

Paper reference 4CP0/01
Pearson Edexcel
International GCSE (9 – 1)

Total Marks

COMPUTER SCIENCE
PAPER 1: Principles of Computer Science

Thursday 23 May 2024 – Afternoon
Time: 2 hours

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

YOU MUST HAVE

Pseudocode command set (enclosed)

YOU WILL BE GIVEN

Data Book.

INSTRUCTIONS

- **Answer ALL questions.**
- **Answer the questions in the spaces provided in this Question Paper or in the Data Book – there may be more space than you need.**

INFORMATION

- **The total mark for this paper is 80.**
- **The marks for EACH question are shown in brackets – use this as a guide as to how much time to spend on each question.**
- **You are not allowed to use a calculator.**

ADVICE

- **Read each question carefully before you start to answer it.**
 - **Try to answer every question.**
 - **Check your answers if you have time at the end.**
 - **Marks will not be awarded for using product or trade names in answers without further explanation.**
-

Answer ALL questions.

Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☐. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☐.

1. There are different ways to connect computers in a network.

(a) Give TWO differences between a WAN and a LAN.

(2 marks)

DIFFERENCE 1 _____

DIFFERENCE 2 _____

(b) Give ONE security risk of connecting computers in a network.

(1 mark)

(continued on the next page)

Turn over

Question 1 continued

- (c) Look at **Figure 1**, for Question 1 (c) in the separate Data Book .

Figure 1 shows a network topology.

- (i) State the name of this network topology.
(1 mark)

- (ii) State ONE drawback of using this network topology.
(1 mark)

(continued on the next page)

Question 1 (c) continued

(iii) A fault tolerant network delivers a reliable service.

Explain ONE reason why this topology is fault tolerant.

(2 marks)

(continued on the next page)

Question 1 continued

(d) Identify which layer of the 4–layer TCP/IP model is responsible for transferring packets across a network.

(1 mark)

☐

A Application layer

☐

B Transport layer

☐

C Network layer

☐

D Data link layer

(continued on the next page)

Turn over

Question 1 continued

(e) Here is the address for a web page.

**`https://www.pearson.com/computing/
specification.html`**

(i) State the protocol being used.

(1 mark)

**(ii) Give the name of the document being
retrieved.**

(1 mark)

(Total for Question 1 = 10 marks)

2. Computer systems use hardware and software.

(a) Two types of software are application software and system software.

(i) State the purpose of application software.

(1 mark)

(continued on the next page)

Question 2 (a) continued

- (ii) One function of an operating system is to provide a user interface.

State **THREE** other functions of an operating system.

(3 marks)

FUNCTION 1 _____

FUNCTION 2 _____

FUNCTION 3 _____

(continued on the next page)

Turn over

Question 2 continued

(b) Computers use different types of storage.

(i) Explain ONE reason why computers need both RAM and ROM.

(2 marks)

(continued on the next page)

Question 2 (b) continued

- (ii) Describe how data is read from a magnetic hard drive.
(3 marks)**

(continued on the next page)

Question 2 continued

- (c) Computers perform the fetch – decode – execute cycle.

Complete the table by writing the numbers 1 to 4 in the sequence number column to put each stage in the correct order.

(4 marks)

STAGE	SEQUENCE NUMBER
The instruction is placed onto the data bus	
The Arithmetic and Logic Unit (ALU) performs a calculation	
The address of the next instruction is placed onto the address bus	
The instruction is decoded by the control unit	

(continued on the next page)

Turn over

Question 2 continued

(d) Identify which ONE of these buses is unidirectional.

(1 mark)

☐

A Address bus

☐

B Control bus

☐

C System bus

☐

D Data bus

(Total for Question 2 = 14 marks)

Turn over

3. Computers use binary to represent and store data.

(a) Two images are stored.

- **Image 1 has a colour depth of 8 bits.**
- **Image 2 has a colour depth of 16 bits.**

(i) State the number of colours that can be represented in Image 1.

(1 mark)

(continued on the next page)

Question 3 (a) continued

- (ii) Image 2 is 1920 pixels wide by 1080 pixels high.**

Construct an expression to show the file size of the image in mebibytes.

You do NOT need to do the calculation.

(3 marks)

Space for working

(continued on the next page)

Turn over

Question 3 (a) continued

**(iii) One pixel in Image 1 is represented by the unsigned binary integer 1100 1010
Identify the denary equivalent.**

(1 mark)

☐

A 54

☐

B 191

☐

C 202

☐

D –74

(continued on the next page)

Turn over

Question 3 continued

(b) A register holds the value 1100 0001 as an 8 – bit binary value in two’s complement.

(i) Convert the two’s complement binary integer 1100 0001 to denary.

(2 marks)

Space for working

(continued on the next page)

Turn over

Question 3 (b) continued

- (ii) Give the result of applying an arithmetic shift left by one to the binary pattern 1100 0001 (1 mark)**

(continued on the next page)

Question 3 (b) continued

**(iii) The value 1111 1111 is added to the value
1100 0001 stored in the register.**

An error occurs.

Explain this error.

(2 marks)

(continued on the next page)

Turn over

Question 3 continued

(c) The ASCII code for the character 1 is 011 0001

**(i) Give the ASCII code for the character 5
(1 mark)**

**(ii) Give TWO benefits of using ASCII to encode
characters.
(2 marks)**

BENEFIT 1

BENEFIT 2

(Total for Question 3 = 13 marks)

Turn over

4. Peter and Marie are employees at a research facility.

(a) Peter is creating a predator – prey population simulation of rabbits and foxes.

He creates rules to simulate the movement and feeding patterns for each animal over time.

One benefit of the predator – prey simulation is that it is simpler than monitoring real life animal populations.

Explain ONE OTHER benefit of using this simulation.

(2 marks)

(continued on the next page

Turn over

Question 4 continued

- (b) Identify the computational model in which several computer systems work together to achieve a goal.**

(1 mark)

☐

A Sequential model

☐

B Parallel model

☐

C Multi – agent model

☐

D Input – process – output model

(continued on the next page)

Question 4 continued

- (c) Employees at the research facility use a biometric identifier to login to the network.**

Describe ONE OTHER security measure that could be used to ensure that an employee is who they claim to be.

(2 marks)

(continued on the next page)

Question 4 continued

(d) Marie is a researcher in nanotechnology.

**(i) State what is meant by the term
NANOTECHNOLOGY.**

(1 mark)

(ii) Give ONE application of nanotechnology.

(1 mark)

(continued on the next page)

Question 4 continued

(e) Marie has a mobile phone.

The address of the device is:

2024:0eb8:3c4d:0015:0000:0000:1a2f:1a2b

Describe the relationship between the structure of this address and the total number of bits required to store it.

(3 marks)

(continued on the next page)

Turn over

Question 4 continued

- (f) The research facility is considering introducing cameras and facial recognition software to monitor the work and movement of people on and around its site.**

Discuss the privacy issues that need to be considered when deciding whether or not to install this new system.

(6 marks)

Answer space continued on the next two pages

Turn over

Question 4 (f) continued

[illegible]

Turn over

Question 4 (f) continued

(Total for Question 4 = 16 marks)

5. A team is developing a computer game.

(a) Look at the table for Question 5 in the separate Data Book.

Complete the table by adding a tick (✓) to show the characteristics of program language translators.

You may select more than one translator per characteristic.

(3 marks)

(continued on the next page)

Question 5 continued

(b) Luca is testing the computer game.

The computer that he is using is an older model with a processor that runs at a low clock speed.

Explain ONE drawback of testing the game using this computer.

(2 marks)

(continued on the next page)

Question 5 continued

- (c) Anna uses utility software.**

**Look at the table for Question 5 (c)
in the separate Data Book.**

**Complete the table by adding the type of utility
software she should use to solve each issue.**

(4 marks)

- (d) Tarik is writing an instruction manual for the
computer game.**

**He decides to use software to compress the
instruction manual before emailing it to a
proofreader for checking.**

**State and justify the most appropriate
compression method.**

(3 marks)

Answer space continues on the next page

Question 5 (d) continued

Method

Justification

(continued on the next page)

Question 5 continued

- (e) Members of the team developing the game are either coders or designers.**

Coders (C) write the application code.

Designers (D) design the graphics for the game and write instruction manuals.

Team members have one role only.

Construct a logic statement, using AND, OR and NOT with the letters C and D, to show the conditions for being a member of the team.

(3 marks)

Space for working

(Total for Question 5 = 15 marks)

Turn over

6. Pseudocode and flowcharts are used to create algorithms.

(a) The number of minutes a train is early or late are recorded each day for a week.

- **A value of 0 is recorded if the train is on time.**
- **A negative value is recorded if the train is early.**
- **A positive value is recorded if the train is late.**

Look at Figure 2, for Question 6 in the separate Data Book.

The algorithm in Figure 2 has been created to calculate and output the total number of trains that were early, on time or late.

(continued on the next page)

Question 6 (a) continued

Identify the type of iteration construct used in Figure 2.

(1 mark)

☐

A Post – conditioned loop

☐

B Count controlled loop

☐

C Array loop

☐

D Pre – conditioned loop

(continued on the next page)

Question 6 continued

- (b) There are FOUR errors in the pseudocode in Figure 2.**

Write the correct code for lines 08, 10, 11 and 23

- (i) Line 08
(1 mark)**

- (ii) Line 10
(1 mark)**

(continued on the next page)

Turn over

Question 6 (b) continued

(iii) Line 11

(1 mark)

(iv) Line 23

(1 mark)

(c) Give ONE reason for the variable `index` being incremented in line 18.

(1 mark)

(continued on the next page)

Turn over

Question 6 continued

(d) In the game FizzBuzz a user enters a number.

These conditions apply:

- **if the number is divisible by 3 the program displays Fizz**
- **if the number is divisible by 5 the program displays Buzz**
- **if the number is divisible by both 3 and 5 the program displays FizzBuzz**
- **if the number is not divisible by either 3 or 5, the program displays the number entered.**

Hint: If one number is divisible by another number there is no remainder.

Look at the flowchart for Question 6 (d) in the separate Data Book.

These are the components needed for the flowchart.

(continued on the next page)

Question 6 continued

In the blank space provided for Question 6 (d) in the separate Data Book, draw the flowchart for the algorithm used in the game.

Use each component once.

Do not add any additional components.

Use as many arrows and yes/no labels as you need.

(6 marks)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 80 MARKS

END OF PAPER
