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EDEXCEL INTERNATIONAL GCSE COMPUTER SCIENCE: QUESTIONS BY TOPIC

Problem Solving (Topic 1)

International GCSE Computer Science Topic 1

5 questions · 68 marks · Mark schemes included

Pearson Edexcel International GCSE (9–1) Computer Science 4CP0, Papers 1 & 2, June 2019 - June 2022

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HOW TO USE THIS BOOKLET

Questions run from the lowest mark tariff to the highest. Paper 2 answers use the Python mark scheme (2A).

Click any heading or question row below to jump straight to it.

On every question page, click ANSWER in the top-right corner to jump to its mark scheme.

Diagrams, graphs, tables and data are printed exactly as they appeared in the original papers.

QUESTION	SOURCE	MARKS	PAGE
11–14 MARKS QUESTIONS		4 questions · 52 marks	3
1. Q5	Paper 1 June 2019	12	4
2. Q4	Paper 1 November 2021	12	9
3. Q5	Paper 1 June 2021	14	12
4. Q4	Paper 1 June 2022	14	16
15+ MARKS QUESTIONS		1 questions · 16 marks	20
5. Q6	Paper 1 November 2020	16	21



QUESTIONS

5 questions · 68 marks · lowest tariff first



11–14 MARKS QUESTIONS

4 questions in this booklet



5 Ships carry cargo around the world in containers.

(a) Containers come in two sizes.

Figure 2 shows an algorithm written using flowchart symbols.

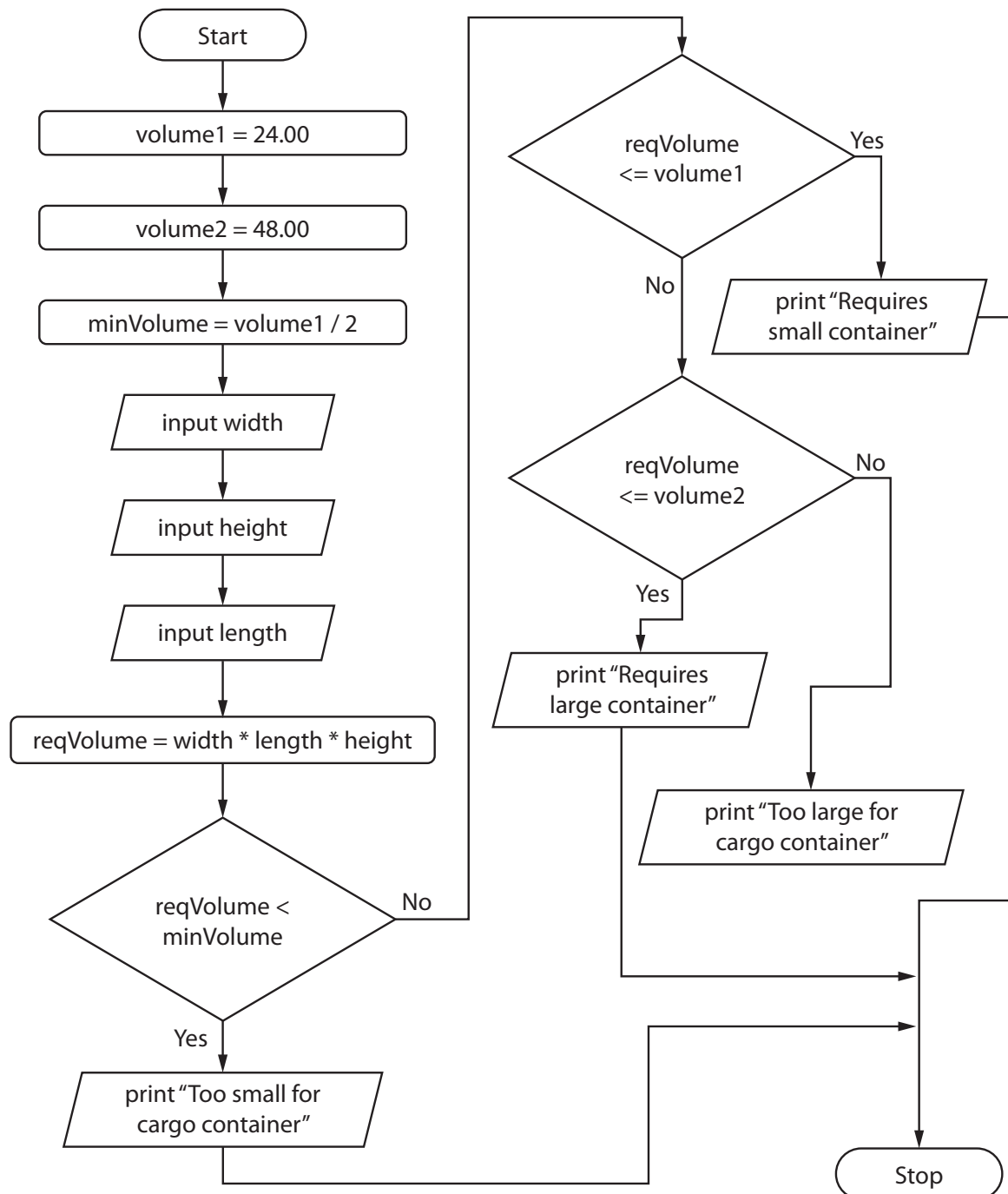


Figure 2

(i) Complete the table to show the output for each cargo item.

(3)

Cargo item			Output
width	length	height	
4	4	2	
2	2	2	
3	8	5	

(ii) State the purpose of the algorithm in **Figure 2**.

(1)



(b) Each ship is registered to a state.

Figure 3 shows a partially completed algorithm written in pseudocode.

The completed algorithm must:

- print each state to the display on a new line
- count the number of states
- create a message as a single string (e.g. there are *number* states)
- print the message to the display.

Complete the algorithm in the space provided in **Figure 3**.

(4)

```
SET numStates TO 0
```

```
SET states TO ["France", "Singapore", "Malta", "Panama", "Greece", "Italy"]
```

```
FOR EACH state FROM states DO
```

```
END FOREACH
```

Figure 3

(c) Cargo ships have maximum weight loads.

Figure 4 shows an algorithm written using pseudocode.

The algorithm should identify the size of cargo ship required for any load.

There is an error on line 9.

```
2  SET loadWeight TO [20000, 28000, 40000, 50000]
3  SET index TO 0
4  SET found TO FALSE
5
6  SEND "Enter cargo weight" TO DISPLAY
7  RECEIVE target FROM (INTEGER) KEYBOARD
8
9  WHILE (NOT found) DO
10     IF (loadWeight [index] >= target) THEN
11         SEND loadWeight [index] TO DISPLAY
12         SET found TO TRUE
13     ELSE
14         SET index TO index + 1
15     END IF
16 END WHILE
17
18 IF (NOT found) THEN
19     SEND "No ship available" TO DISPLAY
20 END IF
```

Figure 4

(i) Trace tables are used to identify errors in algorithms.

Complete the trace table for an input of 50500 to show what happens due to the error on line 9 in the pseudocode in **Figure 4**.

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

(2)

target	found	index	loadWeight[index]
50500	FALSE	0	

(ii) Construct a single line of pseudocode to correct line 9.

(2)

(Total for Question 5 = 12 marks)

4 Algorithms can be used to perform calculations and to process data.

(a) State what is meant by the term **algorithm**.

(1)

(b) **Figure 3** shows an algorithm.

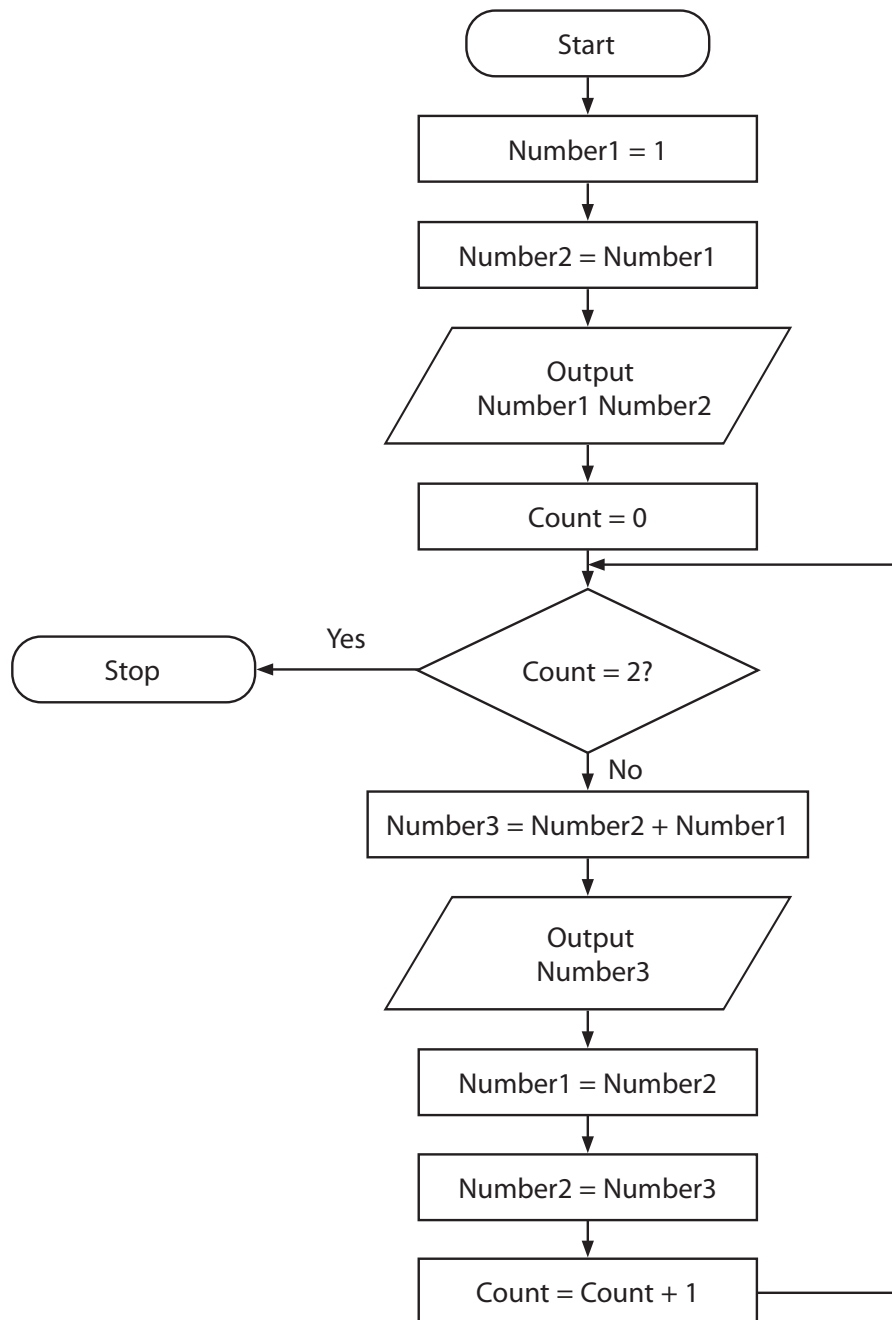


Figure 3



(i) Complete this trace table for the algorithm.

You may not need to use all the rows.

(5)

Number1	Number2	Number3	Count	Output	Count = 2?
1	1	–	0	1 1	False

(ii) The benefits of using a trace table include that they allow variable states, outputs and decisions to be recorded.

Give **one other** benefit of using a trace table to test an algorithm.

(1)

.....

.....



(c) An algorithm is needed to count and display the number of vowels in a word.

The vowels are a, e, i, o, and u.

The completed algorithm must:

- count the number of vowels
- create a message as a single string (e.g. there are *number* vowels)
- print the message to the display.

Here is a partially completed algorithm written in pseudocode.

Complete the algorithm in the spaces provided.

(5)

SET word TO 'elephant'

FOR EACH letter FROM word DO

END FOREACH

(Total for Question 4 = 12 marks)



5 Isaac is a program developer.

(a) **Figure 3** shows an algorithm Isaac has written.

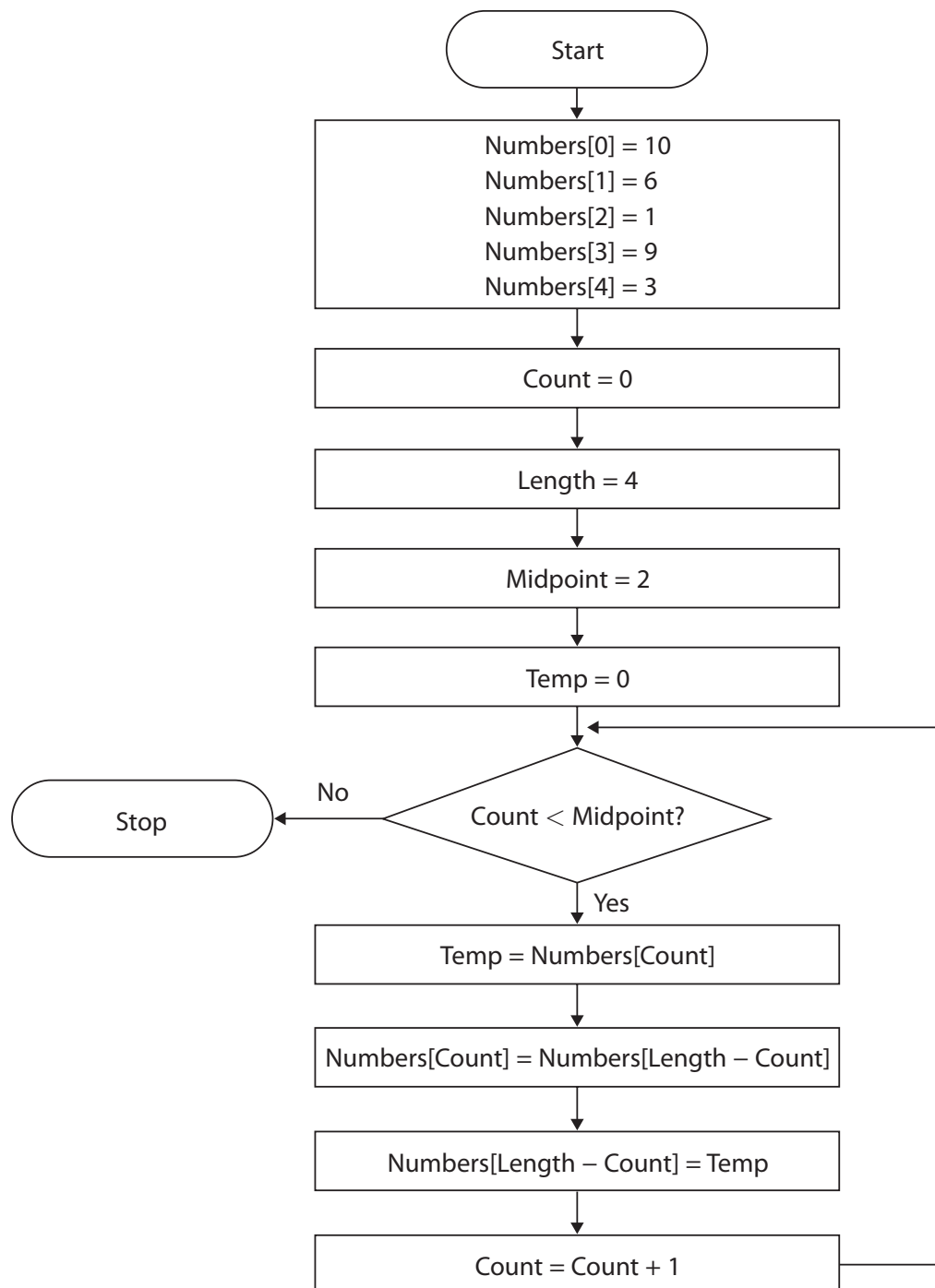


Figure 3



(i) Complete the trace table. You may not need to use all of the rows. (5)

				Numbers array				
Count	Length	Midpoint	Temp	[0]	[1]	[2]	[3]	[4]
0	4	2	0	10	6	1	9	3

(ii) Give the purpose of the algorithm. (1)

(iii) Explain why the variable Temp is needed. (2)

(b) **Figure 4** shows an algorithm Isaac has written using pseudocode.

The algorithm should display the average of the numbers that have been input.

```

1  SET total TO 0
2  SET number TO 0
3  SET count TO 0
4  WHILE number <> -1 DO
5      SEND 'Input a number or -1 to end the program' TO DISPLAY
6      RECEIVE number FROM (INTEGER) KEYBOARD
7      SET total TO total + number
8      SET count TO count + 1
9  END WHILE
10 SET average TO total / count
11 SEND 'The average is ' & average TO DISPLAY

```

Figure 4

Isaac uses the input 2, 3, 5, 2, -1 to test the algorithm. He discovers an error.

Expected result	Actual result
The average is 2.75	The average is 2.2

(i) Explain why the **Actual** result is not the same as the **Expected** result.

(2)

.....

.....

.....

.....

(ii) Give the number of the line that contains the error.

(1)

.....

(iii) Amend a single line of pseudocode to correct the error.

(1)

.....



(c) Isaac is going to sell one of his programs and distribute it on a DVD.

Give **two** advantages of choosing a programming language that uses a compiler, rather than an interpreter, for a program that will be distributed on a DVD.

(2)

1

.....

2

.....

(Total for Question 5 = 14 marks)

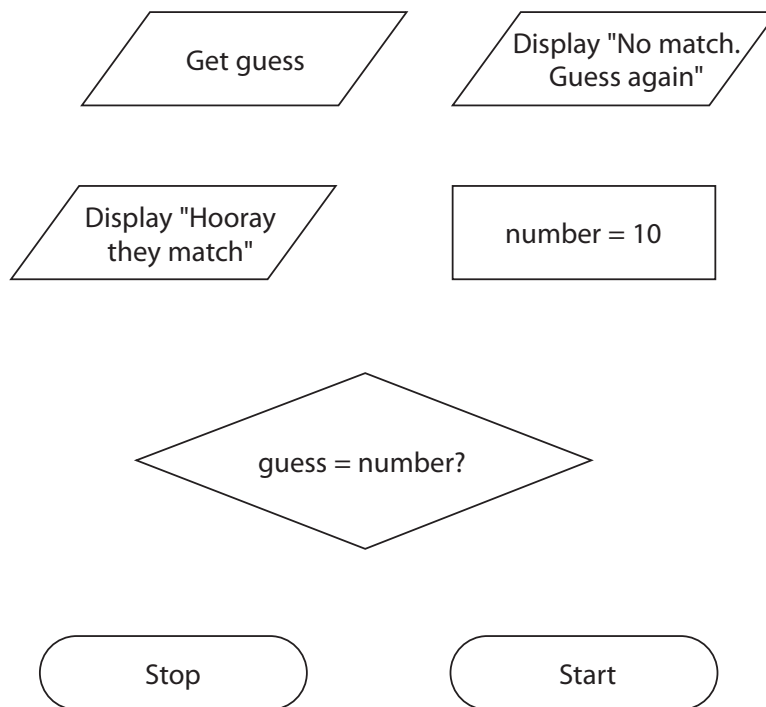


4 Reba likes writing programs.

(a) She is writing a guessing game.

She needs a flowchart to show the logic of the game.

(i) These are the components needed to draw the flowchart.



Draw the flowchart for the algorithm in the box on the next page.

Use each component once.

Do not add any additional components.

Use as many arrows and yes/no labels as you need.

(5)

Draw your flowchart here.



(ii) Identify an alternative method for writing the algorithm.

(1)

- ☐ **A** Simulation
- ☐ **B** Cipher
- ☐ **C** Program code
- ☐ **D** Truth table

(b) Reba wants to develop a program that will convert a temperature in Fahrenheit to Celsius.

Here are four steps in the algorithm.

The steps are not in the correct order.

	Step
A	Change the temperature to Celsius
B	Get the temperature in Fahrenheit
C	Show the temperature in Celsius
D	Set the temperature to 0

(i) Give the letter of the step that initialises a variable.

(1)

(ii) Give the letter of the step that inputs a value.

(1)

BLANK PAGE

QUESTION 4 (c) BEGINS ON THE NEXT PAGE.



- (c) **Figure 2** shows the pseudocode for an early version of an algorithm that Reba has written for another game.

The algorithm:

- asks the user to input a colour or input –1 to end the game
- awards 1 point for red
- awards 8 points for orange
- generates the score for the game
- displays the results of the game.

```
1 SET Colour TO ""
2 SET Score TO 0
3 SET RedPoints TO 0
4 SET OrangePoints TO 0
5 SET NumOranges TO 0
6
7 WHILE Colour <> "-1" DO
8     RECEIVE Colour FROM (STRING) KEYBOARD
9     IF Colour = "red" THEN
10         SET RedPoints TO RedPoints + 1
11     ELSE
12         IF Colour = "orange" THEN
13             SET OrangePoints TO OrangePoints + 8
14             SET NumOranges TO NumOranges + 1
15         END IF
16     END IF
17 END WHILE
18
19 SET Score TO RedPoints + OrangePoints
20
21 SEND ("Score: "& Score) TO DISPLAY
22 SEND ("Number of reds: "& RedPoints) TO DISPLAY
23 SEND ("Number of oranges: "& OrangePoints) TO DISPLAY
```

Figure 2

Reba inputs: red, orange, red, red, orange, -1

The outputs are not as she expects.

(i) Complete the trace table to show the outputs.

(4)

Colour	Score	RedPoints	OrangePoints	NumOranges	Outputs
	0	0	0	0	
red					
orange					
red					
red					
orange					
-1					

(ii) Give the line number of the pseudocode that contains the error.

(1)

(iii) Write a replacement line of pseudocode to correct the error.

(1)

(Total for Question 4 = 14 marks)



15+ MARKS QUESTIONS

1 question in this booklet



6 A software engineer is working with some algorithms.

(a) An algorithm needs to be developed.

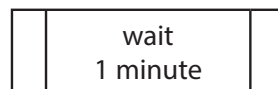
The algorithm must:

- check for a change of hour every minute
- use the library subprogram `getHour()` to get the hour part of the current time in the 24-hour clock (0 to 23)
- output "Good morning" when the hour is between 3 and 12, inclusive
- output "Good afternoon" when the hour is between 13 and 19, inclusive
- output "Good night" at all other times.

Complete the flowchart to represent this algorithm, in the space provided on the next page.

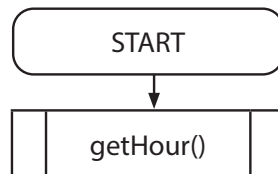
The call to the library subprogram `getHour()` has already been included.

Use this subprogram symbol to show waiting for 1 minute.



(6)

Draw your flowchart here.



- (b) Another algorithm determines when to change the flavoured syrups for a drinks dispensing machine.

Figure 4 shows this algorithm written in pseudocode.

```

1 SET flavours TO ["anise", "mango", "cola", "apple", "papaya", "strawberry",
  "lychee", "banana"]
2
3 SET volume TO [0.7, 0.2, 0.6, 0.1, 0.05, 0.8, 0.4, 0.6]
4
5 SET i TO 0
6
7 WHILE i < 8 DO
8
9     IF (volume[i] < 0.1) THEN
10         SEND (flavours[i] & " needs changing") TO DISPLAY
11
12     ELSE
13         IF (volume[i] >= 0.3) AND (volume[i] <= 0.5) THEN
14             SEND (flavours[i] & " needs ordering") TO DISPLAY
15         END IF
16     END IF
17
18     SET i TO i + 1
19
20 END WHILE

```

Figure 4

- (i) Give the output produced by the algorithm.

(2)

.....

.....

.....

.....

The algorithm works with a fixed number of flavours.

- (ii) Give the number of the line in the algorithm that would need to be amended to allow for any number of flavours.

(1)

.....

.....

(iii) State how the pseudocode needs to be changed to make this amendment.

(1)

QUESTION 6(c) BEGINS ON THE NEXT PAGE.

(c) The algorithms will be coded in a high-level language.

Programs written in high-level languages must be translated in order to be executed by a computer.

Discuss the similarities and differences between a compiler and an interpreter.

(6)



MARK SCHEMES

official Pearson Edexcel mark schemes



Question Number	Answer	Mark																
5(a)(i)	One mark for each correct row <table><tr><th>Width</th><th>Length</th><th>Height</th><th>Output</th></tr><tr><td>4</td><td>4</td><td>2</td><td>Requires large container (1)</td></tr><tr><td>2</td><td>2</td><td>2</td><td>Too small for cargo container (1)</td></tr><tr><td>3</td><td>8</td><td>5</td><td>Too large for cargo container (1)</td></tr></table> Do not penalise spelling	Width	Length	Height	Output	4	4	2	Requires large container (1)	2	2	2	Too small for cargo container (1)	3	8	5	Too large for cargo container (1)	
Width	Length	Height	Output															
4	4	2	Requires large container (1)															
2	2	2	Too small for cargo container (1)															
3	8	5	Too large for cargo container (1)															

Question Number	Answer	Additional Guidance	Mark
5(a)(ii)	Any response that indicates the concept of: Determining which size shipping container is needed for the indicated cargo.		1

Question Number	Answer	Additional Guidance	Mark
5(b)	SEND states [numStates] TO DISPLAY (1) or SEND state TO DISPLAY (1) SET numStates TO numStates + 1 (1) or LENGTH(states) (1) Concatenation of message and variable uses " and & & numStates & TO DISPLAY (1) or & LENGTH(states) & TO DISPLAY (1) or STRING(numStates) TO DISPLAY (1) Pseudocode is correct (1)	- Accept , or + in place of & - Ignore capitalisation of commands	4

```

SET numStates TO 0
SET states TO ["France", "Singapore",
               "Malta", "Panama",
               "Greece", "Italy"]
FOR EACH state FROM states DO
    SEND state TO DISPLAY
    SET numStates TO numStates + 1
END FOREACH
SEND "There are " & numStates & "states" TO DISPLAY

```

```

SET numStates TO 0
SET states TO ["France", "Singapore",
               "Malta", "Panama",
               "Greece", "Italy"]
FOR EACH state FROM states DO
    SEND state TO DISPLAY
END FOREACH
SEND "There are " & LENGTH (states) & "states" TO DISPLAY

```

```

SET numStates TO 0
SET states TO ["France", "Singapore",
               "Malta", "Panama",
               "Greece", "Italy"]
FOR EACH state FROM states DO
    SEND state TO DISPLAY
    SET numStates TO numStates + 1
END FOREACH
SEND "There are " & STRING (numStates) TO DISPLAY

```



Question Number	Answer	Additional Guidance	Mark
5(c)(i)	Showing that index goes up to 4 and does not exceed 4 (1) Showing correspondence between values of index and loadWeight[index] (1)	- There does not have to be an explicit indication of the out-of-bounds / crashing error. - Ignore target and found columns - Allow two rows per loop with matching index and loadWeight values	2

target	found	index	loadWeight[index]
50500	FALSE	0	20000
		1	28000
		2	40000
		3	50000
		4	

target	found	index	loadWeight[index]
50500	FALSE	0	
		1	20000
		2	28000
		3	40000
		4	50000

Question Number	Answer	Additional Guidance	Mark
5(c)(ii)	- Use of AND operator (in the test of relevant conditions) (1) - Use of suitable function to find the length of the array using a correct comparison to index (1) Example: WHILE ((NOT found) AND (index < LENGTH (loadWeight))) DO	- Do not penalise pseudocode syntax - Ignore changes to first condition as long as meaning is not lost	2

Question Number	Answer	Additional Guidance	Mark																								
4(a)	Award one mark from: • a step-by-step description of a process that completes a task (1) • a set of instructions that describes how to get something done (1)		1																								
4(b)(i)	Award one mark each to a maximum of five marks for: • two correct decisions in last two lines (1) • two correct outputs (1) • correct increment at Count=Count+1 (1) • correct change for Number3=Number2+Number1 (1) • correct change for Number1=Number2 AND Number2=Number3 (1) <table><tr><th>Number 1</th><th>Number 2</th><th>Number 3</th><th>Count</th><th>Output</th><th>Count = 2?</th></tr><tr><td>1</td><td>1</td><td>-</td><td>0</td><td>1 1</td><td>False</td></tr><tr><td>1</td><td>2</td><td>2</td><td>1</td><td>2</td><td>False</td></tr><tr><td>2</td><td>3</td><td>3</td><td>2</td><td>3</td><td>True</td></tr></table>	Number 1	Number 2	Number 3	Count	Output	Count = 2?	1	1	-	0	1 1	False	1	2	2	1	2	False	2	3	3	2	3	True	Ignore spelling errors Allow true false, Y N etc. for decisions	5
Number 1	Number 2	Number 3	Count	Output	Count = 2?																						
1	1	-	0	1 1	False																						
1	2	2	1	2	False																						
2	3	3	2	3	True																						
4(b)(ii)	Award one mark each for: • helps visualise how the algorithm works (1) • helps detect (logic) errors (1)		1																								

Question Number	Answer	Additional Guidance	Mark
4(c)	Award one mark each to a maximum of five marks for: - SET count TO 0 (1) - IF statement checks for a match to 1 vowel (1) - IF statement checks for a match to all vowels (1) - count incremented correctly (1) - display count (1) - concatenates suitable message with the count (1) SET word TO "elephant" SET count TO 0 FOR EACH letter FROM word DO IF letter = 'a' OR letter = 'e' OR letter = 'i' OR letter = 'o' OR letter = 'u' THEN SET count TO count + 1 END IF END FOREACH SEND 'The number of vowels is ' & count TO DISPLAY		5
Total			12

Question Number	Answer	Additional Guidance	Mark																																																																																										
5(a)(i)	Award five marks for: - Count column correct (1) - Temp column correct (1) - Row 2 Numbers[Count value from row above] swapped with Temp value (1) - Row 3 Numbers[Count value from row above] swapped with Temp value (1) - All correct (1) <table><tr><th colspan="4"></th><th colspan="5">Numbers array</th></tr><tr><th>Count</th><th>Length</th><th>Midpoint</th><th>Temp</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th></tr><tr><td>0</td><td>4</td><td>2</td><td>0</td><td>10</td><td>6</td><td>1</td><td>9</td><td>3</td></tr><tr><td>1</td><td></td><td></td><td>10</td><td>3</td><td></td><td></td><td></td><td>10</td></tr><tr><td>2</td><td></td><td></td><td>6</td><td></td><td>9</td><td></td><td>6</td><td></td></tr></table> <table><tr><th colspan="4"></th><th colspan="5">Numbers array</th></tr><tr><th>Count</th><th>Length</th><th>Midpoint</th><th>Temp</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th></tr><tr><td>0</td><td>4</td><td>2</td><td>0</td><td>10</td><td>6</td><td>1</td><td>9</td><td>3</td></tr><tr><td>1</td><td>4</td><td>2</td><td>10</td><td>3</td><td>6</td><td>1</td><td>9</td><td>10</td></tr><tr><td>2</td><td>4</td><td>2</td><td>6</td><td>3</td><td>9</td><td>1</td><td>6</td><td>10</td></tr></table>					Numbers array					Count	Length	Midpoint	Temp	0	1	2	3	4	0	4	2	0	10	6	1	9	3	1			10	3				10	2			6		9		6						Numbers array					Count	Length	Midpoint	Temp	0	1	2	3	4	0	4	2	0	10	6	1	9	3	1	4	2	10	3	6	1	9	10	2	4	2	6	3	9	1	6	10	Ignore any numbers that are greyed out	5
				Numbers array																																																																																									
Count	Length	Midpoint	Temp	0	1	2	3	4																																																																																					
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2	4	2	6	3	9	1	6	10																																																																																					
5(a)(ii)	Award one mark from: - To reverse the contents of the array (1) - To reverse the order of the numbers (1)		1																																																																																										
5(a)(iii)	Award two marks for a linked explanation such as: You need to swap the contents of array values (1) and without Temp one of the values would be lost (1)		2																																																																																										

Question Number	Answer	Additional Guidance	Mark
5(b)(i)	Award two marks for a linked explanation such as: - Isaac has included the -1 as a number in the addition (1) but the number has not been added to the count (1) - Isaac has misunderstood the WHILE loop (1) as it should not execute after the -1 has been input (1) - Isaac is expecting the wrong result (1) it should be 3 (1) - The count is 1 too many as the -1 is counted as a number (1) and the total is incorrect as 1 is subtracted from the total (1)		2
5(b)(ii)	Line 3 (1) Line 10 (1)		1
5(b)(iii)	SET count TO -1 (1) SET average TO (total + 1) / (count – 1)	Ignore brackets if the meaning is clear	1

Question Number	Answer	Additional Guidance	Mark
5(c)	Award two marks from: - Compiler produces object code to distribute that is difficult to reverse engineer / no need to distribute the source code (1) - Compiler optimises the code / object code (1) - Program runs faster (as it does not need translating) (1) - The target computer has no need to have the original compiler / does not need an interpreter (1) - Compiled code is smaller than the original code (1), which may not fit on the DVD (1)		2

Question Number	Answer (flow chart replaced)	Additional Guidance	Mark
4(a)(i)	Award up to five marks for: - Start and stop terminators in the correct positions (1) 1-3 - Number set to 10 AND Get guess in the correct positions (1) 4-6 - Loop back to before Get guess and after number set to 10 if there is no match (1) Does not need to go via message box - Yes/no labels on decision match output messages (1) 4-6 - Correctly connected as in MS image, with at least 6 arrows correct (1) 7-9 <pre> graph TD Start([Start]) --> Set10[number = 10] Set10 --> GetGuess[/Get guess/] GetGuess --> Decision{guess = number?} Decision -- No --> Oops[/Oops no match/] Oops --> GetGuess Decision -- Yes --> Match[/Hooray they match/] Match --> Stop([Stop]) </pre>	Boxes should be marked by content rather than shape.	5
4(a)(ii)	The only correct answer is C <i>A is not correct because a simulation is a completed program</i> <i>B is not correct because a cipher is a form of encryption</i> <i>D is not correct because a truth table is a method of testing an algorithm</i>		1

Question Number	Answer	Additional Guidance	Mark
4(b)(i)	Award one mark for: D		1
4(b)(ii)	Award one mark for: B		1

Question Number	Answer	Additional Guidance	Mark																																																																								
4(c)(i)	Award up to four marks for: - RedPoints column correct (1) - OrangePoints AND NumOranges columns correct (1) - Score correct in row 8 OR row 9 (1) -1 or below - Outputs correct and starting on the same row as the score OR the row below (1) can all be on one line <table><tr><th>Colour</th><th>Score</th><th>Red Points</th><th>Orange Points</th><th>Num Oranges</th><th>Outputs</th></tr><tr><td></td><td>0</td><td>0</td><td>0</td><td>0</td><td></td></tr><tr><td>red</td><td></td><td>1</td><td></td><td></td><td></td></tr><tr><td>orange</td><td></td><td></td><td>8</td><td>1</td><td></td></tr><tr><td>red</td><td></td><td>2</td><td></td><td></td><td></td></tr><tr><td>red</td><td></td><td>3</td><td></td><td></td><td></td></tr><tr><td>orange</td><td></td><td></td><td>16</td><td>2</td><td></td></tr><tr><td>-1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td>19</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td>Score: 19</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td>Number of reds: 3</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td>Number of oranges: 16</td></tr></table>	Colour	Score	Red Points	Orange Points	Num Oranges	Outputs		0	0	0	0		red		1				orange			8	1		red		2				red		3				orange			16	2		-1							19										Score: 19						Number of reds: 3						Number of oranges: 16		4
Colour	Score	Red Points	Orange Points	Num Oranges	Outputs																																																																						
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4(c)(ii)	Award one mark for: 23		1																																																																								

4(c)(iii)	Award one mark for: Pseudocode that replaces OrangePoints with NumOranges on line 23 (1) SEND ("Number of oranges: "& NumOranges) TO DISPLAY		1
Total for question 4			14



6(a)	Indicative content provided Other solutions do exist and should be awarded		6
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Aspect of Solution	Marks			
	0	1	2	3
Functionality	No awardable content	There are significant errors in logic, leading to an overall solution that is non-functional	There are minor errors in logic, leading to an overall solution that is not completely functional	There are no errors in logic, leading to an overall solution that is fully functional
Accuracy of Notation	No awardable content	Notation follows a broadly unrecognisable convention that is applied inconsistently, although aspects of it are discernible	Notation follows a recognisable convention which is broadly discernible but is applied inconsistently	Notation follows a recognisable convention and is applied consistently throughout

There are a maximum of 3 marks for functionality.

There are a maximum of 3 marks for accuracy of notation.

The marks for functionality and accuracy are awarded independently.

6(b)(i)	- papaya needs changing (1) - lychee needs ordering (1)		2
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Question Number	Answer	Additional Guidance	Mark
6(b)(ii)	7 (1)		1

Question Number	Answer	Additional Guidance	Mark
6(b)(iii)	Replace 8 with LENGTH(flavours)/LENGTH(volume) (1) or A new line 7: WHILE i < LENGTH(flavours) DO (1) or WHILE i < LENGTH(volume) DO (1)	Ignore case If new line is given award mark if logic is clear	1

6(c)	Indicative content: Compiler • One line of a compiled language maps to multiple executable instructions • Reads in a whole file and translates it at once • Produces an executable file • Executable file is portable between machines with the same architecture and operating systems • End-user cannot see the programming source code • Does not need an additional environment/software to run the code Interpreter • One line of a compiled language maps to multiple executable instructions • Reads, translates, and executes one line at a time • A special environment is needed to be installed on the user's machine to run the code; this is machine specific • Source code is portable to any machine with an interpreter which can run on it • End-user can see the programming source code Similarities • One line of a compiled language maps to multiple executable instructions/one to many relationship to machine code • Both are used to interpret high level programming languages • Both produce machine code from human-readable programming code Differences • Compiler reads in a whole file and translates it at once. Interpreter reads, translates and executes one line at a time • Compiler produces an executable file, interpreter does not • Executable files produced by a compiler will only execute on machines with the same architecture and operating systems. Source code produced by an interpreter is portable to any machine with an interpreter which can run on it • Compiled code does not require any additional software	6
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	to execute the code. An interpreter needs a special environment to be installed on the user's machine to run the code; this is machine specific	
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Level	Mark	Descriptor
	0	No rewardable content.
Level 1	1-2	Basic, independent points are made showing elements of knowledge and understanding of key concepts/principles of computer science. The discussion will contain basic information with little linkage between points made.
Level 2	3-4	Demonstrates adequate knowledge and understanding of key concepts/principles of computer science. The discussion shows some linkages and lines of reasoning with some structure.
Level 3	5-6	Demonstrates comprehensive knowledge and understanding by selecting relevant knowledge and understanding of key concepts/principles of computer science to support the discussion being presented. The discussion shows a well-developed, sustained line of reasoning which is clear, coherent, and logically structured.

