  |
| 3 | c | ii |  |  |  |
| 4 | a |  | 2 marks max per processMemory Management* Puts applications that are in use/to be used into RAM/Main Memory
* Takes programs not being used out of RAM
* Moves programs to and from Virtual Memory

Multitasking* Allows more than one program to (appear to) run at the same time
* Shares processor time between tasks
* Splits processor time into “time slices”
* Allocates time slices to each process
 | 4 |  |
| 4 | b | i | * Compression is reducing the size of a file

Needed to: (1 mark max for items below)* Allow files to be uploaded to the internet faster
* Allow files to be downloaded from the internet faster
* Maximise storage space in a computer/storage device
* Allow files to be sent as attachments in emails (or other services)
 | 2 |  |
| 4 | b | i | * Lossy compression permanently deletes data
* ...whereas lossless compression doesn’t delete any data
* ...whereas lossless compression uses algorithms to encode data and store differently
* With lossy compression, the file can never revert back to the original
* ...whereas with lossless compression, the file can be turned back into the original file
* Lossy compression reduces file size more
* ...whereas lossless compression is less effective at reducing file size
 | 2 |  |
| 4 | b | iii | 1 mark for type of compression, 2 marks for explanation* Lossy
	+ Achieves higher compression/smaller file size/faster streaming than lossless
	+ Sound can still be listened to/understood at a lower quality
 | 3 |  |
| 4 | b | iv | 1 mark for type of compression, 2 marks for explanation* Lossless
	+ Book must be exactly as originally written with no data removed
	+ Otherwise the book cannot be understood/is unintelligible.
 | 3 |  |
|  |  |  |  |  |  |
| 5 | a |  | * Each character is given a numeric code
* This code is then stored in binary
* Characters can take 7 bits, 8 bits or 16 bits depending on character set
* Text is stored as series of binary numbers
 | 2 |  |
| 5 | b |  | * 100 0010 (1 added to code for A)
 | 1 |  |
| 5 | c |  | * 100 0100 (3 added to code for A)
 | 1 |  |
| 5 | d |  | Allow use of numbers given in parts b and cMust be binary code for D then binary code for A then binary code for B in orderOne mark for each correct letter, must be in order* 1000100 1000001 1000010
 | 3 |  |
| 5 | e | i | * Unicode
* Unicode uses 16 bits to represent each character
* Can represent a very wide range of characters including emojis
* Can represent 2^16 characters
 | 3 | Need to give the name of character set or do not award marks for explanation |
| 5 | e | ii | 1 mark per bullet to max 3* ASCII
* Uses 7 bits to represent each character
* Do not need more than 7 bits to represent each character
* Represents english letters and numbers and basic symbols.
* Represents all characters needed in an english children's book
* Using a different character set is unnecessary
 | 3 | Need to give the name of character set or do not award marks for explanation |
| 5 | f |  | * Will divide it
* By 4 (by 2 x 2) (by 2^2)
 | 2 |  |
| 5 | g |  | * 00011010
 | 1 |  |
| 5 | h |  | Give 2 marks if answer given* 16 + 8 + 2
* 26
 | 2 | Allow use of the answer from part f |
| 6 | a |  | 2 mark per bullet, max 2* It is a parameter
* It is a variable used in a subroutine/function/procedure
* Allows us to pass values/data into a subroutine/function/procedure
* Acts as a placeholder for data entered when the function is called
 | 2 |  |
| 6 | b |  | 1 mark per bullet, max 2* Breaks down / decomposes / modularises the problem / program // structures the program
* …making it easier to design/create/test
* …each subroutine can be tested separately
* Reuse code (in different programs)
* …quicker to develop (new) programs
* …build on existing work / use of a library of subroutines
* Avoid repetition of code (in the same program)
* …makes program shorter / smaller
* … subprogram called instead of copying/pasting.
* … quicker to develop (new) programs
* Easier to maintain …as code is easier to understand/read
* …as code is shorter
* Easier to debug
* …as code is shorter
* …same bugs will not have been copied to other areas of the program.
* Work can be split up in a team
* ...to suit developers’ skill set
* …to work on different subprogram at the same time / develop separately
* Allows for abstraction / removes complexity
* …subprograms can be used by programmers who do not need to understand how they work.
 | 2 | Allow “can be called multiple times”Allow “file size is smaller”.Do not allow “more efficient” without further explanation. |
| 6 | c |  |

|  |  |  |
| --- | --- | --- |
| **size** | **result** | **noOfItems** |
| 0 |  | 0 |
| 8 | even | 1 |
| 11 | odd | 1 |
| -1 |  | 1 |

 | 4 |  |
| 6 | d |  | * Creates a 2 dimensional array that stores 5 items across and 2 items down (or 2 items across and 5 items down)
* Asks the user for the barcode ID and stores it in an appropriately named variable
* Asks the user for the season of the item of clothing and stores it in an appropriately named variable
* Adds the barcode ID to the array
* Adds the season to the array
* Adds these items to the array so that they are held “together”
* Repeats bullets 2,3,4,5 and 6
* ...4 more times (5 times total)
 | 8 | Example program:array clothing [4,1]for x = 0 to 4 barcodeID = input("Enter barcode ID") season = input("Enter season") clothing[x,0] = barcodeID clothing[x,1] = seasonnext x |

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