

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

Total Marks
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Computer Science  
PAPER 1: Principles of Computer  
Science

Friday 26 May 2023 – 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**

**Resource Booklet – 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.**
- **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.**
  - **Marks will not be awarded for using product or trade names in answers without giving 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 ☐.**

**(continued on the next page)**

1. People use networks in all aspects of their lives.

(a) An office building has desktop computers connected in a network.

One reason for networking computers is to enable technicians to maintain them remotely.

State TWO OTHER reasons for connecting computers in a network.

(2 marks)

Answer space continues on the next page

REASON 1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Question 1 (a) continued**

**REASON 2** \_\_\_\_\_

\_\_\_\_\_

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**(continued on the next page)**

**Question 1 continued**

**(b) Access to data must be controlled.**

**(i) Identify ONE reason that encryption is used.  
(1 mark)**

☐

**A To compress the file so it takes up less storage space**

☐

**B To make sure both sender and receiver use the same key**

☐

**C To make sure data is only understood by the intended receiver**

☐

**D To stop malicious hackers getting into a computer network**

**(continued on the next page)**

**Turn over**

**Question 1 (b) continued**

- (ii) **File servers are in a small room at the back of an office.**

**The office has a burglar alarm.**

**Give TWO OTHER ways that the servers can be secured using physical methods.**

**(2 marks)**

**WAY 1** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**WAY 2** \_\_\_\_\_

\_\_\_\_\_

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**(continued on the next page)**

**Turn over**



**Question 1 (b) continued**

**(iii) Phishing is a type of social engineering.**

**State what is meant by the term SOCIAL ENGINEERING.  
(1 mark)**

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**(continued on the next page)**

**Question 1 continued**

**(c) 5G is a communication standard.**

**Identify the characteristic that is true for the 5G communication standard.**

**(1 mark)**

☐

**A It has a high transmission latency**

☐

**B It has built-in security**

☐

**C It has a lower bandwidth than 3G and 4G**

☐

**D It uses wireless communication**

**(continued on the next page)**

**Turn over**

**Question 1 continued**

**(d) Programmers write and test code.**

**They use modular testing.**

**State what is meant by the term**

**MODULAR TESTING.**

**(1 mark)**

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**(continued on the next page)**

**Question 1 continued**

- (e) Computer scientists are viewed as professionals, in the same way that doctors are viewed as professionals.**

**Give TWO ways that computer scientists can demonstrate professionalism.**

**(2 marks)**

**Answer space continues on the next page**

**WAY 1** \_\_\_\_\_

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**Question 1 (e) continued**

**WAY 2** \_\_\_\_\_

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**(Total for Question 1 = 10 marks)**

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**2. Computers manipulate binary patterns.  
People interpret those patterns.**

**(a) Look at the table for Question 2 (a)  
in the separate Data Book.**

**Complete the table by adding  
the hexadecimal notation  
for each of the denary values.**

**(continued on the next page)**

**Question 2 continued**

- (b) Identify the expression to give the number of unique binary patterns that can be stored in six bits.  
(1 mark)**

☐

**A**     $6^2$

☐

**B**     $6 \times 2$

☐

**C**     $6^2 - 1$

☐

**D**     $2^6$

**(continued on the next page)**

**Turn over**

**Question 2 continued**

- (c) Binary patterns are manipulated by shifts.**
- (i) Give the result of applying a logical shift right by two to the binary pattern 0101 1100 (1 mark)**

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**(continued on the next page)**



**Question 2 (c) continued**

- (ii) Give the result of applying an arithmetic shift right by three to the binary pattern 1100 0101 (1 mark)**

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**(continued on the next page)**

**Question 2 continued**

- (d) Binary patterns can be interpreted as signed or unsigned integers.**
- (i) Convert the denary unsigned integer 60 to 8 – bit binary.  
(2 marks)**

**(continued on the next page)**

**Turn over**

**Question 2 (d) continued**

- (ii) Here is a binary bit pattern for a signed integer in sign and magnitude format.**

**1001 0110**

**Convert the binary bit pattern to denary. Be sure to include a sign symbol in your answer.  
(2 marks)**

**(continued on the next page)**

**Turn over**

**Question 2 (d) continued**

**(iii) Negating a signed integer means changing its sign without changing its value.**

**The negation of +16 is –16.**

**The negation of –24 is +24.**

**Here is the binary bit pattern for a signed integer in two's complement format.**

**1110 0101**

**(continued on the next page)**

**Question 2 (d) (iii) continued**

**Convert the binary pattern to  
its negation in two's  
complement.  
(2 marks)**

**(continued on the next page)**

**Turn over**

**Question 2 continued**

- (e) Construct an expression to convert 13 kilobytes to kibibytes.**

**You DO NOT need to do the calculation.**

**(2 marks)**

**(Total for Question 2 = 13 marks)**

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**Turn over**

**3. Software programs carry out tasks on computers.**

**(a) A headteacher uses a computer simulation to model the effect of increasing class sizes.**

**Explain ONE problem with using simulations to predict the effects of changes.**

**(2 marks)**

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**Question 3 continued**

**(b) Images are stored as files before being displayed or printed.**

**(i) Give ONE measurement of image resolution.  
(1 mark)**

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**Question 3 (b) continued**

- (ii) Increasing the colour depth of an image leads to an increase in the image file size.**

**Describe the reason for the increase in file size.**

**(2 marks)**

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**Question 3 continued**

**(c) Software is divided into two categories.**

**Describe ONE difference between system software and application software.**

**(2 marks)**

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**Question 3 continued**

- (d) Look at the image for Question 3 (d) in the separate Data Book. The image shows secondary storage.**

**Two files (W and Z) are stored on it.**

**Each file is made up of several blocks (e.g. Z1, Z2, Z3).**

**Complete the image to show the state after running a defragmentation utility.  
(2 marks)**

**(continued on the next page)**

**Question 3 continued**

- (e) Here is part of a file that contains electric meter readings.**

<b>04631</b>	<b>04984</b>	<b>05103</b>	<b>05163</b>
<b>05271</b>	<b>05383</b>	<b>05487</b>	<b>05722</b>

**Explain the effect on the file of applying a run – length encoding algorithm to this data file.**

**(2 marks)**

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**Turn over**

**Question 3 continued**

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

**A series of tasks is written in different programming languages.**

**Complete the table to show the correct programming language translator for each task.**

**(4 marks)**

**(Total for Question 3 = 15 marks)**

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4. Data packets travel across networks from one device to another.

(a) Identify the measurement of network speeds.  
(1 mark)

☐

**A**    **Mebibits per second**

☐

**B**    **Mebibytes per second**

☐

**C**    **Megabits per second**

☐

**D**    **Megabytes per second**

**(continued on the next page)**

**Question 4 continued**

- (b) Look at the table for Question 4 (b) in the separate Data Book. Data packets contain the addresses of the sender and the receiver.**

**Complete the table to give the number of bits that make up each type of network address.  
(2 marks)**

**(continued on the next page)**

**Question 4 continued**

**(c) Data packets travel over physical media.**

**(i) Describe ONE difference between the media used by a wired network and a wireless network.**

**(2 marks)**

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**Turn over**



**Question 4 (c) continued**

- (ii) Some people confuse Ethernet<sup>®</sup> and Wi-Fi.**

**Describe what is meant by the term ETHERNET<sup>®</sup>.**

**(2 marks)**

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**Question 4 continued**

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

**A single physical box connects a desktop computer to the Internet.**

**The box incorporates three different components.**

**Complete the diagram to show the names of the components in the correct order.**

**(3 marks)**

**(continued on the next page)**

**Question 4 continued**

- (e) Users enter passwords when logging onto a network and when creating accounts using a web page.**

**Describe ONE difference between validation and authentication.  
(2 marks)**

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**(Total for Question 4 = 12 marks)**

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- 5. Hardware devices execute programs to carry out a variety of tasks.**
- (a) Look at the table for Question 5 (a) in the separate Data Book.**
- A program controls a bee character in an animation.**
- The bee can turn to face North, East, South or West.**
- The bee can move any number of steps in the direction it is facing.**
- Complete the table to show one input and one output required to move the bee.**
- (2 marks)**

**(continued on the next page)**

**Question 5 continued**

- (b) Computers are made up of hardware components.**
- (i) Look at the diagram for Question 5 (b) (i) in the separate Data Book.**

**Complete the diagram by adding directional arrows between the components to show the flow of communication.  
(3 marks)**

**(continued on the next page)**

**Question 5 (b) continued**

**(ii) Identify what is stored in ROM.  
(1 mark)**

☐

**A The software firewall**

☐

**B The basic input output system**

☐

**C The operating system**

☐

**D The user interface code**

**(continued on the next page)**

**Question 5 (b) continued**

**(iii) Cache is used as temporary storage. One type of cache is located between main memory and the CPU.**

**Explain ONE reason cache is used in a computer.  
(2 marks)**

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**(continued on the next page)**

**Turn over**

**Question 5 continued**

- (c) A washing machine uses several different embedded systems.**

**One embedded system uses a switch to identify the type of wash cycle selected by the user.**

**Describe ONE OTHER example of an embedded system found in a washing machine.**

**(2 marks)**

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**Turn over**



**Question 5 continued**

**(d) Programs use logic statements to control physical hardware.**

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

**A window shuts when the temperature is too cool or it is a rainy night.**

**The values are defined as:**

- **A shows it is night time**
- **B shows it is too cool**
- **C shows it is raining.**

**Complete the truth table to show the results of each operation. Two rows have been done for you.**

**(3 marks)**

**(continued on the next page)**

**Turn over**

**Question 5 (d) continued**

**(ii) A warehouse has an automated alarm system. When the alarm system is activated it will sound if:**

- **a movement sensor (M) is activated**
- **a pressure pad (P) is activated**
- **a key code (C) to deactivate the alarm system has not been entered.**

**On the blank space provided for Question 5 (d) (ii) in the separate Data Book, construct a logic statement, using AND, OR and NOT with the letters M, P and C, to show the conditions that will sound the alarm.**

**(3 marks)**

**(continued on the next page)**

**Turn over**

**Question 5 continued**

- (e) A computer with a single CPU runs several processes at the same time.**

**This computer is multitasking.**

**Describe how the operating system enables processes to share a single CPU.**

**(2 marks)**

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**(Total for Question 5 = 18 marks)**

**6. Programmers share algorithms with different people and write algorithms for different reasons.**

**(a) A programmer is showing a new algorithm to a group of non – technical managers.**

**State an appropriate method for writing the algorithm.**

**Justify your answer.**

**(2 marks)**

**Method** \_\_\_\_\_

\_\_\_\_\_

**Justification** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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**(continued on the next page)**

**Turn over**

**Question 6 continued**

- (b) Look at the Figure 1 for Question 6 (b) in the separate Data Book. Figure 1 shows an algorithm that displays a string based on the number input by the user.**

**Give ONE reason why the selection statement on line 7 is not required.**

**(1 mark)**

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**(continued on the next page)**

**Question 6 continued**

**(c) Look at the Figure 2 for Question 6 (c) in the separate Data Book. Figure 2 shows an algorithm that manipulates arrays.**

**The algorithm works with any number of scores.**

**(i) Describe what happens to the variable OLDINDEX when line 5 is executed.  
(2 marks)**

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**Turn over**

**Question 6 (c) continued**

- (ii) State the purpose of the algorithm in Figure 2.  
(1 mark)**

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**(continued on the next page)**

**Question 6 continued**

- (d) Cloud storage has become an increasingly popular service. Discuss the benefits and drawbacks of using cloud storage. (6 marks)**

**Answer space continues on the next 3 pages**

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### Question 6 (d) continued

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**Turn over**

### Question 6 (d) 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 6 (d) continued**

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**(Total for Question 6 = 12 marks)**

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**TOTAL FOR PAPER = 80 MARKS**

**END OF PAPER**

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