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)

Wednesday 15 May 2024

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 ▶

P78200RA

F:1/1/1/1/1/1/1/

P 7 8 2 0 0 R A 0 1 2 0

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 Computational thinking

(a) Identify the term that means breaking a problem or solution down into smaller parts.

(1)

- ☒ **A** Abstraction
- ☒ **B** Computation
- ☒ **C** Decomposition
- ☒ **D** Evaluation

(b) State **two benefits** of subprograms. (subroutines)

(2)

1 Only has to be written once, can be reused

2 Programs easier to understand

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(c) Here is an algorithm that uses colours.

```
1  # ------------------------------------------------------
2  # Global variables
3  # ------------------------------------------------------
4  theColours = ["Green", "Blue", "Yellow", "Red", "Purple"]
5  colour = ""
6
7  # ------------------------------------------------------
8  # Main program
9  # ------------------------------------------------------
10
11 for item in theColours:
12     print (item)
13
14 colour = input ("Enter a colour: ")
15 while (colour != ""):
16     if (colour == "Green"):
17         print ("Green is my favourite colour")
18     else:
19         print (colour + " is a good colour")
20
21     colour = input ("Enter a colour: ")
```

(i) Give the first line number of a condition-controlled loop.

(1)

15

(ii) Give the first line number of iteration over every item in a data structure.

(1)

11

(iii) Give the line numbers of a selection.

(1)

16,18

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(d) Programs can have syntax errors and runtime errors.

(i) Define the term 'syntax error'.

(1)

Error in grammar of programming language

(ii) Runtime errors happen when a program is executing.

Explain a runtime error.

(2)

Program crashes as an instruction in the code is unable to be executedby the CPU

(e) Algorithms use relational and arithmetic operators.

(i) Here is a relational operator used in a conditional test.

```
count > index
```

State the **two** different results of evaluating a conditional test.

(2)

1 True

2 False

(ii) Identify the result of 5 // 2 // -> DIV

(1)

- ☒ **A** 0.5
- ☒ **B** 1
- ☒ **C** 2
- ☒ **D** 2.5

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(f) Programmers consider algorithm efficiency when they write code.

(i) Sorting and searching use algorithms.

Complete the table with the name of a search algorithm and a sort algorithm.

(2)

Algorithm type	Characteristic	Algorithm name
Search	Is a divide and conquer algorithm	binary search
Sort	Is **not** a divide and conquer algorithm	bubble sort

(ii) Explain **one** effect the number of comparisons has on the execution time of a sorting algorithm.

(2)

Lower number of comparisons means a quicker execution time

(Total for Question 1 = 16 marks)

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2 Data

(a) The ASCII system is used to represent letters and symbols.

(i) State the number of bits used to represent each letter or symbol in ASCII.

ASCII = 7 bit

(Extended ASCII = 8 bit , unicode =16 bit)

(1)

(ii) The ASCII code 65 represents the letter A.

Give the letter represented by the ASCII code 68.

D

(1)

(b) Sound waves are converted to binary using sample intervals.

Define the term 'sample interval'.

Number of seconds between samples

(1)

(c) Give an expression to calculate the size of a bitmap image, not the size of the file that stores the image.

height x width = size in pixels

(2)

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(d) Computers manipulate binary patterns.

(i) Complete the table with the result of applying the shift to the binary pattern.

(2)

Binary pattern	Shift	8-bit binary result
1010 0011	Logical shift left by 3	00011000
1100 1010	Arithmetic shift right by 2	11110010

preserve the leftmost bit when shifting right

(ii) Identify the correct statement about overflow.

(1)

- ☒ **A** Causing the program to crash during an arithmetic operation
- ☒ **B** Requiring more bits to store a result than are available to store it
- ☒ **C** Switching between binary and hexadecimal number systems
- ☒ **D** Using an index less than 0 or greater than the length of an array

(iii) Convert the denary value +112 to 8-bit binary representation.

(2)

128 64 32 16 8 4 2 1

0 1 1 1 0 0 0 0

(iv) Give the 8-bit binary two's complement representation of denary –73

(2)

-128 64 32 16 8 4 2 1

1 0 1 1 0 1 1 1

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(e) The number of bits determines the number of patterns that can be represented.

(i) Identify the number of symbols available in the hexadecimal system.

(1)

- ☒ **A** 2
- ☒ **B** 8
- ☒ **C** 10
- ☒ **D** 16

(ii) The address bus of a computer is 8-bits wide.

State the number of unique addresses that can be accessed.

(1)

$2^8 = 256$

(f) Construct an expression to convert 40 681 930 227 712 bytes to tebibytes.

(2)

byte -> kibi - > mebi -> gibi -> tebi

40681930227712 / 1024^4

(Total for Question 2 = 16 marks)

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3 Networks

(a) Networks are described in many different ways.

(i) Give the type of network that covers a small geographical area.

(1)

LAN

(ii) Name the characteristic of a wireless network that is measured in metres.

(1)

range

(iii) Give **two disadvantages** of a bus network topology.

(2)

1 If cable is broken, whole network stops working

2 Number of collisions increases as number of devices increases

(b) Describe penetration testing.

(2)

Network attack with the knowledge of system to recommend measures that should be taken to improve security

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(c) Network protocols control the rules of communication.

(i) Name a network protocol that transmissions from other electrical devices can interfere with and that can be blocked by walls.

(1)

Wi-Fi // Bluetooth

(ii) Name the network protocol used to download a music file from a server.

(1)

FTP

(d) Describe how the link layer of the TCP/IP protocol stack works.

(2)

Converts data into a suitable signal for transmission

Adds MAC address for source/destination

Recieves data from network layer, sends data via physical hardware

(e) Construct an expression to calculate the transmission rate, in megabits per second, required to transmit a 1.4 gibibyte file in 13 minutes.

You do not need to do the calculation.

(4)

gibibytes to megabits

/1024 = mebibytes

x 8 /1028 = mebibits 8 x 1024^3 / 1000^2 = megabits

1.4x 8 x 1024^3 / 13x60x1000^2

minutes to seconds

(Total for Question 3 = 14 marks)

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4 Computers

(a) A compiler translates source code to machine code. If the source code is edited, it must be recompiled.

Give **two other** characteristics of a compiler.

(2)

1 Translates entire program in one go

2 Errors reported atfter translation

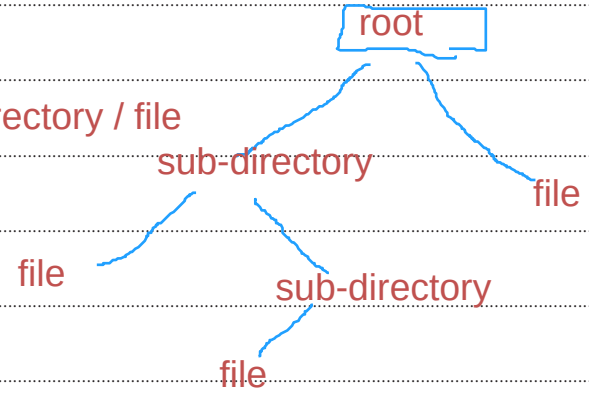
(b) Describe how an operating system organises files and folders.

(2)

Uses tree structure with a root node

Each branch on the tree is a sub-directory / file

Each file has a unique path



(c) Explain **one** way an audit trail helps programmers create robust software.

(2)

Tracks changes that are made, so we can go back to an earlier version easier

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(d) Parking at an airport is controlled by computers.

No paper tickets are issued.

Here is an image of the control system at the exit.

The control system uses sensors, a camera and a database.

The barrier lifts if the parking fee has been paid.

Describe what the system does when the exit sensor is activated by a car driving towards it.

(2)

Camera reads reg plate - looks it up in the database to see that the fee has been paid

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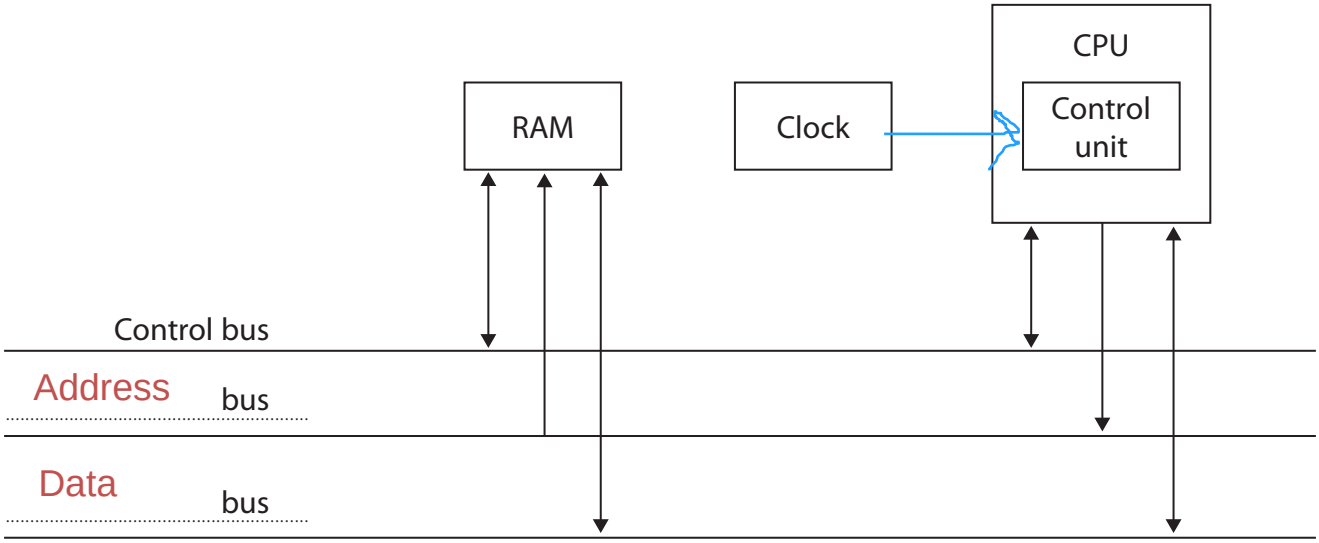
(e) The components of a computer carry out the fetch-decode-execute cycle.

Complete the diagram with:

- the names of **two** buses
- a directional connection from the clock to the correct component.

(3)



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(f) A company is developing a new smartphone.

The smartphone has built-in devices, including a camera and a sound recorder.

The smartphone has applications, including one to edit pictures, one to translate speech to a text file and one for email.

Discuss the characteristics of high-level and low-level programming languages that make them suitable for developing software for the smartphone.

You should consider:

- the built-in devices
- the applications.

(6)

Low-level suitable for direct manipulation of hardware - so suitable for writing device drivers

Low-level languages helpful for optimisation of reducing execution timeLow -level generate smaller executable code- so suitable for low RAM devices eg mobile phones

High level is suitable for build in devices - provide libraries and customisable. Much easier to write in and understand

New applications in a high level language would be portable to mobile phones

High level languages libraries have specialised subprograms to complete advanced actions EG editing an image

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5 Issues and impact

(a) A replacement cycle is the time between the purchase of a device and the purchase of its replacement.

Describe **one** impact the length of replacement cycles has on the environment.

(2)

Quicker replacement cycles means more devices being disposed more often - more pollution

(b) Intellectual property is protected by different methods.

Complete the table with the method of protection for **each** type of intellectual property.

(2)

Intellectual property	Method of protection
A hardware invention	patents
An advertising slogan	Copyright

(c) Robots use sensors to collect data about their surroundings in order to carry out actions independently.

Explain **one** way that a modern car is a robot.

(2)

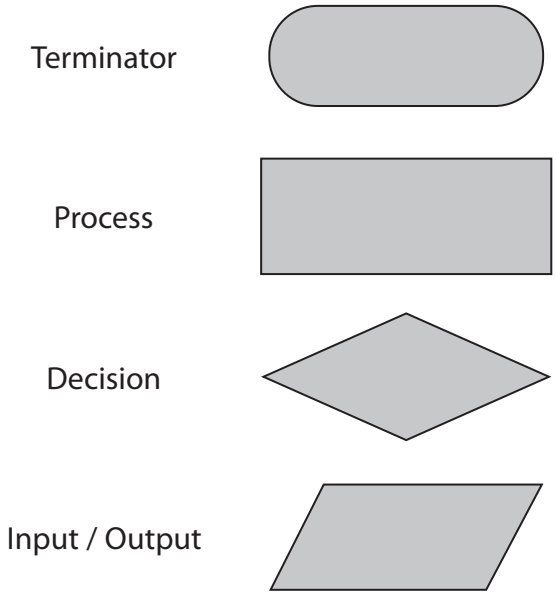
When SENSORS detect rain, window wipers are automatically deployed

Temperature is AUTOMATICALLY adjusted, sensor monitors change in temp of cars interior

(d) Anti-malware protects systems from viruses.

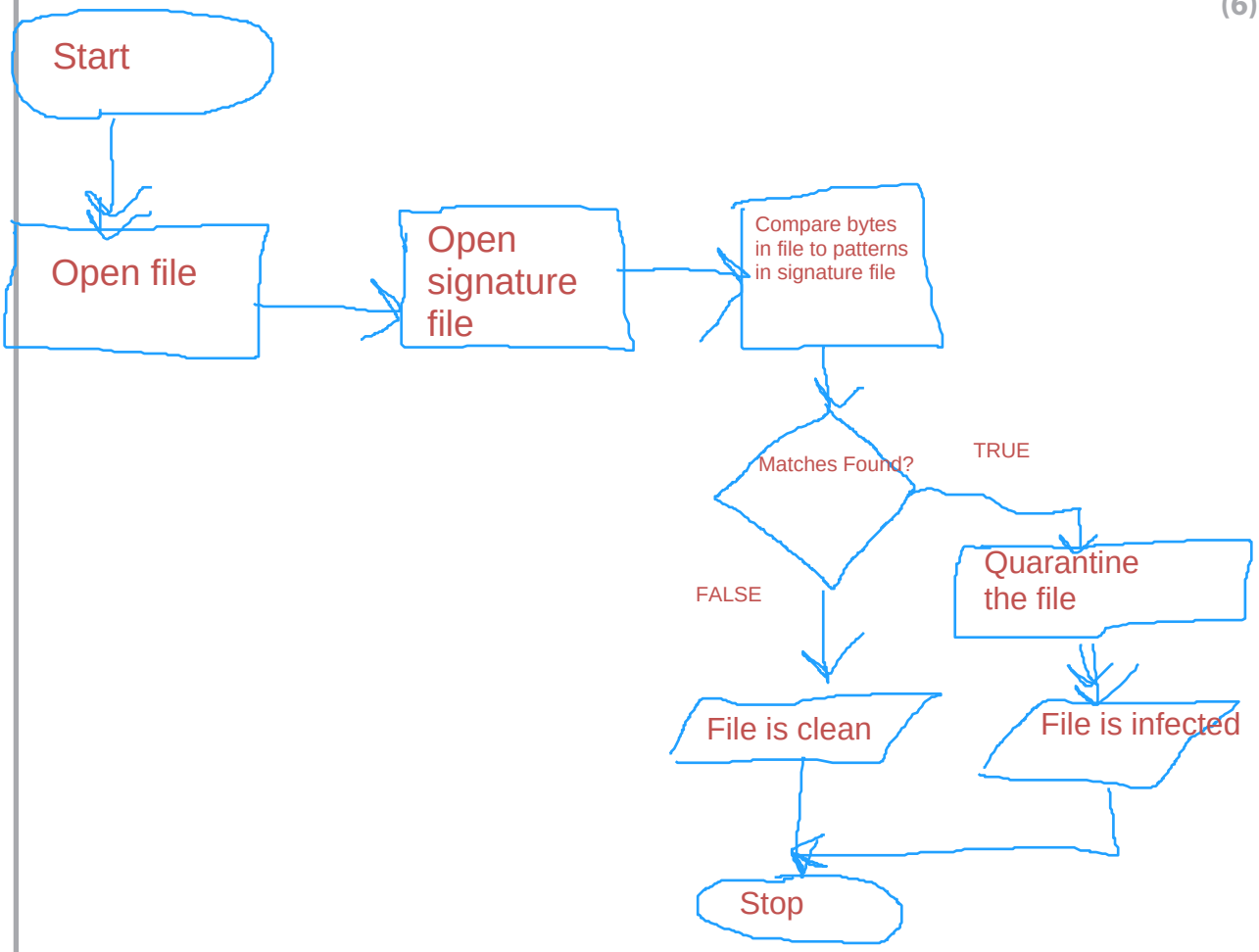
Draw a flowchart in the box provided to show how anti-malware detects a virus in a file and what it does with the file.

Here are some flowchart symbols:



You may not need to use all the flowchart symbols.

(6)



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(Total for Question 5 = 12 marks)

TOTAL FOR PAPER = 75 MARKS

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