Chhetri Academy

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GCSE COMPUTER SCIENCE

1.2

Edexcel 1CP2 | Specification point 1.2.4

Be able to determine the correct output of an algorithm for a given set of data and use a trace table to...

Untiered

Past paper question booklet

3	2019-2023	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.

4 Margaret needs to keep track of how much money she makes. She collects the sales figures on a weekly basis.

(a) The pseudocode of an algorithm is shown.

```
2  w = 0 REPEAT SET w TO w + 1 SEND w TO DISPLAY UNTIL w = 52
```

In some programming languages, if a program is written like this, it could be translated and executed.

Discuss the suitability of this code for humans and how it could be improved.

(6)

(b) A pseudocode algorithm that manipulates sales figures is shown.

```
SET num TO 0
SET x TO 999
SET y TO 0

FOR EACH num FROM "SalesFile.txt" DO
    IF (num < x) THEN
        SET x TO num
    IF (num > y) THEN
        SET y TO num
END FOREACH

SEND x & " " & y TO DISPLAY
```

(i) The first four inputs from the file to the algorithm are 355, 554, 199, and 409.

Complete the trace table showing the execution of the pseudocode with these four inputs. You may not need to fill in all the rows in the table.

(6)

num	x	y	Display

(ii) State the purpose of this algorithm.

(1)

.....

.....

(Total for Question 4 = 13 marks)

5 Computational thinking

(a) Here is an algorithm that prints colours.

```
1   # ---------- Global variables ----------
2   inkColours = ["Cyan", "Magenta", "Yellow", "Black"]
3
4   # ---------- Subprograms ----------
5   def displayAll (inList):
6       for index in range (0, len (inList)):
7           print (index, inList[index])
8
9   # ---------- Main Program ----------
10  userInput = input ("Would you like to see the colours? ")
11  if ((userInput == "y") or (userInput == "Y")):
12      displayAll (inkColours)
13  else:
14      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.

```
18  while ((index < len (theArray)) and (not found) and (not passed)):
19      if (theArray[index] == theTarget):
20          found = True
21          location = index
22      elif (theArray[index] > theTarget):
23          passed = True
24      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.

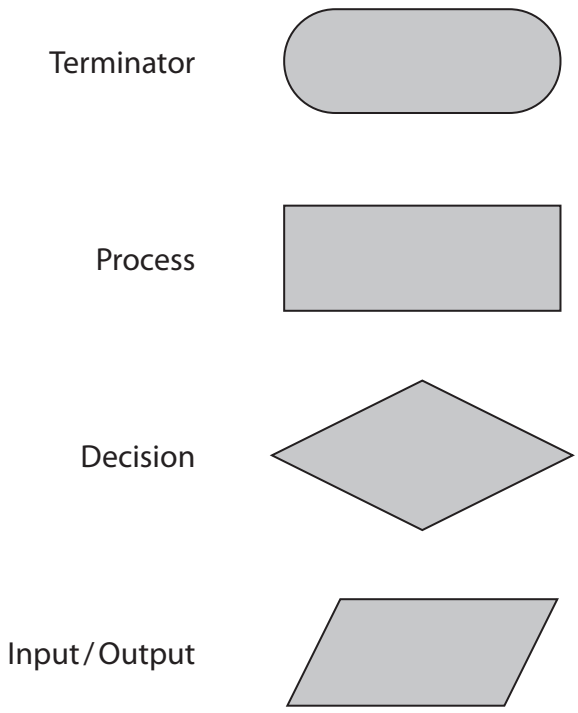
You may not need to fill in all the rows in the table.

(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:



Draw a flowchart to show this algorithm.

(6)

(Total for Question 5 = 18 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.

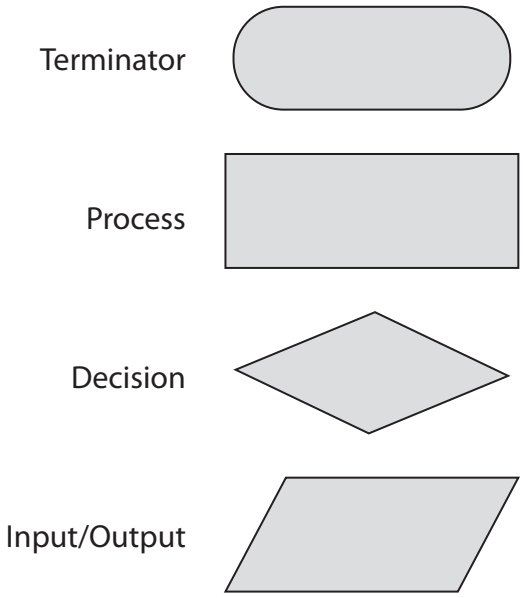
The number can be positive or negative.

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.

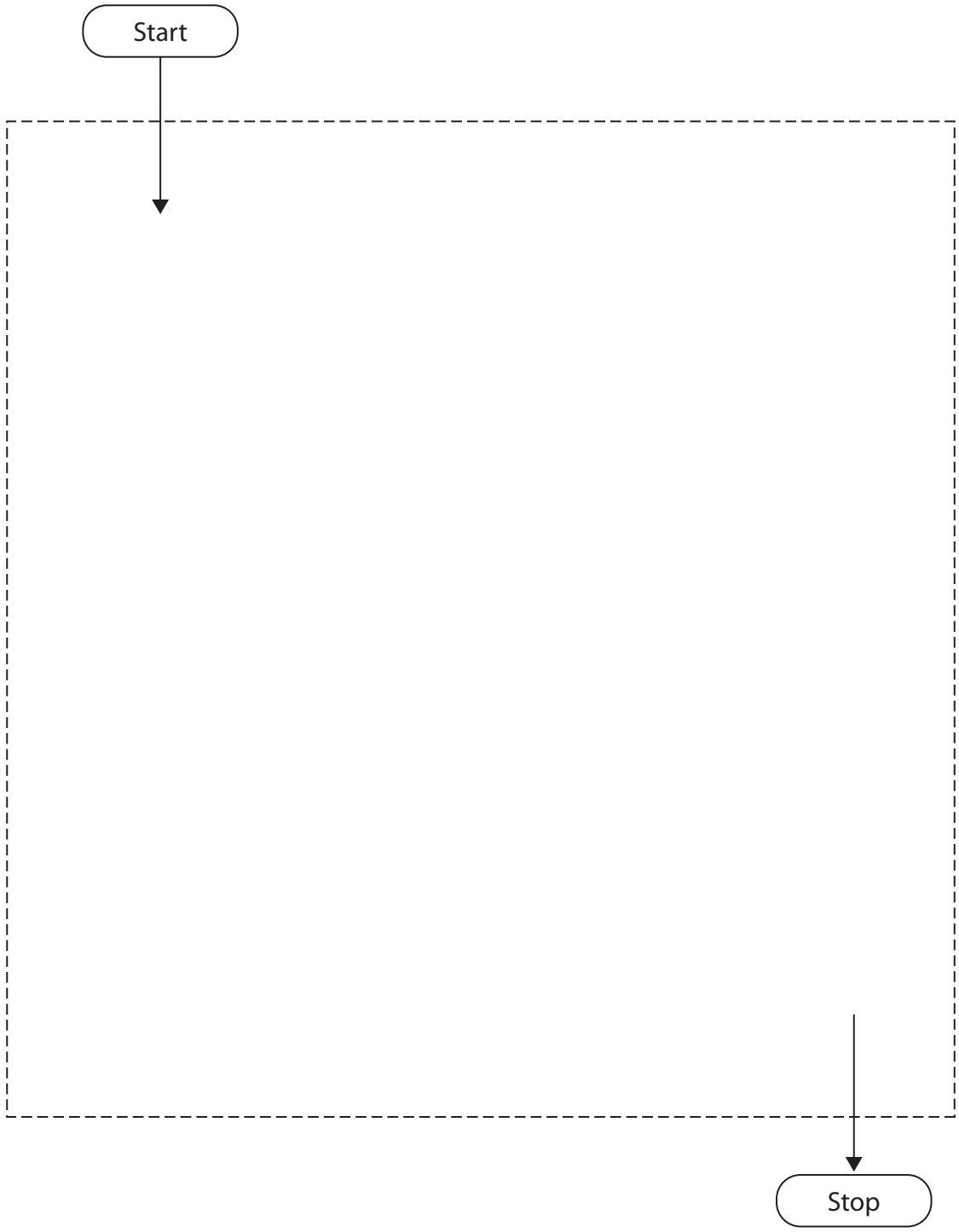
Here are some flowchart symbols:



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.

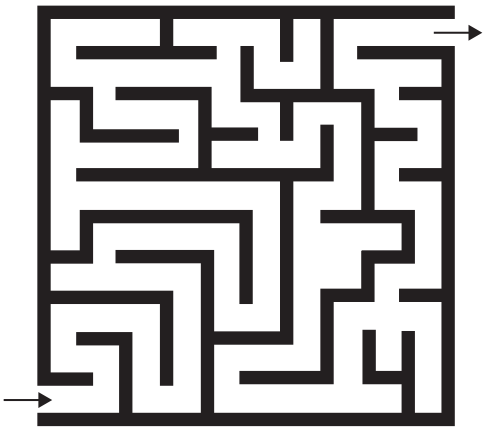
A security system turns on a floodlight when the sunlight falls below a certain level (S) and a movement sensor is activated (M).

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)