

## OCR style

# GCSE (9-1) Computer Science

## Paper 1: Computer systems – Practice Paper

J277/01 · Practice paper

**Time allowed: 1 hour 30 minutes**

|                         |  |
|-------------------------|--|
| <b>Candidate name</b>   |  |
| <b>Centre number</b>    |  |
| <b>Candidate number</b> |  |

### Materials

- Do not use: a calculator
- You must 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 (\*).

### Advice

- Read each question carefully before you start your answer.

*Original practice material written by Teach io in the style of OCR GCSE (9-1) Computer Science (J277). It is not produced, approved or endorsed by OCR.*

## Answer all the questions.

Time allowed: 1 hour 30 minutes.

**1** A company makes smart heating thermostats that let homeowners control their heating from a mobile phone app.

**(a)** Complete the table by writing the name of the CPU component or register that matches each description.

**[4]**

| Description                                                                                          | Component or register |
|------------------------------------------------------------------------------------------------------|-----------------------|
| Decodes instructions and sends signals to control how data moves around the CPU                      |                       |
| Holds the data or instruction that has been fetched from memory, or is about to be written to memory |                       |
| Small, fast memory inside the CPU that stores frequently used data and instructions                  |                       |
| Holds the address of the next instruction to be fetched, and is incremented during the fetch stage   |                       |

**(b)** The thermostat contains an embedded system.

Describe what is meant by an embedded system, using the thermostat as an example.

**[3]**

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**(c)** The company is designing a new control panel for its heating systems. The CPU in the old panel has a clock speed of 1.2 GHz. The CPU in the new panel has a clock speed of 2.4 GHz.

Explain how increasing the clock speed could affect the performance of the control panel. Explain why the performance might not double.

**[4]**

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**2** A wildlife charity uses digital cameras that take photos of animals automatically when they move past.

**(a)** State why the camera needs RAM.

**[1]**

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**(b)** Give two characteristics of ROM.

**[2]**

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**(c)** Explain why a computer needs secondary storage as well as primary storage.

**[3]**

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**(d)** The photos taken by the camera are saved onto a removable memory card.

Explain two characteristics of secondary storage that the manufacturer should consider when choosing the memory card for the camera.

**[4]**

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**(e)** The memory card has a capacity of 2 GB. Each photo is 4 MB in size.

Calculate the maximum number of photos that can be stored on the memory card. Show your working.

**[2]**

3

**(a)** Convert the denary number 218 into an 8-bit binary number.

[1]

**(b)** Convert the binary number 01111011 into hexadecimal. Show your working.

[2]

**(c)** Add the following two 8-bit binary numbers. Give your answer in binary and show your working.

10010110

0011101

[2]

**(d)** The binary number 11001000 has a binary shift of 3 places to the right applied.

(i) Give the result of the shift.

(ii) State the effect of this shift on the denary value of the number.

[2]

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**(e)** Explain how a character set is used to represent text in a computer. **[2]**

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**(f)** A mono sound clip is recorded with a sample rate of 8000 Hz and a bit depth of 16 bits. The clip is 5 seconds long.

Calculate the file size of the sound clip in kilobytes. Show your working. **[3]**

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**(g)** A photo is edited so that its resolution is increased.

Describe the effect this has on the image. **[2]**

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**4** A town council is planning to allow a company to use autonomous delivery robots. The robots travel along pavements to deliver food and parcels from local shops to people's homes. Each robot has cameras and sensors to navigate, sends its location to the company's servers, and is powered by a rechargeable battery. Customers order and unlock deliveries using a smartphone app.

\* Discuss the impact of introducing autonomous delivery robots across the town.

In your answer you might consider:

- ethical issues
  - legal issues
  - environmental issues.
- [8]**

**5** A gym has a local area network (LAN) that connects its reception computers and fitness-class screens. Members can also use the gym's wireless network on their phones.

Describe one difference between a client–server network and a peer-to-peer network.

**(b)** Complete the table by identifying the network hardware or component that matches each description.

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| Description                                                                                        | Hardware or component |
|----------------------------------------------------------------------------------------------------|-----------------------|
| Allows wireless devices, such as members' phones, to connect to the wired network                  |                       |
| The physical cables that carry data signals between devices on a wired network                     |                       |
| Connects the computers in the gym's LAN and sends each frame only to the device it is addressed to |                       |

**(c)** Members complain that the gym's wireless network is very slow in the evening.

Explain two factors that could cause the network to perform slowly at this time.

**[4]**

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**(d)** Each device on the network has an IP address and a MAC address.

Explain the difference between an IP address and a MAC address.

**[3]**

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**(e)** Explain why protocols are needed when devices communicate over a network.

**[2]**

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**(f)** State one benefit to the gym of storing its booking data in the cloud. **[1]**

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**6** The gym stores members' personal and payment details on its server.

**(a)** Complete the table by describing each threat and giving one method of preventing it. **[4]**

| Threat             | Description | Prevention |
|--------------------|-------------|------------|
| Malware            |             |            |
| Social engineering |             |            |

**(b)** Describe how data interception could be used to steal members' payment details. **[2]**

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**(c)** The gym uses encryption to protect members' data.

Describe how encryption protects the data. **[2]**

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**(d)** Explain why the gym should give reception staff and managers different user access levels. **[2]**

7

**(a)** Describe two ways in which the operating system manages the computer's hardware and resources.

**[4]**

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**(b)** A laptop stores confidential exam results. The school installs encryption software on the laptop.

Explain why encryption software is useful for this laptop.

**[3]**

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**(c)** A website designer wants to reduce the file size of photos on a holiday company's website so that the pages load quickly.

Identify which type of compression should be used. Justify your answer.

**[3]**

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**END OF QUESTIONS**