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

Total Marks

Computer Science

PAPER 1: Principles of Computer Science

Wednesday 15 May 2024 – 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					

Y78200RA

Pearson

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.**

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. COMPUTATIONAL THINKING

(a) Identify the term that means breaking a problem or solution down into smaller parts.
(1 mark)

- ☐ A Abstraction
- ☐ B Computation
- ☐ C Decomposition
- ☐ D Evaluation

(continued on the next page)

Question 1 continued

(b) State TWO BENEFITS of subprograms.
(2 marks)

BENEFIT 1 _____

_____

_____

_____

BENEFIT 2 _____

_____

_____

_____

(continued on the next page)

Question 1 continued

(c) Look at the algorithm for Question 1 (c) in the separate Data Book. It shows an algorithm that uses colours.

(i) Give the first line number of a condition – controlled loop.
(1 mark)

(ii) Give the first line number of iteration over every item in a data structure.
(1 mark)

(continued on the next page)

Question 1 (c) continued

(iii) Give the line numbers of a selection.
(1 mark)

(continued on the next page)

Question 1 continued

(d) Programs can have syntax errors and runtime errors.

(i) Define the term 'syntax error'.

(1 mark)

(ii) Runtime errors happen when a program is executing.

Explain a runtime error.

(2 marks)

Answer space continues on the next page

Question 1 d (ii) continued

(continued on the next page)

Question 1 continued

(e) Algorithms use relational and arithmetic operators.

(i) Here is a relational operator used in a conditional test.

count > index

State the TWO different results of evaluating a conditional test.
(2 marks)

RESULT 1 _____

_____

RESULT 2 _____

_____

(continued on the next page)

Question 1 (e) continued

(ii) Identify the result of 5 // 2

(1 mark)

☐ A 0•5

☐ B 1

☐ C 2

☐ D 2•5

(continued on the next page)

Question 1 continued

(f) Programmers consider algorithm efficiency when they write code.

(i) Sorting and searching use algorithms.

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

Complete the table with the name of a search algorithm and a sort algorithm.
(2 marks)

(continued on the next page)

Question 1 (f) continued

(ii) Explain ONE effect the number of comparisons has on the execution time of a sorting algorithm.
(2 marks)

(Total for Question 1 = 16 marks)

2. DATA

(a) The ASCII system is used to represent letters and symbols.

(i) State the number of bits used to represent each letter or symbol in ASCII.
(1 mark)

(ii) The ASCII code 65 represents the letter A. Give the letter represented by the ASCII code 68.
(1 mark)

(continued on the next page)

Question 2 continued

(b) Sound waves are converted to binary using sample intervals.

Define the term ‘sample interval’.
(1 mark)

(continued on the next page)

Question 2 continued

(c) Give an expression to calculate the size of a bitmap image, not the size of the file that stores the image.
(2 marks)

(continued on the next page)

Question 2 continued

(d) Computers manipulate binary patterns.

(i) Look at the table for Question 2 (d) in the separate Data Book. Complete the table with the result of applying the shift to the binary pattern. (2 marks)

(continued on the next page)

Question 2 (d) continued

(ii) Identify the correct statement about overflow.
(1 mark)

☐ A Causing the program to crash during an arithmetic operation

☐ B Requiring more bits to store a result than are available to store it

☐ C Switching between binary and hexadecimal number systems

☐ D Using an index less than 0 or greater than the length of an array

(continued on the next page)

Question 2 (d) continued

(iii) Convert the denary value +112 to 8 – bit binary representation. (2 marks)

(continued on the next page)

Question 2 (d) continued

(iv) Give the 8–bit binary two's complement representation of denary –73
(2 marks)

(continued on the next page)

Question 2 continued

(e) The number of bits determines the number of patterns that can be represented.

(i) Identify the number of symbols available in the hexadecimal system.
(1 mark)

☐ A 2

☐ B 8

☐ C 10

☐ D 16

(continued on the next page)

Question 2 (e) continued

(ii) The address bus of a computer is 8 – bits wide.

State the number of unique addresses that can be accessed.

(1 mark)

(continued on the next page)

Question 2 continued

(f) Construct an expression to convert 40 681 930 227 712 bytes to tebibytes.

(2 marks)

(Total for Question 2 = 16 marks)

3. NETWORKS

(a) Networks are described in many different ways.

(i) Give the type of network that covers a small geographical area.
(1 mark)

_____

_____

(ii) Name the characteristic of a wireless network that is measured in metres.
(1 mark)

_____

_____

(continued on the next page)

Question 3 (a) continued

(iii) Give TWO DISADVANTAGES of a bus network topology. (2 marks)

DISADVANTAGE 1

DISADVANTAGE 2

(continued on the next page)

Question 3 continued

(b) Describe penetration testing.
(2 marks)

(continued on the next page)

Question 3 continued

(c) Network protocols control the rules of communication.

(i) Name a network protocol that transmissions from other electrical devices can interfere with and that can be blocked by walls.
(1 mark)

(ii) Name the network protocol used to download a music file from a server.

(1 mark)

(continued on the next page)

Question 3 continued

(d) Describe how the link layer of the TCP / IP protocol stack works. (2 marks)

(continued on the next page)

Question 3 continued

(e) Construct an expression to calculate the transmission rate, in megabits per second, required to transmit a 1.4 gibibyte file in 13 minutes.

You do not need to do the calculation.
(4 marks)

Answer space continues on the next page

Question 3 (e) continued

(Total for Question 3 = 14 marks)

4. COMPUTERS

(a) A compiler translates source code to machine code. If the source code is edited, it must be recompiled.

Give TWO OTHER characteristics of a compiler.
(2 marks)

Answer space continues on the next page

CHARACTERISTIC 1

Question 4 (a) continued

CHARACTERISTIC 2

(continued on the next page)

Question 4 continued

(b) Describe how an operating system organises files and folders.
(2 marks)

(continued on the next page)

Question 4 continued

(c) Explain ONE way an audit trail helps programmers create robust software.
(2 marks)

(continued on the next page)

Question 4 continued

(d) Parking at an airport is controlled by computers.

No paper tickets are issued.

Look at the image for Question 4 (d) in the separate Data Book.

The image shows the control system at the exit.

The control system uses sensors, a camera and a database.

The barrier lifts if the parking fee has been paid.

Describe what the system does when the exit sensor is activated by a car driving towards it.
(2 marks)

Answer space begins on the next page

Question 4 (d) continued

(continued on the next page)

Question 4 continued

(e) The components of a computer carry out the fetch–decode–execute cycle.

Look at the diagram for Question 4 (e) in the separate Data Book.

Complete the diagram with:

- the names of TWO buses
- a directional connection from the clock to the correct component.

(3 marks)

(continued on the next page)

Question 4 continued

(f) A company is developing a new smartphone.

The smartphone has built–in devices, including a camera and a sound recorder.

The smartphone has applications, including one to edit pictures, one to translate speech to a text file and one for email.

Discuss the characteristics of high–level and low–level programming languages that make them suitable for developing software for the smartphone.

(continued on the next page)

Question 4 (f) continued

You should consider:

- **the built – in devices**
- **the applications.**

(6 marks)

Answer space continues on the next three pages

Question 4 (f) continued

Question 4 (f) continued

Question 4 (f) continued

(Total for Question 4 = 17 marks)

5. ISSUES AND IMPACT

(a) A replacement cycle is the time between the purchase of a device and the purchase of its replacement.

Describe ONE impact the length of replacement cycles has on the environment.
(2 marks)

Answer space continues on the next page

Question 5 (a) continued

(continued on the next page)

Question 5 continued

(b) Intellectual property is protected by different methods.

Look at the table for Question 5 (b) in the separate Data Book. Complete the table with the method of protection for EACH type of intellectual property. (2 marks)

(continued on the next page)

Question 5 continued

(c) Robots use sensors to collect data about their surroundings in order to carry out actions independently.

Explain ONE way that a modern car is a robot.
(2 marks)

(continued on the next page)

Question 5 continued

(d) Anti – malware protects systems from viruses.

Look at the flowchart symbols for Question 5 (d) in the separate Data Book.

Draw a flowchart in the blank space provided for Question 5 (d) in the separate Data Book to show how anti – malware detects a virus in a file and what it does with the file.

(6 marks)

(Total for Question 5 = 12 marks)

TOTAL FOR PAPER = 75 MARKS

END OF PAPER
