7 Algorithm design and problem-solving – Trace Tables
ANSWERS

4 | 1 mark for each correct column | **4**

A	B	C	Output
4	4	4	
	8	3	
	12	2	
	16	1	16
3	3	3	
	6	2	
	9	1	9
-1			Exit

3

Area	Tins	Height	Width	Doors	Windows
0	0	3	5	1	0
13.5		3	7	0	0
34.5		3	5	0	3
46.5		3	7	1	1
65		–1	0	0	0
	7				

(2 marks) ←(1 mark)→ ← (1 mark) →

1 mark 0, 13.5
1 mark for rest

[4]

3 Trace table for input value 33

X	A	B	OUTPUT
33	4	1	1
4			4

← (1 mark) → (1 mark)

Trace table for input value 75

X	A	B	OUTPUT
75	9	3	3
9	1	1	1
1			1

← (1 mark) → (1 mark)

[4]

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>6(a)</td><td>One mark per correct column, max five
<table>
<tr><th>Value</th><th>Average</th><th>Total</th><th>Count</th><th>OUTPUT</th></tr>
<tr><td></td><td></td><td>0</td><td>0</td><td></td></tr>
<tr><td>25</td><td></td><td>25</td><td>1</td><td></td></tr>
<tr><td>35</td><td></td><td>60</td><td>2</td><td></td></tr>
<tr><td>3</td><td></td><td>63</td><td>3</td><td></td></tr>
<tr><td>0</td><td>21</td><td></td><td></td><td>Total is 63</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Average is 21</td></tr>
<tr><td></td><td></td><td>0</td><td>0</td><td></td></tr>
<tr><td>57</td><td></td><td>57</td><td>1</td><td></td></tr>
<tr><td>20</td><td></td><td>77</td><td>2</td><td></td></tr>
<tr><td>25</td><td></td><td>102</td><td>3</td><td></td></tr>
<tr><td>18</td><td></td><td>120</td><td>4</td><td></td></tr>
<tr><td>0</td><td>30</td><td></td><td></td><td>Total is 120</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Average is 30</td></tr>
<tr><td></td><td></td><td>0</td><td>0</td><td></td></tr>
<tr><td>–1</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td>5</td></tr>
<tr><td>6(b)</td><td>One mark per mark point, max two
MP1 to add together / find the average of a batch of numbers
MP2 the total and average are output (when the batch is complete/when 0 is entered)
MP3 when 0 is entered a new batch is started.</td><td>2</td></tr>
</table>

Question	Answer	Marks
8(a)		5

Accept	Reject	PartOK	Error	OUTPUT
0	0			
1		Y		
2		Y		
3		Y		
	1	N		
4		Y		
5		Y		
6		Y		
7		Y		
	2	N		
8		Y		
9		Y		
10		Y	20	
				Too many rejected 20% error

One mark for each column

Question	Answer	Marks
8(b)	**One** mark for each point **max three** • after the Input box // before the first decision box • insert a process box • to convert the input to upper case **OR** • change the first decision / add another decision box • to accept `'y'` as well • by adding `OR PartOK = 'y'`	3

Question	Answer	Marks
7(a)	**One** mark per correct column, max **four**	4

Pointer	Letter	Choice	OUTPUT
1	F		
2			
3			
4			
5			
6			Letter F is represented by Foxtrot
			Another Letter? (Y or N)
		Y	
1	D		
2			
3			
4			Letter D is represented by Delta
			Another Letter? (Y or N)
		N	

7(b)	(Linear) search	1

Question	Answer	Marks
7(c)	**One** mark per mark point, max **two** • The algorithm would not stop • … because it would not have found the item it was seeking **Or** • The array would run out of values after the pointer reached 13 • the algorithm will crash	**2**

Question	Answer	Marks
9(a)	**One** mark for each column `F`, `C` and `T` **Two** marks for columns `X[1]` to `X[5]` all entries correct or **One** mark for columns `X[1]` to `X[5]` with one error	**5**

F	C	X[1]	X[2]	X[3]	X[4]	X[5]	T
		10	1	5	7	11	
0	1						10
1	2	1	10				10
1	3		5	10			10
1	4			7	10		
	5						
0	1						
	2						
	3						
	4						
	5						

9(b)	**One** mark for each point • (bubble) sort data in array • in ascending order	**2**

Question	Answer	Marks
7(a)	**One** mark per mark point, max **six** • correct `Total` column • correct `Value` column • correct `Five1` column • correct `Five2` column • correct `Ten1` and `Ten2` columns • correct OUTPUT column	**6**
7(b)	**One** mark per mark point, max **two** • to find if an input is divisible by (both 5 and) 10 • … add them together **and** output the total	**2**

Total	Value	Five1	Five2	Ten1	Ten2	OUTPUT
0						
	5	1	1	0	0.5	Rejected
	50	10	10	5	5	
50	52	10	10.4			Rejected
	555	111	111	55	55.5	Rejected
	57	11	11.4			Rejected
	500	100	100	50	50	
550	–1					550

Question	Answer	Marks
8(a)	See table below **One** mark for each column `NumberSales`, `Total`, `SaleValue` **One** mark for columns `Average` and `OUTPUT`	**4**
8(b)	**Error – one mark** for identification of error for example including negative numbers / not differentiation between negative and positive values **Correction** **One** mark for correct placement and **one** mark for appropriate action For example – after the input box insert a decision box to reject negative numbers	**3**

NumberSales	Total	SaleValue	Average	OUTPUT
0	0			
1	5.50	5.50		
2	8.90	3.40		
3	15.15	6.25		
4	19.00	3.85		
5	8.00	-11.00		
		0	1.6	Average sale value 1.6

3 **(a)** **Number 1 Trace Table**

X	T1	T2	Output
37	2	5	5
2			2

← (1 mark) →← (1 mark) →

Number 2 Trace Table

X	T1	T2	Output
191	11	15	F
11			B

← (1 mark) →← (1 mark) → [4]

(b) – convert a denary number to hexadecimal
– and output it in reverse order [2]