

Cambridge International AS & A Level

COMPUTER SCIENCE**9618/23**

Paper 2 Fundamental Problem-solving and Programming Skills

May/June 2026**MARK SCHEME**Maximum Mark: 75

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

This document consists of **15** printed pages.

General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: - the specific content defined in the mark scheme - the specific skills defined in the mark scheme or in the level descriptions - the standard of response required as exemplified by the standardisation scripts.
2	Examiners must award whole marks (not half marks, or other fractions).
3	Examiners must award marks positively . This means that: - marks are not deducted for errors or omissions - marks are awarded for correct/valid answers as defined in the mark scheme and also for other valid answers which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate - the quality of spelling, punctuation and grammar are judged only when the mark scheme indicates that these features are specifically assessed in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must consistently apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the full range of marks defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and must not award marks with grade thresholds or grade descriptions in mind.

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	Benefit of the doubt
	To indicate where a key word/phrase/code is missing
	Incorrect
	Follow through
	Indicate a point in an answer
Highlighted text	To draw attention to a particular aspect or to indicate where parts of an answer have been combined
	Ignore
	Not answered question
	No examples or not enough
	Not relevant or used to separate parts of an answer
Off-page comment	Allows comments to be entered at the bottom of the RM marking window and then displayed when the associated question item is navigated to.
	Repetition
	Indicates that work on a page has been seen including blank answer spaces and blank pages.
	Correct

Annotation	Meaning
	Too vague

Mark scheme abbreviations

/	separates alternative words / phrases within a marking point
//	separates alternative answers within a marking point
underline	actual word given must be used by candidate (grammatical variants accepted)
max	indicates the maximum number of marks that can be awarded
()	the word / phrase in brackets is not required, but sets the context

Note: No marks are awarded for using brand names of software packages or hardware.

Question	Answer	Marks	Guidance
1(a)	<u>Post-condition(al) loop // post-condition(al) iteration</u>	1	
1(b)	5	1	

Question	Answer	Marks	Guidance
2(a)	BOOLEAN	1	
2(b)	<pre>IF MainsOn (=TRUE) THEN DisplayOn ← TRUE ENDIF</pre> Accept: DisplayOn ← MainsOn Accept '=' in place of the assignment arrow	1	
2(c)	MP1 The robot is only ready to move if... the mains power is on and MP2 The strength of the (suction) value selected is non-zero	2	Reject – Zero for a 'repeat' of the pseudocode statement.
2(d)(i)	<u>breakpoint</u>	1	
2(d)(ii)	38 (minutes)	1	

Question	Answer	Marks	Guidance
3(a)	The initial ANALYSIS stage is carried out by studying in detail the current system. A design for the proposed new system is produced. Following the design and coding stages, it is decided to install the completed new software initially in only two of the shops. BETA testing is carried out. The final stage of the project uses ACCEPTANCE testing to test all programs on the company's hardware. After successful testing, the company approves the new system. The company then installs the new software in all shops. In the first week of its use, unexpected bugs are reported. CORRECTIVE maintenance has to be carried out.	4	

Question	Answer	Marks	Guidance
3(b)	Team A MP1 Rapid Application Development /RAD // Iterative MP2 Large project can be broken down into smaller steps MP3 All stakeholders/users are involved (at all stages) MP4 There is constant discussion between the client (and Team A) MP5 Prioritises the client needs and end-user experience MP6 A <u>prototype</u> is available at an early stage MP7 More readily allows for requirement changes to be made MP8 Minimal planning is required MP9 Programs/modules can be developed in parallel Max 2 Team B MP10 Waterfall (method/model) MP11 Next stage does not start until the current stage is successfully completed MP12 More predictable for budget MP13 More predictable for timeline/completion MP14 All requirements are identified before coding MP15 Late changes cannot be accommodated Max 2	4	Reject 'early version'.
3(c)	MP1 Production of flowcharts // structure <u>charts</u> // STDs // Structured English // E-R diagrams MP2 Consider data storage (hardware / database / files) MP3 Design inputs screens // Design screen outputs // reports to be produced MP4 Select (Programming) language to be used MP5 Produce <u>pseudocode algorithms</u> / data structures / procedures/functions/modules are produced / Identifier table MP6 Produce a testing strategy statement // (detailed) test plan MP7 Consider – is there relevant code available from program libraries? Max 3	3	Reject 'program structure'.

Question	Answer	Marks	Guidance
4	<i>Example solution:</i> • Initialise count to zero • REPEAT • Input next number • If number > 120 then increment the count • Until number = -1 • Output the count <i>Mark as follows:</i> MP1 Initialise count and later evidence of use of counter (not 'sum') MP2 Conditional loop and terminated when –1 is input MP3 Test for number > 120 and increment the count (not 'sum') inside the loop MP4 Output the count (Accept either 'sum' or 'count')	4	A 'sum' solution will have a Max 2.
5(a)	<pre> FUNCTION InterviewSummary(ThisApplicant : STRING) RETURNS STRING DECLARE Summary : STRING Summary ← MID(ThisApplicant, 8, <u>MP2</u> LENGTH(ThisApplicant) – 7) <u>MP3</u> Or: Summary ← RIGHT(ThisApplicant, LENGTH(ThisApplicant) – 7) <u>MP2</u> <u>MP3</u> RETURN Summary ENDFUNCTION </pre> <i>Mark as follows:</i> MP1 Function identifier and function ending and parameter MP2 Calculation for summary expression (part 1) – using MID or RIGHT MP3 Calculation for summary expression (part 2) – using LENGTH MP4 Return of the calculated STRING value (earlier declaration optional) and RETURNS STRING in the header –	4	Do not accept a final missing close bracket (for the MID or RIGHT function).

Question	Answer	Marks	Guidance
5(b)	<pre> PROCEDURE Search(Initial : CHAR, ShortSurname : STRING) DECLARE ThisApplicant, ThisSurname : STRING DECLARE ThisInitial : CHAR DECLARE Found : BOOLEAN OPENFILE "JobApps.txt" (FOR) READ Found ← FALSE REPEAT READFILE "JobApps.txt", ThisApplicant ThisInitial ← LEFT(ThisApplicant, 1) ThisSurname ← MID(ThisApplicant, 2, 5) IF ThisSurname = ShortSurname AND ThisInitial = Initial THEN Found ← TRUE OUTPUT "Name found" ENDIF UNTIL Found = TRUE OR EOF("JobApps.txt") IF Found = FALSE THEN OUTPUT "Name not Found" ENDIF CLOSE(FILE) "JobApps.txt" ENDPROCEDURE </pre> <i>Mark as follows:</i> 1 mark per gap	7	

Question	Answer	Marks	Guidance
6(a)	1 "LEOPARD" 2 "DOG" 3 "BISON" 4 "ZEBRA" 5 "ANT" 6  3 20 1 4 2 1 3 2 4 0 5 3 6  19 20 MP2 Correct Data array values MP3 Correct pointers	3	
6(b)	The end of ' (linked) list '	1	
6(c)(i)	Start pointer: 5 ANT3 BISON1 DOG1 LEOPARD4 ZEBRA0 Mark as follows: Start is 5 and other pointer values are correct and BISON pointer is changed to 1 and arrows are as shown and DOG is 'isolated'	1	
6(c)(ii)	MP1 The item is not in the list MP2 The data item is the only item in the list MP3 The item is the first in the list	2	

Question	Answer	Marks	Guidance
6(d)	MP1 Store 'BAT' at the next available location /with index 6 / in the Data array MP2 Visit the start pointer node MP3 Compare this data value with 'BAT' //compare 'BAT' with 'ANT' MP4 When 'BAT' is less than the current value - 'position is found' MP5 IF not, move to next node // move to 'BISON' MP6 and store the previous position MP7 Repeat until 'BAT' less that current value MP8 Link pointer of the previous node // 'ANT' points/connects to 'BAT' MP9 Link pointer of 'BAT' points to the current node / 3 // 'BAT' points/connects to 'BISON' Max 6	6	

Question	Answer								Marks	Guidance																																																																																																			
7(a)(i)	<table><tr><td colspan="3"></td><td colspan="6">Data</td></tr><tr><td>Num1</td><td>Index</td><td>i</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>12</td><td>1</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td>2</td><td>3</td><td></td><td>3</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td>3</td><td>4</td><td></td><td></td><td>4</td><td></td><td></td><td></td></tr><tr><td></td><td>4</td><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td>5</td><td>6</td><td></td><td></td><td></td><td>6</td><td></td><td></td></tr><tr><td></td><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>											Data						Num1	Index	i	1	2	3	4	5	6	12	1	2	2							2	3		3						3	4			4					4	5								5	6				6				4																																			4	
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Question	Answer	Marks	Guidance																																																												
7(b)(i)	<table><tr><th>Num 1</th><th>Num2</th><th>Index</th><th>Match</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr><tr><td>20</td><td>8</td><td>4</td><td>FALSE</td><td>2</td><td>4</td><td>5</td><td>10</td><td></td><td></td></tr><tr><td></td><td></td><td>3</td><td>FALSE</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>2</td><td>TRUE</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> Max 2 for any additional incorrect entries	Num 1	Num2	Index	Match	1	2	3	4	5	6	20	8	4	FALSE	2	4	5	10					3	FALSE									2	TRUE																											3	
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7(b)(ii)	Highest common factor // Greatest common divisor of Num1 and Num2 // by good explanation i.e. 4 is the highest number that divides exactly into both 8 and 20	1																																																													

Question	Answer	Marks	Guidance
8(a)(i)	DECLARE Bins : ARRAY [0:2, 1:120] OF BOOLEAN <u>MP1</u> <u>MP2</u>	2	Do not accept variations of syntax.

Question	Answer	Marks	Guidance
8(a)(ii)	Example solution: <pre> PROCEDURE InactiveReport() DECLARE Level, BinNo : INTEGER DECLARE BinCount : INTEGER BinCount ← 0 FOR Level ← 0 TO 2 IF Level = 0 THEN OUTPUT "Level: ground floor" ELSE OUTPUT "Level: " & NUM_TO_STR(Level) ENDIF FOR BinNo ← 1 TO 5 IF Bins[Level, BinNo] = FALSE THEN OUTPUT "Bin " & NUM_TO_STR(BinNo) BinCount ← BinCount + 1 ENDIF NEXT BinNo NEXT Level OUTPUT NUM_TO_STR(BinCount) & " bins are not in use" ENDPROCEDURE </pre> Mark as follows: MP1 Bin count declared and initialised before the loop and correctly incremented MP2 (Outer) level loop – iterates 3 times MP3 (Inner) bin loop – iterates 5 times MP4 Correct 2D array syntax and test for not in use with a Boolean comparison MP5 Correct header OUTPUT statement(s) - includes the 'Ground floor' text and 'Bin' text and bin number MP6 Correct final OUTPUT statement with 'total not in use' text and the count Max 5	5	

Question	Answer	Marks	Guidance
8(a)(iii)	Bins[0, 3] ← FALSE Bins[1, 2] ← TRUE Bins[2, 1] ← FALSE Bins[2, 2] ← FALSE Bins[2, 3] ← TRUE Bins[2, 4] ← TRUE Bins[2, 5] ← FALSE <i>Mark as follows:</i> MP1 Bins(0, 3) ← FALSE MP2 Bins(1, 2) ← TRUE MP3 Level 2 assignment all complete	3	
8(b)(i)	<i>Example solution:</i> <pre>TYPE BinData DECLARE Size : STRING DECLARE Active : BOOLEAN DECLARE StockCode : STRING DECLARE StockLevel : INTEGER ENDTYPE</pre> <i>Mark as follows:</i> Two variables correct – 1 Mark 4 variables correct – 2 marks	2	

Question	Answer	Marks	Guidance
8(b)(ii)	<i>Example solution:</i> <pre> FUNCTION FindBin(MySize : STRING) RETURNS STRING DECLARE Level, BinNo : INTEGER DECLARE Text : STRING Text ← " No bins available" Level ← 0 REPEAT BinNo ← 1 REPEAT IF Bins[Level, BinNo].Size = MySize AND Bins[Level, BinNo].Active = FALSE THEN Text ← "Level: " & NUM_TO_STR(Level) & " Bin: " & NUM_TO_STR(BinNo) OUTPUT Text RETURN Text ELSE BinNo ← BinNo + 1 ENDIF UNTIL BinNo = 121 Level ← Level + 1 UNTIL Level = 3 OUTPUT Text RETURN Text ENDFUNCTION </pre> <i>Mark as follows:</i> MP1 Function header and string parameter and return string and ending MP2 Use of any (outer level) loop for 3 iterations MP3 Use of any (inner) bin loop for 5 / 120 iterations MP4 Correct 2D array syntax with either data field – .Size or .Active MP5 Correct IF statement condition including AND MP6 Formation of the text string with correct syntax – MP7 Correct return value (and output) – in both cases and in the correct place	7	Do not accept comma syntax.