Chhetri Academy

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GCSE COMPUTER SCIENCE

1.2

Edexcel 1CP2 | Specification point 1.2.1

Be able to follow and write algorithms (flowcharts, pseudocode*, program code) that use sequence,...

Untiered

Past paper question booklet

5	2015-2023	Untiered
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

5 A student has decided to learn how to program.

*(a) Discuss the suitability of **compiled** and **interpreted** programming languages for the student.

(6)

(b) The student has written an algorithm. This image shows the algorithm in pseudocode.

```
1  FUNCTION myFunction
2
3      SET anArray TO [78, 83, 72, 80, 83]
4      SET f TO FALSE
5      SET c TO -1
6      SET i TO 0
7      SET b TO 75
8
9      WHILE (NOT f) DO
10         IF anArray[i] = b THEN
11             SET f TO TRUE
12             SET c TO i
13         ELSE
14             SET i TO i + 1
15         END IF
16     END WHILE
17
18     RETURN c
19
20 END myFunction
```

(i) State the line number that shows the initialisation of a data structure.

(1)

(ii) State the range of line numbers that show a repetition.

(1)

(c) Complete the trace table to find an error in the algorithm.

(2)

b	f	i	anArray[i]	c
75	FALSE	0		–1

(d) There is a bug in line 9. Write a line of code that will fix this bug.

(1)

.....

(e) State the purpose of the algorithm.

(1)

.....

.....

(f) The student is writing an algorithm to solve a problem.

- The user will provide a series of numbers, representing the weights in grams of individual fruits.
- The weights are always **whole positive numbers**.
- The number of weights to be entered will also be provided by the user.
- The solution should calculate and report the **mean** weight of the fruits to **two decimal places**.

Two examples of the executing solution are shown below:

```
How many weights do you want to enter?
3
Enter a weight:
138
Enter a weight:
135
Enter a weight:
285
Average weight is: 186.00
```

```
How many weights do you want to enter?
4
Enter a weight:
279
Enter a weight:
135
Enter a weight:
145
Enter a weight:
138
Average weight is: 174.25
```

Write an algorithm for this solution using a programming language you are familiar with.

Do not use a flowchart.

(7)

Answer space continues on the next page.

(Total for Question 5 = 19 marks)

2 Charles is a computer programmer for a company that sells digital products through the Internet.

He must be aware of the ethical and legal issues arising from the use of computers.

(a) Identify the legislation that applies in each situation.

(3)

Situation	EU Cookie Law (e-Privacy Directive)	Computer Misuse Act	Copyright, Designs and Patents Act
A teenager was given a computer game for her birthday. She gives a copy of the game to her friend.	☒	☒	☒
A university student tries to gain access to government computers, even though he is not a registered user.	☒	☒	☒
A company has been storing small files on users' computers to track the use of its website, but is not telling them.	☒	☒	☒

(b) Charles is writing program code for the IT department to use.

(i) Identify the type of programming language **most** suitable for each situation.

(4)

Situation	High-level programming language	Low-level programming language
Keeping a list of computers that need fixing.	☒	☒
Increasing the speed of part of a computer program so that it runs in 1 hour instead of 20 hours.	☒	☒
Keeping track of how many users log into the company's file servers each day.	☒	☒
Writing a program for a new computer processor.	☒	☒

Here is some pseudocode.

```
10  SET aNum TO 0
11  SET userNum TO 0
12
13  WHILE userNum = 0 DO
14      SEND "Enter a number:" TO DISPLAY
15      RECEIVE userNum FROM (INTEGER) KEYBOARD
16  END WHILE
17
18  IF userNum < 10 THEN
19      SET aNum TO cubeNum (userNum)
20  ELSE
21      SET aNum TO userNum
22  END IF
23  SEND aNum TO DISPLAY
24
25  FUNCTION cubeNum (aNum)
26  BEGIN FUNCTION
27      SET total TO aNum * aNum * aNum
28      RETURN total
29  END FUNCTION
```

(ii) State the coding technique that Charles could use to make the pseudocode easier to understand.

(1)

(iii) State the name of the subprogram shown in the pseudocode.

(1)

(iv) State the range of line numbers that show a selection statement.

(1)

(v) State a line number on which the variable `aNum` is a local variable.

(1)

(vi) State a line number on which the variable `aNum` is a global variable.

(1)

(c) Charles is preparing to write program code.

(i) Complete the table to show the place value of the 1s to the right of the decimal in this binary real number.

(3)

Place value	4	2	1	•					
	0	1	0	•	1	1	0	0	0

Convert this binary real number to denary.

(ii) State the number of bits in a nibble.

(1)

(iii) Write an arithmetic expression to show the time needed to transmit a 10 KB file at 10 Mbps.

(2)

(Total for Question 2 = 18 marks)

8 P-Cubed wants to know the weight of the heaviest item and the weight of the lightest item.

An operator enters weights for each item. The operator enters 0 when finished.

The algorithm will:

- Take the weights of an item from the user.
- Count the number of items.
- Tell the user if they have entered an invalid weight.
- Output the weight of the heaviest item.
- Output the weight of the lightest item.

Here is a sample output.

```
Enter the weight for the item, 0 to quit: 800

Enter the weight for the item, 0 to quit: -123
  Error.  No negatives allowed

Enter the weight for the item, 0 to quit: 500

Enter the weight for the item, 0 to quit: 200

Enter the weight for the item, 0 to quit: 0
```

Write an algorithm to meet the requirements.

Use pseudo-code or a programming language with which you are familiar.

(9)

(Total for Question 8 = 9 marks)

3 Algorithms are used in the design of computer programs.

(a) Describe what is meant by the term 'algorithm'.

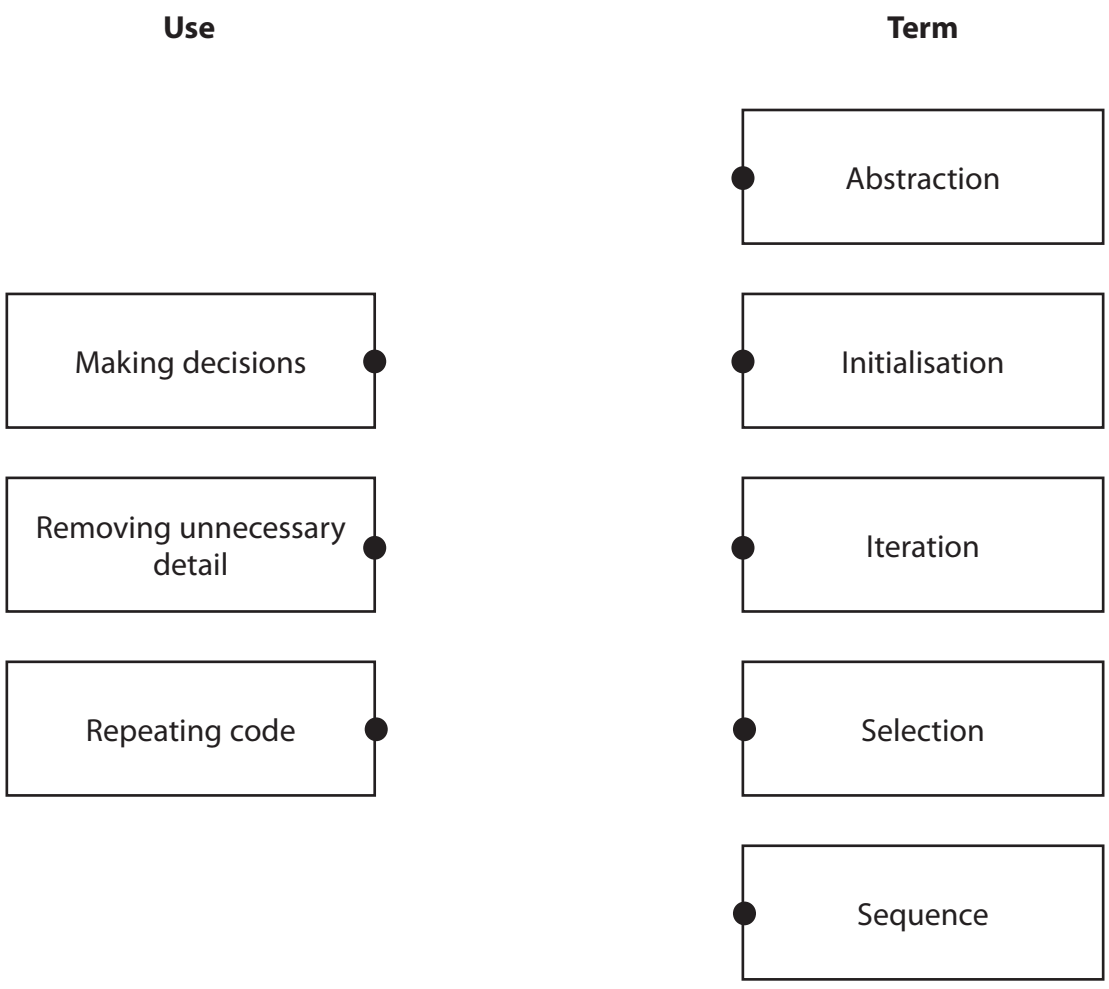
(2)

.....

.....

(b) Draw a straight line to match each use to the correct term.

(3)



(c) Explain why it is important for computing technology to be inclusive.

(2)

(d) Explain **one** positive impact of computing technology on the environment.

(2)

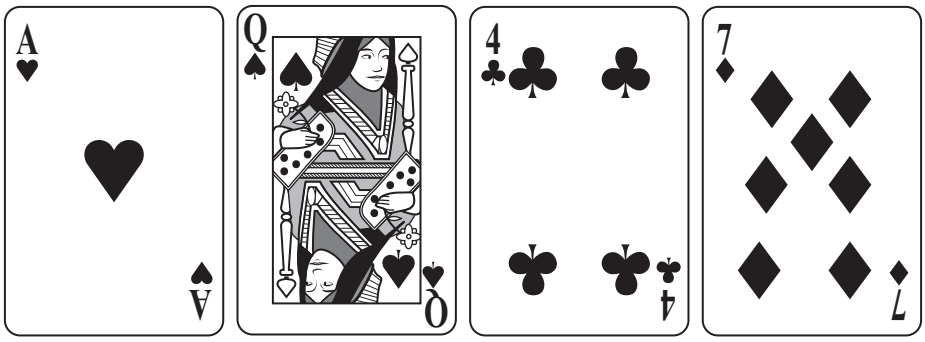
(e) Some open source software requires payment from users.

All open source software gives software developers certain freedoms.

Describe **one** freedom that open source software provides to developers.

(2)

(f) Here are four playing cards.



Describe how abstraction could be applied to playing cards when creating a card game to run on a computer.

(2)

.....

.....

.....

.....

(Total for Question 3 = 13 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)

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

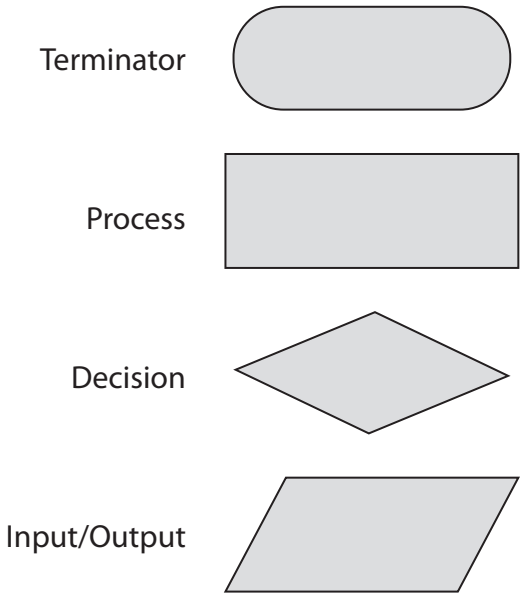
The number can be positive or negative.

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.

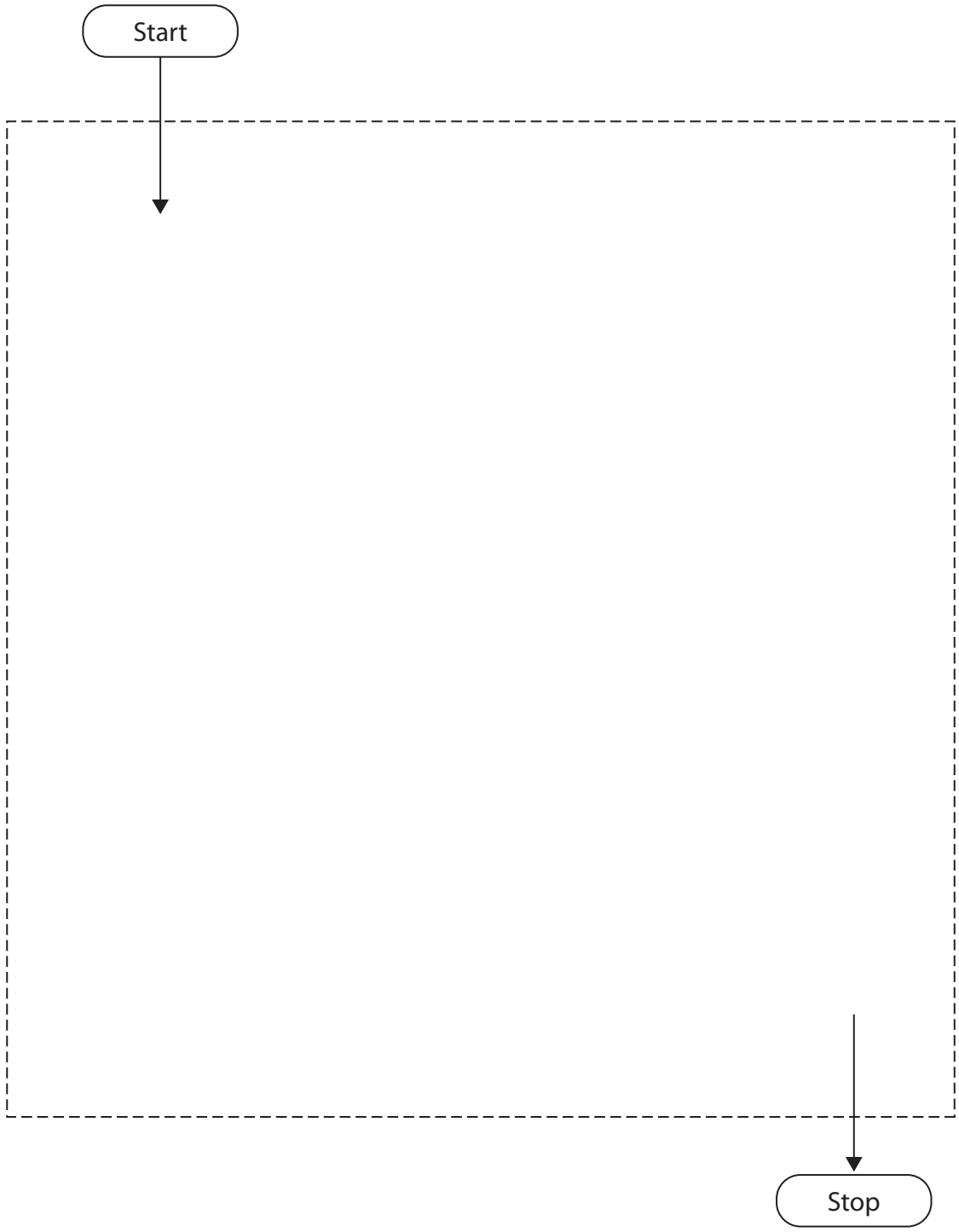
Here are some flowchart symbols:



Complete the flowchart to show the algorithm.

You may not need to use all the flowchart symbols.

(4)



(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.

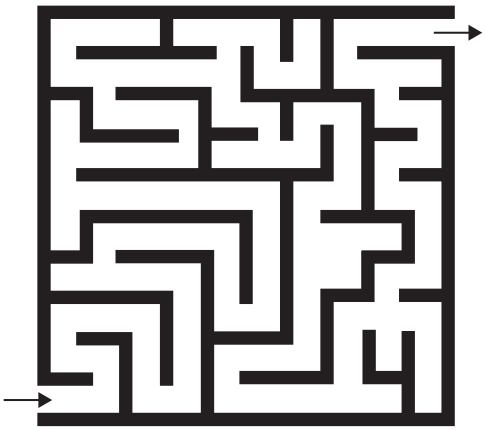
A security system turns on a floodlight when the sunlight falls below a certain level (S) and a movement sensor is activated (M).

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)

(Total for Question 4 = 20 marks)