Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number ☐☐☐☐☐

Candidate Number ☐☐☐☐

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Time 1 hour 30 minutes

Paper reference **1CP2/01**

Computer Science

PAPER 1: Principles of Computer Science

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** 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.*

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.

Turn over ▶

Pearson

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 Networks

(a) Devices are connected to networks.

(i) Give **two** reasons for connecting computers in a network.

(2)

1 ....

....

2 ....

....

(ii) Describe **one** way a local area network (LAN) is different from a wide area network (WAN).

(2)

....

....

....

....

(iii) A network has a speed of 17.08 megabits per second.

Identify the equivalent speed in bits per second.

(1)

☐ **A** 17 080

☐ **B** 17 080 000

☐ **C** 17 080 000 000

☐ **D** 17 080 000 000 000

(iv) Define the term 'latency'.

(1)

....

....

(b) Data is split up into packets for transmission over a network.

(i) Each device on a network has a unique identifier that is used when sending or receiving packets of data.

State the name of the unique identifier.

(1)

....

(ii) Identify the item included between the header and the footer in a data packet.

(1)

☒ **A** Data being sent
☒ **B** Destination address
☒ **C** Packet number
☒ **D** Public key

(c) Describe how a firewall protects a local area network (LAN).

(2)

....

....

....

....

(d) State the name of an email protocol.

(1)

....

(e) Explain **one** disadvantage of using a star network topology.

(2)

....

....

....

....

(Total for Question 1 = 13 marks)

2 Computers

(a) Some low-level programming languages use mnemonics.

(i) State the purpose of a mnemonic.

(1)

....

....

(ii) State the type of low-level programming language that uses mnemonics.

(1)

....

(iii) Mnemonics are one characteristic of some low-level languages.
Describe **one other** characteristic of a low-level language.

(2)

....

....

....

....

(iv) State the name of the high-level programming language translator that executes a line of code immediately after translating it.

(1)

....

(b) State the **two** items held in RAM according to the von Neumann architecture.

(2)

1 ....

2 ....

(c) Data can be stored in different ways.

(i) Describe how data is stored on optical media.

(2)

....

....

....

....

(ii) State the type of secondary storage that stores data as electric charges.

(1)

....

(d) An embedded computer system is part of a larger machine.

State **two** characteristics of embedded systems that make them different from general purpose computers.

(2)

1 ....

....

2 ....

....

(e) Identify **two** reasons for using data compression.

(2)

☒ **A** Reduces data transfer times

☒ **B** Reduces disk fragmentation

☒ **C** Reduces required storage space

☒ **D** Reduces the chance of data being hacked

☒ **E** Reduces the need for error detection and correction

(f) Robust software must be free from vulnerabilities before it is released to users. Programming bugs are one type of vulnerability.

State **two other** types of vulnerability.

(2)

1 ....

....

2 ....

....

(g) Some users are given administrator privileges.

Explain **one** way an operating system allows an administrator to manage users.

(2)

....

....

....

....

(Total for Question 2 = 18 marks)

3 Data

(a) Computers manipulate binary patterns. Patterns can represent signed or unsigned integers.

(i) Convert the denary number 57 to 8-bit binary.

(2)

....

....

....

....

(ii) Convert the binary number 0010 1101 to hexadecimal.

(2)

....

....

....

....

(iii) Describe the process of converting a binary number to two's complement.

(2)

....

....

....

....

(iv) Explain what has happened as a result of adding these two 8-bit binary numbers.

	1	0	1	1	0	0	0	1	
	1	0	1	0	1	1	0	0	+
1	0	1	0	1	1	1	0	1	

(2)

(b) After applying compression to a file, the original contents cannot be reconstructed fully.

State the type of compression used on the file.

(1)

(c) Data can be encoded using ASCII.

Describe ASCII.

(2)

(d) A pixel is the smallest element in a bitmap image.

(i) Two images are displayed on the same screen.

One image is 1280 × 720 pixels. The second image is 1920 × 1080 pixels.
The second image has a higher resolution.

State **one** reason why the second image will be displayed in more detail.

(1)

....

....

(ii) A 10-colour bitmap image uses 15-bit colour depth. The image is 1028 pixels wide and 640 pixels high.

Complete the expression to show the minimum file size for the image in MiB.

You do not have to do the calculation.

(4)

$$\frac{\boxed{\dots\dots\dots} \times \boxed{\dots\dots\dots} \times \boxed{\dots\dots\dots}}{\boxed{1024} \times \boxed{\dots\dots\dots} \times \boxed{\dots\dots\dots}}$$

(Total for Question 3 = 16 marks)

4 Issues and impact

(a) Explain **one** reason why files should be backed up regularly.

(2)

....

....

....

....

(b) Consent must be obtained before organisations can use personal data.

Give **two** pieces of information that organisations must tell people when requesting consent to use their personal data.

(2)

1 ....

....

2 ....

....

(c) Police forces use algorithms to help decide how many officers to deploy and where to send them.

Discuss how algorithmic bias can affect the decisions police forces make.

Your answer should consider:

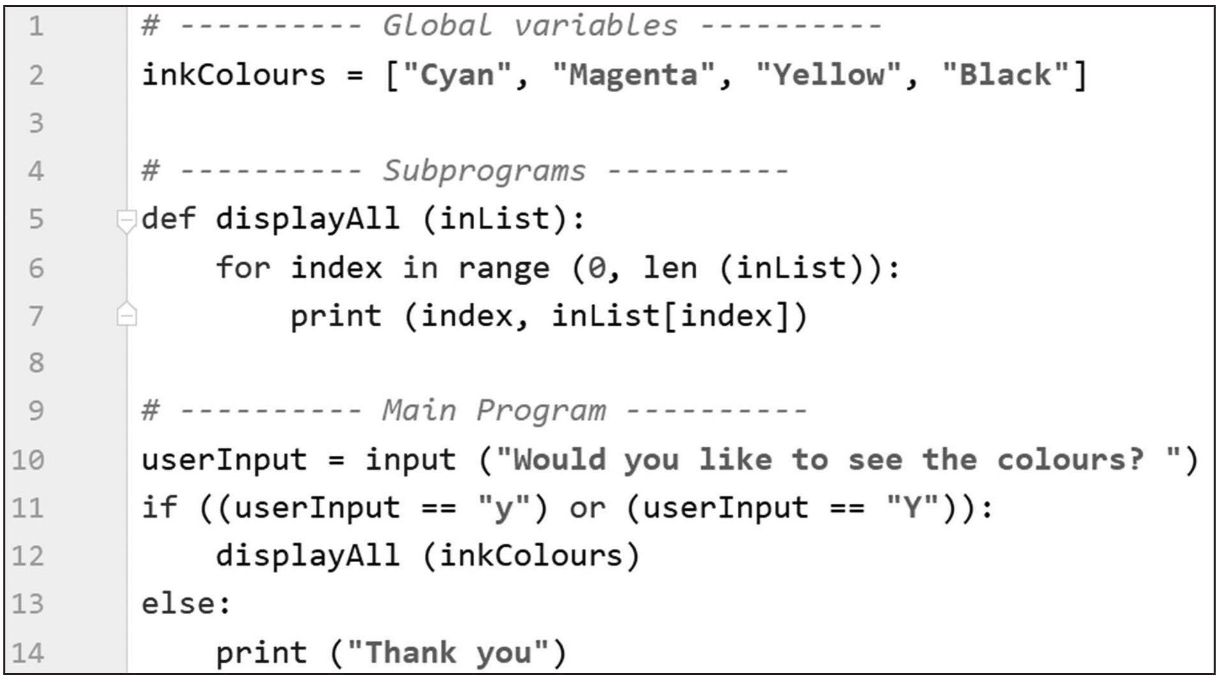
- the cause of algorithmic bias
- the impact on individuals and communities of algorithmic bias
- the methods available to reduce the risk of algorithmic bias.

(6)

(Total for Question 4 = 10 marks)

5 Computational thinking

(a) Here is an algorithm that prints colours.



```
# ---------- Global variables ----------
inkColours = ["Cyan", "Magenta", "Yellow", "Black"]

# ---------- Subprograms ----------
def displayAll (inList):
    for index in range (0, len (inList)):
        print (index, inList[index])

# ---------- Main Program ----------
userInput = input ("Would you like to see the colours? ")
if ((userInput == "y") or (userInput == "Y")):
    displayAll (inkColours)
else:
    print ("Thank you")
```

(i) State the type of data structure used to hold the ink colours.

(1)

....

(ii) Give the contents of `inkColours[2]`

(1)

....

(iii) State the name of the computational thinking technique used by the subprogram `displayAll()` to hide the logic of printing.

(1)

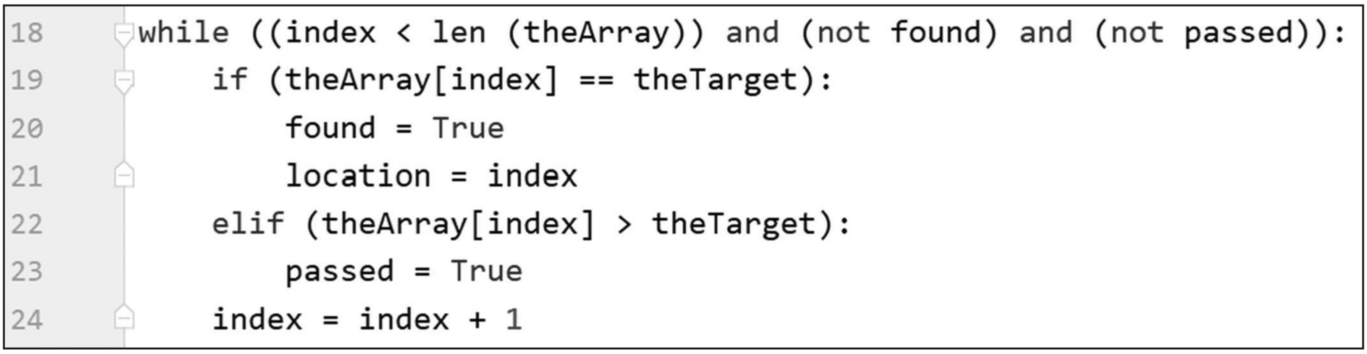
....

(iv) State the name of the computational thinking technique used when separating logic into different blocks, such as the subprogram and the main program.

(1)

....

(b) This algorithm searches a sorted array of numbers for a target value.
The target value may or may not be in the array.



```
while ((index < len (theArray)) and (not found) and (not passed)):
    if (theArray[index] == theTarget):
        found = True
        location = index
    elif (theArray[index] > theTarget):
        passed = True
    index = index + 1
```

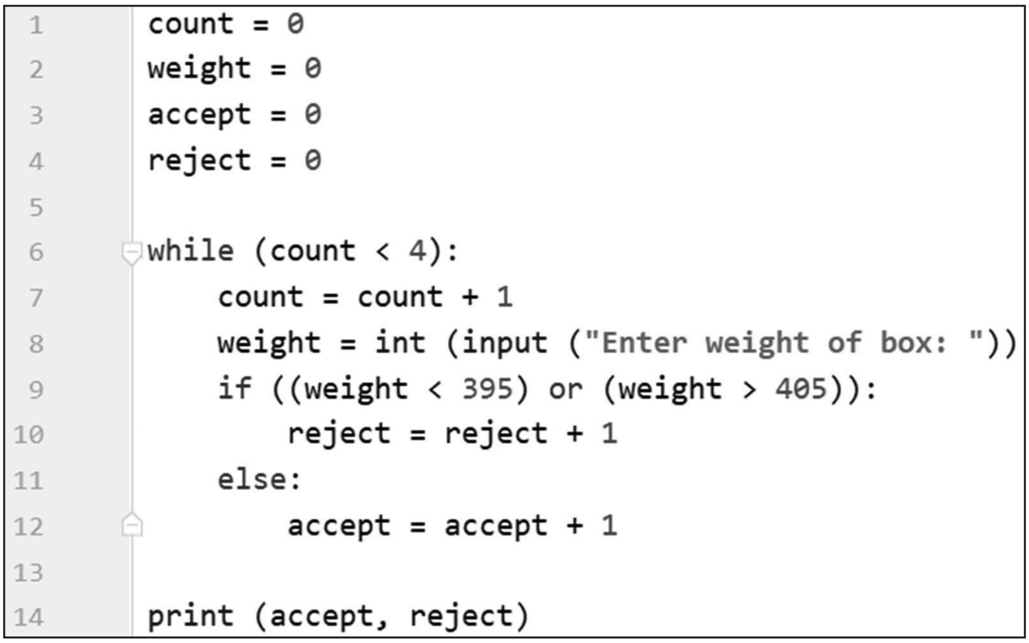
The use of the `found` variable helps to make the algorithm efficient.

Describe how the use of the `passed` variable also helps to make the algorithm efficient.

(2)

(c) Laura owns a fruit shop.

This program checks the weight of boxes of strawberries from Laura’s shop.



```
count = 0
weight = 0
accept = 0
reject = 0

while (count < 4):
    count = count + 1
    weight = int (input ("Enter weight of box: "))
    if ((weight < 395) or (weight > 405)):
        reject = reject + 1
    else:
        accept = accept + 1

print (accept, reject)
```

The inputs are 404, 393, 395, 405.

Complete the trace table showing the execution of the program with these inputs.

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

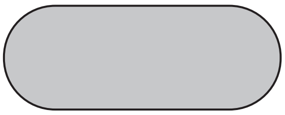
(6)

count	**accept**	**reject**	**weight**	**Display**

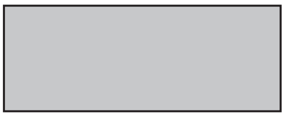
(d) An algorithm is required that allows a user to enter two numbers. The algorithm then informs the user which number is greater, or whether the two numbers are equal. The algorithm is expressed in a flowchart.

Here are some flowchart symbols:

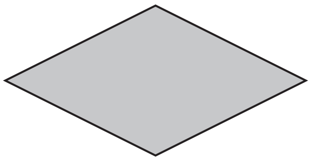
Terminator



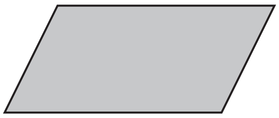
Process



Decision



Input / Output



Draw a flowchart to show this algorithm.

(6)

(Total for Question 5 = 18 marks)

TOTAL FOR PAPER = 75 MARKS

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