Chhetri Academy

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GCSE COMPUTER SCIENCE

1.3

Edexcel 1CP2 | Specification point 1.3.1

Be able to apply logical operators (AND, OR, NOT) in truth tables with up to three inputs to solve problems

Untiered

Past paper question booklet

2	2016-2025	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 Manuel is interested in understanding the relationship between hardware and software.

(a) Describe what is meant by the term 'stored program concept'.

(2)

(b) Computing machines can take many forms and can be based on various models.

(i) Describe what is meant by the term 'virtual machine'.

(2)

(ii) Explain the difference between the sequential and parallel computational models.

(4)

(c) Manuel is writing a program to help pupils with their maths revision.

Here is some pseudocode for an algorithm that calculates the area of a circle, with radius of 5 units. It uses a subprogram.

```
calcCircleArea ()

PROCEDURE calcCircleArea ()
BEGIN PROCEDURE
    SET area TO Pi * 5 * 5
    SEND area TO DISPLAY
END PROCEDURE
```

Manuel wants to change the pseudocode so that the area of any circle can be calculated using `calcCircleArea`.

(i) Write the changed pseudocode in the box below.

(3)

Manuel is writing a binary search routine to search for an individual pupil in a list of all pupil numbers.

Here is the list of pupil numbers.

837, 1529, 1683, 2245, 3901, 3921, 4524

(ii) Complete the table showing the pupil numbers visited and the associated sublists when using a binary search to locate the pupil number 1683.

(5)

Pupil number visited	**Sublist**

Manuel is working on logic for an exclusive OR operator, often known as XOR. This logical operator can be implemented using AND, OR, and NOT.

(iii) Complete this truth table to show Q.

(3)

A	B	R = A OR B	S = NOT (A AND B)	Q = R AND S
0	0			
0	1			
1	0			
1	1			

(Total for Question 4 = 19 marks)

5 Computational thinking

(a) Here is a partially completed truth table.

The logical expression for **Q** is complete.

Complete the truth table to give the:

- logical expression for **S**
- logical expression for **T**
- values for **Q**

(3)

A	B	C	S	T	Q
					NOT S AND T
0	0	0	0	0	
0	0	1	0	1	
0	1	0	0	1	
0	1	1	0	1	
1	0	0	0	0	
1	0	1	1	1	
1	1	0	0	1	
1	1	1	1	1	

(b) Here is an algorithm to process sales data.

```
#  ------------------------------------------------
#  Global variables
#  ------------------------------------------------

salesData = [[9, 6, 32],
             [20, 12, 9],
             [9, 8, 8],
             [32, 24, 29],
             [7, 20, 12],
             [6, 9, 6]]
total = 0
currMax = 0

#  ------------------------------------------------
#  Main program
#  ------------------------------------------------
for sale in salesData:
    total = 0
    for item in sale:
        total = total + item
        if (item < currMax):
            currMax = item
    print (sale, total)
print (currMax)

```

(i) The data structure `salesData` is shown as a table of records, with fields in each record.

Complete the table with the line number for each traversal.

(2)

	Line number
Traverses the records	
Traverses the fields	

(ii) There is a logic error in the code.

Write the corrected line of code.

(1)

.....

.....

(c) Here is an algorithm.

```
1  #  ----------------------------------------------------
2  #  Constants
3  #  ----------------------------------------------------
4
5  NUM = 6
6
7  #  ----------------------------------------------------
8  #  Global variables
9  #  ----------------------------------------------------
10
11 total = 0
12
13 #  ----------------------------------------------------
14 #  Main program
15 #  ----------------------------------------------------
16
17 for number in range (1, NUM + 1):
18     remainder = NUM % number
19     if (remainder == 0):
20         total = total + number
21 print (total)
22
```

Complete the trace table.

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

(4)

number	remainder	total	Output
		0	

(d) The efficiency of algorithms can be analysed.

The worst case is when the most comparisons are required.

The best case is when the fewest comparisons are required.

(i) Explain the worst case for a linear search on an array.

(2)

(ii) Explain the best case for a bubble sort on an array.

(2)

(e) A binary search algorithm looks for a target in a sorted array.

Here is an array of numbers.

Index	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Value	11	22	33	44	55	66	77	88	99	100	101

Complete the table to show the steps of a binary search algorithm to look for the number **78**, which is not in the array.

You must show the calculation of the mid-point.

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

(6)

Start index	End index	Calculation of mid-point	Found Y or N	Discard lower, higher or none

(Total for Question 5 = 20 marks)