

# Cambridge International AS & A Level

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**COMPUTER SCIENCE****9618/21**

Paper 2 Fundamental Problem-solving and Programming Skills

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

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**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.

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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: <ul style="list-style-type: none"><li>the specific <b>content</b> defined in the mark scheme</li><li>the specific <b>skills</b> defined in the mark scheme or in the level descriptions</li><li>the <b>standard of response</b> required as exemplified by the standardisation scripts.</li></ul>                                                                                                                                                                                                                                                                                    |
| 2 | Examiners must award <b>whole marks</b> (not half marks, or other fractions).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 3 | Examiners must award marks <b>positively</b> . This means that: <ul style="list-style-type: none"><li>marks are not deducted for errors or omissions</li><li>marks are awarded for correct/valid answers as defined in the mark scheme and also for <b>other valid answers</b> which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate</li><li>the quality of spelling, punctuation and grammar are judged <b>only</b> when the mark scheme indicates that these features are <b>specifically assessed</b> in the question. However, the meaning of all responses must be unambiguous.</li></ul> |
| 4 | Examiners must <b>consistently</b> 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 <b>full range of marks</b> 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 <b>must not</b> 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                                                                                                                                    |

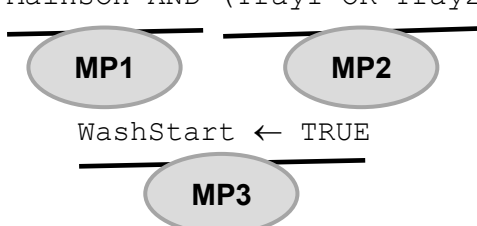
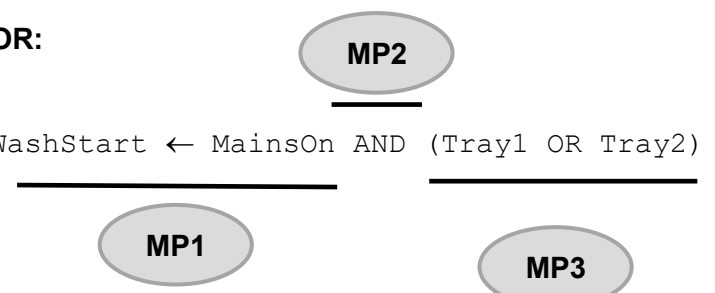
| Annotation                                                                        | Meaning   |
|-----------------------------------------------------------------------------------|-----------|
|  | Too vague |

**Mark scheme abbreviations**

|                  |                                                                             |
|------------------|-----------------------------------------------------------------------------|
| /                | separates alternative words / phrases within a marking point                |
| //               | separates alternative answers within a marking point                        |
| <b>underline</b> | actual word given must be used by candidate (grammatical variants accepted) |
| <b>max</b>       | 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)<br><br>Or reverse order ...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1     |
| 2(a)(iii) | <p>IF<br/>MainsOn AND (Tray1 OR Tray2) THEN</p>  <p>WashStart ← TRUE</p> <p>ENDIF</p> <p>OR:</p>  <p>WashStart ← MainsOn AND (Tray1 OR Tray2)</p>                                                                                                                                                                                                                                                                                              | 3     |
| 2(b)(i)   | Report window // Watch window                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1     |
| 2(b)(ii)  | 103                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1     |
| 3(a)      | <p><b>MP1</b> Investigate the current system /any example<br/>// investigate any other similar systems</p> <p><b>MP2</b> Discussion/interviews with managers</p> <p><b>MP3</b> Discussion/interviews with staff <b>who operate the system</b></p> <p><b>MP4</b> Carry out a <b>survey</b> of <b>employees/customers</b><br/>// carry out a <b>focus group of employees/customers</b></p> <p><b>MP5</b> Observe the current system in use</p> <p><b>MP6</b> Produce the <u>requirements specification</u></p> <p><b>MP7</b> Decide on the <b>(program development) life cycle</b> to be used</p> <p><b>Max 3</b></p> | 3     |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Marks |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 3(b)     | <p>Before any programming is started, the <b>DESIGN</b> stage for the proposed new system must be completed.</p> <p>For this large project, the tasks will be broken down into several <b>MODULES // SUB-TASKS</b> each will be coded by a different programming team.</p> <p>Once each team has completed its work, <b>INTEGRATION // UNIT</b> testing must be carried out.</p> <p>Before the new system is delivered to the business, <b>ALPHA</b> testing is carried out in-house.</p> <p>It is decided to install the software initially in only one of the call centres where <b>BETA</b> testing is carried out.</p> <p>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.</p> <p>The software is withdrawn until <b>ADAPTIVE</b> maintenance is completed.</p> <p>1 mark per gap</p> | 6     |
| 4        | <p><i>Example solution:</i></p> <p>Initialise Count to zero<br/> REPEAT<br/>     INPUT integer number<br/>     IF integer number &gt; 0 then increment the <b>count</b><br/>     UNTIL integer number equals 0<br/> OUTPUT Count</p> <p><i>Mark as follows:</i></p> <p><b>MP1</b> Initialise Count to zero <b>and</b> later evidence of use of counter<br/> <b>MP2</b> Conditional loop <b>and</b> terminated when 0 is input<br/> <b>MP3</b> Test for number &gt; 0 <b>and</b> increment count <b>inside the loop</b><br/> <b>MP4</b> Output the count (either 'sum' or 'count')</p> <p><b>Max 4</b></p>                                                                                                                                                                                                                                                                                                                              | 4     |

| Question | Answer | Marks |
|----------|--------|-------|
|----------|--------|-------|

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Marks |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 5(a)     | <p><i>Example solution:</i></p> <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> <p><i>Mark as follows:</i></p> <p><b>MP1</b> Function header <b>and</b> single parameter <b>and</b> returns REAL <b>and</b> end</p> <p><b>MP2</b> Declaration of required local variable(s)</p> <p><b>MP3</b> Correct calculation of 'multiples of 20' and 'other' amounts using MOD and DIV // alternative method</p> <p><b>MP4</b> Cost is returned</p> | 4     |
| 5(b)     | TotalCost ← BulbCost (NumberPurchased)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1     |

| Question | Answer                                                                                                 | Marks |
|----------|--------------------------------------------------------------------------------------------------------|-------|
| 6(a)     | <p><b>MP1</b> LEFT(DataPacket, 3) // MID(DataPacket, 1, 3)</p> <p><b>MP2</b> MID(DataPacket, 5, 1)</p> | 2     |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Marks    |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 6(b)     | <p><i>Example solution:</i></p> <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> <p><i>Mark as follows:</i></p> <p><b>MP1</b> Function header <b>and</b> end function (<b>and</b> string parameter)</p> <p><b>MP2</b> Calculation for description expression (<i>part 1</i>)<br/>using MID/RIGHT</p> <p><b>MP3</b> Calculation for description expression (<i>part 2</i>)<br/>using the LENGTH function</p> <p><b>MP4</b> Return of a calculated value <b>and</b> RETURN STRING in the header</p> | <b>4</b> |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Marks |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 6(c)     | <p><i>Example solution:</i></p> <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) &gt; 560 AND     (ThisMachine = 'B' OR ThisMachine = 'C') THEN     OUTPUT ThisDescription   ENDIF ENDWHILE CLOSEFILE "Rejects.txt" </pre> <p><i>Mark as follows:</i></p> <p><b>MP1</b> OPENFILE in READ mode <b>and</b> CLOSEFILE</p> <p><b>MP2</b> Conditional loop - terminates when EOF("Rejects.txt")</p> <p><b>MP3</b> READFILE – with correct syntax</p> <p><b>MP4</b> 'Attempted' isolation of length <b>and</b> machine data</p> <p><b>MP5</b> IF STR_TO_NUM(ThisLength) &gt; 560 AND<br/>(ThisMachine = 'B' OR ThisMachine = 'C')</p> <p><b>MP6</b> OUTPUT of return value from RejectDescription() <b>inside the loop</b></p> | 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) | <p>The queue operates on the principle the first item to join the queue will be the next item to leave</p> <p><b>MP1</b> First in – first out 'feel'</p> <p><b>MP2</b> Must refer to their application stated in part (i)</p> | 2     |
| 7(b)(i)  | <p><b>MP1</b> DECLARE MyQueue : ARRAY [1:8] OF STRING</p> <p><b>MP2</b> DECLARE Front : INTEGER<br/>DECLARE Rear : INTEGER</p>                                                                                                | 2     |

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

| Question    | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Marks       |              |            |   |    |   |  |   |   |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|------------|---|----|---|--|---|---|---|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|
| 7(c)        | <p>Example solution:</p> <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> <p>Mark as follows:</p> <p><b>MP1</b> Front and Rear are each assigned a value in range<br/> <b>MP2</b> Correct FOR-NEXT loop // other loop structure<br/> <b>MP3</b> MyQueue[i] assigned an empty string in a loop</p>                                          | 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> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; padding: 5px; background-color: #f0f0f0;">MP1</div> <div style="border: 1px solid black; border-radius: 50%; padding: 5px; background-color: #f0f0f0;">MP2</div> </div> | 2     |

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

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Marks    |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 9(c)(ii) | <p><b>Example solution:</b></p> <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> <p><b>Marks as follows:</b></p> <p><b>MP1</b>    <b>Three</b> correctly formed INPUT statements each with a prompt</p> <p><b>MP2</b>    OUTPUT of the “Matching floor etc” heading</p> <p><b>MP3</b>    Outer FOR loop / or other (for the floors)</p> <p><b>MP4</b>    Inner FOR loop / or other (for the rooms)</p> <p><b>MP5</b>    Correct use of array with dot notation with at least one data item<br/><b>inside loop</b></p> <p><b>MP6</b>    ‘Attempt’ to combine all three tests (room type, view, grade)<br/><b>inside loop</b></p> <p><b>MP7</b>    Output of floor and room<br/><b>inside loop</b></p> | <b>7</b> |