



Mark Scheme (Results)

November 2021

Pearson Edexcel GCSE

In Computer Science (1CP1/02)

Paper 2: Application of Computational Thinking

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question	Answer	Additional Guidance	Mark
1(a)(i)	Any two from • dateOfBirth / Date of birth / DOB (1) • membershipType (1) • gender (1) • parent/guardian (if under 16) (1) • address (1)	• Accept any equivalent names that are sensible in the context • Accept variable names with spaces	2

Question	Answer	Additional Guidance	Mark
1(b)	Any one from • Input - membership number (1) • Process - check availability (1) • Output - cost of booking / cost (1)	• Accept sensible alternative wording.	3

Question	Answer	Additional Guidance	Mark
1(c)	• (years x discount rate) (1) • Adjusted fee / 12 (1) Examples: • $(432 - (432 * (\text{yrs.} \times 0.05))) / 12$ • $(\text{fullFee} - (\text{fullFee} * (\text{numYears} * 0.05))) / 12$ • $(\text{membership} - (\text{membership} * (\text{Years} * \text{discount}))) / 12$	• Ensure that expression follows the BIDMAS rules of precedence	2

Question	Answer	Additional Guidance	Mark
2(a)	Selection (1)		1

Question	Answer	Additional Guidance	Mark
2(b)	One mark for each output in the correct cell		

Question	Answer	Additional Guidance	Mark
2(c)	One mark for month (3,4,9 or 10) (1) One mark for day ≤ 5 (1) One mark for time (not between 17 : 00 and 20 : 00) (1) Example month = 10 AND day = 4 AND time = 12:00		3

Question	Answer	Additional Guidance	Mark
3(a)	Line 4 - FUNCTION (1)pMass , pHeight (2). One parameter (1) Line 22 - mass , height (2). One variable (1) Matching order (parameters with variables) (1)	Ignore case and spacing	6

Question	Answer	Additional Guidance	Mark
3(b)(i)	Setting a count controlled loop (1) Setting a loop that executes for each value in the attendance array (1)	Accept iteration	1

Question	Answer	Additional Guidance	Mark																																
3(b)(ii)	<table border="1"> <thead> <tr> <th>count</th><th>total</th><th>mean</th><th>DISPLAY</th></tr> </thead> <tbody> <tr> <td>0</td><td>0</td><td>0</td><td></td></tr> <tr> <td>1</td><td>25</td><td></td><td>25</td></tr> <tr> <td>2</td><td>40</td><td></td><td>40</td></tr> <tr> <td>3</td><td>65</td><td></td><td>65</td></tr> <tr> <td>4</td><td>85</td><td></td><td>85</td></tr> <tr> <td>5</td><td>100</td><td></td><td>100</td></tr> <tr> <td></td><td></td><td>20</td><td>20</td></tr> </tbody> </table> Initialisation (1) Count, totals and display from loop, all correct (3) (1 per correct column) mean correct (1) display of mean correct (1)	count	total	mean	DISPLAY	0	0	0		1	25		25	2	40		40	3	65		65	4	85		85	5	100		100			20	20		6
count	total	mean	DISPLAY																																
0	0	0																																	
1	25		25																																
2	40		40																																
3	65		65																																
4	85		85																																
5	100		100																																
		20	20																																

Question Number	Answer	Additional Guidance	Mark																								
4(a)	<table><tr><th>Data element</th><th>Example</th><th>Datatype</th></tr><tr><td>ID Reference</td><td>26_SMJ_C_3</td><td>String</td></tr><tr><td>Surname</td><td>SMITH</td><td>String</td></tr><tr><td>Initial</td><td>J</td><td>Character</td></tr><tr><td>Telephone</td><td>08756 554221</td><td>String</td></tr><tr><td>Qualification type</td><td>H & F Certificate</td><td>String</td></tr><tr><td>Qualification Level</td><td>3</td><td>Integer</td></tr><tr><td>Hourly rate (£)</td><td>55.00</td><td>Real</td></tr></table> Character / char (1) Integer (1) Real / Float / Decimal (1) Example of correct use of String (1)	Data element	Example	Datatype	ID Reference	26_SMJ_C_3	String	Surname	SMITH	String	Initial	J	Character	Telephone	08756 554221	String	Qualification type	H & F Certificate	String	Qualification Level	3	Integer	Hourly rate (£)	55.00	Real		4
Data element	Example	Datatype																									
ID Reference	26_SMJ_C_3	String																									
Surname	SMITH	String																									
Initial	J	Character																									
Telephone	08756 554221	String																									
Qualification type	H & F Certificate	String																									
Qualification Level	3	Integer																									
Hourly rate (£)	55.00	Real																									

Question	Answer	Additional Guidance	Mark
4(b)(i)	Validation Validation is required to make sure any input data is logical / rational / reasonable / complete / within acceptable limits. (1) It is needed to reduce / minimise the number of errors in the data input (1) by checking the input data against a given set of validation rules. (1)		2
4(b)(ii)	Any two from: Range Check (1) used when working with numbers, lets appropriate limits to be set (1) Type Check (1) a way to confirm that the correct data type is entered. (1) Length Check (1) used to make sure that the correct number of characters are entered (1) . Lookup (1) - can be when only a limited list of values is valid / improves accuracy because it lessens the risk of spelling mistakes. (1) Format / Pattern / pattern-matching check (1) compares data that is entered to a preassigned template / sequence. (1) Presence Check (1) this kind of check makes sure that an essential or required field cannot be left blank / must be filled in. (1)		4

Question Number	Answer	Additional Guidance	Mark
5(a)(i)	Logic error (1)		2
5(a)(ii)	IF arrayToSort[index,2] < arrayToSort[index + 1,2] THEN Correct relational operator (1)		

Question Number	Answer	Additional Guidance	Mark
5(b)	2 D array / array of records (1)	Do not accept array without dimension	1

Question Number	Answer	Additional Guidance	Mark
5(c)(i)	An explanation such as: Change the outer loop from a count controlled loop (1) to be condition controlled (WHILE, / REPEAT) (1) A local variable / flag could then be used to control the sort. (1) The flag could be set to FALSE in the inner loop when no swaps are made. (1) The flag could then be used in the outer loop to stop the sort and end the procedure. (1) Alternative After every iteration the lowest value will be at the end of the array. (1). The next iteration need not include already sorted elements (1). Therefore an improvement would be to restrict the inner loop to avoid already sorted values (1) by decrementing the loop counter (1).		4

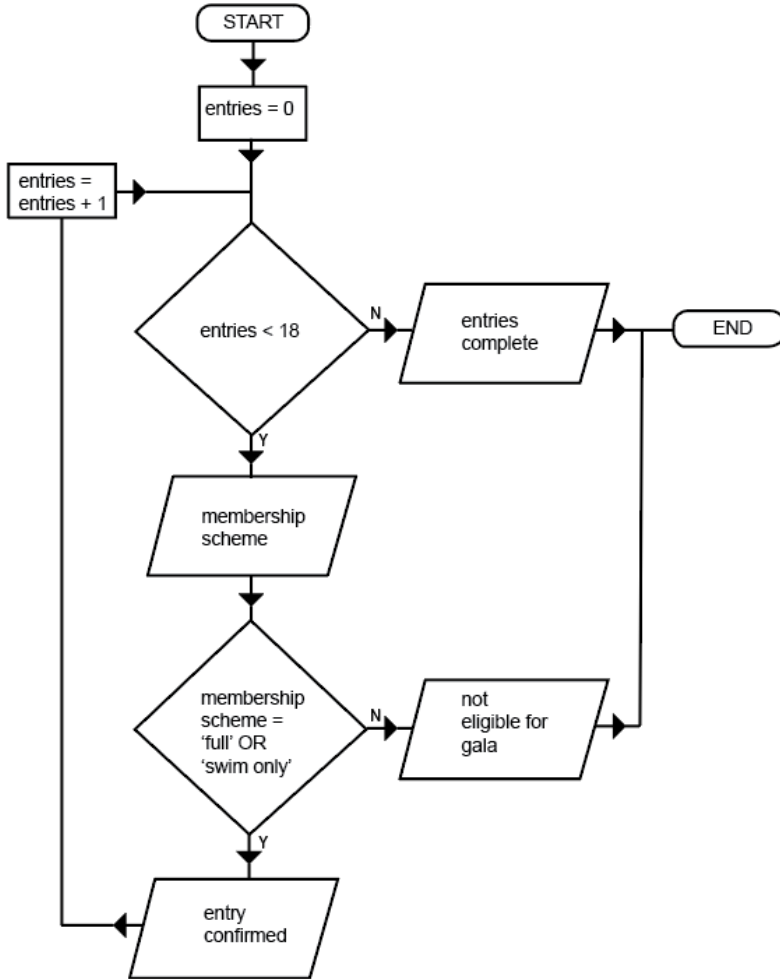
Question Number	Answer	Additional Guidance	Mark
5(c)(ii)	Use of comments (1) Use of whitespace / blank / separating lines (1)		2

Question	Answer	Additional Guidance	Mark
6(a)	<pre> IF (aTemp > wTemp + 2) OR (humidity > 70) SET AC TO ON ELSE SET AC TO OFF END IF </pre> aTemp > wTemp +2 (1) Correct value for humidity (1) Correct ON and OFF (1) Correct construct and structure IF / ELSE / END IF (1)	- Do not penalise for missing or incorrect use of brackets. - Accept solution based on range of wTemp	4

Question	Answer	Additional Guidance	Mark
6(b)	Indicative content wTemp AND NOT aTemp OR NOT humidity / wTemp AND (NOT (aTemp OR humidity)). WTemp TRUE (1) Correct use of AND NOT (1) Correct use of OR NOT (1)		3

Question	Answer	Additional Guidance	Mark
7	<pre> Activate starter / sound horn and lights For each lane Activate automatic timer Check for false start / input from pressure sensor. If yes then sound recall, reset timer and repeat If no check for input from 25m touch pad if zero input disqualify check for input from 50m touch pad stop timer and record time. </pre> Start race / start timer (1) Check for false start / reference to pressure sensor (1) Activate recall with suitable output (1) Check for input from sensor at 25m / reference to disqualify (1) Check for input from sensor at 50m / finish (1) Save result / record time (1)	Do not penalise syntax	6

Question Number	Answer	Additional Guidance	Mark
8(a)	<pre> graph TD START([START]) --> Init[F_Count = 0 T_Count = 0] Init --> Read[/READ Heat_file/] Read --> WY{W = Y} WY -- Yes --> AddSN[ADD SN to Final] AddSN --> Finc[F_Count = F_Count + 1] Finc --> F6{F_Count = 6} WY -- No --> T3{T_Count < 3} T3 -- Yes --> Tinc[T_Count = T_Count + 1] Tinc --> AddSN T3 -- No --> F6 F6 -- No --> Read F6 -- Yes --> END([END]) </pre> Decision T_Count < 3 (1) Decision F_Count = 6 / <6 (1) Example of correct use of decision symbol (1) Example of correct Yes / No (1) Increment T_Count (1) connected to 'ADD SN process (1)		6

Question	Answer	Additional Guidance	Mark
8(b)	Indicative content  <pre>graph TD; START([START]) --> Init[entries = 0]; Init --> LoopStart(()); LoopStart --> Decision1{entries < 18}; Decision1 -- N --> Complete[/entries complete/]; Complete --> END([END]); Decision1 -- Y --> Input[/membership scheme/]; Input --> Decision2{membership scheme = 'full' OR 'swim only'}; Decision2 -- N --> NotEligible[/not eligible for gala/]; NotEligible --> END; Decision2 -- Y --> Confirmed[/entry confirmed/]; Confirmed --> Increment[entries = entries + 1]; Increment --> LoopStart;</pre> The flowchart describes the process of adding entries to a gala. It begins with a 'START' terminal, followed by an initialization step 'entries = 0'. A loop starts with a decision 'entries < 18'. If 'N' (No), the process moves to 'entries complete' and then to the 'END' terminal. If 'Y' (Yes), it proceeds to an input step 'membership scheme'. Another decision follows: 'membership scheme = 'full' OR 'swim only''. If 'N', the process moves to 'not eligible for gala' and then to 'END'. If 'Y', it proceeds to an output step 'entry confirmed', which then loops back to the 'entries = entries + 1' step, which in turn loops back to the 'entries < 18' decision.		6

Aspect of Solution	Marks			
	0	1	2	3
Functionality	No rewardable 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 rewardable 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 is a maximum of 3 marks for functionality. There is a maximum of 3 marks for accuracy of notation. Each row is awarded independently.				

Question	Answer		Mark
9	Indicative content: <pre> 1 2 ARRAY scores 3 SET scores TO [8.9, 9.1, 8.2, 7.8, 8.1] 4 REAL inFactor 5 6 SET lowest TO 10.0 7 SET highest TO 0.0 8 9 RECEIVE inFactor FROM (REAL) KEYBOARD 10 SET index TO 0 11 WHILE (index < length (scores)) DO 12 SET total TO total + scores[index] 13 IF scores {index} < lowest THEN 14 lowest = scores {index} 15 ELSE 16 IF scores [index] > highest THEN 17 highest = scores [index] 18 END IF 19 END IF 20 SET index TO index + 1 21 END WHILE 22 23 #calculate dive score 24 diveScore = ((total - (highest + lowest)) * inFactor 25 SEND ("Dive score =") & diveScore TO DISPLAY </pre>	<pre> 1 2 ARRAY scores 3 SET scores TO [8.9, 9.1, 8.2, 7.8, 8.1] 4 REAL inFactor 5 6 SET lowest TO 10.0 7 SET highest TO 0.0 8 9 RECEIVE inFactor FROM (REAL) KEYBOARD 10 SET index TO 0 11 FOR EACH score FROM scores DO 12 SET total TO total + score 13 IF score < lowest THEN 14 lowest = score 15 ELSE 16 IF scores > highest THEN 17 highest = score 18 END IF 19 END IF 20 SET index TO index + 1 21 END FOR EACH 22 23 #calculate dive score 24 diveScore = ((total - (highest + lowest)) * inFactor 25 SEND ("Dive score =") & diveScore TO DISPLAY </pre>	9
	• Assignment of highest and lowest • Assignment of index • While loop with condition • Calculate total • Selection statement for lowest • Selection statement for highest • Increment index • End loop • Calculate dive score		

Aspect of Solution	Marks			
	0	1	2	3
Functionality	No rewardable 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 rewardable 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
Efficiency, Appropriateness, and Accuracy of Solution	No rewardable content	There are significant errors in the selection and accurate use of appropriate techniques.	Techniques have been selected and used with some accuracy, although the techniques may not be the most appropriate.	Techniques have been selected and used accurately and appropriately throughout to demonstrate an efficient solution.
There is a maximum of 3 marks for functionality. There is a maximum of 3 marks for accuracy of notation. There is a maximum of 3 marks for efficiency, appropriateness, and accuracy of solution. Each row is awarded independently.				