OCR 2024 Predicted Paper 1
GCSE (9–1) Computer Science
J277/01 Computer Systems
Time allowed: 1 hour 30 minutes

Do not use a calculator

INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space, use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer all the questions.

INFORMATION
- The total mark for this paper is **80**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has 13 pages.

ADVICE
- Read each question carefully before you start your answer.
- This is just a predicted paper based off previous years

1. Ben 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]

    (b) State what is meant by a single core 3.5 GHz processor.

    _____

    _____

    _____

    _____

    [2]

2. Computers represent data in binary form.

(a) Complete the table by writing the missing denary, 8-bit binary or hexadecimal values.

Denary	8-bit binary	Hexadecimal
		12
40		28
118	01110110	
	11111000	

[4]

(b) Identify how many unique values can be represented by 5 bits.

_____ [1]

(c) Perform a binary shift of 3 places right on the binary number 10001110.

_____ [1]

(d) Tick **one** box to identify the largest file size.

☐ 2 000 000 bytes

☐ 2300KB

☐ 200MB

☐ 0.1GB

[1]

(e) Add the following 8-bit binary numbers

```
      1    0    0    1    1    0    1    1
 +    0    1    1    1    0    1    0    0
    _____

    _____
```

[2]

(f) An overflow error can occur when adding two 8-bit binary numbers.
Describe what is meant by an overflow error.

_____

_____

_____

_____

[2]

3. A student is performing a range of actions on the internet using their computer.

(a) Complete the table by identifying the most appropriate protocol for each of the tasks the student is performing.

Task	Protocol
Downloading an email to your computer	
Downloading a text document from a web server	
Transmitting a file from a client to a server	
Requesting to view a news webpage from a web server	

[4]

(b) Some protocols have layers.
Describe one advantage of using layers to construct network protocols.

_____

_____

_____

_____

[2]

4. A company, GCST Supermarkets, has supermarket stores throughout the country. The computers for each store connect to the central office using a Wide Area Network (WAN).

(a) One characteristic of a WAN is that they are set up over a large geographical area. Give one other characteristic of a WAN.

_____

_____

[1]

(b) GCST Supermarkets use a client server network to connect the checkout computers to the store's server.
Describe one benefit to GCST Supermarkets of using a client server network instead of a peer-to-peer network.

_____

_____

[2]

(c) The supermarket manager's computer can access the Internet and the World Wide Web.
Explain the difference between the Internet and the World Wide Web.

_____

_____

_____

_____

[2]

(d) The supermarket introduces a WAP (Wireless Access Point) to allow network access to wireless devices. The manager has noticed that the performance of the network has recently decreased.
Describe how introducing wireless access could have slowed down the network.

_____

_____

_____

_____[2]

(e) The IP address 192.134.243.433 is linked to the website with a URL of
https://www.gcsecomputersciencetutor.vercel.app. When the URL is entered into a
browser, the website homepage is loaded.
Describe the relationship between the website URL, the IP address and the
webserver.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

[5]

5. Alex is producing images and sound effects for a website.
   Part of a bitmap image is shown in Fig. 2:

W	W	R	R	R	B	B
W	W	R	Y	R	B	B
B	B	R	R	R	B	B
B	B	B	LG	B	DG	B
B	DG	DG	LG	DG	B	B
B	B	DG	LG	B	B	B
B	B	B	LG	B	B	B

Fig. 2

The letters represent a colour, as shown in Fig. 3:

Letter	Colour
W	White
B	Blue
R	Red
Y	Yellow
DG	Dark Green
LG	Light Green

Fig. 3

(a) Using the example in Fig. 2, explain how a bitmap image is stored on a computer.

_____

_____

_____

_____

_____

_____

[3]

(b) State what is meant by colour depth and give the colour depth required to store the image in Fig. 2.

_____

_____

_____

[2]

(c) Explain how reducing the number of colours in an image can reduce its file size.

1 _____

_____

2 _____

_____

[2]

(d) Alex needs to create an audio recording of himself singing.

(i) Explain how sampling is used to make the recording.

_____

_____

_____

_____

_____

[3]

(ii) State the effects of increasing the sample rate of the recording.

_____

_____

_____

[2]

6. Binary numbers can represent different forms of data.

(a) One form of data is characters.
Complete the description of how computers represent characters in binary using the given list of terms. Not all terms will be used.

2	4	8	9	16	32	256	71	72	74	76
78	80	81	all	different		identical		one	repeated	
similar	some		unique							

A character set stores .... of the characters that the computer

can represent. Each character is given a .... binary code.

Lower-case and upper-case letters in a character set are given

.... binary codes. One example of a character set is ASCII. This

character set uses .... bits for each character. If the code value

for the character 'F' is 70 then the code value for the character 'L' is

....

[5]

(b) Tick one or more boxes in each row to identify whether each statement applies to each character set.

	ASCII	Extended ASCII	Unicode
Can represent European characters			
Uses different character codes for upper-case and lower-case letters			
Can represent thousands of different characters, including Russian and Chinese symbols			

[3]

7. Hamish stores confidential documents on his laptop.

    (a) Hamish would like to use encryption to add another layer of protection to his documents.
    Explain how encryption helps to protect Hamish's documents.

    _____

    _____

    _____

    _____

    _____

    [2]

    (b) Identify and describe one other software-based security method that will help Hamish protect his computer system and data.

    Method_____

    Description_____

    _____

    _____

    _____

    [3]

    (c) Hamish's laptop has both hardware and software. The hardware includes primary and secondary storage.
    Explain why a computer needs both primary and secondary storage.

    _____

    _____

    _____

    _____

    _____

    [2]

8. Security on a computer can be provided directly by the operating system or by using utility programs.

(a) State two utilities that can be used for security.

1 _____

2 _____

[2]

(b) Explain why memory management is necessary.

_____

_____

_____

_____

_____

[3]

(c) The computer has Virtual Memory (VM)
The table has four statements about VM. Not all of the statements are correct.
Tick the **True** column for the statements that are correct.
Rewrite any statement that is incorrect in the **False** column by changing the statement to make it true.

Statement	True	False – rewrite the statement to make it true.
A section of primary storage is partitioned to act as virtual memory		
VM is needed when RAM is full, or nearly full		
Data from VM is transferred back to secondary storage when needed		
Data from ROM is transferred into VM		

[4]

9. Layla is a software engineer. She is creating a new version of a computer game she released three years ago. She is considering selling the game online and not making it available physically in shops.

    (a) Describe the environmental impact of Layla's decision.

    _____

    _____

    _____

    _____

    [2]

    (b) Layla released her game under a proprietary licence.
        Explain why a proprietary licence is a more appropriate choice than open source.

    _____

    _____

    _____

    _____

    [2]

    (c) Tick one box on each row to identify the legislation that would cover each of the given events.

Event	The Data Protection Act (2018)	Computer Misuse Act (1990)	Copyright Designs and Patents Act (1988)
A company transmits personal data to another company without the individual's permission.			
A school accidentally publishes their students' addresses on the school website.			
The interface for a piece of software is replicated by a rival company.			
A user leaves a computer logged on and another person leaves them a message on their desktop.			
A student guesses their teacher's password and accesses their computer account.			

    [5]

END OF QUESTION PAPER