

Paper reference 1CP2/01
Pearson Edexcel
Level 1 / Level 2 GCSE (9 – 1)

Total Marks

Computer Science
PAPER 1: Principles of Computer
Science

Friday 19 May 2023 – Afternoon
Time: 1 hour 30 minutes

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

Surname					
Other names					
Centre Number					
Candidate Number					

YOU MUST HAVE

Nil.

YOU WILL BE GIVEN

Data Book.

INSTRUCTIONS

- **Answer ALL the questions.**
- **Answer the questions in the spaces provided**
– **there may be more space than you need.**
- **You are not allowed to use a calculator.**

INFORMATION

- **The total mark for this paper is 75.**
- **The marks for EACH question are shown in brackets**
– **use this as a guide as to how much time to**
spend on each question.
- **There may be spare copies of some diagrams.**

Turn over

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.**
-

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. COMPUTERS

(a) The CPU contains a number of components.

(i) Look at the table for Question 1 (a) (i) in the separate Data Book.

Complete the table with the correct bus for each role.

(3 marks)

(continued on the next page)

Turn over

Question 1 (a) continued

- (ii) Identify the component inside the CPU that stores data.
(1 mark)**

☐

A Arithmetic logic unit

☐

B Clock

☐

C Main memory

☐

D Register

(continued on the next page)

Question 1 continued

(b) Algorithms can be written in a high–level language.

**(i) State what high–level code is translated to.
(1 mark)**

**(ii) State TWO methods of source code translation.
(2 marks)**

METHOD 1 _____

METHOD 2 _____

(continued on the next page)

Turn over

Question 1 continued

(c) Identify the feature of an optical disc that allows data to be read.

(1 mark)

☐

A It is magnetic

☐

B It is portable

☐

C It is reflective

☐

D It is volatile

(continued on the next page)

Turn over

Question 1 continued

(d) Define the term 'embedded system'.

(1 mark)

**(e) A code review is carried out by a programmer
or an automated system.**

Both methods cost money.

**Look at the table for Question 1 (e)
in the separate Data Book.**

**Complete the table with ONE OTHER
DISADVANTAGE for each method.**

(2 marks)

(continued on the next page)

Turn over

Question 1 continued

**(f) Identify the purpose of defragmentation software.
(1 mark)**

☐

A Compressing data

☐

B Encrypting data

☐

C Organising data

☐

D Protecting data

(continued on the next page)

Turn over

Question 1 continued

(g) One function of an operating system is to manage processes.

**(i) Describe ONE way the operating system makes sure each process can use the CPU.
(2 marks)**

(continued on the next page)

Question 1 (g) continued

(ii) Give ONE OTHER function of an operating system.

(1 mark)

(Total for Question 1 = 15 marks)

2. NETWORKS

- (a) Look at the diagram for Question 2 (a) in the separate Data Book.

Complete the diagram of the 4–layer TCP / IP model.

(2 marks)

- (b) Name the network topology that uses terminators to absorb signals.

(1 mark)

(continued on the next page)

Question 2 continued

(c) Identify the reason computers are connected in a network.

(1 mark)

☐

A To improve encryption

☐

B To prevent hacking

☐

C To reduce latency

☐

D To share peripherals

(continued on the next page)

Question 2 continued

(d) State the network protocol used to request a webpage.

(1 mark)

(e) Explain ONE benefit to a user of using IMAP to access emails.

(2 marks)

(continued on the next page)

Turn over

Question 2 continued

- (f) A factory has two file servers installed in an office. A closed – circuit television system monitors the factory.**

Explain ONE OTHER method of physical security that could be used to protect the servers.

(2 marks)

(continued on the next page)

Question 2 continued

- (g) Network speed is the current rate of data transmission, measured in bits per second.**

Define the term 'bandwidth'.

(1 mark)

(continued on the next page)

Question 2 continued

- (h) High – speed fibre – optic cables form the internet backbone. Routers connect other networks to this backbone.**

Describe how a router enables data to arrive at its destination.

(2 marks)

(Total for Question 2 = 12 marks)

3. ISSUES AND IMPACT

(a) Computer worms are a type of malware.

Describe ONE way that a worm can move from machine to machine.

(2 marks)

(continued on the next page)

Question 3 continued

- (b) The source code of a software application is automatically copyrighted.**

State ONE OTHER method of intellectual property protection to control who can use a software application.

(1 mark)

(continued on the next page)

Question 3 continued

- (c) Computer programs control some aeroplane landings.**

Explain ONE reason computers are NOT capable of safely controlling all aeroplane landings.

(2 marks)

(continued on the next page)

Question 3 continued

- (d) Large amounts of water are used to manufacture computer chips.**

**Describe ONE way this impacts the environment.
(2 marks)**

(continued on the next page)

Question 3 continued

- (e) There are ethical and legal issues with the collection and use of personal data.**

Look at the table for Question 3 (e) in the separate Data Book.

Complete the table with the ethical or legal issue for each situation.

One row has been completed for you.

(2 marks)

(Total for Question 3 = 9 marks)

4. COMPUTATIONAL THINKING

(a) Programmers use trace tables with algorithms.

Explain the purpose of a trace table.

(2 marks)

(continued on the next page)

Question 4 continued

(b) Algorithms use arrays and records to hold data.

Describe a record.

(2 marks)

(continued on the next page)

Question 4 continued

- (c) An algorithm allows users to enter a whole number.

The number can be positive or negative.

The purpose of the algorithm is to report whether the number is even or odd.

The modulus function returns the remainder after division.

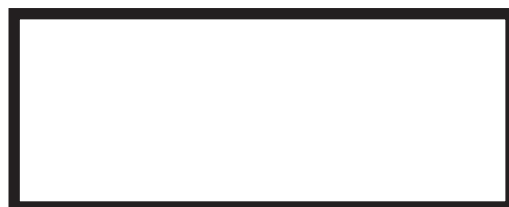
The algorithm can be expressed as a flowchart.

Here are some flowchart symbols:

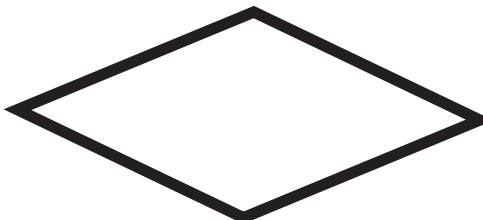
Terminator



Process



Decision



Input / Output



(continued on the next page)

Turn over

Question 4 (c) continued

**Look at the incomplete flowchart for
Question 4 (c) in the separate Data Book.**

Complete the flowchart to show the algorithm.

**You may not need to use all the flowchart
symbols.**

(4 marks)

(continued on the next page)

Question 4 continued

- (d) A linear search algorithm can be used on both a sorted and an unsorted array.**

Describe how a linear search algorithm operates on an UNSORTED array.

(4 marks)

(continued on the next page)

Turn over

Question 4 continued

- (e) Algorithms control physical devices using logical operators.**

A security system turns on a floodlight when the sunlight falls below a certain level (S) and a movement sensor is activated (M).

**Complete the truth table provided for Question 4 (e) in the separate Data Book.
(2 marks)**

(continued on the next page)

Question 4 continued

- (f) Look at the diagram for Question 4 (f) in the separate Data Book.**

The diagram shows a Maze game.

A group of students are working together on a single maze game. The arrow keys control the character. When the character reaches the end of the maze without touching a wall, a happy sound is played. The game also displays a score.

Discuss the use of decomposition and abstraction in developing this game.

Your answer should include:

- a definition of each term**
- the benefits each brings to the group of students**
- an example of where each could appear in the program code.**

(6 marks)

Answer space continues on the next 4 pages

Question 4 (f) continued

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Turn over

Question 4 (f) continued

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Turn over

Question 4 (f) continued

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Turn over

Question 4 (f) continued

(Total for Question 4 = 20 marks)

5. DATA

(a) Describe ONE effect of using lossy compression to reduce the size of a file.

(2 marks)

(continued on the next page)

Question 5 continued

- (b) Look at the original image for Question 5 (b) in the separate Data Book.**

There is one bit available to represent each pixel.

Explain ONE reason why the image cannot be accurately represented using one bit for each pixel.

(2 marks)

(continued on the next page)

Question 5 continued

(c) Shifts are performed on binary patterns.

A LOGICAL shift right is performed on a pattern.

An ARITHMETIC shift right is performed on the same original pattern.

**Describe the reason the results will be different.
(2 marks)**

(continued on the next page)

Question 5 continued

(d) Binary, denary and hexadecimal patterns represent numbers.

**(i) Convert the binary pattern 0100 0010 to denary.
(1 mark)**

**(ii) Convert the binary pattern 0101 1011 to hexadecimal.
(2 marks)**

(continued on the next page)

Turn over

Question 5 continued

(e) Data storage is measured in bits and bytes.

**(i) State the number of unique values that
can be represented with 6 bits.**

(1 mark)

(continued on the next page)

Question 5 (e) continued

- (ii) A file format uses a 100×600 table of 32 – bit integers.

The file uses 1 kibibyte of additional data.

Construct an expression to show the number of BYTES of storage needed to store the file.
(3 marks)

(continued on the next page)

Question 5 continued

**(f) Look at the diagram for Question 5 (f)
in the separate Data Book.**

The diagram is a grid.

An analogue sound is represented in digital form.

**The sound is one second long and is sampled
at 10 Hz.**

**The digital representation has a bit depth
of 5 and is stored in two's complement.**

SOUND DATA:

0 0 0 0 0	1 1 1 1 1	1 1 1 1 1	1 1 1 1 1	1 1 1 1 1
0 0 0 0 0	0 0 0 0 0	0 0 0 0 1	0 0 0 0 1	0 0 0 0 1

(continued on the next page)

Question 5 (f) continued

On the grid, draw a graph to represent the data sampled.

You must include:

- **labels for the x and y axes**
 - **values for the x and y axes**
 - **each sample plotted as a cross (×)**
 - **samples joined up to show the digital form.**
- (6 marks)**

(Total for Question 5 = 19 marks)

TOTAL FOR PAPER = 75 MARKS

END OF PAPER
