

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

Total Marks

COMPUTER SCIENCE
PAPER 1: PRINCIPLES OF
COMPUTER SCIENCE

Monday 20 May 2019 – Afternoon
TIME: 2 hours (plus your
additional time allowance)

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

Surname					
Other names					
Centre Number					
Candidate Number					

ITEMS INCLUDED WITH QUESTION PAPER

- **A separate Data Booklet.**
- **A spare Data Booklet.**
- **A Pseudocode command set.**

INSTRUCTIONS

- **Use BLACK ink, BLACK ball – point pen, BLACK felt tip or your usual method.**
- **Write your name, centre number and candidate number on the front cover.**
- **Answer ALL questions.**
- **Answer the questions in the spaces provided in this Question Paper or in the Data Booklet – THERE MAY BE MORE SPACE THAN YOU NEED.**

INFORMATION

- **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 giving further explanation.**
-

**ANSWER ALL QUESTIONS. WRITE YOUR ANSWERS
IN THE SPACE PROVIDED IN THIS QUESTION PAPER
OR IN THE DATA BOOKLET.**

**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 ☐.**

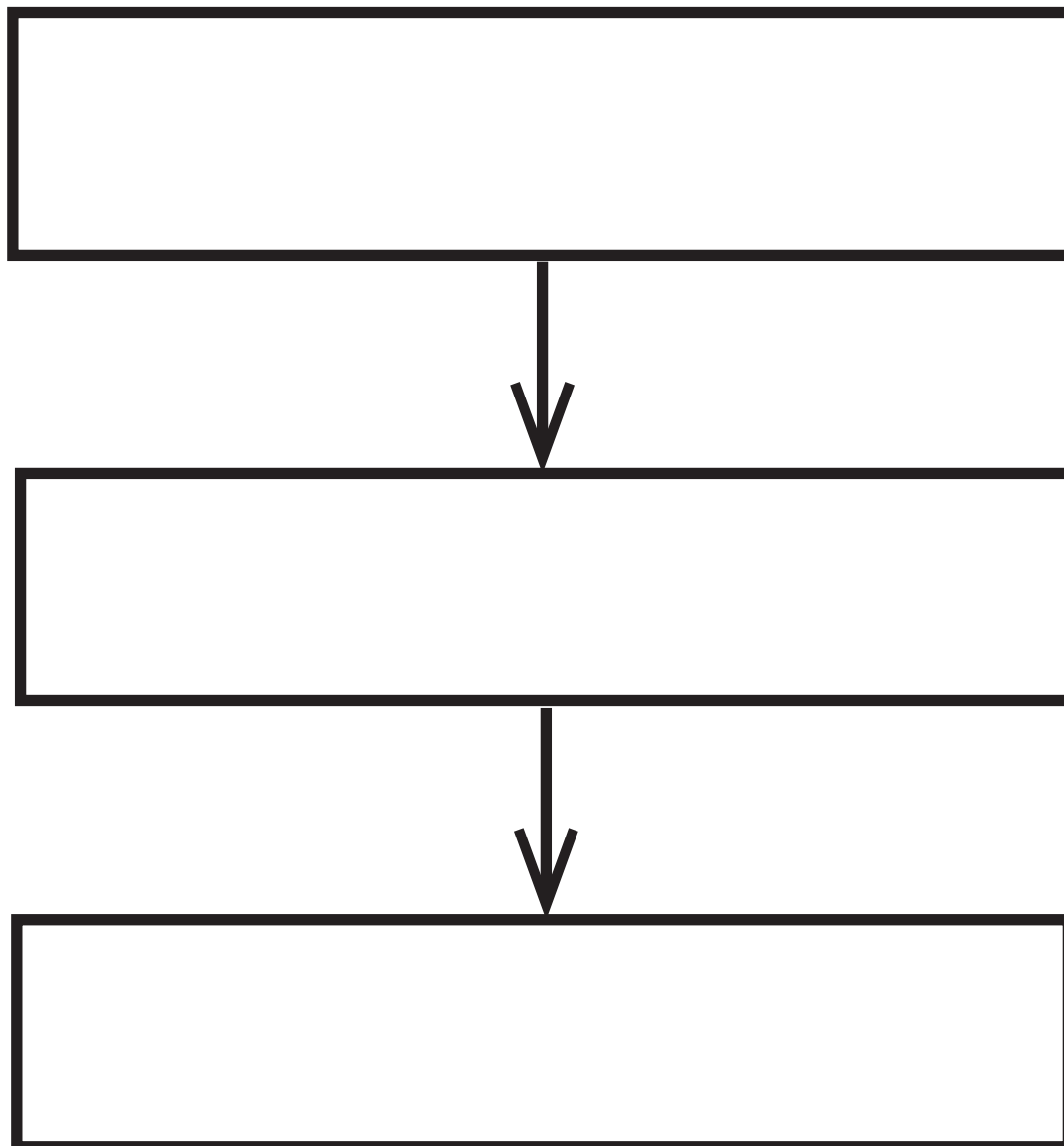
Question 1 is on the next page.

1. Computers are made up of both hardware and software components.

(a) Computers use a three – step computational model.

Complete the diagram below with the names of the THREE steps.

(3 marks)



Question 1 (b) is on the next page.

Turn over

1. (b) Identify the hardware component responsible for controlling the fetch – decode – execute cycle.

(1 mark)

☐

A Cache

☐

B Central processing unit

☐

C ROM

☐

D Address bus

Question 1 (c) is on the next page.

Turn over

1. (c) Von Neumann developed the stored program concept that permits two different types of item to reside in memory.

Name these TWO types.

(2 marks)

TYPE 1 _____

TYPE 2 _____

Question 1 (d) is on the next page.

Turn over

1. (d) Some computers use virtual memory.

Explain how virtual memory works.

(2 marks)

Question 1 (e) is on the next page.

1. (e) An optical storage device writes data onto a **CD or DVD**.

Describe how data is stored physically on optical media.

(2 marks)

Question 1 (f) is on the next page.

Turn over

1. (f) A disc – formatting program is an example of a type of software.

Identify the type.

(1 mark)

☐

A Security software

☐

B Application software

☐

C Translation software

☐

D System software

(TOTAL FOR QUESTION 1 = 11 MARKS)

Question 2 is on the next page.

Turn over

2. Zafer and Robert work for a company that makes washing machines.

(a) Zafer writes user manuals for the washing machines.

He stores these documents in the cloud.

Zafer and the cloud storage provider share responsibility for data security.

State ONE area of responsibility for each of them.

(2 marks)

ZAFER _____

CLOUD STORAGE PROVIDER _____

Question 2 (b) is on the next page.

Turn over

2. (b) Robert programs the robots that make the parts for the washing machines.

Zafer writes the user manuals.

Robert and Zafer have different levels of access to folders and files on the company network.

The different levels of access are Read, Write, Execute and None.

Complete the table below to show the levels of access that each has.

(2 marks)

	ROBERT	ZAFER
Washing machine design drawings		
A folder of manuals for new machines		

Question 2 (c) is on the next page.

2. (c) Look at **Figure 1** for Question 2 (c) in the separate Data Booklet.

Zafer uses a browser to view pages on Pearson's website by typing a uniform resource locator into a browser.

This is shown in **Figure 1**.

A domain name server is used in this process.

Identify the input to and the output from the domain name server.

(2 marks)

INPUT _____

OUTPUT _____

Question 2 (d) is on the next page.

Turn over

2. (d) Zafer can use a desktop or a tablet computer to connect to the internet.

Only the tablet has wireless capabilities.

Look at the diagram for Question 2 (d) in the separate Data Booklet.

The diagram shows the components used to connect to the internet.

Complete the diagram to show how the desktop and the tablet are connected to the internet.

(6 marks)

(TOTAL FOR QUESTION 2 = 12 MARKS)

Question 3 is on the next page.

3. Isra works in an office building where she has access to different types of network.

(a) Isra uses different types of networks for different tasks.

(i) Name the type of network she uses to print a document on the printer in the office next door.

(1 mark)

(ii) Name the type of network she uses to order stationery from an online supplier.

(1 mark)

3. (b) Identify the measurement used for network data speeds.

(1 mark)

☐

A Megabits per second

☐

B Megapixels per second

☐

C Megacycles per second

☐

D Megahertz per second

Question 3 (c) is on the next page.

Turn over

3. (c) Isra uses her tablet computer and smartphone to access email.

She wants to set up a new email account.

State the email protocol she should use.

Justify your choice.

(3 marks)

EMAIL PROTOCOL _____

JUSTIFICATION _____

Question 3 (d) is on the next page.

Turn over

3. (d) Look at the table for Question 3 (d) in the separate Data Booklet.

The table describes characteristics of different network topologies.

Complete the table to match each characteristic to ONE network topology.

(4 marks)

- (e) Information sent across networks is represented in bit patterns.

- (i) The bit pattern **1101 0001** uses sign and magnitude representation.

Convert this bit pattern to a denary number.

(2 marks)

Turn over

3. (e) (ii) Convert the denary number **75** to
8 – bit binary.

(2 marks)

Question 3 (e) (iii) is on the next page.

Turn over

3. (e) (iii) The addition of these two 8 – bit binary patterns generates an error condition.

$$\begin{array}{cccccccc} 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 \\ 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & + \\ \hline 0 & 0 & 1 & 0 & 1 & 1 & 0 & 1 \end{array}$$

Explain this error condition.

(2 marks)

(TOTAL FOR QUESTION 3 = 16 MARKS)

Question 4 is on the next page.

Turn over

4. One function of an operating system is file management.

(a) Both kibibyte and kilobyte can be used as measures of file size.

Compare kibibyte and kilobyte.

(2 marks)

Question 4 (b) is on the next page.

4. (b) An image is **2322** pixels high and **4128** pixels wide.

The image is stored with a **16** – bit colour depth.

The metadata for the image is **975** bytes.

On the blank space provided for Question 4 (b) in the separate Data Booklet, construct an expression to show how the file size, in megabytes, is calculated.

You do NOT need to do the calculation.

(4 marks)

Question 4 (c) is on the next page.

4. (c) Operating systems often include compression software for reducing file sizes.

(i) Give TWO reasons for reducing file sizes.

(2 marks)

REASON 1 _____

REASON 2 _____

Question 4 (c) (ii) is on the next page.

4. (c) (ii) Give TWO drawbacks of using compression software.

(2 marks)

DRAWBACK 1 _____

DRAWBACK 2 _____

Question 4 (d) is on the next page.

Turn over

4. (d) A text file is stored on a hard disc.

The file holds information from one side of a sheet of paper.

The sheet of paper is represented as a grid, 80 columns wide and 66 rows long.

Each cell in the grid contains a single 2 – byte Unicode character.

The file also contains 40 characters of metadata.

The hard disc allocates space in blocks of 1024 bytes.

On the blank space provided for Question 4 (d) in the separate Data Booklet, construct an expression to show the number of blocks required to store the file.

You do NOT need to do the calculation.

(4 marks)

(TOTAL FOR QUESTION 4 = 14 MARKS)

Question 5 is on the next page.

Turn over

5. Ships carry cargo around the world in containers.

(a) Look at Figure 2 for Question 5 (a) in the separate Data Booklet.

Containers come in two sizes.

Figure 2 shows an algorithm written using flowchart symbols.

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

Complete the table to show the output for each cargo item.

(3 marks)

(ii) State the purpose of the algorithm in Figure 2.

(1 mark)

Turn over

5. (b) Look at **Figure 3** for Question 5 (b) in the separate Data Booklet.

Each ship is registered to a state.

Figure 3 shows a partially completed algorithm written in pseudocode.

The completed algorithm must:

- print each state to the display on a new line
- count the number of states
- create a message as a single string (e.g. there are NUMBER states)
- print the message to the display.

Complete the algorithm in the space provided in **Figure 3**.

(4 marks)

Question 5 (c) is on the next page.

5. (c) Look at **Figure 4** for Question 5 (c) in the separate Data Booklet.

Cargo ships have maximum weight loads.

Figure 4 shows an algorithm written using pseudocode.

The algorithm should identify the size of cargo ship required for any load.

There is an error on line 9.

- (i) Look at the trace table for Question 5 (c) (i) in the separate Data Booklet.

Trace tables are used to identify errors in algorithms.

Complete the trace table for an input of **50500** to show what happens due to the error on line 9 in the pseudocode in **Figure 4**.

You may not need to fill in all the rows in the table.

(2 marks)

Turn over

5. (c) (ii) Construct a single line of pseudocode to correct line 9.

(2 marks)

(TOTAL FOR QUESTION 5 = 12 MARKS)

Question 6 is on the next page.

Turn over

6. A train company uses ticket vending machines at each station.

(a) The machines use embedded systems.

(i) Explain ONE benefit of using an embedded system in these machines.

(2 marks)

Question 6 (a) (ii) is on the next page.

6. (a) (ii) Customers use a touch screen to select their destination.

They can pay by cash or bank card.

Their tickets and a receipt are printed.

The touch screen is controlled by an embedded system.

Give TWO other hardware components in the ticket machine that are controlled by embedded systems.

(2 marks)

HARDWARE COMPONENT 1 _____

HARDWARE COMPONENT 2 _____

Question 6 (a) (iii) is on the next page.

Turn over

6. (a) (iii) The ticket machine uses data encryption when a customer pays using a bank card.

State why data encryption is used in this case.

(1 mark)

- (b) Compare FOUR features of high – level and low – level programming languages.

(4 marks)

Turn over

Question 6 (c) is on the next page.

- 6. (c) Artificial intelligence (AI), in many forms, has an increasing impact on our lives.**

Discuss this statement considering characteristics, uses and ethical issues.

(6 marks)

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Turn over

[illegible]

Turn over

(TOTAL FOR QUESTION 6 = 15 MARKS)

TOTAL FOR PAPER = 80 MARKS
