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Level 3 National in Computing

Unit 2: Fundamentals of Computer Systems (31769H)

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A grade boundary is where we set the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade, Distinction, Merit and Pass.

Setting grade boundaries

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When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in external assessments

Each external assessment we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries for each test, because then it would not take into account that a test might be slightly easier or more difficult than any other.

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Unit 2: Fundamentals of Computer Systems (31769H)

Grade	Unclassified	Level 3		
		Pass	**Merit**	**Distinction**
Boundary Mark	**0**	24	37	50

Introduction

This is the second examination of Unit 2 (Fundamentals of Computer systems) for BTEC Level 3 National in Computing, which first became available for teaching in September 2016. Examination opportunities will continue to be available for this unit twice a year: January and May/June. 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), is 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; each scenario is outlined at the beginning of that question 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 overall learner performance in this series improved compared to the previous examination series (Summer 2017) with the mean mark for the paper increasing by over 4 marks.

Although there is still room for progress, many learners showed an increased understanding of the basic subject knowledge and vocabulary. This was an area identified as an area of concern following the Summer 2017 examination series and it is pleasing to see learners making improvements in this area.

Again, there was an improvement in learners understanding of the requirements of different command verbs. However, the improvement here wasn't as significant as the improvement in subject knowledge. There is still some work required here, in particular, the link between understanding the requirements of the command verb and the mark tariff of a question. For example, learners need to ensure that a 4 mark explain question has 4 clear, distinct parts to the response that each logically build upon/link the initial point made.

Centres are encouraged to look at the sample assessment materials, previous papers and sample marked learner work, 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 have made use of a range of support materials, such as the sample assessment materials, there was still a pocket of learners repeated answers verbatim from sample materials/past papers 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

Question 1a

Learner performance on this question was generally good, with most learners able to provide credit worthy responses. Most learners were able to provide a suitable method of providing an internet connection other than a public hotspot. Responses typically suggested the use of 3G or tethering to the users mobile phone.

Where learner performance was not as strong, this was typified by not fully addressing the demand of the command verb. This question was a three mark 'describe one…' which requires a technical description of how something works. When answering such questions, learners should ensure their response is a linked process that has an appropriate number of stages. The number of stages required is informed by the mark tariff.

Example response 1:

(a) Describe **one** other way Vanessa could provide an internet connection for the system that could be used when cycling.

(3)

Vanessa could use her phones mobile data and open up a personal/private hotspot which the system would be able to use Wi-Fi to connect to this personal/private hotspot and it would use the phones mobile data to ~~provide~~ provide an internet connection for the system.

Use mobile data (1)

Private hotspot (1)

'use Wi-Fi to connect' (1)

3 marks total

Example response 2:

(a) Describe **one** other way Vanessa could provide an internet connection for the system that could be used when cycling.

(3)

Vanessa could use bluetooth which connects to her mobile phone with her mobile roaming data turned on.

'Bluetooth' (1)

'Connect to her mobile phone' (1) - enough to show understanding of tethering/data connection sharing

'Mobile roaming turned on' - this is not awarded a mark. Roaming is related to the way the Phone achieves data in different countries and not about tethering.

2 marks total

1b

Performance on this question was good with most learners providing at least one appropriate negative impact of public Wi-Fi. Where learners did not perform as well, was usually due to responses that were far too generic and did not address the specific demands of the given scenario. For example, many learners provided answers relating to security concerns of public Wi-Fi which did not address the question being asked.

Example response 1:

> (b) Give **two** reasons why using Wi-Fi to connect to public hotspots may negatively affect the performance of the system.
>
> (2)
>
> 1 Because public hotspots May be Slow effecting the Parfarmce Speed.
>
> 2 Wifi hotspots have a Short range So She woul be able to Stay connecd for long.

1. 'May be slow' - No mark - Reference to speed must have justification within context.

2. 'Short range so she won't be able to stay connected for long' - Enough for MKPT 1

1 mark total

Example response 2:

> (b) Give **two** reasons why using Wi-Fi to connect to public hotspots may negatively affect the performance of the system.
>
> (2)
>
> 1 Wi-fi signal is prone to interference
>
> 2 Wi-fi's signal gets weaker the greater the distance is from the source.

1. Wi-fi signal is prone to interference' MKPT4 (1)

2. 'Signal gets weaker the greater the distance from the source' - Enough for MKPT 1 (1)

2 marks total

1c

Performance on this question was a little disappointing. While many learners were able to identify an appropriate internal component (typically GPS) many were not able to provide an appropriate, linked, description to move beyond 1 or 2 marks.

Common errors in technical knowledge included the way in which the GPS works with many describing a two way communication rather than the GPS within the decide wording as a receiver of signals and using those to calculate position.

Another common error seen was the confusion of mapping/navigation software, which would use the position data with how the device actually determines the current position.

Example response 1:

(c) The system will provide the user with location data.

Describe how an internal component could be used by the system to determine location.

(4)

GPS – Geographical Positioning System will allow to gather the data about the location of the user, and then that data can be used by location Maps, such as Google Maps or Open Maps, to inform the user and the device of its physical position and allow for further route instructions to be displayed, such as turn-by-turn navigation.

1 mark awarded for:

GPS (1)

Responses relating to mapping were not awarded marks. The map does not determine/is not used in determining location, it uses the location that has been determined by one of the internal components.

Example response 2:

(c) The system will provide the user with location data.

Describe how an internal component could be used by the system to determine location.

(4)

The system could implement GPS (Global-Positioning-System) to locate the location of the device. This technology uses satillites to triangulate the position of the system. This a technology can be used any where in the world and is free to use.

GPS (1)

Uses satellites (1)

To triangulate position (1)

3 marks total

1d

Learner performance on this question was quite mixed. While many learners were able to provide appropriate reasons for using a mobile CPU in the given system, most were not able to provide appropriate linked expansions.

Performance on this question exemplifies much of the performance across the paper, in that learners' basic subject knowledge was sound but often deeper understanding was not demonstrated through linked responses.

The given example shows a resposne that achieved all four marks.

(d) The multifunctional system will make use of a central processing unit (CPU) designed for mobile devices.

Explain **two** reasons why the features of a mobile CPU make it suitable for Vanessa's system.

(4)

1 Firstly mobile cpus drain much less power allowing the device to run much longer without charge and as Vanessa is travelling she wont have a constant source of electricity.

2 Secondly Mobile cpus are often much smaller meaning her device would be much more portable due to its smaller form factor.

Response 1. '..Mobile CPUs drain much less power' (1) run much longer without charge (1)

'Mobile CPUs are often much smaller' - On its own does not gain credit smaller must be referenced to what it is smaller than such as desktop/server processors

Response 2. 'much more portable' (1) 'due to small form factor' (1)

Note: Explanations may have the identification and expansion given in the mark scheme reversed as with response 2. This is acceptable, and credit is given for good explanations that showed deeper linked understanding.

1e

Performance on this question was very good with most learners able to correctly complete the given truth table.

1f

While the majority of learners were able to access 1 or 2 marks out of 4, the overall performance on this question was disappointing with relatively few learners providing a fully correct flow chart solution. While most learners provided a flow chart that included a checks for user touching the screen and the bike moving, many responses had logical errors or did not use a loop correctly to ensure that the system would run continuously. Often the construction and presentation of flow charts was poor and with many learners not correctly following standard flow chart conventions.

2a

Performance on this question was generally quite good with most learners able to gain 2 out of 4 marks for giving examples of the work each of the two components would do. However much fewer learners were able to gain 3 or 4 marks. To improve performance on questions such as this learners should have made a greater link to how they work together. Responses were often descriptions of two separate processes rather than a how they share workload.

> (a) Angga's computer has a central processing unit (CPU) and a graphics processing unit (GPU) that are both used when he is playing computer games.
>
> Describe how the CPU and GPU share work to improve computer performance.
>
> (4)
>
> The CPU and GPU Share the work load as The CPU does not all of the processing of the game data while the GPU does all of the rendering and the graphical aspect of the game so that they are both not being over worked and the game can run smoothly.

'CPU does all of the processing of game data' (1) - enough for CPU perfroms instructions/calculations

'GPU does all of the rendering' (1)

'and the game can run smoothly' (1) - reduce lag

3 marks total

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2b

Most learners were able to gain at least 1 of the 2 available marks for this question. This was typically for showing an understating of the removal of data during the lossy compression process. However, relatively few learners showed deeper understanding, often due to unfocused responses that did not address the demands of the question and/or command word. Learners are reminded that 'Describe how' will typically require a technical response of a specific computing process. Many learners provided responses relating to the impact (eg loss of quality) rather than how the computer performs the compression.

Example response:

(b) Some of the video and audio files Angga has on the network have been compressed using 'lossy' compression.

Describe how 'lossy' compression reduces the file size of video and audio files. (2)

Lossy compression uses run length encoding which which groups together similar colours, frequencys and makes them into one which makes the file smaller but some of the original data is from then lost.

'Uses run length encoding' (1) - although the learner has not used the word algorithm, they have used an example algorithm name so was deemed mark worthy.

'Which groups together similar colours...makes them into one' (1) this is an example of repeated data

'Some of the original data is then lost' - this is also mark worthy however the maximum 2 marks has already been awarded.

2 marks total

2c

This question demonstrates a variation in the describe response and emphasises the need to consider all information carefully before answering. The command verb is describe as no justification is required as would typify a explain for example. In this

case, rather than a specific process, the response should describe how the file would have been affected by the process.

Many learners provided overlapping answers with question 2b. However where these were appropriate, such as reference to the permanent loss of specific data, these were credited; many learners were able to gain at least 1 mark for this.

Example response 1:

> (c) Angga uses the Network to access a music album he has stored on the server.
>
> It has been compressed using 'lossy' compression.
>
> Describe **one** way that using 'lossy' compression will have a negative effect on the use of the audio file.
>
> (3)
>
> As he has used lossy compression the quality of the music would not be the same for example the high notes won't be quite as high as he will have lost or some of the original data for the audio file.

'quality of the music won't be the same' (1)

'for example the high notes won't be as high' (1) although not 100% accurate it shows an understanding of the loss of higher frequencies.

'Some of the original data is lost' (1)

3 marks total.

Example response 2:

> (c) Angga uses the Network to access a music album he has stored on the server.
>
> It has been compressed using 'lossy' compression.
>
> Describe **one** way that using 'lossy' compression will have a negative effect on the use of the audio file.
>
> (3)
>
> The quality of the audio file will have been reduced, meaning there may be a noticeable drop in quality and it doesn't sound as good

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The quality of the audio file will have been reduced (1)

'It doesn't sound as good' - this would be an appropriate alternative wording for 'reduced sound quality', however a mark has already been awarded against this marking point.

Learners are reminded that to gain subsequent marks in higher tariff questions, additional points should not be rewords of points already made but expansions or linked developments of the initial point.

1 mark total

2d

Performance on this question was generally very poor with relatively few learners gaining marks. Many learners did not demonstrate sufficient technical understanding of what FTP is and therefor were unable to expand to the benefits of the protocol. A common error by learners was confusing this protocol with TCP/IP or encryption methods.

Example response 1

> (d) Angga wants to transfer files to his network attached storage (NAS) when he is travelling.
>
> He intends to use File Transfer Protocol (FTP) to transfer video files from his PC to the NAS.
>
> Explain **one** benefit of using FTP to transfer the files to the NAS.
>
> (3)
>
> FTP allows users to remotely access a shared file system, such as NAS, as if they were directly connected. It can be used with a Graphical User Interface to make it easier to operate, rather than using command line.

'Allows users to remotely access a shared file system' (1) - Enough for access from any location.

'as if they were directly connected' (1) - enough understanding shown to award for allows direct connection with NAS.

2 marks total

2e

Overall performance on this question, and all extended writing questions showed an improvement in quality compared to the performance during the summer 2017 series.

Improvements in responses were characterised by improved technical understanding and better construction of answers that showed better chains of reasoning. As a result, a greater number of Mark band two responses were seen.

These improvements are pleasing to see and centres and learners should be congratulated for this, the number top mark band responses seen was still very small. While improvements have been made in terms of the quality of response, the majority of responses do not make adequate use of the given scenario.

In the example response provided, we can see that the learner here is starting to make reference to the given scenario to show a deeper understating of the subject matter. The accompanying commentary shows how the marks were awarded.

Example response:

(e) Angga would also like to use the Network Attached Storage (NAS) to store backups.

Analyse the factors Angga would need to consider when implementing back up procedures for all his family's devices.

(6)

Backing up all of Anggas families devices would require an incredibly large amount of storage in the NAS as there are many devices to back up Angga should make sure he buys enough storage for all of his family as well as some extra for other files to be stored as well as if additional devices want to be backed up he must also consider how he will store it securely and safely such as using RAID 1 or 10 so that if one drive is lost the backup data will also not be lost. This will only be an issue if a device were to fail at the same time as a drive so it may not be necessary to buy additional storage for the security. Furthermore, Angga must think of a way to regularly back up her devices. The wireless devices could be updated at night when no one is using the network so that all available bandwidth could be focused on a large scale task such as back ups.

Technical Vocab

Some technical vocabulary is used and it is used appropriately.

Issues and chains of reasoning

The learner identifies a number of appropriate issues (time of back-up, impact on storage level, multiple back-ups). There is some attempt to explore these points in greater detail.

Link to scenario

The learner has made some links to the scenario, for example, 'backing up wireless devices overnight when no one is using the network'. However, these could be explored further with clearer examples from the scenario.

When awarding marks for an extended writing response, a holistic view is taken in order to choose which level descriptor 'best fits' the response.

This response shows good chains of reasoning in the latter part of the response but the earlier part of the response is less fluent and consists of a number of isolated statements. As this is a lower tariff extended writing question (6 marks) This response was considered just enough to be placed in Mark band 3. Note that in a higher demand/tariff question greater clarity in reference to the scenario would be required to achieve the higher mark bands.

Overall however the consideration of the network usage by the wireless devices was enough to show some understanding of the scenario however this could have been improved with more specific reference to the details of the scenario and their specific needs.

5 marks awarded

3a

This question was answer very well overall with most learners gaining at least 2 marks out of 4, with many learners providing responses that gained 3 or 4 marks. Typically learners showed a goo understanding of the queue data structure and were able to compare it to a stack. Again where learners were most successful they applied their knowledge to the given scenario and contextualised their answer.

3b

As already stated in this report overall the extended responses form learners showed an improvement in quality from Summer 2017. For this question learners were able to generally identify issues within the provided diagram, such as exposed computers and ethernet cables, and in most cases provide sound chains of reasoning as to the security risk they pose.

Relatively few learners provided a response that was placed in the top mark band, although they were more common that in Summer 2017. Typically responses were prevented from accessing the top mark band due to not exploring the impact the identified issues would have on the business.

In the example responses below, we can see a response that exemplifies the characteristics of the top mark band and an example of work that fits in the middle mark band. Centres are encouraged to explore these with learners to identify ways that performance can be improved.

Example response 1:

Discuss how the hardware and layout in **Figure 2** may affect the security of the system and the impact this may have on Carter's business.

(8)

The Layout of the ethernet sockets and cables allow for the easy physical access to unauthorised parties who could potentially use this vulnerability to access private customer payment details. which could incurr legal fines upon Carter's business if this The Terminals are also very clo opportunity is taken by an attacker.

The terminals are very close to eachother allowing customers to potentially shoulder surf and observe each-others details with this potentially deterring customers from using the terminals meaning for Carter, a lesser degree of return on investment.

The PC's being under the table is also quite insecure offering another physical means of accessing private customer data with multiple open ports as well as components like the hard drive housing lots of data where an unauthorised party can take a pc or component which would lead to a loss of company worth with respect to assets for Carter's business.

Technical Vocabulary

The response makes only limited use of technical vocabulary. However, when used, it is used appropriately to support the points made.

Issues and chains of reasoning

The response identifies three main issues from the given stimulus and provides linked arguments as to how these may cause issues.

Links to scenario

For each of the points made, the learner makes appropriate links to impacts on the scenario (loss of revenue, legal action for failing to secure systems)

Overall this is a well structured and accurate response.

It best fits the descriptor for mark band 3.

8 marks awarded

Example response 2:

> Discuss how the hardware and layout in **Figure 2** may affect the security of the system and the impact this may have on Carter's business.
>
> (8)
>
> The main security flaw in this configuration would be the ethernet sockets being above the table. This is not ideal as these ethernets could be connected to by any one meaning they would have access to the network. This means a person could steal valuable data that is on a server of a man-in-the-middle attack could be used

> be collect personal data. This could result in a breach in the Data protection act of 1994.

Technical vocabulary

There is evidence of technical vocabulary being used and where it is used, it is used appropriately.

Issues and chains of reasoning

The learner identifies only a very limited scope of issues (access to ethernet sockets). However, this is an appropriate issue and the learner attempts to expand upon this and links some appropriate points.

Link to Scenario

There is only a limited link to the scenario. The leaner's points are appropriate for the stimulus image but there is limited/no consideration of the impact on the business beyond a superficial level.

While the response only identifies one flaw (Ethernet sockets) the learner explores different potential issues related to this, the response best suits the descriptor for mark band 2.

4 marks awarded

3c

In this extended responses question learners again did not, on the whole make appropriate use of the scenario and were often restricted to Mark band s 1 and 2.

In this question in particular, learners tended to become too focused on the stimulus image itself and made direct comparisons between the two examples. While this was appropriate to a certain degree and learners were credited, this tended to narrow the scope of the response and few learners considered the full demands of the question (i.e. use and performance of the given system).

When using stimulus such as this learners are encouraged to use it as a starting point by which to identify a specific issue, they should then use their understanding of related content and the given scenario to expand their response. These characteristics are what typified responses that were placed in the top mark band.

Example response 1:

Analyse how the features of the two interfaces will affect the use and performance of the system.

(8)

Firstly using the graphical interface could be benificul as it can be used by people of any language however it could also cause problems as it may be hard to understand exactly what the images mean also typing a product name could cause problems with other languages or with poor spelling.

However Using the menu biased system could ~~maybe~~ be beneficial as the headings are alot more clear at what they mean it also shows all available options from the start as it has no ~~search~~ option. However it stands out alot less than the graphical interface and this will not attract people to use it. Overall I think that the menu based interface is better as the information is more clear making it easier to use.

Technical vocabulary

The learner makes limited use of technical vocabulary. The scope of the response is quite limited so there is only limited opportunity to demonstrate this.

Issues and chains of reasoning

The learner makes some points about both interfaces but the linking of ideas and exploration is very superficial.

Application to the scenario

There is some reference to the system as an ordering tool but this is not really explored in terms of how the interfaces would be of use for this or how they would be suitable for a touch screen system.

The response best meets the descriptor for mark band 1

2 marks awarded

Example response 2:

Analyse how the features of the two interfaces will affect the use and performance of the system.

(8)

The use of the Graphical interface will be more suited for use with Customers. Icons allow for a better use of space on touchscreen displays. Also, icons are easily recognisable compared to reading text, which will allow for a faster use of the system.

By having a search bar, instead of tapping through various different options, the user can search what they want and checkout for quicker. This will speed up ordering times.

The popular category allows for customers who havent made a decision to quickly order something, whereas on the menu based interface, they still have to tap on it to lead to another section. The menu based interface is not user very attractive or appealing to customers and cannot be navigated through as easily. This will slow down the use of the system and increase ordering times.

The Graphical Interface also allows the user to see what is in their basket, to re-add or remove items etc unlike the menu based interface.

Example response 2 shows an understaning of the impacts on the business as well as sound technical understanding while the exploration of the impacts could be developed further there is enough to place the response in the top mark band.

7 marks awarded

4a

Learners' performance on this question was generally quite poor. While this was designed as one of the most demanding questions on the paper, many learners did not achieve any marks on this question.

Where learners did not perform well this was due to the incorrect focus of their response. Many leaners provided responses relating to error checking rather than error correction. While some credit was given if understanding was shown of the checking leading to some form of correction, many learners provided responses that were far too similar to the parity bit question in the summer 2017 examination. Centres are reminded that while using previous papers is a good means of preparation, learners should be aware of the full scope of the specification and should understand how to apply similar concepts in different contexts.

Example response:

Discuss error correction systems that could be used and the implications for Shania.

(10)

Repeat request of data can be used to correct data that has had an error detected in it, using method such as a parity bit check to determine an error and request the re-send of data so can assure reduction of errors, though it is very easy to process there is very low tollerance in the error of data because any even count of errors cancel out the error detection making it useless, however, it requires the least amount of extra data to be sent.

Data duplication along with Check parity can be used, if one of the sent data has an error the duplicated data is used instead, this would double the amount of data being sent each time

Parity grid provides a few rows of bits accompanied by with extra data that is used as a grid to Check for errors along each row and Column of the sent data in a grid. This can be be Used to identify bit(s) that have errors and fix them. this may not work if two errors happen on the same row / column as it would not allow the error position to be determined.

When data being sent from sensors are to be done in realtime error correction such as the resending of data would not work, this sort of data should used a combination of data duplication & parity grid to maximize the accuracy of data. For data being sent to backups and control signals could Used a refault request system to re-send errored data.

Technical vocabulary

The learner uses technical vocabulary fluently to support a number of valid points relating to error correction methods

Issues and chains of reasoning

The learner identifies a number of valid issues and provides some linked exploration of the error correction methods identified.

Application to the scenario

The final paragraph briefly explores the scenario and rightly covers that repeat requests would not be suitable. However this is explored only to a limited degree.

The response does not provide much coverage of the given scenario in terms of the data collection system, however there is some reference to it and the learner demonstrates a solid technical understanding of error correction.

Taking a holistic view, the response best meets the descriptor for mark band 3

It is placed at the bottom of the mark band due to not enough exploration of the scenario.

8 marks awarded

4b

Performance on this question was generally in line with the other extended questions with a good spread of marks awarded, but with most learners being placed in mark band 1 or 2. While there were a number of mark band 3 responses seen these were rare. Typically learners showed a good technical understanding of what the kernel is and the role it plays in the computer.

To improve performance here greater application is required to the scenario. In this case the requirement was that learners referenced how the kernel would control the data collection process and the range of devices and sensors.

The example response typifies responses that showed good understanding bit did not achieve the highest mark band:

Example response:

> **Discuss the role of the kernel in controlling and managing system components and tasks in Shania's computer system.**
>
> (12)
>
> The role of a kernel in a computer system is to manage memory and other I/O functions such as CPU scheduling, and device driver loading. In Shania's system her laptops operating system is initialised at boot using the kernel and her hardware such as the microphone and sensors are loaded as Modules to be allowed to interact with the system using device drivers which interact with the hardware layer using software. The The operating system is then responsible for functioning within the rules of the kernel, which dictates how the cpu should prioritise instructions and how many tasks it can do at a time. Furthermore the kernel is also responsible for security within the hardware layer meaning that software is not allowed to override the kernel so long as there is no module. Another way that her kernel works with her laptop is by deciding how to store data which she has specifically set to collect data for manipulation. Because kernels are modular it means that she can lose some features that are un-needed allowing for her computer to be fine tuned for her work.

This example shows good understanding of the kernel but does not make sufficient reference to the scenario to move to mark band 3

8 marks awarded

Summary

Overall learners' performance has improved in this series both in terms of the level of learners' knowledge and examination preparation.

Based on performance in this examination series, learners are offered the following advice to help continue this improvement:

- Continue to 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.
- Continue to 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.
- Centres are encouraged to consult the 'Technology Update' which will be published on the BTEC website. This document defines the scope of the technologies that will may be used in examinations such as defining the range of 'common protocols', 'Input devices' utility software' etc. and should be used in conjunction with the specification when planning and delivering content.

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