

Cambridge International AS & A Level

COMPUTER SCIENCE**9618/21**

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 **14** 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

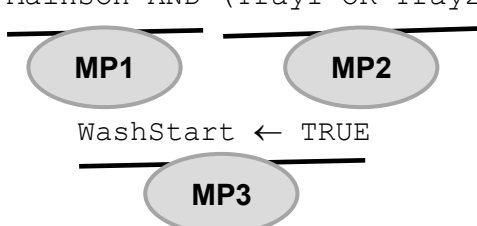
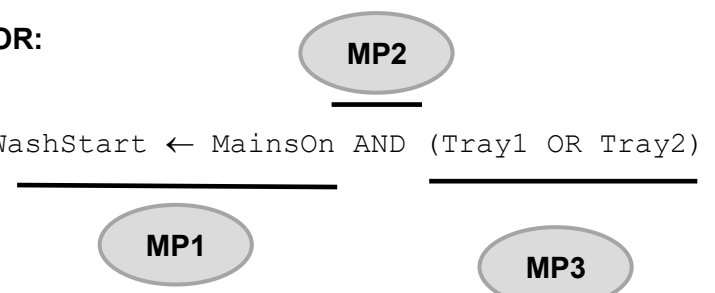
Annotation	Meaning
	Too vague

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
1(a)	<u>Count-control(led) loop // Count-control(led) iteration</u>	1
1(b)	4	1

Question	Answer	Marks
2(a)(i)	BOOLEAN	1
2(a)(ii)	MainsOn (= TRUE) AND WaterOn (= TRUE) Or reverse order ...	1
2(a)(iii)	IF MainsOn AND (Tray1 OR Tray2) THEN  WashStart ← TRUE ENDIF OR:  WashStart ← MainsOn AND (Tray1 OR Tray2)	3
2(b)(i)	Report window // Watch window	1
2(b)(ii)	103	1
3(a)	MP1 Investigate the current system /any example // investigate any other similar systems MP2 Discussion/interviews with managers MP3 Discussion/interviews with staff who operate the system MP4 Carry out a survey of employees/customers // carry out a focus group of employees/customers MP5 Observe the current system in use MP6 Produce the <u>requirements specification</u> MP7 Decide on the (program development) life cycle to be used Max 3	3

Question	Answer	Marks
3(b)	Before any programming is started, the DESIGN stage for the proposed new system must be completed. For this large project, the tasks will be broken down into several MODULES // SUB-TASKS each will be coded by a different programming team. Once each team has completed its work, INTEGRATION // UNIT testing must be carried out. Before the new system is delivered to the business, ALPHA testing is carried out in-house. It is decided to install the software initially in only one of the call centres where BETA testing is carried out. The new software is finally rolled out to all five call centres. In the first week of its use, staff report that the software still requires extra features which were not originally agreed. The software is withdrawn until ADAPTIVE maintenance is completed. 1 mark per gap	6
4	<i>Example solution:</i> Initialise Count to zero REPEAT INPUT integer number IF integer number > 0 then increment the count UNTIL integer number equals 0 OUTPUT Count <i>Mark as follows:</i> MP1 Initialise Count to zero and later evidence of use of counter MP2 Conditional loop and terminated when 0 is input MP3 Test for number > 0 and increment count inside the loop MP4 Output the count (either 'sum' or 'count') Max 4	4

Question	Answer	Marks
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Question	Answer	Marks
5(a)	<i>Example solution:</i> <pre> FUNCTION BulbCost(Quantity : INTEGER) RETURNS REAL DECLARE Cost : REAL DECLARE Twenty : INTEGER DECLARE Other : INTEGER Twenty ← Quantity DIV 20 Other ← Quantity MOD 20 Cost ← (Twenty * 30) + (Other * 1.75) RETURN Cost ENDFUNCTION </pre> <i>Mark as follows:</i> MP1 Function header and single parameter and returns REAL and end MP2 Declaration of required local variable(s) MP3 Correct calculation of 'multiples of 20' and 'other' amounts using MOD and DIV // alternative method MP4 Cost is returned	4
5(b)	TotalCost ← BulbCost (NumberPurchased)	1

Question	Answer	Marks
6(a)	MP1 LEFT(DataPacket, 3) // MID(DataPacket, 1, 3) MP2 MID(DataPacket, 5, 1)	2

Question	Answer	Marks
6(b)	<i>Example solution:</i> <pre> FUNCTION RejectDescription(ThisReject : STRING) RETURNS STRING DECLARE Description : STRING Description ← MID(ThisReject, 7, <i>Part 1</i> <u>LENGTH(ThisReject) - 6)</u> <i>Part 2</i> OR: Description ← RIGHT(ThisReject, LENGTH(ThisReject) - 6) <i>Part 1</i> <i>Part 2</i> RETURN Description ENDFUNCTION </pre> <i>Mark as follows:</i> MP1 Function header and end function (and string parameter) MP2 Calculation for description expression (<i>part 1</i>) using MID/RIGHT MP3 Calculation for description expression (<i>part 2</i>) using the LENGTH function MP4 Return of a calculated value and RETURN STRING in the header	4

Question	Answer	Marks
6(c)	<i>Example solution:</i> <pre> DECLARE ThisPacket : STRING DECLARE ThisLength : STRING DECLARE ThisMachine : CHAR DECLARE ThisDescription : STRING OPENFILE "Rejects.txt" FOR READ WHILE NOT EOF("Rejects.txt") READFILE "Rejects.txt", ThisPacket ThisLength ← LEFT(ThisPacket, 3) ThisMachine ← MID(ThisPacket, 5, 1) ThisDescription ← RejectDescription(ThisPacket) IF STR_TO_NUM(ThisLength) > 560 AND (ThisMachine = 'B' OR ThisMachine = 'C') THEN OUTPUT ThisDescription ENDIF ENDWHILE CLOSEFILE "Rejects.txt" </pre> <i>Mark as follows:</i> MP1 OPENFILE in READ mode and CLOSEFILE MP2 Conditional loop - terminates when EOF("Rejects.txt") MP3 READFILE – with correct syntax MP4 'Attempted' isolation of length and machine data MP5 IF STR_TO_NUM(ThisLength) > 560 AND (ThisMachine = 'B' OR ThisMachine = 'C') MP6 OUTPUT of return value from RejectDescription() inside the loop	6

Question	Answer	Marks
7(a)(i)	Printer queue on a computer network // modelling/simulation of a real-world problem using a queue //accept anything reasonable	1
7(a)(ii)	The queue operates on the principle the first item to join the queue will be the next item to leave MP1 First in – first out 'feel' MP2 Must refer to their application stated in part (i)	2
7(b)(i)	MP1 DECLARE MyQueue : ARRAY [1:8] OF STRING MP2 DECLARE Front : INTEGER DECLARE Rear : INTEGER	2

Question	Answer	Marks																								
7(b)(ii)	Queue <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>1</td><td>{ "PIG" }</td><td></td></tr> <tr><td>2</td><td>"DOG"</td><td>← Front</td></tr> <tr><td>3</td><td>"RAT"</td><td></td></tr> <tr><td>4</td><td>"SPIDER"</td><td></td></tr> <tr><td>5</td><td>"HORSE"</td><td></td></tr> <tr><td>6</td><td>"CAT"</td><td>← Rear</td></tr> <tr><td>7</td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td></tr> </table> Mark as follows: MP1 Correct sequence of five values in locations <u>2–6</u> MP2 Front points to DOG in location 2 and Rear points to CAT in location 6	1	{ "PIG" }		2	"DOG"	← Front	3	"RAT"		4	"SPIDER"		5	"HORSE"		6	"CAT"	← Rear	7			8			2
1	{ "PIG" }																									
2	"DOG"	← Front																								
3	"RAT"																									
4	"SPIDER"																									
5	"HORSE"																									
6	"CAT"	← Rear																								
7																										
8																										
7(b)(iii)	MyQueue <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>1</td><td>"MONKEY"</td><td></td></tr> <tr><td>2</td><td>"SNAKE"</td><td>← Rear</td></tr> <tr><td>3</td><td></td><td></td></tr> <tr><td>4</td><td>("LION")</td><td></td></tr> <tr><td>5</td><td>"GIRAFFE"</td><td>← Front</td></tr> <tr><td>6</td><td>"TIGER"</td><td></td></tr> <tr><td>7</td><td>"ANT"</td><td></td></tr> <tr><td>8</td><td>"GERBIL"</td><td></td></tr> </table> Mark as follows: MP1 MONKEY and SNAKE in locations 1, 2 with correct Rear pointer MP2 GIRAFFE in 5 with Front pointer and TIGER, ANT, GERBIL in locations 6, 7 and 8	1	"MONKEY"		2	"SNAKE"	← Rear	3			4	("LION")		5	"GIRAFFE"	← Front	6	"TIGER"		7	"ANT"		8	"GERBIL"		2
1	"MONKEY"																									
2	"SNAKE"	← Rear																								
3																										
4	("LION")																									
5	"GIRAFFE"	← Front																								
6	"TIGER"																									
7	"ANT"																									
8	"GERBIL"																									

Question	Answer	Marks																											
7(c)	Example solution: <pre> PROCEDURE InitialiseQueue() DECLARE i : INTEGER Front ← 0 /...7/8 Rear ← 0 / ... 7/8 FOR i ← 1 TO 8 MyQueue[i] ← "" NEXT i ENDPROCEDURE </pre> Mark as follows: MP1 Front and Rear are each assigned a value in range MP2 Correct FOR-NEXT loop // other loop structure MP3 MyQueue[i] assigned an empty string in a loop	3																											
8(a)	<table border="1"> <thead> <tr> <th>LeftPointer</th><th>RightPointer</th><th>MidPointer</th></tr> </thead> <tbody> <tr> <td>1</td><td>15</td><td>8</td></tr> <tr> <td></td><td>7</td><td>4</td></tr> <tr> <td>5</td><td></td><td>6</td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td></tr> </tbody> </table>	LeftPointer	RightPointer	MidPointer	1	15	8		7	4	5		6																4
LeftPointer	RightPointer	MidPointer																											
1	15	8																											
	7	4																											
5		6																											
8(b)	Found 6	1																											
8(c)	6	1																											

Question	Answer	Marks
9(a)	<pre> DECLARE Version1 : ARRAY [0:2, 1:15] OF CHAR </pre> MP1 MP2	2

Question	Answer	Marks
9(b)	<i>Example solution:</i> <pre> DECLARE RoomNumber, FloorNumber, Count : INTEGER Count ← 0 OUTPUT "Floor number: " INPUT FloorNumber OUTPUT "Floor number: " & NUM_TO_STR(FloorNumber) FOR RoomNumber ← 1 TO 15 IF Version1[FloorNumber, RoomNumber] = 'A' THEN OUTPUT RoomNumber Count ← Count + 1 ENDIF NEXT RoomNumber OUTPUT NUM_TO_STR(Count) & " room(s) available" </pre> <i>Mark as follows:</i> MP1 Declaration of all integer variables MP2 Input of the floor number (with prompt) MP3 Loop for 15 iterations MP4 Test array element to check if room is 'available'? MP5 Initialisation and increment of count and Output room number MP6 Output of the final count line including the message outside the loop	6
9(c)(i)	<i>Example solution:</i> <pre> TYPE RoomData (DECLARE Available : <u>CHAR</u>) DECLARE RoomType : CHAR DECLARE View : BOOLEAN DECLARE Grade : STRING ENDTYPE </pre> <i>Mark as follows:</i> MP1 and MP2 Two variables correct 1 mark Three variables correct 2 marks MP3 ENDTYPE	3

Question	Answer	Marks
9(c)(ii)	Example solution: <pre> DECLARE BoolView : BOOLEAN DECLARE MyRoomType : CHAR DECLARE InputView, MyRoomGrade : STRING DECLARE Floor, Room : INTEGER OUTPUT "Room type - S/D/F ?" INPUT MyRoomType OUTPUT "View - True/False ?" INPUT InputView IF TO_UPPER(InputView) = "TRUE" THEN BoolView ← TRUE ELSE BoolView ← FALSE ENDIF OUTPUT "Room grade - ST/DL ?" INPUT MyRoomGrade OUTPUT "Matching floor number and room number:" FOR Floor ← 0 TO 2 FOR Room ← 1 TO 15 IF Version2[Floor, Room].RoomType = MyRoomType AND Version2[Floor, Room].View = BoolView AND Version2[Floor, Room].RoomGrade = MyRoomGrade AND Version2[Floor, Room].Available = 'A' THEN OUTPUT Floor, " ", Room ENDIF NEXT Room NEXT Floor </pre> Marks as follows: MP1 Three correctly formed INPUT statements each with a prompt MP2 OUTPUT of the “Matching floor etc” heading MP3 Outer FOR loop / or other (for the floors) MP4 Inner FOR loop / or other (for the rooms) MP5 Correct use of array with dot notation with at least one data item inside loop MP6 ‘Attempt’ to combine all three tests (room type, view, grade) inside loop MP7 Output of floor and room inside loop	7