

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

Total Marks
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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					

**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. 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)**

**Turn over**

**Question 1 continued**

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

**BENEFIT 1** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**BENEFIT 2** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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**(continued on the next page)**

**Turn over**

**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)**

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

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**(continued on the next page)**

**Turn over**

**Question 1 (c) continued**

**(iii) Give the line numbers of a selection.**

**(1 mark)**

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**(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)**

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

**Explain a runtime error.**

**(2 marks)**

**Answer space continues on the next page**

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**Turn over**

**Question 1 d (ii) continued**

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**(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)**

**Turn over**

**Question 1 (e) continued**

**(ii) Identify the result of  $5 \div 2$**   
**(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)**

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**(Total for Question 1 = 16 marks)**

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**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)**

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

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**(continued on the next page)**

**Turn over**

**Question 2 continued**

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

**Define the term 'sample interval'.  
(1 mark)**

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**(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)**

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**(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)**

**Turn over**

**Question 2 (d) continued**

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

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**Question 2 (d) continued**

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

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**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)**

**Turn over**

**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)**

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**(continued on the next page)**

**Question 2 continued**

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

**(2 marks)**

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**(Total for Question 2 = 16 marks)**

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### 3. NETWORKS

**(a) Networks are described in many different ways.**

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

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

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**Turn over**

**Question 3 (a) continued**

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

**DISADVANTAGE 1**

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**DISADVANTAGE 2**

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**Turn over**

**Question 3 continued**

**(b) Describe penetration testing.  
(2 marks)**

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**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)**

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

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**Turn over**

**Question 3 continued**

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

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**Turn over**

**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**

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**Question 3 (e) continued**

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**(Total for Question 3 = 14 marks)**

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## 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

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Turn over



**Question 4 (a) continued**

**CHARACTERISTIC 2**

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**Question 4 continued**

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

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**Turn over**

**Question 4 continued**

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

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**(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 continues on the next page**

**Turn over**

**Question 4 (d) continued**

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**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**

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### Question 4 (f) continued

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**Turn over**

## Question 4 (f) continued

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**Question 4 (f) continued**

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**(Total for Question 4 = 17 marks)**

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## 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

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Turn over

**Question 5 (a) continued**

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**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)**

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**Turn over**

**Question 5 (b) 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)**

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**(Total for Question 5 = 12 marks)**

**TOTAL FOR PAPER = 75 MARKS**

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**END OF PAPER**