Please check the examination details below before entering your candidate information

Candidate surname MyCSTutor.co.uk

Other names CS Worked Solutions

Centre Number

Candidate Number

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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P 7 2 5 9 5 A 0 1 2 4

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 Computers

(a) The CPU contains a number of components.

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

(3)

Bus	Role
Control	Carries a read signal to main memory.
Address	Carries the memory location of a piece of data.
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 X

☒ **B** Clock X

☒ **C** Main memory X → not CPU

☒ **D** Register ✓

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

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

machine code

(1)

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

(2)

1 compilation (by compiler)

2 interpretation (by interpreter)

(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)

System that performs a specific task within a larger device

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(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	Human error
By an automated system	May not find all issues

(f) Identify the purpose of defragmentation software.

(1)

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

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(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)

Scheduling method such as round robin - each process gets a time slice, or may be helf in priority. Incomplete processes go to back of queue

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

(1)

Provides user interface

(Total for Question 1 = 15 marks)

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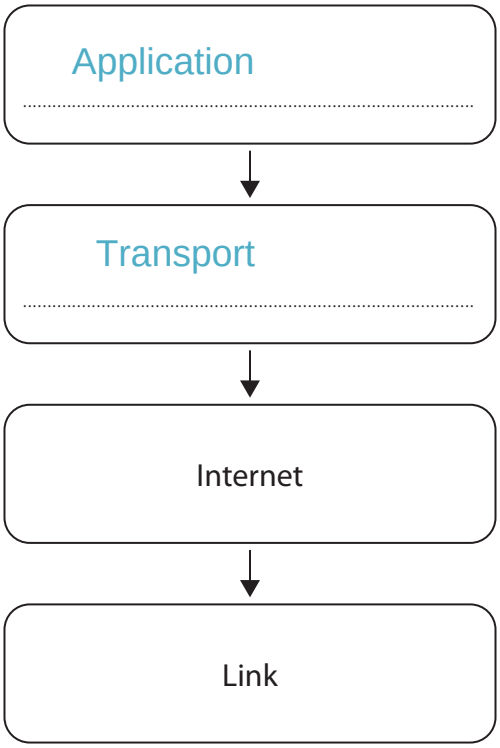
2 Networks

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

(2)



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

(1)

Bus

(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

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

(1)

HTTP(S)

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

(2)

Don't need client application to download messages, so emails can be accessed through a browser

(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)

Alarms - so to notify of intruders / unauthorised access

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

Define the term 'bandwidth'.

(1)

The maximum amount of data that can be transmitted per unit time

(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)

Reads recipients IP Address.

Uses a routing table , looks for fastest pathway to destination

(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)

Worms duplicate themselves without the need of a host file, and spread via email contacts - make users unknowingly execute them

(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)

Licensing

(c) Computer programs control some aeroplane landings.

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

(2)

System may be out of date - have errors/bugs so landing program may crash or unsuitable for extreme rare conditions

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(d) Large amounts of water are used to manufacture computer chips.

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

(2)

Rivers may be polluted - health risk

Humans may not have access to enough water

(e) There are ethical and legal issues with the collection and use of personal data.

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

One row has been completed for you.

(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.	Misuse
A school displays closed-circuit television (CCTV) screens in a public area.	Privacy

(Total for Question 3 = 9 marks)

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4 Computational thinking

(a) Programmers use trace tables with algorithms.

Explain the purpose of a trace table.

(2)

Helps program find errors /bugs by running through an input through the algorithm and seeing the value variables hold at each point

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

Describe a record.

(2)

Data structure where each field is related to the others

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

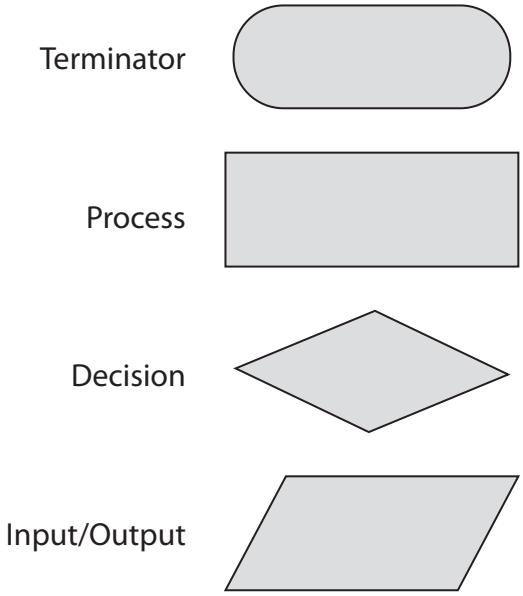
The number can be positive or negative.

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.

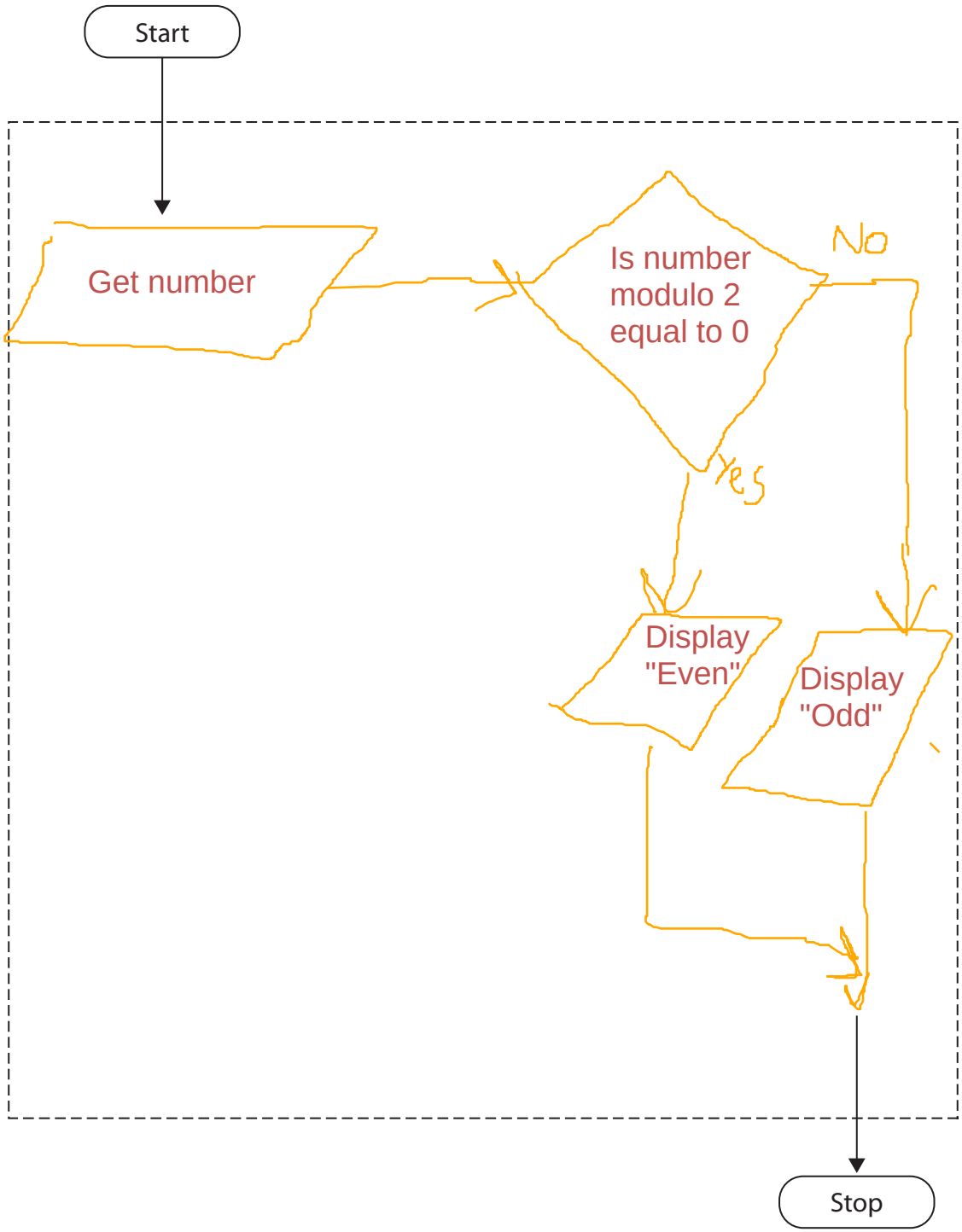
Here are some flowchart symbols:



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)

Begins at first position

Iterates through entire array, comparing the current item with the target.

Stop when item = target, or end of array reached (and item is not matched)

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(e) Algorithms control physical devices using logical operators.

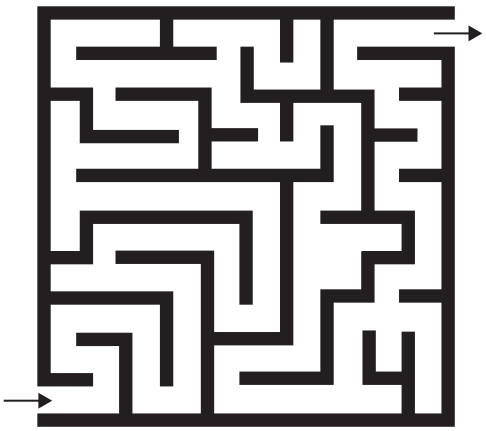
A security system turns on a floodlight when the sunlight falls below a certain level (S) and a movement sensor is activated (M).

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)

Decomposition - breaking down problem into smaller, easier parts

Abstraction - removing unnecessary / irrelevant detail

PRO Decomposition :

Easier to solve smaller problems

Parts of the program can be shared between class members to speed up developme

PRO Abstraction:

Individual parts of the programs such as updating the score can be ignored by the group of students writing the code for moving the character with the arrows EG

Appear in program code:

Subprograms / subroutines show decomposition - as they are blocks f code separate fr main program

EG updating score, reset character to start

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Subprograms are abstractions as names hide the internal code, even if the name is not descriptive.

(Total for Question 4 = 20 marks)

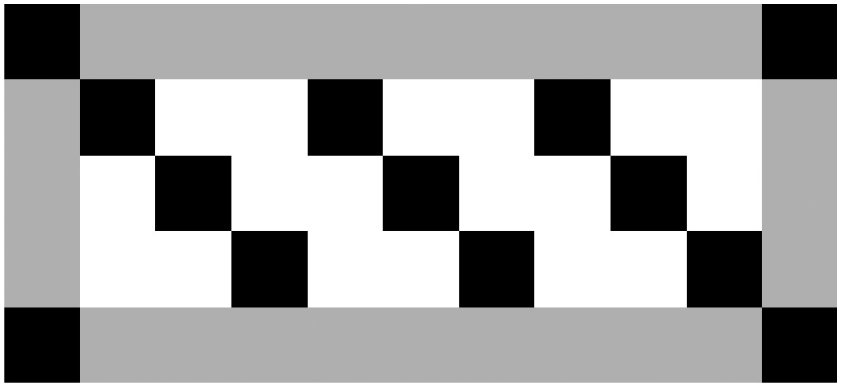
5 Data

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

(2)

Original file information can not be fully recreated as removed data can't be restored

(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)

One bit can represent two values, so only representing two colours. There are three colours, so this image can't be represented

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(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)

Arithmetic shift copies the most significan bit (left), logical fills with 0's left.

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

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

(1)

128 64 32 16 8 4 2 1

0 1 0 0 0 0 1 0 64+2 = 66

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

(2)

0101 1011

5 11

5B

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

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

(1)

2^6 = 64

(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)

((100 x 60 x 32) / 8) +1024

resolution x depth / bytes + kibibyte

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

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

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

Sound data:

00000 11111 11111 11111 11111

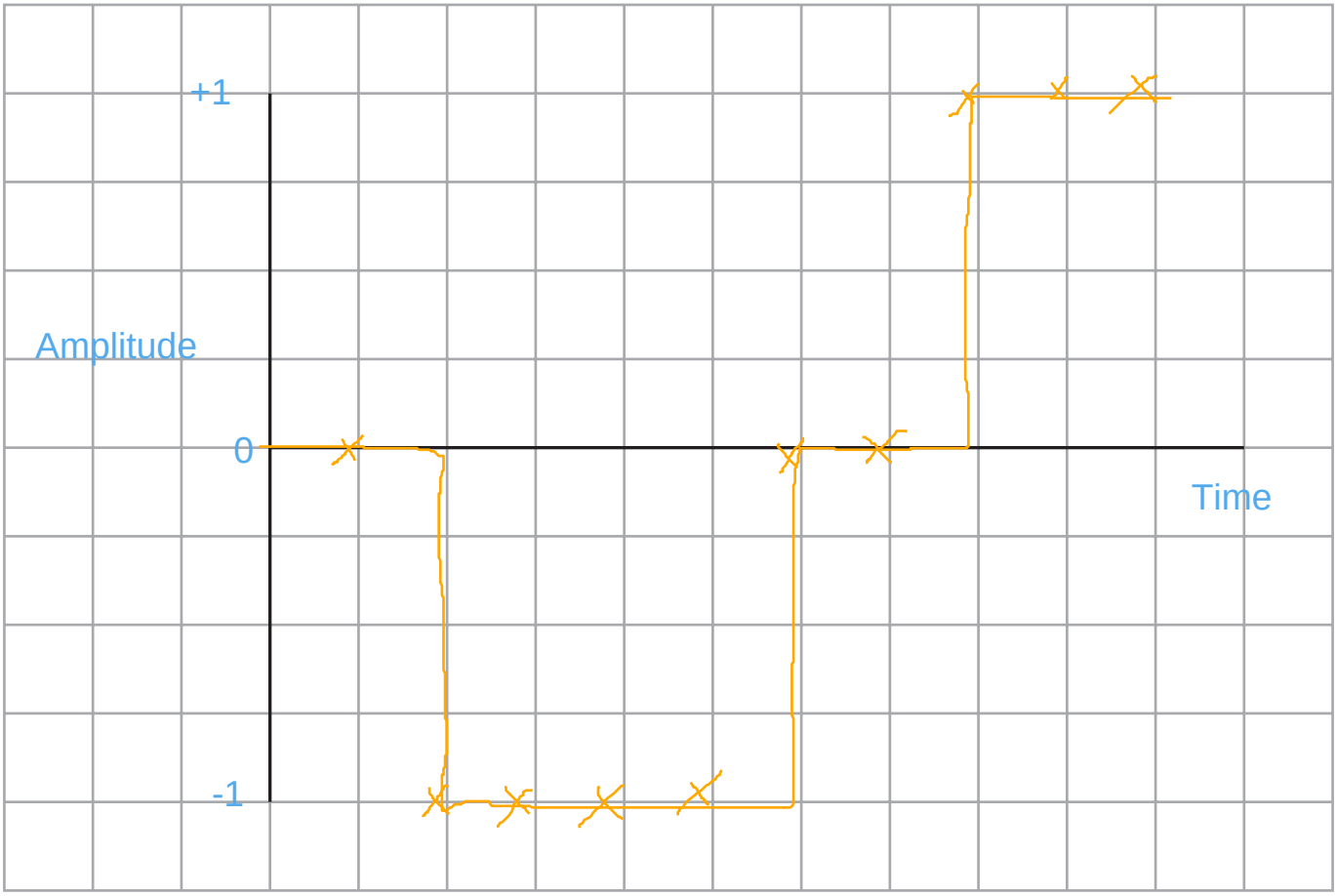
00000 00000 00001 00001 00001

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 ×
- samples joined up to show the digital form.

(6)



(Total for Question 5 = 19 marks)

TOTAL FOR PAPER = 75 MARKS