

GCSE (9-1)

Exemplar Candidate Work

COMPUTER SCIENCE

J276

For first teaching in 2016

J276/01 Summer 2018 examination series

Version 1

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Introduction

These exemplar answers have been chosen from the summer 2018 examination series.

OCR is open to a wide variety of approaches and all answers are considered on their merits. These exemplars, therefore, should not be seen as the only way to answer questions but do illustrate how the mark scheme has been applied.

Please always refer to the specification <https://www.ocr.org.uk/qualifications/gcse/computer-science-j276-from-2016/> for full details of the assessment for this qualification. These exemplar answers should also be read in conjunction with the sample assessment materials and the June 2018 Examiners' report or Report to Centres available from Interchange <https://interchange.ocr.org.uk/Home.mvc/Index>

The question paper, mark scheme and any resource booklet(s) will be available on the OCR website from summer 2019. Until then, they are available on OCR Interchange (school exams officers will have a login for this and are able to set up teachers with specific logins – see the following link for further information <http://www.ocr.org.uk/administration/support-and-tools/interchange/managing-user-accounts/>).

It is important to note that approaches to question setting and marking will remain consistent. At the same time OCR reviews all its qualifications annually and may make small adjustments to improve the performance of its assessments. We will let you know of any substantive changes.

Question 1(a)(i)

1 William is creating a film for a school project using a digital video camera.

(a) The digital video camera has a secondary storage device.

(i) Explain why the digital video camera needs secondary storage.

..... [2]

Exemplar 1

2 marks

The digital video camera needs to be a secondary storage because it needs to save the data permanently or store the data. [2]

Examiner commentary

The candidate has identified that it stores data (1) and does this permanently (1) which meets the criteria for non-volatile.

Exemplar 2

0 marks

It may need secondary storage for back-up in case the original is lost / corrupted. Have a spare one if the file cuts out at certain points i.e. stops earlier than suppose too. [2]

Examiner commentary

The candidate has identified that secondary storage is for backing up data, which is inaccurate. They have not stated that it actually stores the data, or the purpose of this storage method.

Exemplar 3

0 marks

The camera needs secondary storage as it is temporary and ^{so it} can be replaced when it is full. This could be an SSD card inserted into the camera. [2]

Examiner commentary

The candidate has incorrectly identified secondary storage as temporary memory.

Question 1(a)(ii)

- (ii) The digital video camera uses solid state storage.

Explain why solid state storage is the most appropriate type of storage for the digital video camera.

[4]

Exemplar 1

4 marks

Ans An SSD is the **fastest** storage so can be read or written to very quickly which is good for cameras to store large ^{video} files quickly. It is also the most compact and durable storage making it portable which is important for a camera as the memory is small and not easily damaged as there are no moving parts. Its capacity is not huge but it does not need to store tremendous amounts of data at once as ~~photos~~ can be expected. [4]

Examiner commentary

The candidate has not been credited a mark on the first line for stating it is the fastest, because they have not stated what it is the fastest at ... i.e. read/writing data. They have however then expanded this to say data can be read/written very quickly which is sufficient for this mark, which is then expanded to state that it means the videos can be saved quickly (1) which is an application to this scenario. The candidate proceeds to describe solid state as being compact (1) and durable (1). This has gained 3 marks for identifying characteristics, and 1 mark for the expansion of the speed.

Exemplar 2

2 marks

It is most appropriate because it can store a lot of data before it is full meaning you spend less money on replacing them because they last longer. The solid state storage can store large files/long videos rather than stopping when it is full and making you delete data. It can also be moved to a computer storage. [4]

Examiner commentary

The candidate has identified that it stores a lot of data – it does not state it stores the most, but has identified that it has a large capacity. They have then expanded this to identify that this large storage allows them to store large files i.e. videos – gaining the second mark. There are no marks available for moving it to another device, because this can be done with all types of storage.

Exemplar 3

0 marks

The digital video camera appropriate storage type can be solid state because it has the most storage inside it, easiest to back-up when lost, it is also the most secure and also has easy access to the owner. [4]

Examiner commentary

The candidate stated 'it has the most storage inside it' which is insufficient and inaccurate as solid state may not have the most. They refer to it being safer, which again is inaccurate and easy access is too vague – not specific enough about characteristics of the storage device, indeed all storage devices have easy access to the data.

Question 1(b)(i)

(b) William transfers the videos to a computer for editing.

(i) The computer has 1GB of storage free.

Calculate the number of videos that could be stored on the computer if each video was 100MB in size.

Show your working.

..... [2]

Exemplar 1

2 marks

1 GB is 1000 MB 100 MB $\times 10 = 1000$ MB

1 GB = 10 videos

..... [2]

Examiner commentary

The candidate has shown their working, as multiplying 100 by 10 to gain 1000MB, and has clearly given the final answer as 10 videos.

Question 1(b)(ii)

(ii) A program needs to calculate the size of files in bytes. The program must:

- Ask the user to input a file size in megabytes
- calculate and output the number of bytes this represents in a user friendly format (e.g. "There are 5242880 bytes in 5MB").

Write an algorithm using pseudocode to calculate the number of bytes in a given number of megabytes.

..... [6]

Exemplar 1

6 marks

```

2/b)ii)  MBSize = int(input("Enter file size in MB: "))
         Bytesize = MBSize * 1000000
         print("There are " + Bytesize + " Bytes in " + MBSize + " MB")
    
```

Examiner commentary

The candidate has output a message in the first statement encased within speech marks (1). This input is then stored in a variable (1). They perform the correct calculation in one statement which is appropriate (2). They then output this new, changed variable (1) in an appropriate message (1).

Exemplar 2

5 marks

```

START
INPUT Megabytes
Bytes = Megabytes * 1024
Bytes = Bytes * 1024
OUTPUT "Bytes: " + Bytes + " in " + Megabytes
END
    
```

..... [6]

Examiner commentary

This candidate has read in the input to a variable, but has missed the output message. The question states the system must ask the user to input a file size, and this was not met. They have performed the correct calculation in 2 stages, then output the new value in an appropriate message.

Exemplar 3

5 marks

```

input print ("input size of file: ")
input = 5Mb
filesize = input
newfilesize = filesize * 1048576
newfilesize = 5242880
print ("There are " newfilesize " bytes in sub")

```

Handwritten code with annotations: green checkmarks (✓) and red crosses (✗). A red box highlights 'input = 5Mb'. A red box labeled 'BOD' is next to 'filesize = input'. A handwritten calculation is shown:
$$\begin{array}{r} 1048576 \\ 5 \overline{) 5242880} \\ \underline{5242880} \\ 0 \end{array}$$

[6]

Examiner commentary

The candidate has output a message asking for the input (1). The second line is incorrect and is ignored because using the keyword input in this way would not work – the third line is read as taking the input and storing it in fileSize, the candidate has been given benefit of doubt here. The calculation is only credited 1 mark because they have calculated the newfilesize correctly – but they have then overwritten this with the data for 5mb. This means that the final, newly calculated value will be incorrect, 2 marks cannot be credited for a correct calculation that is then overwritten. The new value (with FT from the previous error) is then output (1) in an appropriate message (1).

Exemplar 4

4 marks

```

Fsize = Input ("What is the file size in MB?")
Bytes = (Fsize / 1,000,000)
Print ("There are " Bytes " in your file")
Bytes = (Fsize * 1,000,000)
Print ("There are " Bytes " in your file")
    
```

[6]

Examiner commentary

The candidate has output a message within their input statement (1) and stored the value input into the variable Fsize (1). They have performed the incorrect calculation and are not credited marks for this, however they do then output the new (incorrectly) calculated value and are given FT for this (1), the variable is within an appropriate message so is credited the last MP.

Exemplar 5

1 mark

```

Print ("How big is the file, megabytes")
Input ("answer")
Print ("This amount of megabytes is a total of
answer GB")
    
```

[6]

Examiner commentary

The candidate has output a message, meeting MP1. The input line has speech marks around the text within the brackets identifying this as a string and not a variable, therefore this mark cannot be credited. They do not calculate the number of bytes, and output a message without using the calculated variable.

Exemplar 6

1 mark

```

START
INPUT ("filesizeMB")
IF filesizeMB = 5MB
    OUTPUT ("There are 5242880 bytes")
ELSE
    OUTPUT ("In ' + filesizeMB + ' there are ...")
FINISH

```

[6]

Examiner commentary

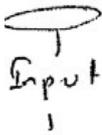
The candidate has output the message within the input statement. The content within the brackets is within speech marks and therefore is a string and not an identifier, it is not a fully appropriate message but is given as sufficient. The mark for the input is not credited because the value input is not stored anywhere. The candidate has not performed the calculation; therefore, the output message cannot be credited marks because they are not outputting the new value.

Exemplar 7

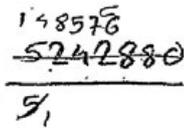
0 marks

(ii) A program needs to calculate the size of files in bytes. The program must:

- o Ask the user to input a file size in megabytes
- o calculate and output the number of bytes this represents in a user friendly format (e.g. "There are 5242880 bytes in 5MB").



Write an algorithm using pseudocode to calculate the number of bytes in a given number of megabytes.



Start
 Input the filesize in megabytes
 Input = Input 1
 Calculate = 148576 ** Input 1
 MB to bytes = 148576 * Input 1
 End

[6]

Examiner commentary

The candidate has given input but the text to the right is not appropriate for an identifier (spaces) and does not have speech marks therefore cannot be assumed to be an output message. No marks are credited for this statement. The calculation is inaccurate and is not credited any marks. There is no attempt to output the newly calculated value.

Question 1(c)(i)

(c) William's computer has utility programs installed including automatic backup.

(i) William can choose between a full or incremental backup.

Identify the backup method William should use to backup the computer, justifying your choice.

Method:

Justification:

..... [3]

Exemplar 1

3 marks

Method: Incremental backup

Justification: He should use an incremental backup, which is a backup where only new or edited files are copied. This is because it uses a lot less **BOD** room than a full backup, and takes a significantly shorter time. He should also invest in a full backup from time to time every so often. [3]

Examiner commentary

The candidate has given incremental as their answer. They have identified that only new or edited files are copied (1). A benefit of doubt is given for it taking up less room – this is read as memory space. Finally, they say that this takes less time to do.

Exemplar 2

1 mark

Method: Incremental backup

Justification: because his computer already has automatic backup so for him to waste more storage on a full backup wouldn't be smart.

[3]

Examiner commentary

The candidate has identified incremental backup but is not credited marks, as the marks are for the justification. They have stated that a full backup wastes storage – which is not necessarily true as in ‘wastes’, but they have implied that full uses more storage and therefore are credited the mark for MP5

Exemplar 3

1 mark

Method: full backup

Justification: This is because it'll store all information rather than certain parts only. A full back up will be more efficient because it makes sure to get all the information and store it in a safe place in the memory drivers.

[3]

Examiner commentary

The candidate has given full backup as their method, which does not gain a mark, but their justification must match their choice. They have described a full backup as storing all the information – the term information is given a bod because it should refer to data. They have explained this same point again later.

Question 1(c)(ii)

(ii) Give **one** additional utility program William could make use of and describe how he would use it.

Utility program:

Description of use:

.....

[3]

Exemplar 1

3 marks

Utility program: Defragmentation ✓

Description of use: as he changes files, adds new ones and deletes old ones, secondary disk storage files will become fragmented with gaps between them making it more effort to read. Defragmentation closes the gaps and groups files together making it more efficient to retrieve the files ✓

[3]

Examiner commentary

The candidate has identified defragmentation (1) which is an appropriate utility program. They then describe what a fragmented disk is and how this occurs which has not answered the question. At the end of their answer they describe what defragmentation does and are credited two marks (2) for this.

Exemplar 2

3 marks

Utility program: Encryption software programme ✓

Description of use: This software programme could be beneficial as it will allow users to scramble the data to stop the data to be understood by others ✓

[3]

Examiner commentary

The candidate has identified an appropriate example of a utility program (encryption). They describe what encryption does, i.e. it scrambles data which is appropriate, and that this stops it being understood by others which is a clear expansion of the explanation for the third mark.

Exemplar 3

0 marks

Utility program:iCloud~~X~~.....

Description of use:back-up all data stored on his
device and access wherever he is simply
by going to settings, icloud, backup and
will always be ~~at~~ easy to access.

[3]

Examiner commentary

The candidate has given a brand name which is not acceptable. Cloud storage is also not a utility program.

Question 1(d)

- (d) William wants to upload his videos on the Internet and is considering releasing them under a Creative Commons license.

Explain how a Creative Commons license will impact the use of William's videos by other people.

[3]

Exemplar 1

3 marks

This means the public will be able to use his work without asking permission. This comes under certain conditions from which William can choose. For example Attribution means that he must be credited. No anyone distributes his work after using it or non-commercial means it cannot be used for commercial purposes.

[3]

Examiner commentary

The candidate has identified that the public can use his work. They have then described one specific type of Creative Commons – attribution, they get a mark for naming this and the final mark for describing that this means redistribution required crediting the original author. They proceed to give further valid points but have already gained the maximum of 3 (e.g. can only be used non-commercially)

Exemplar 2

2 marks

Uploading videos in Creative Commons license is not a good idea as other people can copy and edit the video or misuse it through copying it. People can also update the video without William's wish. For example: People may edit the video and post it to different sites against William's will and privacy.

[3]

Examiner commentary

The candidate has identified that under a Creative Commons license other people can edit the video. They then repeat this same point using the term update instead of edit. Further they repeat this again, 'People may edit the video' but they expand this by saying it can then be posted to different sites, meeting the MP about redistribution. The final part of this sentence about it being against William's will is ignored.

Exemplar 3

0 marks

Companies may watch William's video and see what skills he has and see how his performance is. This may make William targeted by loads of people depending on how good he is. HELP his pursue a career in ~~the~~ film filming.

[3]

Examiner commentary

The candidate has not explained what a Creative Commons license allows. They have given a social impact explanation of William uploading films, which is not answer the question.

Question 2(a)

2 A house has computers in each room and a central router. Every room allows both Ethernet and WiFi connections to the router.

- (a) Identify if the house network is a LAN (local area network) or a WAN (wide area network). Justify your choice.

Network type:

Justification:

.....
.....

[3]

Exemplar 1

3 marks

Network type: LAN ✓

Justification: ~~WAN~~ it is a group of connected devices on a small geographical location ✓ and all of the hardware is owned ✓ controlled by the persons that use it.

[3]

Examiner commentary

The candidate has correctly identified LAN (1). They describe the small geographical area (1) and identify that in a LAN the hardware is owned by the people in the network (1).

Exemplar 2

2 marks

Network type: Logical Area Network

Justification: The network would be LAN because it is only located in a small radius ✓ of one house without a large amount of computers connected for the whole street.

[3]

Examiner commentary

The candidate is not credited the mark for logical area network, however when the full answer is read they have stated it as LAN later. They are not being tested on what LAN stands for because this is given in the question, and therefore are credited this mark. They expand this by stating it is in a small radius – radius demonstrates understanding of the term 'local'.

Exemplar 3

1 mark

Network type: LAN ✓

Justification: the reason it wouldn't be WAN is because it isn't a wide area it's local because it has a central router in each room meaning only the computer in that room and any other device near will use it. [3]

Examiner commentary

The candidate has correctly identified LAN (1 mark). They have described it using the same terminology, i.e. local area, which is not demonstrating their understanding of what this means and therefore is insufficient for the mark. They have stated it has a central router, but this does not mean it is a LAN.

Question 2(b)

(b) The following table has descriptions of Ethernet and WiFi.

Tick (✓) **one** box in each row to identify if the description is more appropriate for Ethernet or WiFi.

Description	Ethernet	WiFi
A wired connection		
More likely to be affected by interference		
Data can be transmitted at a faster speed		
Wireless transmission		
Shorter transmission range before data is lost		

[5]

Exemplar 1

5 marks

Description	Ethernet	WiFi
A wired connection	✓	
More likely to be affected by interference		✓
Data can be transmitted at a faster speed	✓	
Wireless transmission		✓
Shorter transmission range before data is lost		✓

[5]

Examiner commentary

The candidate has given all 5 correct answers.

Question 2(c)(i)

(c) (i) Describe the purpose of the router in the house's network.

..... [2]

Exemplar 1

2 marks

Describe the purpose of the router in the house's network.

The router is used to direct packets
 from another network ie the internet to
 the houses network

BOD

..... [2]

Examiner commentary

The candidate has identified that it directs packets (1) meeting MP1, and then continues to state that this is from one network to another – identifying that the router connects these two networks, they have then given an example to make it clear what they mean.

Exemplar 2

0 marks

So they have easy access if the
 wifi plays up and better connection
 around the household.

..... [2]

Examiner commentary

The candidate has not described the purpose of a router, they have confused it with a wireless access point. This question requires technical understanding of the functionality of a router..

Question 2(c)(ii)

(ii) Identify **two** additional items of network hardware, apart from cables and a router, that may be used within the house network.

1

2 [2]

Exemplar 1

2 marks

1 WAP ✓
2 NIC ✓ [2]

Examiner commentary

These are both appropriate network hardware devices. Known acronyms are accepted as answers.

Exemplar 2

0 marks

1 ...satellite dish.....
2 ...Power box..... [2]

Examiner commentary

Neither of these are items of specific network hardware.

Question 2(d)(i)

(d) A user enters a uniform resource locator (URL) into a web browser on one of the computers in the house. A system is then used to find the IP address of the web server associated with the URL.

(i) Name the system which matches URLs to IP addresses on the web.

.....
..... [1]

Exemplar 1

1 mark

 Domain Name System (DNS)
..... [1]

Examiner commentary

This is the correct answer.

Exemplar 2

0 marks

Web Software
..... [1]

Examiner commentary

Web software does not perform this action.

Question 2(d)(ii)

(ii) The following statements describe what happens after the IP address has been found and returned to the user’s computer.

There are **five** missing statements in the table.

Write the letter of the missing statements from the table in the correct place to complete the description.

- 1 The request is put into packets
- 2
- 3 The packets are sent across the network
- 4
- 5
- 6 If they have not arrived:
- 7 A timeout is sent to request the packets are resent
- 8 If they have arrived:
- 9
- 10

Letter	Statement
A	The server checks if all the packets have arrived
B	The packets are put in order
C	The request is processed by the web server
D	The packets are received by the host server
E	Each packet is given the address and a number

[5]

Exemplar 1

5 marks

- 1 The request is put into packets
- 2 **E** ✓
- 3 The packets are sent across the network
- 4 **D** ✓
- 5 **A** ✓
- 6 If they have not arrived:
- 7 A timeout is sent to request the packets are resent
- 8 If they have arrived:
- 9 **D** ✓
- 10 **C** ✓

Letter	Statement
A	The server checks if all the packets have arrived
B	The packets are put in order
C	The request is processed by the web server
D	The packets are received by the host server
E	Each packet is given the address and a number

[5]

Examiner commentary

These are all given in the correct order.

Exemplar 2

0 marks

1 The request is put into packets

2 **B**

3 The packets are sent across the network

4 **C**

5 **D**

6 If they have not arrived:

7 A timeout is sent to request the packets are resent

8 If they have arrived:

9 **A**

10 **E**

Letter	Statement
A	The server checks if all the packets have arrived
B	The packets are put in order
C	The request is processed by the web server
D	The packets are received by the host server
E	Each packet is given the address and a number

[5]

Examiner commentary

None of these have been positioned correctly.

Question 2(e)(i)

- (e) The house owner is concerned about potential threats to the network from being connected to the Internet.
- (i) Describe **three** possible threats to the computers connected to the network and give **one** way each threat can be reduced or prevented.

Threat 1

.....

.....

.....

Prevention

Threat 2

.....

.....

.....

Prevention

Threat 3

.....

.....

.....

Prevention

[9]

Exemplar 1

9 marks

- Threat 1 *Phishing*: Hacking focused on the human aspect of the system, such as spoof emails sent to try and trick the user into giving out their details / credentials
- Prevention *Education on common phishing strategies* BOD
- Threat 2 *Brute force attacks*: Hackers may simply try to guess their way into user accounts by trying common passwords
- Prevention *use of strong, unique passwords*
- Threat 3 *Malware*: Malware such as a Trojan could be used by hacker to get the user to unknowingly install a program that breaches the network by getting the hacker access
- Prevention *anti-malware software*
- [9]

Examiner commentary

The first threat is phishing which is appropriate in this context. They have described it appropriately. The prevention is given a benefit of doubt mark because it would have been better if it had described what the education was i.e. to not click on links from unknown sources, check the URL etc.

The second threat of a brute force attack is appropriate. They describe this as trying to get into accounts by trying passwords and give a suitable prevention of strong passwords.

The third threat of malware is suitable. They give a suitable description of this and prevention.

Exemplar 2

5 marks

Threat 1 Trojan: where malware is sent through the internet looking like something harmless like a software update.

Prevention anti-malware software

Threat 2 SQL ~~page~~ injection: the virus "injects" a section of code into the computers code and gains access to important files by remembering PIN ^{numbers} A.

Prevention regular software and anti-virus updates

Threat 3 Brute force attack: a person or a computer tries to hack into the computers to steal important information like banking personal identification numbers.

Prevention set up a ^{strong} firewall

[9]

Examiner commentary

The candidates first threat of a trojan virus is appropriate, and they have described it suitably. Anti-malware is an appropriate prevention.

SQL injection is not an appropriate threat to this scenario, which is a house owner who has a LAN, SQL injection is a threat to a website that uses a database.

The third threat of brute force is appropriate, they describe this as hacking – but this is insufficient to describe what a brute force attack actually is, and is not credited the mark. The prevention is appropriate.

Exemplar 3

4 marks

Threat 1 ... If a virus ^{from one device} attacks a main network server, then all the devices connected will also be affected by the virus.

Prevention Use software such as Anti-virus.

Threat 2 ... When multiple devices are connected to a single ^{network and network} it will make the internet slower on the whole network as a lot are using it at once.

Prevention Upgrade to a better network.

Threat 3: Hackers can use the internet to access the network and find out all of someone's information and delete important parts of the network.

Prevention Download Firewall.

[9]

Examiner commentary

The first threat identified is virus (1). They do not explain this sufficiently because there is no description of what 'attacking' actually does. The prevention of anti-virus is appropriate (1).

The second response does not identify a threat – heavy network traffic is not a threat and therefore not credited marks.

The third response identifies hackers as a threat (1). They do not give enough detail in the description i.e. that these people are unauthorised, that they should not be there. The prevention is appropriate, although a preferred answer would be installing and running a firewall rather than just downloading it.

Exemplar 4

1 mark

Threat 1 The computers could get hacked into because someone connected to the same router has access to personal information. For example bank accounts.

Prevention Change [^] the ~~the~~ password.

Threat 2 people can also see private pictures and videos off yourself, close friends and family allowing the to expose any embarrassing pictures.

Prevention put passwords on files.

Threat 3 Also any important work files like plans in the company's ~~to~~ future or business plans can lead to being fired and being jobless for a while.

Prevention put it on a secondary storage device i.e a memory stick. [9]

Examiner commentary

The candidate has identified the hacking is a risk in threat 1 and are credited a mark for this. They have not clearly described what hacking is, and **changing** the password is insufficient for preventing a hacker. The second and third descriptions to not identify what the threats are, they describe the consequences of these threats having been carried out and therefore are not credited marks.

Question 3

- 3* A small island has 100 people living on it. The island has just been connected to the Internet, after previously having no Internet or mobile phone signal.

Discuss the impact on the island's inhabitants and businesses of getting access to the Internet.

In your answer you might consider the impact on:

- inhabitants
- businesses
- ethical issues
- privacy issues

[8]

Exemplar 1

8 marks

The island's inhabitants will have a greater understanding of current world events and gain a better knowledge of the current economy due to online stocks and news. The inhabitants will also gain a larger amount of knowledge due to the amount of information that the internet contains. The island's businesses will also see a rise in sales due to online shopping and visitors to the businesses' websites. However, due to the island's lack of experience with the internet, they may be prone to security problems such as denial of service attacks or viruses. These security problems will cause the island to lose data, money and business due to the attacks that they will experience. Additionally, there will be a greater disparity between classes and people due to previous wealth and money obtained through the internet. This will mean that those with money will be able to purchase good internet and gain access to its greater benefits while less fortunate people will have worse internet or no internet and gain none of the benefits.

[8]

Examiner commentary

The candidate has identified the impact of inhabitants, businesses, privacy and ethical issues. They have covered several positive and negative points without a significantly greater emphasis on either side. The points they have made are appropriate and succinct, with suitable explanations. There are opportunities for further points to be made, but they have covered the requirements. The high-mark band requires a range of considerations which have been made, with appropriate, accurate and detailed points. They have weighed up both sides and justified their points. This was given 8 marks as it was seen to fit all requirements.

Exemplar 2

7 marks

They will be able to communicate with others and gain access to the rest of the world, however they may not realise or understand the need for Safety and Security and maybe taken advantage of for that, and have their privacy exploited as they don't know how to keep it secure. For local businesses it may be good, as they'll be able to advance their business and grow as they'll have help and support from anywhere around ~~the~~ the world which they previously didn't have, however again they may not realise the need for Safety or privacy and their business may be hacked as they aren't used to having to protect against hackers. This may be unethical as they have no experience with the internet and may not realise what is acceptable or the dangers on the internet. However it may allow them to grow more as a country and gain access to things they previously never could and allow them to speak to family and friends that they normally can't speak to as easily. They may even be able to learn more than they previously couldn't even or teach in schools but now they can as they have access to online resources and the internet.

[8]

Examiner commentary

The candidate has given several points including privacy (negative safety issues), business (both positive and negative issues), ethical issues (positive and negative) which are combined with social issues. The candidate has covered a range of issues and has given positive and negatives throughout – this is not a biased response in one direction. There are some opportunities where further detail or explanation could be given for example in their final paragraph they could expand this further explaining the impact of this on the schools, or the people. This is repeated earlier, where the candidate could have gone a step further. This response meets the criteria of a high-level response (range that covers positives and negatives with good detail/expansion). The occasional missed opportunities stop it gaining full marks. For 6 marks it would need to be on the border, but this is a clear high-level and therefore 7 marks is credited.

Exemplar 3

4 marks

This will impact the island by people living there being able to see what goes on in the world and interact with others. They will be caught up with modern day society and the advances in technology. This will help businesses to grow because they can make their own websites to advertise their ~~but~~ businesses. However, these people won't know how to keep safe from the dangers of the internet of hackers taking information. With the internet they need servers and devices which all use up electricity causing a negative effect on the environment. Not everyone will have the access to the internet for time if it's not affordable which will affect businesses because they won't grow like the ones that are now located on the internet with their own networks and so that may put them out of business from getting no money.

Examiner commentary

The candidate has given several points which include business points, privacy and ethical issues. The responses lack depth at times. There are opportunities where they could explain these further – for example they state it will help businesses grow with websites – but not why this helps them grow, or how. For a high-band response they would need a wide range of considerations and detail, which this does not reach. The mid-band needs a range of considerations but is under developed, which this response meets. The response therefore is given the middle of the mid-band at 4 marks.

Exemplar 4

2 marks

The internet won't be smooth and efficient because 100 different devices using it at once will be very slow and hard to use. Also due to no internet and mobile signal everyone will be eager to use it making it an ethical issue. Also people can look into your private data such as social media like facebook.

This also ~~is~~ inhabit's them to do ~~it~~ it even more because they may not off have had internet for a while and may miss family back at home. Also people on the island can get to know other islanders deep secrets also allowing to expose them.

[8]

Examiner commentary

The candidate has stated that there will be issues but has not identified what these are. They have identified that people could access other people's private data, but this is not expanded any further, and is repeated in the second paragraph. For a mid-band response, candidates needed to demonstrate reasonable knowledge and a range of considerations. This has not been met. For 1 mark the candidate needed some information of relevance, and they have met more than this as they have made a good, valid point. This therefore cannot be mid-band, or 1 mark, therefore it gains 2 marks.

Question 4(a)

4 Alicia has designed a computer using Von Neumann architecture.

(a) Describe the purpose of **two** registers that are used by Von Neumann architecture.

- 1
 -
 -
 - 2
 -
 -
- [4]

Exemplar 1

4 marks

- 1 Memory Address Register (MAR) Holds The address of where the next instruction will be found in the memory.
 - 2 Memory Data Register (MDR) Holds The data or memory that has just been fetched from the memory.
- [4]

Examiner commentary

The candidate has identified MAR as being a correct register, and states that it holds the address of the next instruction in memory. They give the second as MDR, and that this holds the data that has been fetched. These are both sufficient because they do not simply state that they hold data or the address of data – they give further detail that goes beyond what the name of each register means.

Exemplar 2

0 marks

- 1 It secure allowing no one to hack in to the software / system.
 - 2 Runs faster and quicker, and doesn't delay making it a better option.
- [4]

Examiner commentary

The candidate has not identified any registers.

Question 4(b)

(b) The CPU has a clock speed of 3.8 GHz.

Describe what is meant by a clock speed of 3.8 GHz.

[2]

Exemplar 1

2 marks

3.8 GHz means 3800000000 cycles per second. [2]

Examiner commentary

The candidate has correctly converted 3.8 GHz to identify the number as 3.8 billion, and have said what is 3.8 billion of, i.e. cycles per second.

Exemplar 2

0 marks

It means how quickly and how fast / slow the download and internet speed is. So it may take 3/4 minutes to download 1 GB on 3.8 GHz. [2]

Examiner commentary

The candidate has confused clock speed with download speeds.

Exemplar 3

0 marks

clock speed is used to measure the speed of the CPU and the clock speed of 3.8 GHz shows it's measured in hertz and that's the speed of the CPU. [2]

Examiner commentary

The candidate has identified the clock speed as the speed of the CPU – but this is given in the first part of the question. The candidate has therefore not expanded their answer beyond the detail given in the question and is not credited any marks.

Question 4(c)

(c) Alicia says:

"My computer has a quad-core processor, so it will run twice as fast as a computer with a dual-core processor."

Explain why this statement is not always true.

[3]

Exemplar 1

3 marks

Some programs and software may not make use of multiple cores, and the speed won't change. Other factors such as the cache or clock speed will also affect how fast the computer is going, and if the quad-core processor has a low amount of RAM or cache and clock speed, it may not go very fast, whereas if the dual-core processor has fast clock speed, cache and high memory it'll go fast. [3]

Examiner commentary

The candidate has identified that the software being run might not use all the cores (1) which is an appropriate reason. They have also identified that the cache (1) and clock speed (1) also impact the speed which is correct.

Exemplar 2

1 marks

This may not always be the case because the dual-core processor may have better RAM and ROM than the ~~quad~~ quad-core processor making it more smoother and better. [3]

Examiner commentary

The candidate has identified that the dual-core could have more RAM, which is a valid reason why the statement might not be true. More ROM is not relevant and would not affect the speed.

Question 4(d)(i)

(d) The computer will only have 2GB of RAM, but Alicia says that virtual memory can be used instead of adding more RAM.

(i) Explain how virtual memory can compensate for the lack of RAM in Alicia's computer.

..... [3]

Exemplar 1

3 marks

When the RAM in Alicia's computer is completely full, the computer will redirect it to the other storages connected to the motherboard such as a hard disk or an SSD. When the data reaches the storage, it is processed very slowly in comparison to the RAM and if the RAM has free blocks, the virtual memory will send the data to the RAM to be processed in a free block. [3]

Examiner commentary

The candidate has identified that VM is used when RAM is full in the first line. They then identify that it uses the hard disk on line 2. Towards the end of the response they describe the process of sending from VM to the RAM which gives the third mark.

Exemplar 2

2 marks

Virtual memory is used as temporary RAM when the RAM is full. If there is not enough RAM, data is moved to virtual memory. Virtual memory has a large amount of storage space so can store a lot of data. It can also be used instead of RAM in the fetch decode execute cycle. [3]

Examiner commentary

The candidate has identified that VM is used when RAM is full (1). They stated that the data is then moved to VM (1), but they do not continue this explanation in how VM works i.e. how it moves data back and forth as required.

Exemplar 3

0 marks

This allows them to have extra storage
inside the computer allowing it too have
more virtual memory and to store more
in Alice's computer.

[3]

Examiner commentary

The candidate has given vague statements about it giving them more storage, which is inaccurate, as it allows RAM to have greater capacity than its limit, but this is too vague to be credited marks.

Question 4(d)(ii)

- (ii) Explain why it would be beneficial for Alicia to get more RAM instead of relying on virtual memory.

[2]

Exemplar 1

1 mark

Virtual memory isn't as fast and can
 sometimes cause disk thrashing as the
 data is constantly being swapped
 between RAM and virtual memory. [2]

Examiner commentary

On the first line the candidate has identified that VM is faster – but not what it is faster at. They have then gone on to state that it can cause disk thrashing which gains a mark. They have described what this is but not why this is a problem so do not get a further mark.

Exemplar 2

0 marks

As virtual memory is ^{allocated} a portion of secondary storage,
 it ~~will~~ is further away from the CPU
 and so will be slower than RAM, or other
 primary storage devices. So more RAM is better
 because it is closer to the CPU. [2]

Examiner commentary

The candidate has stated that VM is further away from the CPU and this makes it faster. The distance is not the key factor here, an item may be further away from the CPU but still have a faster connection. It also does not get the mark for faster because they have not said what it is faster at doing – i.e. reading data, transferring data etc.

Exemplar 3

0 marks

As RAM is significantly faster [^] than Virtual memory
 and having more RAM will drastically increase the
 amount of data stored by the RAM at a time

[2]

Examiner commentary

The candidate has identified that RAM is faster, but does not say what it is faster at, candidates need to be explicit in their description i.e. faster access speed, faster reading speed. The second part of their response states what having more RAM means i.e. it can store more data – but not why this is beneficial.

Exemplar 4

0 marks

because the RAM is more secure
 and can be backed up and
 be kept more secure.

[2]

Examiner commentary

This is incorrect, RAM is not more secure and cannot be backed up in this way they intend.

Question 5(a)

5 When connecting computers into a network, the use of appropriate protocols are important.

(a) Explain what is meant by a protocol.

..... [2]

Exemplar 1

2 marks

A rule ✓ or instructions that data must
follow when being sent over ✓ a network to
keep a universal standard for all computers
sending data..... [2]

Examiner commentary

The candidate has correctly identified that is a rule (1), the instruction element is ignored. They have gone further to describe this as for when data is sent over a network (1)

Exemplar 2

0 marks

It means allowing access into the software/
router. When connecting you input a password
which is the protocol..... [2]

Examiner commentary

This is incorrect, it does not allow access to the software or router, a password is not the protocol.

Question 5(b)(i)

(b) For each of the scenarios below, identify the most appropriate protocol to be used and explain the function of the protocol.

(i) A user wants to transfer a file directly from his computer to his friend's computer.

..... [2]

Exemplar 1

1 mark

FTP - (file transfer  protocol) this will
allow the user to ~~test~~ send data / files
across to his friend
..... [2]

Examiner commentary

The candidate has correctly identified FTP. They have then repeated the question, stating that this allows them to transfer the file, but not the function of this protocol.

Exemplar 2

0 marks

He should use a secondary
storage such as a memory stick
to transfer from both computers.
..... [2]

Examiner commentary

A secondary storage device is not a protocol, they have not answered the question.

Question 5(b)(ii)

(ii) A customer wants to securely log into her bank's website to check her account balance.

..... [2]

Exemplar 1

1 mark

HTTPS, ✓ This is a secure protocol that
 encrypts ✓ the data so that only the
 sender and receiver can understand
 it. [2]

Examiner commentary

The candidate has correctly identified HTTPS (1) and described this as encrypting the data (1)

Exemplar 2

0 marks

She should go ~~ff~~ to her local
 banks that's she's with a set up
 a online banking account and add
 a password to be ~~ta~~ safe. [2]

Examiner commentary

The candidate has not identified a protocol, they have not answered the question.

Question 5(c)

- (c) Explain the difference between how the IMAP (Internet message access protocol) and SMTP (simple mail transfer protocol) protocols are used.

[2]

Exemplar 1

2 marks

SMTP - simply transfers emails from one user to another, however IMAP retrieves the email for the user. It holds a copy of the email until the user downloads it and deletes it themselves.

[2]

Examiner commentary

The candidate has been given a benefit of doubt mark for SMTP transferring emails from one user to another, because it is more from one server to another. Transfer has also been read as sending as it indicates the movement to somewhere as opposed to gathering or receiving data from somewhere. They have then identified that IMAP receives the email for the user.

Exemplar 2

1 mark

- (c) Explain the difference between how the IMAP (Internet message access protocol) and SMTP (simple mail transfer protocol) protocols are used.

IMAP stores emails that have been received by the mail server for a recipient to read. SMTP is used to send the email and transfer the data to the server.

[2]

Examiner commentary

The candidate begins by stating the IMAP stores emails – a protocol cannot store an email. They do not state that this protocol allows for the receiving of email. They do state that SMTP sends the email and are credited this mark.

Exemplar 3

0 marks

IMAP is sending it through a link from
a website and a SMTP is
When you send it ~~privately~~ private and
doesn't have a URL.

[2]

Examiner commentary

The candidate has identified that 'it' is sent, but they have not quantified what 'it' is, this could refer to generic data, files etc. Candidates need to be clear that it is an email that is sent.



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