



Cambridge IGCSE™

COMPUTER SCIENCE**0478/22**

Paper 2

October/November 2021

MARK SCHEME

Maximum Mark: 50

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **13** printed pages.

PUBLISHED**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks												
Section A														
1(a)(i)	<p>One mark per point</p> <ul style="list-style-type: none"> • Variable PassengerID// StartStage • Use Storing the unique ID number of the passenger// Storing/inputting the start stage of the journey 	2												
1(a)(ii)	<p>One mark per point</p> <p>MP1 Name of array MP2 Data type of array MP3 Sample data for array MP4 Use of array MP5 At least two complete arrays with all of the above</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Array name</th> <th style="text-align: left;">Data type</th> <th style="text-align: left;">Sample data</th> <th style="text-align: left;">Use</th> </tr> </thead> <tbody> <tr> <td>JourneyStage1</td> <td>string</td> <td>C1</td> <td>to store the code for the home to start station</td> </tr> <tr> <td>PriceStage1</td> <td>real</td> <td>1.50</td> <td>to store the price of first stage of the journey</td> </tr> </tbody> </table>	Array name	Data type	Sample data	Use	JourneyStage1	string	C1	to store the code for the home to start station	PriceStage1	real	1.50	to store the price of first stage of the journey	5
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JourneyStage1	string	C1	to store the code for the home to start station											
PriceStage1	real	1.50	to store the price of first stage of the journey											
1(b)	<p>One mark per bullet point</p> <p>MP1 Use of validation check, e.g. range check, type check, presence check, length check, format check MP2 Use of conditional statement to check if the validation fails ... MP3 ... a re-entry is requested MP4 Use of loop to repeat the process until an acceptable answer is input MP5 More than one appropriate validation check used / described.</p>	3												
1(c)	<p>Any six from:</p> <p>MP1 Conditional statement to check departure time against 10:00 MP2 ... calculate 40% discount // calculate 60% of the original price MP3 ... calculate discounted total price MP4 Output the discounted total price MP5 Output the booking details with suitable messages MP6 Input with prompt for passenger confirmation ... MP7 ... attempt at action following the confirmation input MP8 Repeating booking data entry if incorrect MP9 Re-checking journey details for correctness</p>	6												

Question	Answer	Marks
1(c)	<p>Example answer</p> <pre>// Tasks 1 and 2 completed IF CollectedTime[Index] > 10:00 THEN JourneyCost[Index] ← JourneyCost[Index] * 0.6 ENDF PRINT "Your journey cost is: ", JourneyCost[Index] PRINT "Your journey details are: ", PassengerID[Index], JourneyTime[Index], JourneyCodes[Index], JourneyID[Index] PRINT "Are these details correct? (Y or N)" INPUT Correct IF Correct = "N" THEN WHILE Correct = "N" PRINT "Re-enter your journey details" PRINT "Correct passenger ID " INPUT PassengerID[Index] PRINT "Correct journey time " INPUT JourneyTime[Index] PRINT "Correct journey codes " INPUT JourneyCodes[Index] PRINT "Your revised journey details are: ", PassengerID[Index], JourneyTime[Index], JourneyCodes[Index] PRINT "Are these details correct? (Y or N)" INPUT Correct ENDWHILE ENDF //Program continues</pre>	
1(d)	<p>Explanation of how each of the following could be done</p> <p>Any four from:</p> <p>MP1 Declaring/using a counter to store the number of bookings for each passenger</p> <p>MP2 Updating the counter for the number of bookings made by each passenger</p> <p>MP3 Attempt to check the number of bookings ...</p> <p>MP4 ... for the correct condition e.g. if the number of bookings is more than 10 / equal to 10</p> <p>MP5 Apply the extra discount to the total price of future journeys</p>	4

Question	Answer	Marks																				
	Section B																					
2	<p>One mark for two correct rows Two marks for three correct rows Three marks for four correct rows.</p> <table border="1"> <thead> <tr> <th>Statement</th> <th>Validation (✓)</th> <th>Verification (✓)</th> <th>Neither (✓)</th> </tr> </thead> <tbody> <tr> <td>a check where data is re-entered to make sure no errors have been introduced during data entry</td> <td></td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>an automatic check to make sure the data entered has the correct number of characters</td> <td style="text-align: center;">✓</td> <td></td> <td></td> </tr> <tr> <td>a check to make sure the data entered is sensible</td> <td style="text-align: center;">✓</td> <td></td> <td></td> </tr> <tr> <td>a check to make sure the data entered is correct</td> <td></td> <td></td> <td style="text-align: center;">✓</td> </tr> </tbody> </table>	Statement	Validation (✓)	Verification (✓)	Neither (✓)	a check where data is re-entered to make sure no errors have been introduced during data entry		✓		an automatic check to make sure the data entered has the correct number of characters	✓			a check to make sure the data entered is sensible	✓			a check to make sure the data entered is correct			✓	3
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a check to make sure the data entered is correct			✓																			

Question	Answer	Marks
3	<p>One mark per bullet point</p> <p>Normal test data</p> <ul style="list-style-type: none"> • Test data e.g. 50 (allow any number between 1 and 100 inclusive) • Reason Data that is within range and should be accepted <p>Extreme test data</p> <ul style="list-style-type: none"> • Test data 100 / 1 • Reason Data at the maximum / minimum end of the range and should be accepted <p>Erroneous test data</p> <ul style="list-style-type: none"> • Test data e.g. 300 (allow anything that isn't between 1 and 100 inclusive, including other data types) • Reason Data outside the range that should be rejected 	6

Question	Answer	Marks
4(a)	<p>One mark for error identified and suggested correction (Max three)</p> <p>Line 8 OUTPUT Value2 – should be INPUT Value2 Line 9 IF Operator – should be CASE OF Operator Line 15 OUTPUT "The answer is ", Value1 – should be Answer</p> <p>The loop may be corrected using a number of alternative methods:</p> <p>One mark for error identified and suggested correction (Max two)</p> <p>Method 1 Line 1 Continue ← 1 should be Continue ← 0 Line 22 UNTIL Continue = 0 should be ENDWHILE // Line 2 WHILE Continue = 0 should be REPEAT and Line 22 UNTIL Continue = 0 should be Until Continue = 1</p> <p>OR</p> <p>Method 2 Line 2 WHILE Continue = 0 should be REPEAT Line 20 Continue ← 1 should be Continue ← 0 // Line 1 Continue ← 1 should be Continue ← 0 and Line 22 UNTIL Continue = 0 should be Until Continue = 1</p> <p>OR</p> <p>Method 3 Line 2 WHILE Continue = 0 should be WHILE Continue = 1 Line 20 Continue ← 1 should be Continue ← 0 and Line 22 UNTIL Continue = 0 should be ENDWHILE</p>	5

Question	Answer	Marks
4(a)	<p>Corrected algorithm example 1</p> <pre> 1 Continue ← 0 2 WHILE Continue = 0 (DO) 3 OUTPUT "Enter 1 for +, 2 for -, 3 for * or 4 for /" 4 INPUT Operator 5 OUTPUT "Enter the first value" 6 INPUT Value1 7 OUTPUT "Enter the second value" 8 INPUT Value2 9 CASE OF Operator 10 1: Answer ← Value1 + Value2 11 2: Answer ← Value1 - Value2 12 3: Answer ← Value1 * Value2 13 4: Answer ← Value1 / Value2 14 ENDCASE 15 OUTPUT "The answer is ", Answer 16 OUTPUT "Do you wish to enter more values (Yes or No)?" 17 INPUT MoreValues 18 IF MoreValues = "No" 19 THEN 20 Continue ← 1 21 ENDIF 22 ENDWHILE </pre>	

Question	Answer	Marks
4(a)	<p>Corrected algorithm example 2</p> <pre> 1 Continue ← 1 2 REPEAT 3 OUTPUT "Enter 1 for +, 2 for -, 3 for * or 4 for /" 4 INPUT Operator 5 OUTPUT "Enter the first value" 6 INPUT Value1 7 OUTPUT "Enter the second value" 8 INPUT Value2 9 CASE OF Operator 10 1: Answer ← Value1 + Value2 11 2: Answer ← Value1 - Value2 12 3: Answer ← Value1 * Value2 13 4: Answer ← Value1 / Value2 14 ENDCASE 15 OUTPUT "The answer is ", Answer 16 OUTPUT "Do you wish to enter more values (Yes or No)?" 17 INPUT MoreValues 18 IF MoreValues = "No" 19 THEN 20 Continue ← 0 21 ENDIF 22 UNTIL Continue = 0 </pre>	

Question	Answer	Marks
4(b)	<p>One mark per bullet</p> <p>MP1 Appropriate loop (begin and end) / otherwise selection</p> <p>MP2 Testing both ends of condition</p> <p>MP3 Suitable message</p> <p>MP4 Input/re-input</p> <pre> WHILE Operator < 1 OR Operator > 4 (DO) OUTPUT "Enter 1, 2, 3 or 4" INPUT Operator ENDWHILE Alternative answer REPEAT IF Operator < 1 OR Operator > 4 THEN OUTPUT "Enter 1, 2, 3 or 4" INPUT Operator ENDF UNTIL Operator >= 1 AND Operator <= 4 </pre> <p>One mark</p> <p>After line 4 / between lines 2 and 5</p>	5

Question	Answer	Marks																																																							
5	<p data-bbox="338 213 786 245">One mark for each correct column</p> <table border="1" data-bbox="338 280 1319 1003"><thead><tr><th data-bbox="338 280 486 346">List</th><th data-bbox="486 280 631 346">Value</th><th data-bbox="631 280 779 346">List1</th><th data-bbox="779 280 925 346">List2</th><th data-bbox="925 280 1319 346">OUTPUT</th></tr></thead><tbody><tr><td></td><td></td><td data-bbox="631 346 779 411">0</td><td data-bbox="779 346 925 411">0</td><td></td></tr><tr><td data-bbox="338 411 486 478">2</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td data-bbox="486 478 631 544">77</td><td></td><td data-bbox="779 478 925 544">77</td><td></td></tr><tr><td data-bbox="338 544 486 609">2</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td data-bbox="486 609 631 675">16</td><td></td><td data-bbox="779 609 925 675">93</td><td></td></tr><tr><td data-bbox="338 675 486 740">1</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td data-bbox="486 740 631 805">35</td><td data-bbox="631 740 779 805">35</td><td></td><td></td></tr><tr><td data-bbox="338 805 486 871">2</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td data-bbox="486 871 631 936">-7</td><td></td><td data-bbox="779 871 925 936">86</td><td></td></tr><tr><td data-bbox="338 936 486 1003">5</td><td></td><td></td><td></td><td></td></tr></tbody></table>	List	Value	List1	List2	OUTPUT			0	0		2						77		77		2						16		93		1						35	35			2						-7		86		5					5
List	Value	List1	List2	OUTPUT																																																					
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Question	Answer					Marks
5	List	Value	List1	List2	OUTPUT	
		18			Input Error	
	1					
		11	46			
	1					
		12	58			
	2					
		20		106		
	-1				List 1 = 58	
					List 2 = 106	
					List 2 is greatest	

Question	Answer	Marks																																				
6(a)(i)	InStock	1																																				
6(a)(ii)	ProductID	1																																				
6(b)	<p> One mark for correct fieldnames One mark for correct table names and show fields One mark for correct sort One mark for correct search criteria in all columns </p> <table border="1" data-bbox="488 515 1621 908"> <tr> <td data-bbox="389 515 488 580">Field:</td> <td data-bbox="488 515 719 580">ProductID</td> <td data-bbox="719 515 949 580">ProductName</td> <td data-bbox="949 515 1180 580">Animal</td> <td data-bbox="1180 515 1411 580">InStock</td> <td data-bbox="1411 515 1621 580"></td> </tr> <tr> <td data-bbox="389 580 488 646">Table:</td> <td data-bbox="488 580 719 646">STOCK</td> <td data-bbox="719 580 949 646">STOCK</td> <td data-bbox="949 580 1180 646">STOCK</td> <td data-bbox="1180 580 1411 646">STOCK</td> <td data-bbox="1411 580 1621 646"></td> </tr> <tr> <td data-bbox="389 646 488 711">Sort:</td> <td colspan="5" data-bbox="488 646 1621 711">Ascending</td> </tr> <tr> <td data-bbox="389 711 488 777">Show:</td> <td data-bbox="488 711 719 777"><input checked="" type="checkbox"/></td> <td data-bbox="719 711 949 777"><input checked="" type="checkbox"/></td> <td data-bbox="949 711 1180 777"><input type="checkbox"/></td> <td data-bbox="1180 711 1411 777"><input type="checkbox"/></td> <td data-bbox="1411 711 1621 777"><input type="checkbox"/></td> </tr> <tr> <td data-bbox="389 777 488 842">Criteria:</td> <td colspan="2" data-bbox="488 777 949 842"></td> <td data-bbox="949 777 1180 842">="cat"</td> <td data-bbox="1180 777 1411 842">=Yes</td> <td data-bbox="1411 777 1621 842"></td> </tr> <tr> <td data-bbox="389 842 488 908">or:</td> <td colspan="5" data-bbox="488 842 1621 908"></td> </tr> </table>	Field:	ProductID	ProductName	Animal	InStock		Table:	STOCK	STOCK	STOCK	STOCK		Sort:	Ascending					Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Criteria:			="cat"	=Yes		or:						4
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