Computer Science (J277)

J277/01, Computer systems, June 2025
Rebecca Stevenson

Please note that you may see slight differences between this paper and the original.

Candidates answer on the Question paper.

OCR supplied materials:
Additional resources may be supplied with this paper.

Other materials required:
- Pencil
- Ruler (cm/mm)

Duration: 90 mins

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions, unless your teacher tells you otherwise.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Where space is provided below the question, please write your answer there.
- You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

- The quality of written communication is assessed in questions marked with either a pencil or an asterisk. In History and Geography a *Quality of extended response* question is marked with an asterisk, while a pencil is used for questions in which *Spelling, punctuation and grammar and the use of specialist terminology* is assessed.
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **80**.
- The total number of marks may take into account some 'either/or' question choices.

1(a) A student is creating a presentation containing images and sound.

One of the files is an audio recording.

Complete the description of how a computer stores sound. Fill in the gaps using the given list of terms. Not all terms will be used.

analogue	colour depth	higher	repeated	smaller
binary	digital	lower	sample rate	unique
bit depth	height	measuring	sampling	
byte	hertz	recording	seconds	

An …… sound wave needs to be converted into a digital sound wave.

Sound …… is when the amplitude of the sound wave is measured at set intervals. The …… is the number of times a second the sound wave is measured. This is given in Hertz.

Each amplitude is given a …… binary number. The number of bits allocated to each sample is the …….

The …… the number of bits, the wider the number of amplitudes can be measured.

[6]

(b) The student creates 10 bitmap images using a computer.

Each image has a colour depth of 8-bits and a resolution of 800 × 500 pixels.

i. Define the term pixel.

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[1]

ii. Calculate the total file size of the 10 images in kilobytes.

Show your working out.

File size: ..... kilobytes

[2]

iii. State the minimum number of bits that will be needed to represent 240 different colours.

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[1]

(c) The student wants to use a secondary storage device to move their files to their home computer.

Identify whether the student should use an optical or solid-state type of secondary storage device. Justify your choice.

Optical or solid-state ……

Justification _____

_____

_____

_____

_____

_____

_____

_____ [4]

2(a) Tick (✓) **one** box on each row to identify the computer operating system function that will manage each task.

Operating system function	Memory management	Peripheral management	User management	File management
Multitasking				
Renaming a folder				
Creation of user accounts				
Installation of a printer driver				
Transfer of data to and from RAM				

[5]

(b) A computer has utility software.

i. State the purpose of utility software in a computer.

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[1]

ii. Explain the purpose **and** function of encryption software.

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[3]

3 A company designs and builds tablet computers. The company wants to reduce the cost of manufacturing their tablet computers. The company also decides to stop releasing software updates for their older tablet computers. This means customers will need to change their devices more often.

Discuss the impact of these decisions on the company and the customers.

Include in your answer:

- ethical issues
- environmental issues
- benefits and drawbacks.

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[8]

4(a) A youth centre is creating a network with 20 computers in a single building that will be connected in a Local Area Network (LAN).

Identify **two** reasons why this network will be a LAN and not a Wide Area Network (WAN).

1

2

[2]

(b) The network design connects the computers in a mesh topology.

i. Describe what is meant by a mesh topology.

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[2]

ii. Describe **one** benefit **and one** drawback of the network using a mesh topology instead of a star topology.

Benefit ---

Drawback ---

---

[4]

(c) The network design originally only had wired connections. The design is updated to include wireless connections via Wi-Fi.

i. Explain the benefits to the youth centre of also providing Wi-Fi connections.

[3]

ii. The decision to use wired and/or wireless connections can affect the performance of the network.

Complete the table by explaining how each factor can affect the performance of a network.

Factor	How it affects performance
Bandwidth	
Number of users accessing the network at the same time	

[4]

(d) The youth centre is going to store data about users and events using cloud storage.

Describe the drawbacks to the youth centre of storing the data on the cloud.

[5]

(e) Users will have access to the internet.

i. Identify **one** device that will be required to allow the LAN to connect to the internet.

[1]

ii. The computers will be allocated an IPv4 address.

Tick (✓) **one** box on each row to identify if the IPv4 address is valid **or** invalid.

IPv4 address	Valid (✓)	Invalid (✓)
192.154.21.2		
258.0.0.3		
56.1.2.66.1		
251.58.3.7		

[4]

iii. When a user wants to access a website they enter the URL into the address bar of a web browser.

Describe the steps that take place to convert the URL into the website's IP address.

[4]

(f) Identify **one** piece of legislation that the youth centre will need to follow when storing users' data **and** describe the steps they need to take to meet the requirements of this legislation.

Legislation _____

Steps the youth centre needs to follow _____

_____

_____

_____

_____

_____

_____ **[4]**

5(a) Tick (✓) **one** box to identify the quantity of megabytes that is the same as 2 terabytes.

☐ 2000 MB

☐ 20 000 MB

☐ 200 000 MB

☐ 2 000 000 MB

[1]

(b) Each row in the table contains a number that is written as a denary value, 8-bit binary value and a 2-digit hexadecimal value. Some values are missing.

Complete the table by writing in the missing value for each number.

Denary	8-bit binary	2-digit hexadecimal
38		26
	01001110	4E
156	10011100	
215		D7

[4]

(c) Complete the binary addition of these two 8-bit binary numbers.

Show your working out.

$$\begin{array}{r} 0\ 1\ 1\ 1\ 0\ 0\ 1\ 1 \\ +\ 0\ 0\ 1\ 1\ 0\ 1\ 0\ 0 \\ \hline \end{array}$$

[2]

(d) Tick (✓) **one** box to identify the result of a 2-place right binary shift on the binary number 01110111.

☐ 00011101

☐ 11101110

☐ 00111011

☐ 11011100

[1]

(e) Describe the binary shift that can be used to multiply any number by 8.

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[2]

6(a) A computer uses the ASCII character set.

Part of the ASCII character set is shown here:

Character	Binary code
K	01001011
L	01001100
M	01001101
N	01001110

Write the binary code to represent the word POP using ASCII.

[2]

(b) A new computer is being built.

Identify **one** benefit and **one** drawback of the computer using Unicode instead of ASCII.

Benefit

Drawback

[2]

(c) A computer's CPU contains registers.

Complete the table by identifying **two** registers **and** state the purpose of each register.

Register	Purpose

[2]

END OF QUESTION PAPER