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| Candidate surname | | | | | Other names | | | | |
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Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Friday 19 May 2023

Afternoon (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 ►

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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 Computers

(a) The CPU contains a number of components.

(i) Complete the table with the correct bus for each role.

(3)

| Bus | Role |
|-----|---|
| | Carries a read signal to main memory. |
| | Carries the memory location of a piece of data. |
| | Carries an instruction from main memory to the CPU. |

(ii) Identify the component inside the CPU that stores data.

(1)

- ☐ **A** Arithmetic logic unit
- ☐ **B** Clock
- ☐ **C** Main memory
- ☐ **D** Register



(b) Algorithms can be written in a high-level language.

(i) State what high-level code is translated to.

(1)

(ii) State **two** methods of source code translation.

(2)

1

2

(c) Identify the feature of an optical disc that allows data to be read.

(1)

☐ **A** It is magnetic

☐ **B** It is portable

☐ **C** It is reflective

☐ **D** It is volatile

(d) Define the term 'embedded system'.

(1)

.....

.....



(e) A code review is carried out by a programmer or an automated system.

Both methods cost money.

Complete the table with **one other disadvantage** for each method.

(2)

| Method of code review | Disadvantage |
|------------------------|--------------|
| By a programmer | |
| By an automated system | |

(f) Identify the purpose of defragmentation software.

(1)

- ☐ **A** Compressing data
- ☐ **B** Encrypting data
- ☐ **C** Organising data
- ☐ **D** Protecting data



(g) One function of an operating system is to manage processes.

- (i) Describe **one** way the operating system makes sure each process can use the CPU.

(2)

- (ii) Give **one other** function of an operating system.

(1)

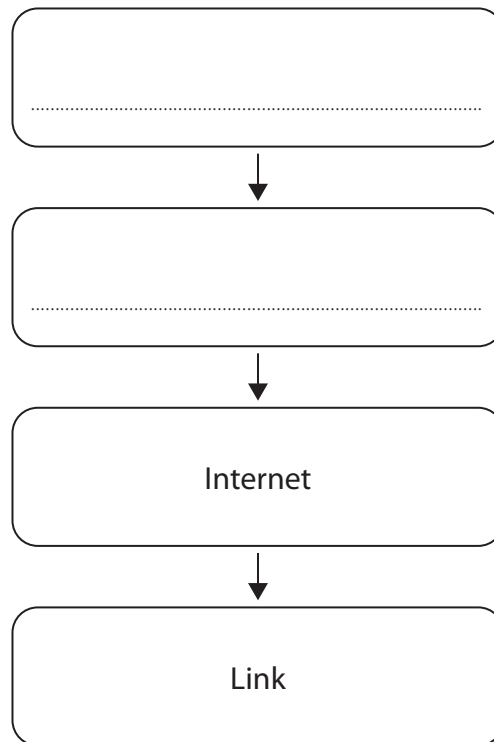
(Total for Question 1 = 15 marks)



2 Networks

(a) Complete the diagram of the 4-layer TCP/IP model.

(2)



(b) Name the network topology that uses terminators to absorb signals.

(1)

(c) Identify the reason computers are connected in a network.

(1)

- ☐ **A** To improve encryption
- ☐ **B** To prevent hacking
- ☐ **C** To reduce latency
- ☐ **D** To share peripherals

(d) State the network protocol used to request a webpage.

(1)

(e) Explain **one** benefit to a user of using IMAP to access emails.

(2)

(f) A factory has two file servers installed in an office.

A closed-circuit television system monitors the factory.

Explain **one other** method of physical security that could be used to protect the servers.

(2)

(g) Network speed is the current rate of data transmission, measured in bits per second.

Define the term 'bandwidth'.

(1)

- (h) High-speed fibre-optic cables form the internet backbone. Routers connect other networks to this backbone.

Describe how a router enables data to arrive at its destination.

(2)

(Total for Question 2 = 12 marks)



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3 Issues and impact

- (a) Computer worms are a type of malware.

Describe **one** way that a worm can move from machine to machine.

(2)

- (b) The source code of a software application is automatically copyrighted.

State **one other** method of intellectual property protection to control who can use a software application.

(1)

- (c) Computer programs control some aeroplane landings.

Explain **one** reason computers are **not** capable of safely controlling all aeroplane landings.

(2)



Describe **one** way this impacts the environment.

Complete the table with the ethical or legal issue for each situation.

(2)

| Situation | Ethical or legal issue |
|---|------------------------|
| An online learning platform publishes data about how students answer questions. | Consent |
| A teacher uses another teacher's login to change student grades. | |
| A school displays closed-circuit television (CCTV) screens in a public area. | |

(Total for Question 3 = 9 marks)



4 Computational thinking

- (a) Programmers use trace tables with algorithms.

Explain the purpose of a trace table.

(2)

- (b) Algorithms use arrays and records to hold data.

Describe a record.

(2)



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(c) An algorithm allows users to enter a whole number.

The number can be positive or negative.

The purpose of the algorithm is to report whether the number is even or odd.

The modulus function returns the remainder after division.

The algorithm can be expressed as a flowchart.

Here are some flowchart symbols:

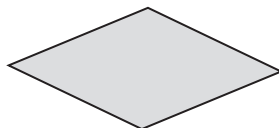
Terminator



Process



Decision



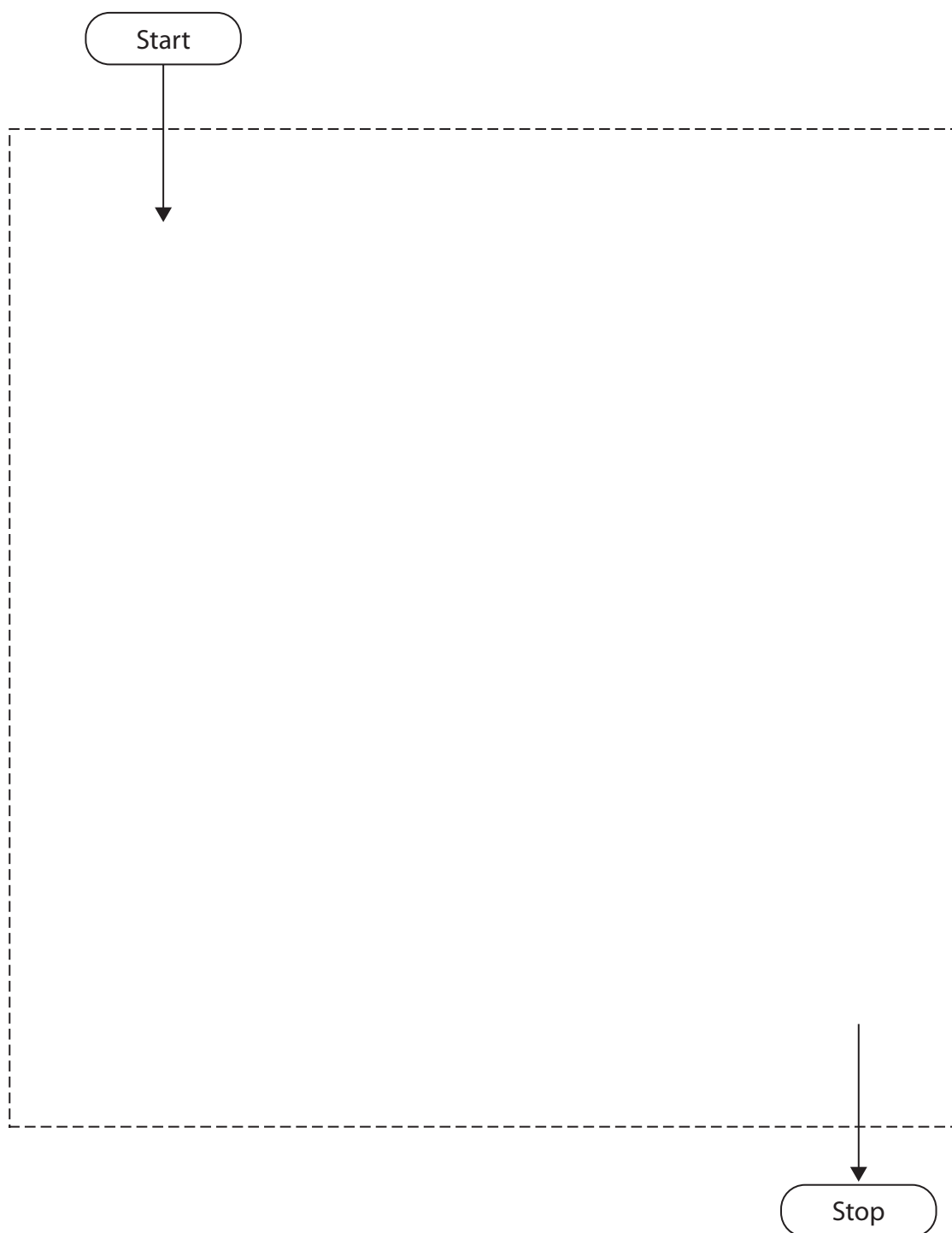
Input/Output



Complete the flowchart to show the algorithm.

You may not need to use all the flowchart symbols.

(4)



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(d) A linear search algorithm can be used on both a sorted and an unsorted array.

Describe how a linear search algorithm operates on an **unsorted** array.

(4)



(e) Algorithms control physical devices using logical operators.

A security system turns on a floodlight when the sunlight falls below a certain level (S) and a movement sensor is activated (M).

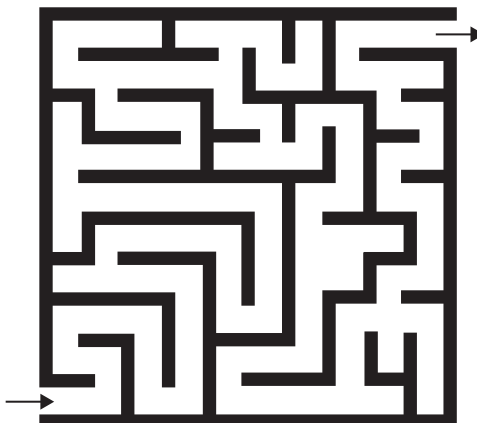
Complete the truth table.

(2)

| S | M | S AND M |
|---|---|---------|
| | | |
| | | |
| | | |
| | | |



- (f) A group of students are working together on a single maze game. The arrow keys control the character. When the character reaches the end of the maze without touching a wall, a happy sound is played. The game also displays a score.



Discuss the use of decomposition and abstraction in developing this game.

Your answer should include:

- a definition of each term
- the benefits each brings to the group of students
- an example of where each could appear in the program code.

(6)

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(Total for Question 4 = 20 marks)

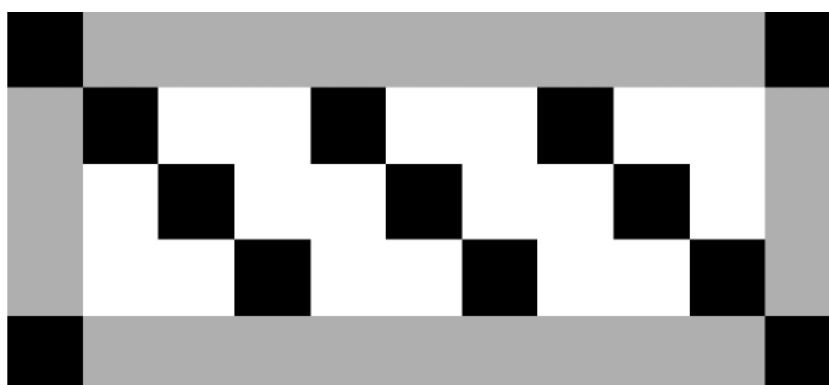


5 Data

(a) Describe **one** effect of using lossy compression to reduce the size of a file.

(2)

(b) Here is an original image.



There is one bit available to represent each pixel.

Explain **one** reason why the image cannot be accurately represented using one bit for each pixel.

(2)

(c) Shifts are performed on binary patterns.

A **logical** shift right is performed on a pattern.

An **arithmetic** shift right is performed on the same original pattern.

Describe the reason the results will be different.

(2)



(d) Binary, denary and hexadecimal patterns represent numbers.

(i) Convert the binary pattern 0100 0010 to denary.

(1)

(ii) Convert the binary pattern 0101 1011 to hexadecimal.

(2)



(e) Data storage is measured in bits and bytes.

(i) State the number of unique values that can be represented with 6 bits.

(1)

(ii) A file format uses a 100×600 table of 32-bit integers.

The file uses 1 kibibyte of additional data.

Construct an expression to show the number of **bytes** of storage needed to store the file.

(3)



(f) An analogue sound is represented in digital form.

The sound is one second long and is sampled at 10Hz.

The digital representation has a bit depth of 5 and is stored in two's complement.

Sound data:

00000 11111 11111 11111 11111

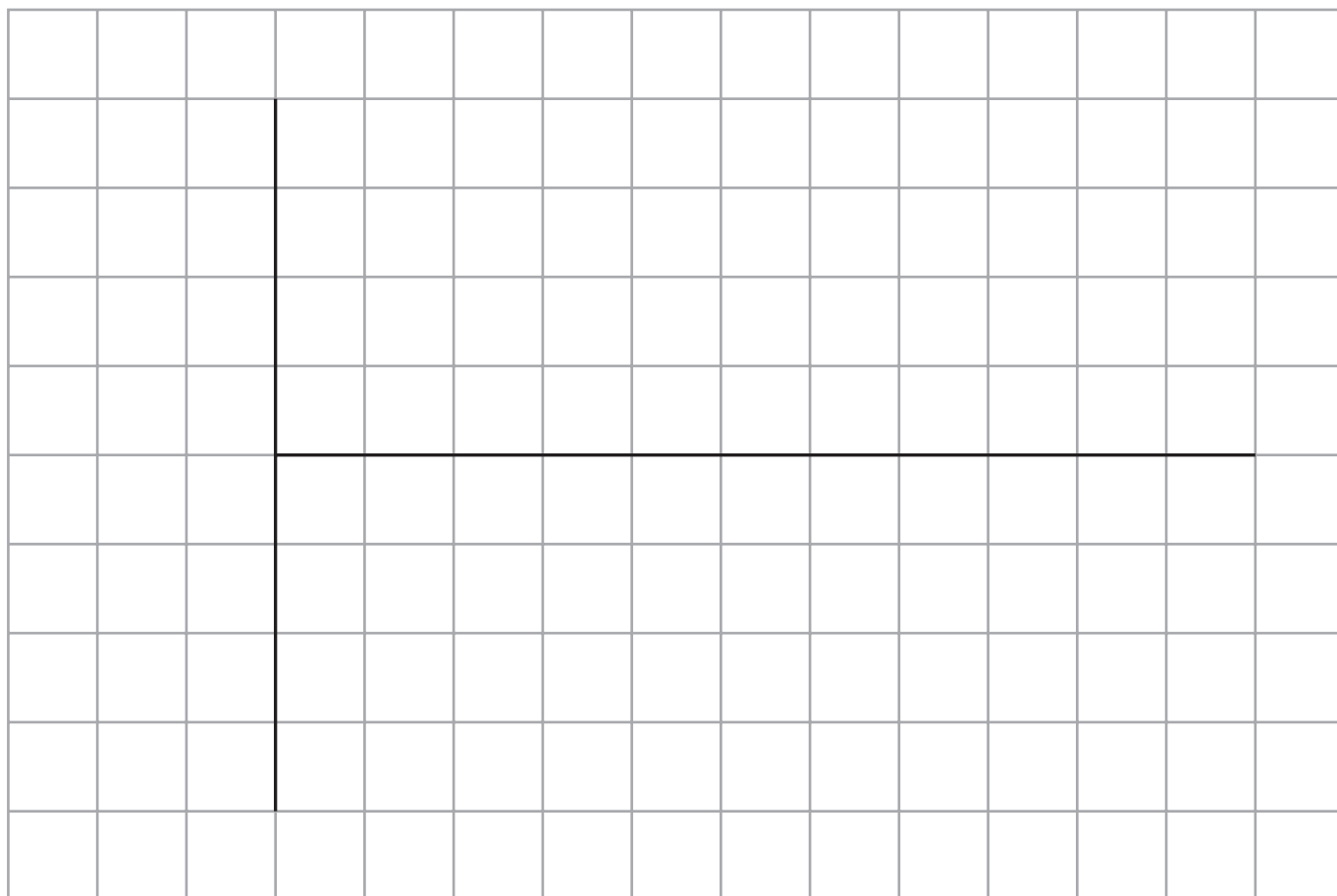
00000 00000 00001 00001 00001

Draw a graph to represent the data sampled.

You must include:

- labels for the x and y axes
- values for the x and y axes
- each sample plotted as an X
- samples joined up to show the digital form.

(6)



(Total for Question 5 = 19 marks)

TOTAL FOR PAPER = 75 MARKS

