

# Examiners' Report

## June 2019

### GCSE Computer Science 1CP1 01

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# Introduction

This is the second time that candidates have taken examinations for this unit, which requires them to demonstrate and apply knowledge and understanding of key principles and concepts outlined in the specification content.

This is an un-tiered paper that has been specifically designed to allow candidates of all ability ranges to find questions that are both challenging and interesting throughout. Questions are contextualised in a scenario and candidates will find that 'command words' are used consistently in the paper to indicate the type of response expected.

Candidates who achieved high marks often provided more detailed responses, including examples and reasons where expansions or explanations were required.

## Question 1 (b)

Some candidates did not gain both marks because they gave only  $1024 \times 1024 \times 1024$  for the first part of their response.

(b) The system uses a hard disc to store images of car number plates.

One kilobyte is 1024 bytes.

Construct an expression that calculates how many bytes there are in **four** terabytes of disc storage.

You do not need to carry out the calculation.

$1024 \times 1024 \times 1024 \times 1024 \times 4 = \text{four Terabytes in}$  <sup>(2)</sup>  
bytes



$1024 \times 1024 \times 1024 \times 1024 \times 4$  was a frequent response.

This response gains both marks.

2 marks

## Question 1 (c)

A few candidates did not gain marks because they responded with P AND T AND S.

Some candidates did not understand what was required and drew logical operators. The + symbol was commonly used incorrectly (perhaps in place of AND).

- (c) Customers pay online in advance to use the car park. Members of staff do not have to pay.

When a car arrives at the exit barrier, the system checks **three** conditions:

- 1) The number plate (P) has been recorded by the system.
- 2) Enough time (T) has been paid for.
- 3) The car belongs to a member of staff (S).

Construct a Boolean logic statement, using P, T and S, to represent the conditions necessary for the system to raise the exit barrier.

(2)

Exit = ( P AND T OR P AND S )



This response gains both marks.

The use of brackets has no impact, because the order of precedence means the AND parts of the expression are evaluated first and then these results would be OR'd together, producing the correct result.

2 marks

## Question 1 (d)

Candidates gave their answers using binary. However, some candidates did miss the second mark.

Some candidates did not gain the second mark because they did not represent the binary using 8 bits.

(d) The ASCII code for the character 'R' is 82 in denary.

Derive the ASCII code for the character 'D' in 8-bit binary.

Handwritten notes: A B C D E F G H I J K, 128 64 32 16 8 4 2 1, (2), 82 - 14 = 68, 68 in binary is 01000100



Marks are awarded for:

- 82 - 14 gains (1) NB: 68 on its own would be enough for a mark
- 0100 0100 (1)

2 marks

## Question 1 (e)

Where candidates did not gain marks, it was often for saying 'cannot access the data' instead of referring to reading or understanding the data.

(e) Explain why the car park system encrypts the data it stores.

(2)

If it's not encrypted then someone could understand the data stored and ~~change~~ use this information to make it so they don't have to pay. Also, the information ~~taken~~ should be kept private to ensure safety of the customer's <sup>should</sup> information (car park use). (Total for Question 1 = 9 marks)



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Examiner Comments

This response gains the first mark because it has the reverse of mark point 1 – if not encrypted, someone could understand the data.

The second mark is gained for reference to customers' information, which is enough to suggest customer data.

2 marks

## Question 2 (a)

Most candidates received one mark for giving examples of what guest characteristics could be stored.

Many candidates did not mention 'record for each guest'. They also missed the opportunity to use other database terminology that would have gained marks. When candidates did not gain marks, they frequently gave responses including information that they thought a database would contain.

**2** A hotel chain stores guest information in a structured database.

(a) Describe how guest information would be structured in a database.

(2)

There would be a column for names, the room number, phone numbers, email addresses and a unique identifier for each guest. This is in an array for each guest in the record.



This is a typical response that receives both marks.

2 marks

## Question 2 (b)

Most candidates gained the mark for this question.

## Question 2 (c)

Some responses lacked clarity or used repeated themes.

Very few candidates referred to access to read and write, scalability and bandwidth limitations.

Most of the answers compared physical security and also access from other devices.

Candidates often used the context of the hotel to situate their response.

Some candidates did not refer to enough content, or use enough rationale, to gain marks in the higher mark bands.



(c) The hotel chain is considering replacing local backup methods with 'cloud' storage.

Discuss the advantages and disadvantages of using 'cloud' storage for backup.

(6)

One advantage of switching to cloud storage for backup is the removal of the need to buy expensive storage, as well as that, if there is a fire at the data center where your data is held, your data is safe as it is stored in multiple data centers. However, because a separate company owns your data, they could be targeted by a cyberattack or security breach, possibly risking the security of your data. Another advantage would be that your data can be accessed ~~any~~ from anywhere so long as you have an internet ~~connection~~ connection, multiple people can access it at the same time as well. This can also be seen as a disadvantage as it is necessary to have an internet connection, as well as the download speed of your data depending on the strength of your internet connection. Finally, data can be ~~see~~ synced between devices while updating. On the disadvantages side, we can also see that you have less control over your data as it is held by another company. As well as that, it is possible you might go against the Data Protection Act as some of the information stored should be confidential. Overall there are many advantages and disadvantages ~~the~~ to cloud storage.



This response shows adequate knowledge of a few key concepts.

Risk of fire is explained in terms of backups of backups. Security is related to targeted attacks.

The content relating to access from anywhere is valid, but access by multiple people is less so. The statement 'at the same time' is perhaps valid, but it is likely to relate to collaboration opportunities, which is not relevant to backed-up data.

There is mention of trust and control.

However, 'expense' is not qualified by scale and bandwidth limitation is referred to, but in a vague way.

Reference to syncing could be interpreted as a reference to collaboration and may be referring to Dropbox-like local app functionality.

The section related to the Data Protection Act (DPA) is irrelevant, because this can apply equally to local storage.

The range of content places this in Level 3. It does not meet the Level 3 descriptor fully but is more than Level 2.

5 marks

## Question 2 (e)

Candidates gaining both marks made clear reference to the fact that all computers are connected to each other, and if one node fails the others will still work.

Very few candidates did not include 'decentralised' in their response and some drew an image of the topology, but did not explain it well (if at all). Sometimes, their response did not match their image (the image being correct) and therefore prevented the award of marks.

Many candidates still referred to a central server, showing a lack of understanding of a mesh. Very few candidates mentioned that the network is self-configuring.

(e) Describe a mesh network topology.

(2)

A mesh network topology is one in which every computer is connected to each other as well as every computer being connected to the server. This means if one computer fails in the network, it will keep going.



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Examiner Comments

The first mark is awarded for reference to each computer being connected to each other computer.

The second mark is awarded because reference is made to the fact that if one node fails, data transfer will still be possible.

2 marks

### Question 3 (a)

Few candidates mentioned NAND memory. Typically, marks were only gained from mention of transistors.

Some candidates did not show adequate knowledge of computer science, referring to flash memory, USB or a simple explanation of how to save files. Very few responses mentioned floating gates, with voltage to control gate. Some candidates could not fully explain the answer and some were vague, showing lack of understanding.

Some candidates described how magnetic hard drives/optical drives worked, rather than solid state drives.

**3** A teacher uses tablet computers with students to teach programming online.

(a) Describe how data is stored on solid state devices.

(3)

Solid state or flash memory data is held through a large number of ~~no~~ charged ~~transistors~~ and uncharged transistors, representing ~~of~~ "1" and "0" respectively. ~~The~~ Solid state memory is non-volatile meaning when power is lost, the data is kept instead of discarded. Examples of Solid State ~~non~~ storage include SSD's, SD's and USB's.



Marks awarded for the part of the response that mentions that charged and uncharged transistors represent 0 and 1.

2 marks

### Question 3 (b)

Frequent awardable responses included those related to anti-malware, backup, defragmentation and compression.

Some candidates had misinterpreted the question and described what the purpose of utility software is, rather than giving examples.

(b) State **two** functions of utility software.

(2)

- 1 To Repair or update the Software.
- 2 To clean the Software of unwanted data.  
Also compress and sort data.



No mark is awardable for 'repair' because it relates to 'software' not 'files'.

Marks are awarded for:

- 'update software' (1)
- 'compress...data' (1)

2 marks

### Question 3 (c)

Many candidates circled the correct protocol. However, the domain rectangle was not as well placed and many candidates included the entire URL. When candidates did not gain marks, they often circled 'python.html'.

(c) Here is a uniform resource locator.

 `http://www.pearson.co.uk/secondary/programming/python.html`

Draw a circle around the protocol and a rectangle around the domain name.

(2)

*https = protocol*

*www.pearson.co.uk = domain name.*



The candidate's annotation helps here and both marks are awarded.

However, without the annotation, there would be one mark awarded for http.

No mark would have been given for the domain, because two rectangles were provided and one of them is incorrect.

2 marks

### Question 3 (d)

Many candidates were able to explain many features, with examples that supported the award of marks.

However, some candidates confused their explanations of High Level Languages and Low Level Languages. Many candidates referred to example languages such as Python and Java, without providing features.

Assembly code and machine code were also mentioned but, again, features (as required by the question) were not given. Pseudocode was also mentioned many times, perhaps indicative of a common misconception.

(d) Discuss the features of high-level and low-level programming languages. (6)

*built in functions / Similar to English*  
*Works with hardware written in machine code / with Assembly operands*  
*not dealing with hardware, just logic*  
*Specific to processor (Assembly)*

One feature of a high-level language is built-in functions, these are pieces of code written by someone else to complete a task that a programmer can call to save themselves time. Another feature of a high-level language is that it is written with words and commands which are used in English which makes it easy for the programmer to write and understand. Another feature of a high level language is that it deals with the logic and data involved in the program, not with instructing the hardware how to behave and achieve the intended goal of the program. On the other hand low-level programming languages such as Assembly language deals very heavily with the behaviour of the hardware, and you need to know a lot about the hardware to write the code successfully. Low-level languages are also much harder to write as they don't resemble English or usual terms with Assembly being written using operands and opcodes. Another feature of low level languages is that they are often specific to the hardware (CPU) they have been written for, this is the case with assembly, and must be re-written to run on different hardware.

(Total for Question 3 = 13 marks)

For high level languages, 'built in functions' is expanded to indicate how they are useful for programmers.

'Closer to English' is also expanded with how it affects use.

The third point 'Another feature...goal of the program' is not articulated well, but shows adequate understanding.

This is developed subsequently into the points made about assembly language requiring a knowledge of the hardware, which is then expanded effectively.

This is better than a Level 2 response, but does not meet the descriptor fully for the top of Level 3, due to the lack of sustained reasoning or coherent structure.

Level 3

5 marks



## Question 4 (a) (i)

There were many variations of response to this question. Some candidates answered in terms of maths and science responses, with 'wavelength' being a frequent label given for frequency. Some candidates declined to respond.

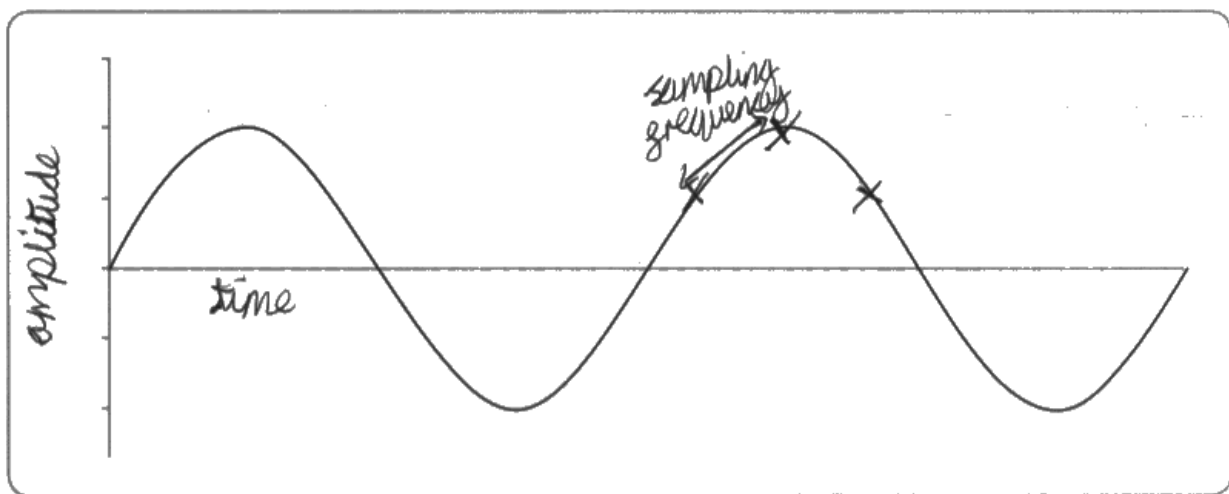
Some candidates did not label at all or were confused by the elements. Some did not use the correct terminology or used 'Pitch' or 'bit depth' instead of 'sample frequency' or 'amplitude'.

**4** A baby monitor uses a microphone to record sound.

(a) An analogue to digital converter is used to change the sounds received by the microphone into a form that can be processed by a computer.

(i) Complete the diagram to show sampling frequency and label both axes.

(3)



All marks are awarded.

Both axes are labelled correctly and understanding of sample frequency is shown.

3 marks

## Question 4 (a) (ii)

Too frequently, candidates responded with 'more accurate' without any other level of detail in their response, thereby limiting the award of marks. Most candidates who gained marks used the responses 'clearer sound' or 'higher quality'.

Where marks were awarded, it was often for stating that 'better' or 'clearer sound' was possible. Many candidates did not gain marks for stating that higher volumes were achievable.

(ii) State the advantage of using a bit depth of 16 rather than a bit depth of 8.

(1)

More sound intervals are captured per second so it is more closer to the original analogue sound.



The comment 'closer to the original analogue sound' was awarded one mark.

The incorrect 'more sound intervals are captured per second' statement was ignored.

1 mark

## Question 4 (c)

Candidates often gained marks for having the correct orientation for the numerator/denominator.

Few candidates gained full marks for  $1024^2$ . Many candidates used 1024 instead of 1000. Quite a number of candidates did not gain the mark for  $\times 8$ .

Some candidates chose to respond using words and written statements and some candidates were confused by division and multiplication.

(c) Construct an expression to show how many seconds it will take to transmit 20 MB of data using a network transmission speed of 2 Mbps

1 KB = 1024 bytes.

You do not have to do the calculation.

(4)

$$(20 \times 1024 \times 1024 \times 8) / 2 \times 1000 \times 1000$$



This is an example of a response that gains full marks.

4 marks

## Question 4 (d)

Many candidates used the response 'notices a change' instead of referring to a set value or the value being outside of a range.

Candidates used 'sends an alert' ('alert' was given in the question) as output, rather than specifying what output was used for this. Many candidates identified that there would be an output, but did not specify what that would be.

Frequently, candidates did not refer to an input device/sensor.

(d) Describe how an embedded system within a baby monitor can be used to alert parents about changes in room temperature.

(3)

A sensor will be in the monitor constantly monitoring temperature change. When the temperature gets too high or too low, the alarm within the monitor will be sent a signal to go off.



Marks are given for:

- sensor (1)
- 'when the temperature gets too high' because this implies the mark available from mark point 2 (1)
- 'the alarm will go off' (1)

3 marks

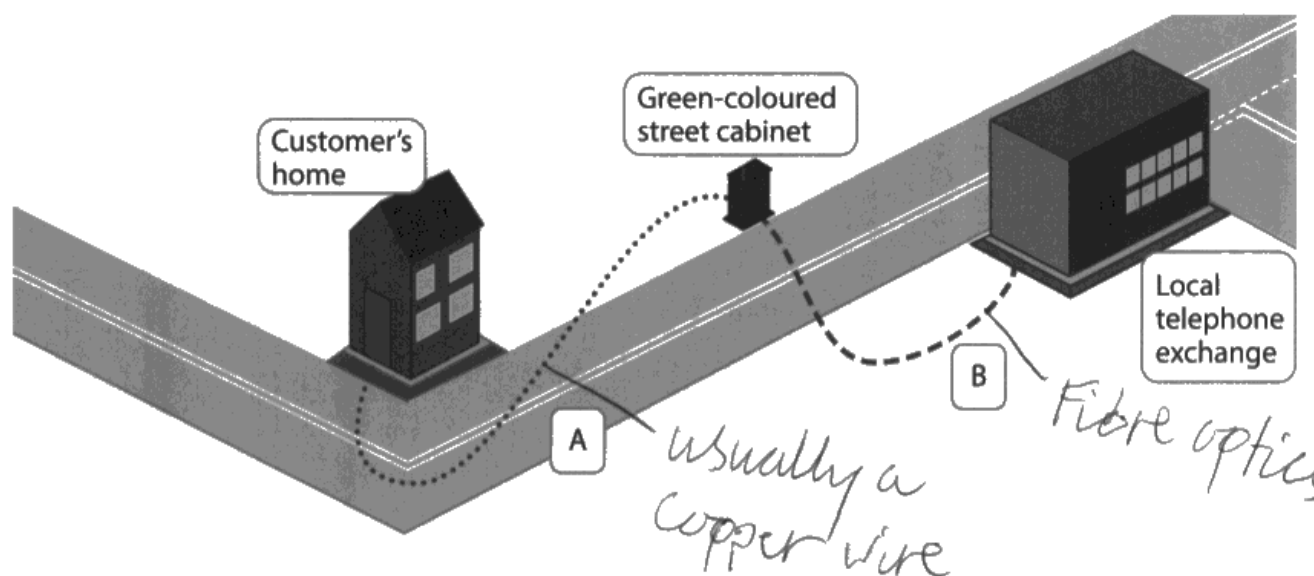
## Question 4 (e)

Candidates did not gain marks for stating 'LAN', 'WAN' or 'Wired' and 'Wireless'. Some candidates also gave the answer the wrong way around.

(e) The diagram shows two **different** types of connectivity media.

State the different types of connectivity media used at A and B.

(2)



A .....

B .....

(Total for Question 4 = 14 marks)



Although not in the answer space, this response gains both marks.

2 marks

## Question 5 (a)

Many candidates gained the mark for this question.

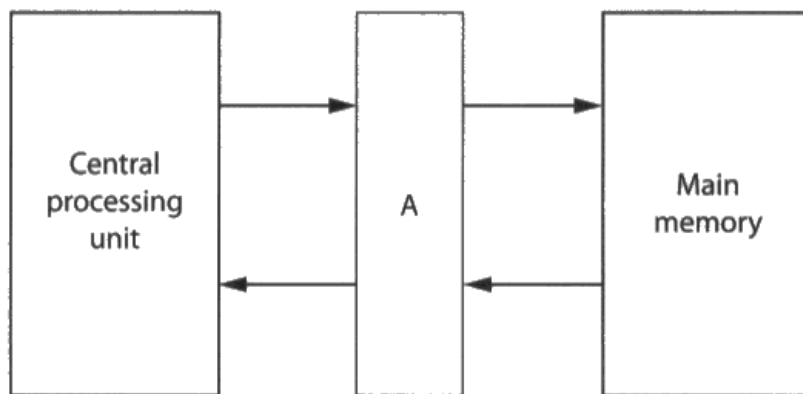
## Question 5 (b)

Frequent responses included 'frequently used instructions' and 'speeds up difference between CPU and main memory'.

Many responses only mentioned that the component sends data across, between the two components, therefore did not gain marks.

(b) Describe the function of the component labelled A.

(2)



Component A is cache. The CPU operates faster than the main memory can. Therefore very fast cache memory is used as a buffer to stop bottlenecks by storing commonly used instructions.



Marks are awarded for:

- 'The CPU operates faster than the main memory' (1)
- '...by storing commonly used instructions' (1)

2 marks

## Question 5 (c) (i)

Most responses gained both marks for this question.

(c) (i) Convert the binary number 0011,1101 to hexadecimal.

(2)

3 D



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A correct response

2 marks

## Question 5 (c) (ii)

Candidates often gained the mark for the second mark point, but often described hex as taking up less storage in a computer, thereby limiting the award of marks.

(ii) Explain why hexadecimal notation is used.

(2)

using binary would be too long  
so it is ~~shorter~~ condensed  
and easier to understand



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Marks are awarded for:

- 'using binary would be too long so it is condensed' because this relates to mark point (MP) 1 (1)
- 'easier to understand' (from MP2) (1)

2 marks

## Question 5 (d)

Many candidates described many parts of the FDE cycle that did not answer the question. There was much description of the address bus 'being sent' to get data and the data bus 'going to fetch data' from memory.

Candidates gained marks frequently for stating that 'the control unit sends a signal'.

Very few candidates referred to the programme counter. There was a typical misconception with the roles of the buses and some responses confused data with instructions.

(d) Describe the role of the control unit, the data bus and the address bus when fetching an instruction from memory.

(4)

The control unit sends a read signal to the RAM via a control bus in which the RAM uses the address bus to specify which memory location in the RAM is required (fetches the required memory location). The contents are then transferred to the CPU along the data bus. The control bus manages flow of information between components specifying if it is a read or write operation and ensures it occurs at the right time. The control unit then decodes the instruction and executes it. When fetching an instruction, the address of the memory location being read is stored in the memory address register. The contents stored are stored



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All marks are awarded.

4 marks

## Question 5 (e)

Most candidates gained the mark for this question.



## Question 6 (a)

Candidates would often gain the mark for 'x8'.

Many candidates were awarded a mark for '1024x1024' or '/64'. Many gained both marks for using both in an expression correctly.

6 A computer stores images online.

(a) An image uses 8-bit colour and is 64 pixels wide.

It uses 1MB of storage.

Construct an expression to calculate the height of the image in pixels.

1 KB = 1024 bytes

You do not have to do the calculation.

(2)

$1 \times 1024 = 1024 \times 1024 =$  ~~1024~~

1MB

$1 \times 1024 \times 1024 \div 64 =$  height of the image in



The 1x part of the expression is ignored because it would have no impact on the result of a calculation.

2 marks

## Question 6 (b)

Candidates who gained marks often described data as being stored in virtual memory on the hard drive and covered points about active and inactive data.

Some candidates did not gain marks because they described cloud storage, or concurrency and scheduling, rather than virtual memory and paging.

(b) The computer runs seven applications, at the same time.

The sum of their memory usage exceeds that of physical memory.

However, all seven applications run.

Describe how the operating system uses virtual memory to manage the situation.

(4)

Virtual memory is when a space is opened up inside of the hard drive (paging) and the least recently used programs are moved to it the space to allow room in the RAM for the new application to be held. Virtual memory is very slow compared to RAM but stops the computer freezing.



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Marks are awarded for:

- correct reference to paging (1)
- 'the least recently used programs are moved to it' (1)
- 'to allow room in the RAM for new application' (1)

3 marks

## Question 6 (c)

Marks were often awarded for reference to efficiency and security vulnerabilities in code. Many candidates stated simply this was for checking errors, or bug fixing, but were not specific enough in reference to the fact that this was after the testing stage.

(c) A code review is an important stage in software development.

State the purpose of a code review.

(1)

A code review makes sure that security vulnerabilities do not get through into the released software.



The mark was gained for reference to checking for security vulnerabilities.

1 mark

## Question 6 (d)

(d) This notification appears on a computer screen.

**Thank you for clicking our link.**

Your important files are no longer accessible.



**Can I get access to my files?**

Yes, you can. Simply send your payment as described below.

**How long do I have?**

14 days.

**How do I pay?**

Send £500 in Bitcoin to abc123def456ghi789.

Describe how this cyber attack operates.

(3)

Once this cyber attack is on your computer, it gains access to your files and blocks you from accessing them forcing you to pay money to unlock your files & data



In this response, 'blocks you from accessing them' is not enough for MP2 because it does not state how.

Credit is given for:

- '(forcing you to pay money) to unlock' (1)

1 mark

## Question 7 (a)

7 The internet is the world's largest network.

- (a) One function of a router is to forward data packets from one network to another across the internet.

Describe how a router carries out this function.

(2)

The router reads the header of the packet and determines where it needs to go. Then, the router directs the packet through the most efficient route to its destination.



Marks are given for:

- reads the header (1)
- most efficient route - MP5 (1)

2 marks

## Question 7 (b)

- (b) Explain why it is important to review network and user policies.

(2)

Network and user policies are often reviewed because of security concerns due to more advanced malware and data leaks that could corrupt a company.



Marks are given for:

- 'because of security concerns' (1)
- 'due to more advanced malware' (1) (Malware = technology)

2 marks

## Question 7 (c)

(c) The transport layer of network protocols splits data into packets before sending it.

Describe the process that ensures the data received matches the original.

The packets are numbered in the right order so that when received they are placed in the original order they were sent in.



Marks are given for:

- packets are numbered MP1 (1)
- placed in original order MP2 (1)

2 marks

## Question 7 (d)

(d) Inclusion is an ethical concern.

A school has decided to allow students to bring their own digital device to use in class.

Assess the impact of the school's decision on its ability to be inclusive.

(4)

Not all the students  
may have a digital device meaning  
not everyone may be included  
which can cause ethical  
problems such as bullying through  
discrimination. This impacts the school  
on being inclusive because not  
everyone may be included.



Marks are given for:

- Not all students may have a digital device (1)

'Meaning not everyone may be included' is too vague and too close to the content in the question to show assessment has been carried out.

The bullying that may ensue is not an impact on the school's ability to be inclusive.

1 mark

## Paper Summary

Based on their performance on this paper, candidates are offered the following advice:

- Develop the good practice of expanding and explaining answers using examples and reasons, especially where more than a simple statement or list is required
- Respond with the context of the question in mind
- Do not repeat responses when more than one example/reason is required
- Ensure responses match the requirements of the command word
- Identify key words in the question to ensure that responses reflect the question that is asked



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