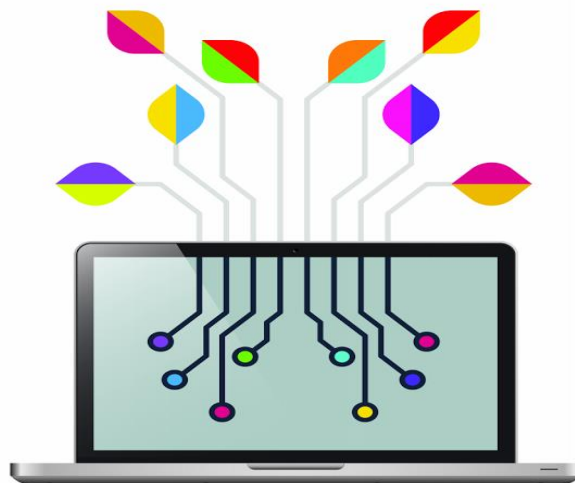Examiners' Report/
Lead Examiner Feedback

Summer 2017

BTEC Level 3 Nationals in Computing
Unit 2: Fundamentals of Computer
Systems (31769H)

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Unit 2: Fundamentals of Computer Systems (31769H)

Grade	Unclassified	Near Pass	Pass	Merit	Distinction
Boundary Mark	0	12	25	39	56

Introduction

This is the first examination of Unit 2 (Fundamentals of Computer systems) for BTEC Level 3 National in computing which was available for first teaching in September 2016. This unit is a mandatory unit for all learners studying either the Extended Certificate (360 GLH), Foundation Diploma (510 GLH) or Extended Diploma (1080 GLH).

This unit, along with Unit 1 (Principles of Computer Science), are assessed through a written examination paper. The examination is designed to test learners' understanding of computer systems within a range of contexts. The paper is divided into four main questions, each with a number of sub parts. Each main question is based around a unique scenario which is outlined at the beginning of that questions and additional information and/or stimulus is provided with individual parts as required. While appropriate credit is given for learners who demonstrate appropriate 'stand-alone' knowledge. More successful learners can apply their understanding to the scenarios provided in the question.

The paper is designed to assess the full grade range of the qualification; as such the paper is ramped so that it gradually increases in difficulty as the questions progress with a higher percentage of 'Pass' targeted marks in the earlier parts of the paper and the higher-grade questions towards the end.

Introduction to the Overall Performance of the Unit

While detailed analysis of specific questions in the paper appears later in this report it should be noted that many learners appeared to not possess some of the basic subject knowledge and vocabulary one would expect from a learner following a Level 3 computing qualification.

The performance of many learners was also hampered by limited understanding of the requirements of different command verbs. Centres are encouraged to look at the sample assessment materials, and previous papers as they become available, with learners and ensure they are familiar with the design and expectation of the paper. Ensuring that learners are aware of the requirements of particular command verbs, definitions of which can be found in the specification for this unit, would greatly improve learner performance.

While it was clear that some centres had made use of the sample assessment materials, for which they should be commended, often learners repeated answers verbatim from the preparation when presented with similar topics. While these learners were able to demonstrate some understanding and were duly credited, these response were often not applied to the given scenario and therefore often only demonstrated superficial understanding. Centres are encouraged to work with learners in exploring Computing use in a range of scenarios and adapting responses to suit these scenarios.

Individual Questions

The following section considers each question on the paper, providing examples of learner responses and a brief commentary of why the responses gained the marks they did. This section should be considered with the live external assessment and corresponding mark scheme.

Question 1(a)
The majority of learners were able to achieve some marks here by demonstrating knowledge of the use of application software. Most learners were able to achieve 1 or 2 marks, typically for identifying that a spreadsheet program could be used to meet the needs of the user and that this would allow the user to display the data as a graph.
Many the number of learners achieving all marks for this question was quite low. This was usually due to limited application to the scenario and poor answer structure.
The command verb for this question (describe) implies that a linked response is required and in the question form 'Describe how...' suggests that a step by step process is required. As the question is worth 4 marks, four distinct parts of the process are required.

Describe how Gareth could use application software to analyse the data he has collected.
(4)

Gareth could use application software such as Microsoft Office Excel to set up a table with each player's details. This software can then be set to highlight the names of the players with the highest scores in each test as well as to highlight or explicitly show the names of the players with poor results eg in red. In addition, this software can be used to keep track of all results in all tests, then that data can be used to create a graph showing the trends in test scores

3 marks given
'Microsft excel' (1) MKPT 2 – Branded software names were credited but it would be expected that a Level 3 computing learners should use appropriate software terminology eg spreadsheet.
'Create a graph' (1) MKPT 5
'Showing trends' (1) MKPT 4
Lines 3-6 are an example of how the data could be used and would be enough for MKPT4 however, this has already been achieved for 'showing trends'.

Describe how Gareth could use application software to analyse the data he has collected.

(4)

Gareth could use software to analyse the data collected by using graphs or ~~a~~ a table on edexcel. This can be accessed and edited during the process. He can analyze the data and see where improvements need to be made.

2 marks given
'by using graphs' (1) MKPT 5
'See where improvements need to be made' (1) - alternative wording MKPT4 - Monitor/predict performance
'Table on edexcel' - not enough for the mark - While branded software was accepted (eg. excel/access) for MKPT 2 We would have to infer that is what the learner meant so mark not awarded.

Question 1(b)
While most learners were able to achieve some marks here the overall performance was poor with most learners only gaining 1 or 2 marks out of 4 and a surprising number of learners did not achieve any marks.
The performance of many learners on this question was hampered by poor exam technique and poor decoding of the question. The command word 'Explain' requires a linked response constructed of a point and a suitable number of expansions, as dictated by the mark tarif. This questions is an 'Explain two...' style question for 4 marks which suggests that two points each with a single expansion should be made. Many learners did not provide expansions to the points they made which meant they limited their possible marks.
Application of knowledge to the given question scenario is was also a concern here. Many learners showed that they understood differences between GUI and CLI however this was often presented in the form of recalled general facts and was rarely applied correctly to the given scenario ie why GUI is suitable for a tablet computer.
Level 3 learners should be able to apply their knowledge in a range of scenarios and not just recall facts that are not always relevant.

Explain **two** reasons why a GUI is most suitable for a tablet computer.

(4)

1 A tablet computer has to be slim, meaning that there isn't enough space to include a physical keyboard for inputs. Instead, an on-screen keyboard can be used which require the tablet to use GUI

2 GUI is most suitable because the tablet will be using a touch-screen which allows a user to click on the screen, meaning that they can click on the GUI

1 mark achieved
Response 1
No awardable content - Although there is reference made to the onscreen keyboard there is no consideration of how this may make it difficult/inefficient for typing.

Response 2
Touch screen (1)

Explain **two** reasons why a GUI is most suitable for a tablet computer.

(4)

1 touch screen needs big buttons for comfortable use as finger can move about in a hand held device, comands would be very difficult to type on a touch device

2 GUI is intuitive, anyone can pick a device read what buttons say and carry out often done tasks

3 marks total
'Touch screen (1)...can move about in a hand held device (1) - Just enough for a linked response fo MKPT 1
'Commands would be very difficult to type on a touchscreen (1) MKPT 4 GUI is intuitive - Although this is mark worthy on its own it does not form a linked explanation so the fourth mark cannot be awarded.

Question 1(c)

As with the first two questions in the paper many learners did not perform as well as would be expected. Many learners did not appear to have the level of technical understanding that would be expected of a level 3 computing learner; again this shortfall in what would be considered basic technical knowledge was compounded by poor exam technique.

Many learners did not provide suitable linked responses (ie. a point followed by two appropriate linked expansions) and often repeated parts of the question. At this level learners are expected to provide the technical reasons there would be a difference in the quality produced by the two devices.

(c) Gareth uses the built-in camera in his tablet computer to record videos of the judo players when they are training.

Explain **one** reason why using the built-in camera might produce videos that are of poorer quality than those produced by a dedicated video camera.

(3)

Since the camera that is built into a tablet is often smaller it does not have features such as optical zoom, therefore when you use zoom on a tablet the video is cropped and the resolution is decreased, giving a poorer quality than a dedicated camera.

Three marks awarded against MKPT 2
'Does not have optical zoom' (1)
'Video is cropped' (1)
'Resolution is decreased' (1)

Explain **one** reason why using the built-in camera might produce videos that are of poorer quality than those produced by a dedicated video camera.

(3)

An buit in Camera on a device is Multifunctional as the device was built to do other task, where as, and dedicated video Camera was designed to do a Specfic task which is to Record video at high quality.

1 mark achieved

'Device is multifunctional' (1)

The rest of the response is in essence just repeating what has been given in the stem/question by defining what 'dedicated' means, this does not answer the question. Responses should give reasons why there are quality differences between dedicated cameras and those in mobile devices.

Question 1(d)

The overall statistics show that mot learners performed well on this question (over half achieved 2 or more marks out of 3). Typically learners were able to identify a suitable device and generally achieved one mark for a partial description of the process.

However, a number of improvements in learner performance across the board can be identified on this question which centres should apply to learner preparation which would improve overall examination performance.

Again, learners' technical vocabulary and understating does not appear to be at the level expected for a level 3 computing qualification. For example the use of the term USB on its own, to imply a storage device is not appropriate at this level.

Exam technique could also be improved here. In questions such as this when a description of how a device could be used is required, more detail is required than many learners provided. 'Describe how...' here implies a step by step process is required. During teaching phases, it may be beneficial to leaners for them think of these types of questions as if they are teaching somebody how to do this. Therefore they should not assume any steps and be clear and concise with their instructions.

Identify one storage device and describe how Gareth could use it to transfer the video from his tablet to Katie's laptop.

(3)

Storage device

U S B

Description

He can save the video from his computer onto her USB which she can then take and input into her computer and watch.

1 mark achieved

Storage device:
'USB' on it's own is not enough. USB is a data/communication medium and not a storage device. Too much has to be assumed to mark this as 'flash memory stick'
Description: 'save the video from his computer ... and input into her computer' (1) awarded process mark under follow through. There is enough understanding demonstrated.

Identify one storage device and describe how Gareth could use it to transfer the video from his tablet to Katie's laptop.

(3)

Storage device

A USB stick

Description

Gareth can put videos of Katie on the USB stick which can then be transferred to Katie's laptop. USB's are portable so you can easily transfer videos.

2 marks achieved
Storage device:
USB stick (1) - Just enough for flash memory stick
Description: Process mark awarded 'can put videos on USB stick which can then be transferred to Katie's laptop' (1) - there is enough to imply they are talking about transferring the stick from one device to another.

Question 1(e)

The majority of learners were able to gain at least 1 mark out of a possible three on this question with a reasonable amount able to achieve at least 2 marks. Where learners provided successful responses, these were typified by a sound understanding of the concepts of data image representation and the effects on quality, namely bit depth, resolution etc. Generally, the quality of responses could be improved through development of exam technique. Learners should be provided with opportunities to produce written responses. Teaching could focus on how to express understating in a clear way as part of a linked response, as it was often lack of clarity that prevented learners from achieving the higher marks.

(e) Gareth takes some photographs of the judo players.

He has chosen to use a <u>compressed image format</u>.

He notices that this <u>affects the quality of the image</u>.

Explain **one** reason why compression sometimes affects the quality of an image.

(3)

Compression sometimes affects the quality of an image because of lossy. This is when the image that has been inputed. The output will have some of the picture missing.

No awardable content
'lossy' and 'bits of the image missing' do not show enough understanding of the reasons the quality are affected (eg. the numbers of colours is reduced)
This response is a typical example of where learners did not achieve marks. Learners should remember that where possible responses should provide technically sound explanations.

Explain **one** reason why compression sometimes affects the quality of an image.

(3)

Compression ~~was the main effect~~ affects the quality of the image as the ~~image~~ file size is made smaller, this means that the image is also reduced and to do this details from the image will have to be removed, for example, pixels with the same colour, might be taken away or grouped together and this will reduce the image quality.

2 marks achieved
'Details from the image will have to be removed' (1) - enough for loss of data
'Pixels of the same colour might be taken away or grouped together' (1)
'image quality is reduced' is not enough to achieve a mark against clarity/accuracy of the image as 'image quality' is given in the question. In an explanation learners should avoid repeating the wording in the question. An explanation require learners to clarify/expand/justify information given

Question 1(f)
Learners generally performed well on this question with most learners achieving at least 1 mark and and the majority able to achieve at least 2 out of a possible 3 marks. Typically, learners were able to identify some parts of the process, such as checking for malicious code and then alerting the user. Comparatively few learners showed a full technical understanding of how an anti-virus protects a system, generally responses did not demonstrate an understanding of a virus definitions database/signatures as a means of identifying malicious code. Centres should endeavour to develop learners' technical understanding of how various utility programs complete the tasks they are designed for, and not just the generic/overarching understanding of the uses/types of software. It is this difference that marks the difference between a Level 3 and a Level 2 learner.

(f) Gareth wants to enter the judo players in to a competition.

The competition organiser sends him an entry form as an attachment to an email.

Gareth scans the attachment with anti-virus software.

Describe how anti-virus software would protect Gareth's computer system.

(3)

An anti virus software scans the computer so that it can identify files and their types. if it spots a suspicious file it will warn the user and be able to delete it if allowed

3 marks achieved
'so that it can identify files and their type' – this is does not enough understanding to achieve a mark for virus definitions/signatures.
'if it spots a suspicious file' (1)
'...it will warn the user' (1)
'...and be able to delete it' (1)
The response is a well-structured response, and is presented as a description of a process. Although the response does not include reference to the virus database, there is enough to gain maximum marks.

(f) Gareth wants to enter the judo players in to a competition.

The competition organiser sends him an entry form as an attachment to an email.

Gareth scans the attachment with anti-virus software.

Describe how anti-virus software would protect Gareth's computer system.

(3)

Anti-virus software would check the email for any virus and if there were any viruses they would send a message on the computer alerting Gareth of the risk of opening the email.

1 mark achieved

'If there were any viruses' - not enough for 'identify if the file is malicious' as this does not demonstrate any understating beyond what is provided in the question 'send a message to alert Gareth' (1) 'Alert user'

Question 2(a)

Learner performance on this question was very disappointing with the majority of learners not achieving a single mark. Learner responses were often very generic and did not show a sound enough understanding at this level. Learners often provided responses such as 'Ethernet connections are faster' but did not provide a comparison as to what they are faster than eg. Wi-Fi. Responses that include comparators eg. faster, more secure etc, on their own without any context or reference do not show enough understanding to gain marks. It was also surprising how many learners did not seem to have a basic technical vocabulary and seemed to not understanding what was meant by 'ethernet cable'.

(a) Ethernet cables have been used to connect the parts of the system shown in **Figure 1** because they use a full-duplex communication channel.

Explain **one** other reason why Ethernet cables would be used in this system.

(2)

Ethernet cables are more secure than wireless connection as wireless can easily be intercepted by hackers whereas ethernet is much more secure.

2 marks achieved
'...are more secure than wireless' (1) – Learner is awarded the mark as there is a direct comparison.
'as wireless can easily be intercepted' (1)

Question 2(b)

The majority of learners were able to gain at least one mark here with most able to demonstrate and understanding of how 'full-duplex' can transmit data in both direction simultaneously. Beyond this however many learners struggled to achieve further marks. Typically responses were not applied well to the given scenario and often included repeated points.

Centres should work with learners on applying understanding of subject matter to a range of contexts. In this question for example, it was clear that many learners understood what full-duplex was but were not adept in explaining application, or justification of use, to a context so responses rarely went beyond a simple d

efinition of what full-duplex means.

(b) Explain why a full-duplex communication channel is the best choice for transmitting data between the units and the control centre.

(4)

Full-duplex communication channel is the best for this system because the units need to send data to the control centre whilst the control centre also sends instructions at the same time. Full-duplex allows for data to travel back and forth at the same time whereas other communication channels only allow one way or both ways but not at the same time

1 mark achieved
'units need to send data to the control centre whilst the control centre also sends instructions at the same time' (1) MKPT 1 (both directions simultaneously)
there is not enough in this response to award MKPT2 (constantly communicating with each other) - although this is hinted at, it is not enough
Full duplex...back and forth at the same time' – This is essentially a repeated point that has already gained credit.
It is clear here that the learner understanding the concept but is not able to apply their understanding to a context.

(b) Explain why a full-duplex communication channel is the best choice for transmitting data between the units and the control centre.

(4)

A full duplex communication channel allows two devices to communicate with each other at the same time (units and Control Centre) making the process more efficient

2 marks achieved
'Devices to communicate with each other at the same time' (1) - Enough for two way communication
'making the process more efficient' (1) - as this is part of a linked explanation, 'more efficient' is acceptable.
Learners should be aware that comparisons such as this must be contextualised to gain credit

Question 2(c)

Learner performance on this item was very poor with very few learners able to gain the mark. Responses implied that learners were not aware of the difference between Binary Coded Decimal (BCD) and standard 8bit binary, and as such performed poorly on this question.

Question 2(d)

Generally learners performed well on this question with the majority of learners able to achieve marks with most gaining at least 2. On the whole learners showed a good understanding of how to convert between 8 but binary and denary numbers, and loss of marks was typically due to errors during the process rather than a misunderstanding of the concepts being tested.

Learners are advised to show all their working out as marks can still be gained for correct application of processes even if minor calculation errors occur.

Module	Energy Produced (watts)	
Module 1	00111100	=60
Module 2	00100110	=38
Module 3	01100110	=102
Module 4	00110000	=48

Calculate, in denary, the average power output from the solar panel.

(3)

60 + 38 + 102 + 48 = 204 ÷ 4 = 51 In watts

00111100 = 60

00100110 = 38

01100110 = 102

00110000 = 48

Average power output from the solar panel = 51

2 marks achieved

In this response, the learner ash made a miscalculation at the final stage of the process (calculating the average)

However, as they have shown their working out they, can be given marks for the correct conversion of the binary numbers.

Question 2(e)

Performance on this question was generally not good with many learners not gaining any marks. Where this was the case it was often clear that learners' performance was hampered by poor understanding of the requirements of the command verbs, with many learners often providing a general definition of the purpose of parity schemes rather than a description of how they work.

Describe how a parity scheme is used to detect errors in transmitted data.

(4)

At the end of data a bit will be added, for checking even parity, number of 1 in the data will be counted, if number is odd then parity bit at the end will be 1 making the number of 1s in the data even if there was already even number of 1s then 0 will be added

When data is received, the number of 1s is counted to see if it an even or odd number and checked with a parity bit.

So if there was an error in transmission then the number of 1 could be changed and no longer match with parity bit

4 marks achieved

This response provides a good example of a well-structured response to the 'Describe' command verb.

'at the end of the data a bit will be added' (1) - MKPT 2

'For checking even parity' (1) - Taken as a whole with the first part of the sentence this can be awarded MKPT 1 - 'a parity bit'

'number of 1 in the data will be counted, if the numer is odd...' (1) MKPT 3

'data is recieved...counted...checked with the parity bit' (1) MKPT 4

the final part of the response:

'if there was an error in transmission number of 1 could be change and no longer match the party bity' - is appropriate to award MKPT5 however the maximum marks for this question have already been achieved

Question 2(f)

The first 'extended writing' question on the paper performance on this question was quite varied. While a small majority of learners were able to access marks, where marks were awarded these were often limited to the lowest mark band. Many learners either did not provide a suitable quality response to gain marks or did not attempt the question at all.

Extended response questions provide learners an opportunity to show breadth of understanding as well as depth, the most successful learners on these questions make effective use of the scenario to contextualise their understanding.

Where responses gained marks generally they showed understanding of the array datatype but the response was either very limited in scope or more often there was little or no consideration of the context.

The command verb 'analyse' implies that the learner must break down the subject matter in to smaller parts. In this question 'Analyse how the features of the array

datatype make it suitable…' suggests that they should consider how what they identify is suitable and/or applied to with reference.

Arrays are suitable for this task as arrays can only store one data type meaning the average power output will only be an integer making it applicable to the data type. ~~Furthermore,~~ However, arrays are static and therefore cannot expand or shrink meaning a new array will have to be created as soon as the primary array has reached its ~~fu~~ capacity.

2 marks achieved
Issues:
The response identifies only a limited number of issues - Single data type and fixed length
Chains of reasoning:
The chains of reasoning are quite limited. There is an attempt to explore the issues with having a fixed length but this is not applied sufficiently to the given scenario. Mark levels are decided using a 'best fit' approach. This response best meets the descriptor for Mark Level 1

(f) The average power output data from all the solar panels will be stored using an array.

Analyse how the features of the array data type make it suitable for this task.

(6)

An array can store a list of the same data type in an organised way under a pre-defined index. This means each unit's ~~average~~ power can be stored against that unit as opposed to a large list in a random order. An array therefore makes it much easier to define what values to determine the average on to ensure the average for each unit is correct. An array also makes this much easier to interpret when looking at the data.

4 marks achieved
Issues:
The response identifies some relevant issues - Data types, indexes
Chains of reasoning:
There are some logical chains of reasoning - the response focuses on the use of index to be able to identify specific data (by its location) in order to analyse the data if needed.
Although the index point is applied and explored in relation to the context, there are no other issues explored.
The response best meets the descriptor for Mark level 2 as the response is accurate and applied to the context but is limited in scope.

Q3(a)
The majority of learners were able to achieve at least one mark on this question. However, in most cases understanding did not appear to go beyond the superficial understanding of the purpose (eg. that they are a temporary data store used by the CPU). Where learners moved beyond 1 mark, they were able to demonstrate an understanding of the purpose of different registers (eg. holding temporary data or the location of data).

In many cases responses were poorly organised and disjointed. Centres are encouraged to work with learners on developing the clarity of their written response, working on creating clearly linked responses with parts that clearly link top, and build upon, the previous point.

Explain the purpose of registers in a central processing unit (CPU).

(4)

The purpose of registers in a central processing unit is that it stores data while the CPU is running. It is another method of storage than RAM (random access memory). Data is stored here when the RAM is full. Data stored in registers can be accessed a lot quicker than data stored in RAM. There are different types of registers, normal registers and special registers that perform certain tasks. There can be several registers in the CPU to store data while the CPU is running. Data in the registers can then be taken and also processed in the CPU.

3 marks achieved

'stores data while the CPU is running' (1) - enough to imply 'temporary data store'

'Data stored in registers can be accessed a lot quicker than data stored in RAM' (1) MKPT 1 - High speed memory location

'There are different types of registers, normal registers and special registers' (1) MKPT 2 Just enough understanding shown but correct terminology 'General purpose register' would have been preferable.

Question 3(b)

Learners performance on this question showed that most learners had an understanding of the subject matter (ie. Factors affecting computer system performance). Most learners were able to access at least one mark with most able to provide a response that was at the top end of mark band 2 or at the bottom of mark band 3.

Typically learner technical understanding here was sound but as in other areas of the paper a lack of understanding of how to structure responses in relation to the given command word hampered performance.

For this question learners could often provide some technically accurate points but there was limited analysis of how these would affect the given scenario.

Analyse how the factors that affect execution speeds will impact on Gurvinder's work.

(6)

Amount of RAM, cache, registers memory will affect execution speed. The calculations when are carried out by CPU will happen quicker if there is more memory available to store results quickly to output instead of transferring under main memory. More cache will allow to keep frequently accessed data ready to use, so it doesn't need to be fetched from main memory.

Clock speed of CPU will affect the speed of calculations quicker it is — quicker faster it can carry out instructions

Number of cores in the processor, more cores would allow calculations to be carried at same time, which would
multiple
increase execution speed

4 marks achieved
Technical Vocabulary
The response uses accurate technical vocabulary throughout and it is applied appropriately to the areas that are discussed.
Arguments
The arguments are relevant, in that they are all related to the execution speed of a computer. However, the response does not look at these in relation to the given scenario.
Chains of reasoning
The technical details are correctly linked to the impact they have on the performance of a computer system but there is little or no link to the overarching scenario.
The response best meets the descriptor for Mark Level 2

Analyse how the factors that affect execution speeds will impact on Gurvinder's work.

(6)

The execution speed is how fast the computer is able to process complete each process. Because monitoring and predicting weather patterns produces a lot of data to be processed, the execution speed would determine how fast the computer can go through the data produced. If Gurvinder happened to use a computer with a poor execution speed then there is a chance it might even lag behind on the data produced by the monitoring meaning there would be a buildup of unprocessed data.

2 marks achieved
Technical vocabulary
There is limited use of technical vocabulary, where this is used it is used appropriately.
Arguments
The response does not explore specific factors that affect the performance but instead covers the impact this may have on Gurvinder.
Chains of reasoning
The response considers the overall impact but there is little or no analysis of the factors that would result in these impacts. There is relevant consideration of the scenario and how performance would impact on the work done.
The response best meets the descriptor for mark level 1.

Question 3(c)

Learner performance on this question was quite disappointing with most learners demonstrating only superficial understating of the subject matter (computer clusters). Typically, learners were able to identify some of the factors that would affect the computer cluster but these were often quite generic, showing only limited application to or specific understating of computer clusters.

Where learners did show a more detailed understating of clusters responses were able to provide descriptions of how the factors would impact on the cluster itself. Common responses focused on the communication method, the processing power of each individual node and compatibility. Very few learners were able to expand their responses and apply the knowledge effectively to the scenario (ie. Gurvinder's weather simulation) and so were unable to access the top mark band.

(c) Gurvinder wants to run a very complex weather simulation.

He has decided the best way to do this will be by using a computer cluster.

Discuss the factors Gurvinder will need to consider when setting up a computer cluster.

(8)

There as are three main factors Sactors; Cost, Performance and communication. Performance can be increased by adding more nodes or higher power nodes, although these both cost money it is usually better to add higher Performance nodes rather than lots of Smaller ones as this lowers energy consumption and as such cost. The more nodes you have the more you need to consider communication as all nodes need to be given orders / instructions as this avoids two doing the same task. If you are networking the nodes, at least Half-duplet will be required for nodes to recive instructions and transmit results.

5 marks achieved
Technical vocabulary
 Technical vocabulary is accurate and used appropriately (eg. Nodes)
Arguments
The response makes several appropriate points/arguments and these are well organised and thought through (ie. cost, performance and communication)
Chains of reasoning
The sections are well thought through and the ideas are linked within each section of the response.
eg. - Performance - fewer higher power nodes against more lower power notes and the consideration of power consumption.
These are well linked but they could have been explored further
Link to scenario
The points made are all relevant to the use of cluster computing but no reference is made to the overarching scenario.
The response is generally accurate but does not make reference to the main scenario so this response best meets the descriptor for mark level 2.
Because of its accuracy and logical links it is placed at the top of the mark band.

Discuss the factors Gurvinder will need to consider when setting up a computer cluster.

(8)

Cluster computing would be ideal to run very complex weather simulation as it allows and millions of calculations to occur simultaneously. However, he will need to consider some factors when setting up a cluster computer system. These are portability - as st he will not be able to move them once installed, speed - make sure the software sp is upto date and and can run as fast as max possible, storage space - allow the data to be transfered to a file at a quick rate.

2 marks achieved
Technical vocabulary
There is some use of technical vocabulary but the response does not explore the technical details of the scenario in enough detail to provide opportunity to demonstrate this in great depth.
 Arguments
The points made are superficial - there is an understanding of the need to process many instructions and that a cluster would make relocation of the system very difficult. However the points made are quite vague and not wholly relevant.

Chains of reasoning

The points made are generrlly made in isolation and idea and impacts are not explored beyond a superficial level

Link to scenario

There is little or no link to the scenario. Many of the points made are quite general and could apply to any computer system and not specifically a computer cluster. The response best suits the descriptor for mark level 1.

Question 4(a)

Learners were on the whole able to demonstrate sufficient understanding of t subject matter to produce responses at the top end of mark level 1 (3 marks out of 10) with almost half of learners able to produce responses that were placed in the middle mark band. However, the only a small percentage of learners were able to produce a response of sufficient quality to move in to the highest nark band.

As in previous extended questions in the paper, many learners showed only a developing understanding of the subject matter and this was rarely applied to the scenario. Where learners did make reference to the scenario, responses were often limited in scope and tended to focus just on the just hardware ie. the types of processor, graphics card etc. that would be required and did not consider wider factors such as compatibility, system change over etc.

Discuss the factors affecting Stephanie and her choice of computer system. (10)

She would need a powerfull PC for her work. She would need aa very good graphics processor to generate, render high quality images for computer games 3D graphics. GPU (graphics processor) would be able to carry out parallel calculations at once due to architecture of GPUs, which is needed for high quality rendering of many objects. High Quality images, raw files take up a lot of space as they have a large number of data points which are not compressed when working on them so her computer would need large storage device, to store her projects, models, pictures, versions of same file. She would need a RAID system, so redundant backup of data would be available; its needed if main memory fails so she can continue her work from backup drive which contains a mirror of her data. She would need a good central processing unit to ~~simulate~~ emulate different devices on her computer to test if her software

works on that device. Fast CPU would not only allow her use emulated virtual devices to test her software but for compiling code. When code is written in high level programming language, it has to be translated to machine code, this is done by the CPU so faster CPU would allow quick compiling which would increase her efficiency as she would not need to wait as long each time she changes source code.

Lastly her computer system would need large amount of RAM, s to store all the running software and its data. She will have multiple applications running simultaneously — emulator, coding environment or graphics designing and rendering software plus browser.

RAM would allow more quickly accessible data to be stored, instead of transferring it to main memory which would take up time

8 marks achieved
Technical vocabulary
 The use of technical language in the response is accurate, fluent and appropriate to the subject matter
Arguments
The response focuses on one main element - Hardware but this is explored in a number of ways:
Chains of reasoning
The response links ideas well and the main area of hard ware is explored in a range of areas. The ways different hardware will help Stephanie eg. 3D graphics, fast processor for compiling/building games and large amounts of data processed. The learner links the need to run emulation software and the need for multiple processes to be run at the same time
Link to scenario
Understanding is applied accurately to the scenario and is used to organise ideas effectively.
Although the response focuses on hardware and may not be considered 'wide ranging' the discussion with in the overarching idea of hardware is quite wide ranging and all points are reasoned well in the given context.
This response best meets the descriptor for mark level 3.
Because it is unbalanced and mainly focuses on hardware it is placed at the bottom of the mark band. It would need to consider other factors such as user experience and implementation to go higher in the mark band.

Discuss the factors affecting Stephanie and her choice of computer system.

(10)

Factors affecting Stephanie choice is the user experience as would it be Suitable for her. Another one is the user needs such as the performance of the pc the availability and the acceability of the pc would the desktop be up to date and have other versions of it? Another one is the cost of buying a pc is it going to be worth buying one such an expensive pc that would have a bigger life span as a cheap pc that would have a shorter life span. Another one, is the compatability, would buying one be able to be compatible with other devices to perform her task. Another factor is the efficiency as would it have all new specification to perform well and operate with her system. Another factor would

be the productivity of the pc, as Stephanie requires a pc that has the latest development and software update in performing her design and be able to interact with the graphical user in order to do so. Another factor is security, as Stephanie would like to keep her designs private and from others, which a pc must have a reasonable firewall or encryption to keep data safe.

3 marks achieved
Technical vocabulary
The use of technical language in the response is accurate but is used infrequently due to the superficial nature of the response
Arguments
The response makes some valid points that would be considered (eg. Compatibility, Hardware requirements)
Chains of reasoning
There is only very limited chains of reasoning. The response is quite superficial.
Link to scenario
There is an attempt to make the points relevant to Stephanie and her job but these are infrequent often implied rather than explored
The response best fits the descriptor for mark level 1.

Question 4(b)

Performance on this question was quite disappointing with a large number of learners either not attempting the question or not demonstrating sufficient understating of the question to move beyond 1 or 2 marks.

Where learners did demonstrate understanding of emulation, these learners were generally able to demonstrate a good understanding of how it could be used by used by Stephanie in her line of work in terms of testing software that she had developed for different platforms. However, learner performance on this question was often hampered by a lack of understanding of the requirements of the command verb (evaluate).

When responding to an evaluate question learner responses should:

- Consider both sides of an argument (where appropriate) for example in this case learners could consider the positives and negatives of using emulation in the given context.
- Provide a suitable conclusion. For mark bands 2 and 3 the conclusion should make summary reference to the points considered throughout the response in order to make a supported judgement. 'eg. ;This would be beneficial because…'

(b) Stephanie has chosen to use emulation when creating and testing her software.
    Evaluate the extent to which emulation would meet Stephanie's needs.

(12)

She will be able to run the software on a PC which is meant for a mobile device This means that she does not need to have multiple devices to to be test her code It is easier for her Just to test all of her software in one place.

It will Save her money because She does not need to Spend money on buying devices for all her Software when She can use an emulator and test and run the code on one device.

She we easiy be able to edu her Software on her PC because She can see the emulation will to check if there were any errors.

She can also give Sample demos of the Software with the emulation So does not need to use another device, which Could be hard to Capture footage on.

When She is creating the Code She will easily be able to check that it works and solve errors, making the coding of the software more efficent.

When She is making different versions of her Software for different devices She will be able to do it in one place and Check if the Code works on all the devices.

3 marks achieved
Technical vocabulary
The use of technical language is generally quite good when used but the scope of the response is quite limited
Arguments
The response makes some valid points and considers a number of benefits of emulation for Stephanie but these tend to focus on testing code (eg. testing code written for different platforms, debugging):
The arguments are unbalanced and only consider positive aspects of emulation
Chains of reasoning
There are limited chains of reasoning with ideas presented in isolation.
Link to scenario
There is an attempt to make the points relevant to Stephanie, but reference to her needs is superficial.
Conclusion
There is no conclusion presented
This response best meets the descriptor for mark level 1.

(b) Stephanie has chosen to use emulation when creating and testing her software.
Evaluate the extent to which emulation would meet Stephanie's needs.

(12)

~~both~~ ~~hardware~~ not a true representation
~~components~~ ~~screen~~ cheap, fast

Emulation would only partialy meet her needs for a few reasons.

Emulation yes will be a good way to test her code and software on different devices however it also has some drawbacks.

Emulation can't emulate hardware such as a touch screen so she could not ~~fully~~ fully know if her code for touch ~~works~~ worked or not.

Emulation can not emulate the exact components of the device so you will not know if the app is laggy or slow on a device because it will be using the system resources from the computer

Emulation is not a true representation of the device running the software because in the name, emmulation. It is simply trying to be that device but it will Never be 100% true and things may still differ

However ~~emu~~ emulation is a cheap way to test the software because you do not need to physicaly own the devices you want to test it on. You may need to pay for the emulator though.

Emulation is also quite fast because you want need to find the device and install your software you just press start and run your software on it.

overall emulation is a good route to take for this however it would prove more effective if the tests were not emmulated.

6 marks achieved
Technical vocabulary
The use of technical language is generally good and used appropriately
Arguments
The response makes some valid points and attempts to provide positive and negative ideas:
Positive - ability to test for different systems
Negative - lack of 'hardware' emulation, never fully 100% accurate
Chains of reasoning
There are some chains of reasoning but ideas are mostly presented in isolation.
Link to scenario There is an attempt to make the points relevant to Stephanie but many of the statements although accurate are quite general.
Conclusion
There is an attempt at a conclusion but this does not really draw on the points/discussion in the rest of the response.
This response best meets the descriptor for mark level 2.

(b) Stephanie has chosen to use emulation when creating and testing her software.
Evaluate the extent to which emulation would meet Stephanie's needs.

(12)

Emulation is achieved through a piece of software that is able to immitate how systems or processor families used in other systems work, thus allowing them to run software intended to work on other systems.

Since emulation is essentially an additional system layer this can cause system slowdown, this is not as much of a problem when emulating much older systems since their specifications requirements are generally lower than most modern systems. In this situation the slowdown may be notiable due to the emulation of newer hardware, however for testing purposes this satisfies Stephanies requirements.

Sometimes Emulation may may be inaccurate, this can lead to unforseen behaviour from some programs this is because emulation is not a 100% replication of the system it is trying to

behave as. For this reason, it may not achieve what Stephanie's needs are for testing purposes.

/legal
Emulators have ethical concerns regarding them. Some companies believe that emulation is illegal but no one has been prosecuted for it others claim that it is fair use. In this situation Stephanie would likely not be breaking laws since she is testing her own software. These concerns may affect Stephanie's needs.

O Overall emulation would be suitable for Stephanie to use, this could also save money that she would have had to spend testing software on different hardware.

9 marks achieved

Technical vocabulary

The use of technical language is good and used appropriately

Arguments

The response makes some valid points and attempts to provide an evaluation of appropriateness

- Testing for different systems (Paragraph 1)
- Additional system strain (Paragraph 2)
- Not 100% accurate (Paragraph 3)
- Licensing (Paragraph

Chains of reasoning

There are logical chains of reasoning. The points made are expanded and explored.

Link to scenario

The points made are fully relevant to Stephanie but they tend to focus on the negative aspects. The responses is not well balanced

Conclusion

There is an attempt at a conclusion and there is some attempt to draw on previous points but this is not fully explored.

Using the best fit approach this response is placed at the bottom of mark level 3.

Summary

Based on performance in this examination series, learners are offered the following advice:

- Develop understanding of key terminology used in the unit so that you are able to access the context of the question.
- Ensure that when providing answers/information ensure your response is applied to the given context.
- Develop understating of the requirements of the different command verbs used in the unit so that you can structure your response appropriately in order to maximise the marks you achieve.
- For shorter response questions (5 marks or less), make note of the number of marks available this will help you identify the number of points you need to make. For example, a 4 mark 'Explain one...' style question would need to make at least four linked points that expand/exemplify understating of a single point
- When producing extended writing responses (6 marks or more) ensure you consider a range of points, each of which should be expanded or supported with examples and applied to the given context.