Pearson Edexcel
International GCSE (9 – 1)

Total Marks

COMPUTER SCIENCE
PAPER 1: PRINCIPLES OF COMPUTER
SCIENCE

Time: 2 hours

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

Surname	
Other names	
Centre Number	
Candidate Number	

Pearson

YOU MUST HAVE

● **Resource Booklet (Pseudocode command set).**

YOU WILL BE GIVEN

● **A separate Diagram Booklet.**

You do not need any other materials.

INSTRUCTIONS

● **Answer ALL questions.**

● **Answer the questions in the spaces provided in**

  this Question Paper or in the Diagram Booklet – 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.**

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** ☒ **.**

Question 1 is on the next page

1. **Computer systems have both hardware and software components.**

    (a) **The central processing unit (CPU) uses the fetch – decode – execute cycle.**

         (i) **State what is meant by the term PROGRAM INSTRUCTION.**
              (1 mark)

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         _____

         _____

         (ii) **State what is meant by the term MEMORY ADDRESS.**
               (1 mark)

         _____

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Turn over

Question 1 continued

1.　(b)　**Identify the component of the CPU that provides temporary data storage.**

(1 mark)

☐　**A**　**Address bus**

☐　**B**　**Data bus**

☐　**C**　**Control unit**

☐　**D**　**Register**

(continued on the next page)

Question 1 continued

1.   (c)   **The performance of the CPU is affected by the clock speed.**

     (i)   **Give ONE benefit of having a higher clock speed.**
           (1 mark)

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     (ii)   **Give ONE drawback of having a higher clock speed.**
            (1 mark)

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Turn over

Question 1 continued

1. (d) Identify which ONE of these describes a
       sequential computational model.
       (1 mark)

☐ **A** **Program instructions are read one
         after another from external storage**

☐ **B** **Program instructions are executed
         by multiple agents working together**

☐ **C** **Program instructions are executed
         in parallel by different cores**

☐ **D** **Program instructions are executed
         one after another**

(continued on the next page)

Question 1 continued

1. (e) **A program can be written in a high–level or a low–level language.**

   (i) **Give ONE reason for writing a program in a low–level language.**
   (1 mark)

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   (ii) **State the purpose of an assembler.**
   (1 mark)

   _____

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(continued on the next page)

Turn over

Question 1 (e) continued

1. (e) (iii) Complete the table below by adding ONE tick (✓) in EACH row to match the description.

(3 marks)

DESCRIPTION	COMPILER	INTERPRETER
Translates the program each time it is executed		
Produces permanent object code		
Translates line by line		
Translates the whole program before it is run		
Generates a list of errors once the complete program has been translated		

(Total for Question 1 = 11 marks)

2. Computers use binary to represent and store data.

   (a) The denary number 78 is the ASCII code for the character **N**.

   (i) Convert the denary number 78 to

   8 – bit binary.
   (2 marks)

Space for working:

Question 2 (a) continued

2.　(a)　(ii)　**Identify the number of characters that can be represented using standard ASCII.**
(1 mark)

☐　**A**　64

☐　**B**　128

☐　**C**　256

☐　**D**　512

(continued on the next page)

Question 2 (a) continued

2. (a) (iii) **Explain ONE reason for using Unicode rather than ASCII to encode languages other than English.**

(2 marks)

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(continued on the next page)

Question 2 continued

2.   (b) **Convert the denary number -43 to $8-$bit binary using sign and magnitude representation.**
          (2 marks)

Space for working:

(continued on the next page)

Question 2 continued

2. (c) **Complete the table provided for Question 2 (c) in the separate Diagram Booklet by adding these two 8 – bit binary integers.**
(2 marks)

(continued on the next page)

Question 2 continued

2. (d) **A bitmap image is made up of pixels.**

 (i) **An image has five colours.**

 Complete the table for Question 2 (d) (i) in the separate Diagram Booklet by adding a unique binary pattern for each colour.

 Each pattern must use the SAME MINIMUM COLOUR DEPTH.

 (2 marks)

(continued on the next page)

Question 2 (d) continued

2. (d) (ii) Another image is 3579 pixels high and 6128 pixels wide.

The image is stored with a 32−bit colour depth.

The metadata for the image is 732 bytes.

Construct an expression below to show how the file size, in **MEGABYTES**, is calculated.

You do **NOT** need to do the calculation.
(4 marks)

Space for working:

Question 2 (d) (ii) continued

(Total for Question 2 = 15 marks)

3.   Alyssa is a music producer.

(a) Look at FIGURE 1 below. FIGURE 1 is a table.
     FIGURE 1 shows the denary values of five
     samples of an analogue sound using a sample
     interval of 0.2 seconds.

FIGURE 1

SAMPLE NUMBER	DENARY VALUE
1	1
2	10
3	12
4	5
5	3

Question 3 (a) continued

3. (a) (i) Complete the graph provided for Question 3 (a) (i) in the separate Diagram Booklet using the sample information from FIGURE 1 to show the digital sound wave.
(3 marks)

(ii) Give a suitable label for the X axis.
(1 mark)

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_____

(iii) Give a suitable label for the Y axis.
(1 mark)

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(continued on the next page)

Question 3 continued

3.   (b) **Alyssa uploads music files to her cloud storage.**

(i)   **She compresses the files before she uploads them using a lossless algorithm.**

Give ONE disadvantage of using a lossless rather than a lossy algorithm for this purpose.

(1 mark)

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(continued on the next page)

Question 3 (b) continued

3.   (b)   (ii)   **Explain ONE benefit to Alyssa of storing her music files in the cloud.**
      (2 marks)

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(continued on the next page)

Question 3 (b) continued

3.   (b)   (iii) **Give ONE possible security issue associated with storing music files in the cloud.**

(1 mark)

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(iv) **One of Alyssa's music files is stored at**

https://www.cloudisfab.com/re12/ru2.mp3

Complete the table provided for Question 3 (b) (iv) in the separate Diagram Booklet by adding a description of each URL component.
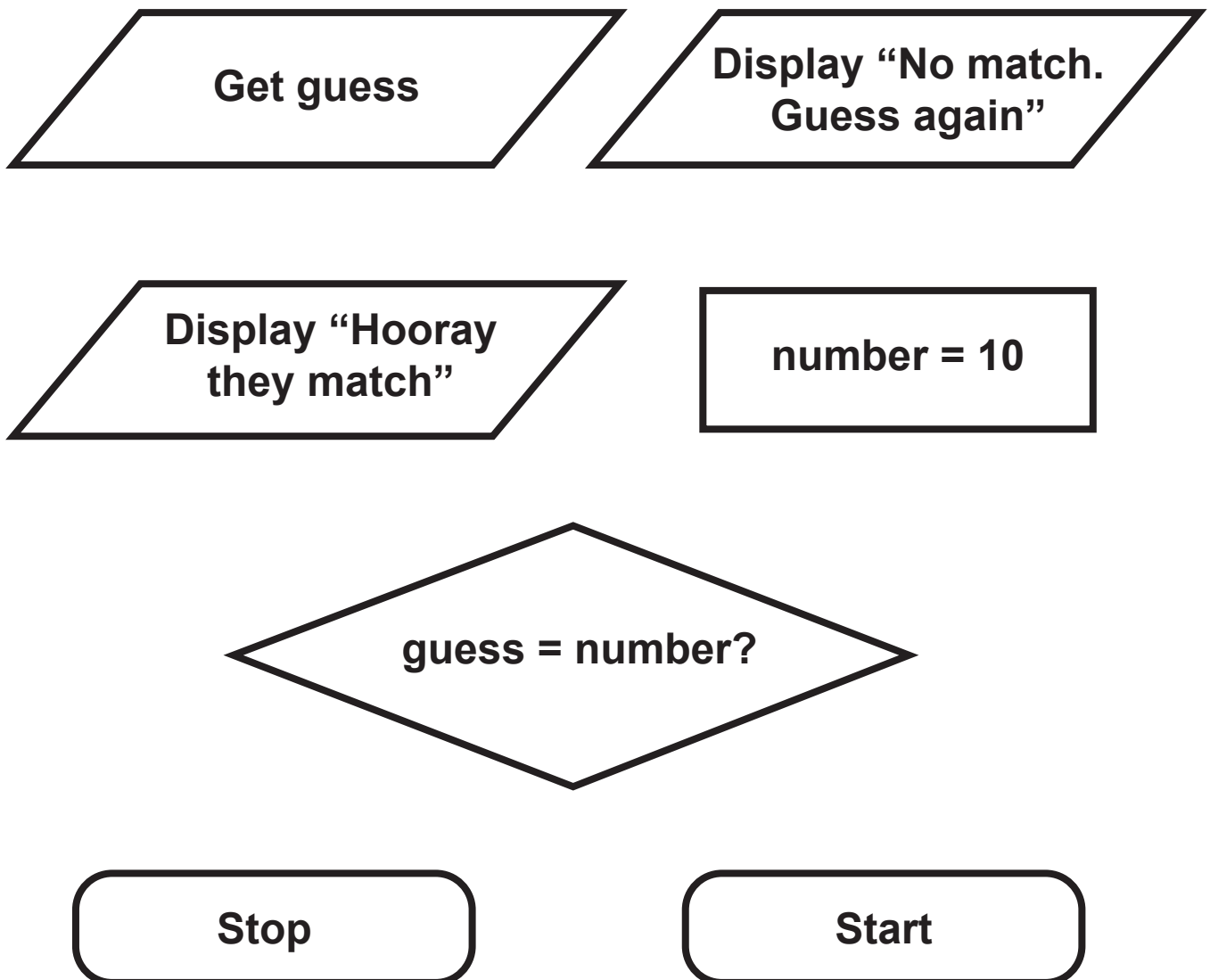
(4 marks)

(Total for Question 3 = 13 marks)

4. Reba likes writing programs.

(a) She is writing a guessing game.

She needs a flowchart to show the logic of the game.

(i) These are the components needed to draw the flowchart.

Get guess

Display "No match. Guess again"

Display "Hooray they match"

number = 10

guess = number?

Stop

Start

(continued on the next page)

Question 4 (a) (i) continued

On the blank space provided for
Question 4 (a) (i) in the separate Diagram
Booklet, draw the flowchart for the algorithm.

Use each component once.

Do not add any additional components.

Use as many arrows and yes / no labels
as you need.
(5 marks)

(continued on the next page)

Question 4 (a) continued

4.   (a)   (ii)   Identify an alternative method for writing the algorithm.

(1 mark)

☐   **A**   **Simulation**

☐   **B**   **Cipher**

☐   **C**   **Program code**

☐   **D**   **Truth table**

(continued on the next page)

Question 4 continued

4. **(b)** **Reba wants to develop a program that will convert a temperature in Fahrenheit to Celsius.**

Look at the table for Question 4 (b) in the separate Diagram Booklet.
The table shows four steps in the algorithm.

The steps are not in the correct order.

(i) **Give the letter of the step that initialises a variable.**
(1 mark)

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(ii) **Give the letter of the step that inputs a value.**
(1 mark)

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(continued on the next page)

Turn over

Question 4 continued

4.   (c)   **Look at FIGURE 2 for Question 4 (c) in the separate Diagram Booklet.**
FIGURE 2 shows the pseudocode for an early version of an algorithm that Reba has written for another game.

The algorithm:

- **asks the user to input a colour or input −1 to end the game**

- **awards 1 point for red**

- **awards 8 points for orange**

- **generates the score for the game**

- **displays the results of the game.**

Reba inputs: red, orange, red, red, orange, −1

The outputs are not as she expects.

(i)   **Complete the trace table provided for Question 4 (c) (i) in the separate Diagram Booklet to show the outputs.**
(4 marks)

(continued on the next page)

Question 4 (c) continued

4.　(c)　(ii)　**Give the line number of the pseudocode that contains the error.**

(1 mark)

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(iii)　**Write a replacement line of pseudocode to correct the error.**

(1 mark)

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(Total for Question 4 = 14 marks)

5. **Viza Health Centre is located in the North East of England.**

    (a) **The health centre uses artificial intelligence to provide a symptom – checking service for its patients.**

    Patients log on to the website and input their symptoms.

    (i) **Describe how artificial intelligence could identify what is wrong with them. (2 marks)**

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Turn over

Question 5 (a) continued

5. (a) (ii) Give ONE reason why a patient may not want to use this online service.

(1 mark)

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Question 5 continued

5.   (b) The health centre has clinics in two buildings: Cleveland and Stockton.

       The network server is in the Cleveland building.

      (i)   Name the type of network used to access the server from within the Cleveland building.
           (1 mark)

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      (ii) Name the type of network used to access the server from the Stockton building.
           (1 mark)

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(continued on the next page)

Question 5 continued

5.　(c)　The network is at risk of an eavesdropping attack.

Identify the description of eavesdropping.
(1 mark)

☐ **A** Tricking people into giving information by sending emails pretending to be from someone in authority

☐ **B** Spying on someone using a computer

☐ **C** Intercepting information as it is transmitted over a network

☐ **D** Redirecting a user from a genuine website to a fake one

(continued on the next page)

Question 5 continued

5.   (d)   Doctors use laptops when they visit patients in their homes.

(i)   The laptops have solid state drives.

Explain ONE reason why a solid state drive is better than a magnetic hard drive for the laptops.
(2 marks)

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Question 5 (d) continued

5.   (d) (ii) **Describe how data is stored on a solid state drive.**

(2 marks)

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(continued on the next page)

Question 5 (d) continued

5. (d) (iii) The laptops have two types of memory.

> **Complete the table below by adding ONE tick (✓) to match EACH description to the type of memory used.**
> **(2 marks)**

DESCRIPTION	RAM	ROM
Stores the boot up sequence		
The contents are lost when the laptop is shut down		

(Total for Question 5 = 12 marks)

6. Santiago manages a computer network for a small business.

(a) Networks are based on a topology.

Look at FIGURE 3 for Question 6 (a) in the separate Diagram Booklet. FIGURE 3 shows a network topology.

(i) Explain ONE benefit of this network topology.
(2 marks)

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Question 6 (a) continued

6.   (a)   (ii)   The internet is the world's largest mesh network.

Explain ONE reason why a mesh topology is essential for the internet.
(2 marks)

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(continued on the next page)

Question 6 continued

6. (b) Santiago works on his laptop whilst travelling by train.

There is a free Wi−Fi connection on the train, but Santiago doesn't use it.

He prefers to set up a network between his smartphone and his laptop to connect to the internet.

(i) Name this type of network.
(1 mark)

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(continued on the next page)

Question 6 (b) continued

6.   (b)   (ii)   **Explain ONE advantage for Santiago of using the network he has set up to connect to the internet, rather than the free Wi – Fi connection.**
(2 marks)

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Question 6 continued

6.   (c) Santiago uses audit trails to help protect the network.

       (i)   State what is meant by an AUDIT TRAIL.
            (1 mark)

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      (ii) Give ONE way the data from audit trails can be used to help keep the network secure.
            (1 mark)

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(continued on the next page)

Question 6 continued

6.   (d)   **Santiago wants to find and fix network vulnerabilities before the reputation of the company suffers.**

Discuss the methods he can use.

You should consider:

- **ethical hacking**

- **commercial analysis tools**

- **review of network and user policies.**

(6 marks)

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Question 6 (d) continued

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Question 6 (d) continued

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(Total for Question 6 = 15 marks)

TOTAL FOR PAPER = 80 MARKS

END OF PAPER