

**GCE**

**Computing**

Unit **F452:** Programming Techniques and Logical Methods

Advanced Subsidiary GCE

**Mark Scheme for June 2017**

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

© OCR 2017

These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

| Annotation | Meaning of annotation                                                                                                                                                                                     |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| X          |                                                                                                                                                                                                           |
| Tick       |                                                                                                                                                                                                           |
| ^          |                                                                                                                                                                                                           |
| /          |                                                                                                                                                                                                           |
| ?          |                                                                                                                                                                                                           |
| 0          |                                                                                                                                                                                                           |
| BOD        |                                                                                                                                                                                                           |
| NBOD       |                                                                                                                                                                                                           |
| TV         |                                                                                                                                                                                                           |
| NE         |                                                                                                                                                                                                           |
| BP         | Blank page – this annotation <b>must</b> be used on all blank pages within the answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response. |

## MARK SCHEME

| Question |   |  | Answer/Indicative content                                                                                                                                                                                                                                                                                                                              | Mark | Guidance            |
|----------|---|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------|
| 1        | a |  | <ul style="list-style-type: none"> <li>Title/Heading and SAVE/ADD/SUBMIT button</li> <li>Label and space for mountain input</li> <li>Label and space for height</li> <li>Label and space for map grid letters</li> <li>Label and space for map reference co-ordinates and RETURN/EXI/CANCEL/CLEAR button</li> <li>Logical flow/clear layout</li> </ul> | 5    | 1 per bullet, max 5 |

| b                                                                                                                                                                                                  | i |                    | <table><thead><tr><th></th><th>Data Type</th><th>Size in bytes</th></tr></thead><tbody><tr><td>Mountain Name</td><td>STRING/CHAR</td><td>10-30</td></tr><tr><td>Height of mountain</td><td>INTEGER</td><td>2</td></tr><tr><td>Grid Letters</td><td>STRING/CHAR</td><td>2</td></tr><tr><td>Co-ordinates</td><td>STRING</td><td>6</td></tr></tbody></table> |               | Data Type                                         | Size in bytes | Mountain Name | STRING/CHAR | 10-30 | Height of mountain | INTEGER | 2 | Grid Letters | STRING/CHAR | 2 | Co-ordinates | STRING | 6 | 4 | Allow 2 or 4 bytes per character (unicode) for Mountain Name, Grid letters & Co-ordinates, if unicode use stated by candidate. |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------|---------------|---------------|-------------|-------|--------------------|---------|---|--------------|-------------|---|--------------|--------|---|---|--------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                    |   |                    | Data Type                                                                                                                                                                                                                                                                                                                                                 | Size in bytes |                                                   |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |
|                                                                                                                                                                                                    |   | Mountain Name      | STRING/CHAR                                                                                                                                                                                                                                                                                                                                               | 10-30         |                                                   |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |
|                                                                                                                                                                                                    |   | Height of mountain | INTEGER                                                                                                                                                                                                                                                                                                                                                   | 2             |                                                   |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |
|                                                                                                                                                                                                    |   | Grid Letters       | STRING/CHAR                                                                                                                                                                                                                                                                                                                                               | 2             |                                                   |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |
|                                                                                                                                                                                                    |   | Co-ordinates       | STRING                                                                                                                                                                                                                                                                                                                                                    | 6             |                                                   |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |
| <ul style="list-style-type: none"><li>Mountain Name - type and size</li><li>Height of mountain – type and size</li><li>Grid Letters – type and size</li><li>Co-ordinates – type and size</li></ul> |   |                    |                                                                                                                                                                                                                                                                                                                                                           |               |                                                   |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |
|                                                                                                                                                                                                    |   |                    |                                                                                                                                                                                                                                                                                                                                                           |               |                                                   |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |
|                                                                                                                                                                                                    |   |                    |                                                                                                                                                                                                                                                                                                                                                           |               |                                                   |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |
|                                                                                                                                                                                                    |   |                    |                                                                                                                                                                                                                                                                                                                                                           |               |                                                   |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |
|                                                                                                                                                                                                    |   |                    |                                                                                                                                                                                                                                                                                                                                                           |               |                                                   |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |
|                                                                                                                                                                                                    |   | ii                 | <ul style="list-style-type: none"><li>record size from Q1bi * 2000</li><li>System overheads 10 – 20%</li><li>converted to KB (divide by 1024)</li></ul>                                                                                                                                                                                                   | 3             | Record size allow FT<br><br>Accept divide by 1000 |               |               |             |       |                    |         |   |              |             |   |              |        |   |   |                                                                                                                                |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| c | <ul style="list-style-type: none"> <li>Starting at the first record</li> <li>Each record in turn is read</li> <li>Until the record is found, (so record is not added)</li> <li>Or EOF is reached, (so record not found so record is added)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 4 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| d | <ul style="list-style-type: none"> <li>Is part of a record that holds a single data item</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| e | <ul style="list-style-type: none"> <li>Read only</li> <li>Write only</li> <li>Read &amp; Write/Update</li> <li>Append</li> <li>Direct access</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2 | <p>Allow other options from programming languages</p> <p>Max 2 marks</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| f | <p>Index sequential</p> <p>Data is arranged according to a key field.</p> <p>Data is arranged in blocks.</p> <p>File can be searched sequentially.</p> <p>An index table is maintained to point to a start of a block the record is in...</p> <p>... the block is then searched sequentially.</p> <p>The index table can be multi-levelled.</p> <p>Secondary index can be used.</p> <p>Overflow blocks can be used if block is full.</p> <p>File can be reorganised to move data from overflow blocks into main.</p> <p>Random Access</p> <p>File is usually created a fixed size ...</p> <p>... large enough to hold all expected records.</p> <p>Hash algorithm is used on key field to allocate address in file.</p> <p>Method of handling clashes needs to be incorporated ...</p> <p>... by either a rehash or move to next free space.</p> <p>Flags used to indicate record deleted.</p> <p>Use comparison</p> <p>Index sequential files are much easier to list/process records in order of key field.</p> | 8 | <p>Levels of responses</p> <p>High Level response [6-8 marks]</p> <p>Candidates will identify the main features of index sequential and random access files. The comparison between the two file types will be fully relevant to this case. Technical terms will be used correctly. The information will be presented in a structured and coherent format, with few errors of grammar, punctuation and spelling. [Good account of both file types]</p> <p>Medium level response [3-5 marks]</p> <p>Candidates will identify some features of index sequential and random access files. The comparison between the two file types maybe one-sided and may not be fully relevant to this case. Technical terms will mainly be used correctly. The information will be presented in a structured format, with limited errors of grammar, punctuation and spelling. [Good account of one file type or reasonable account of both]</p> <p>Low level response [0-2 marks]</p> <p>Candidates may identify some features of index sequential</p> |

|   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |   |                                                                                                                                                                                                                                                                |
|---|---|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |   |    | Random access files are quicker to access an individual record.<br>Index sequential files have greater processing overheads when adding or deleting records.                                                                                                                                                                                                                                                                                                                                                           |   | and/or random access files. The comparison between the two file types will be either very limited or non-existent. Technical terms maybe limited in use or incorrectly used. Errors of grammar, punctuation and spelling may be intrusive.<br>[Random points!] |
| 2 | a |    | <ul style="list-style-type: none"> <li>• Easier to write and test/Easier to program</li> <li>• Shows clearly how different parts of the program relate to each other</li> <li>• Team of programmers each can be working on separate modules</li> <li>• Can be reused in the program/re-usability</li> </ul>                                                                                                                                                                                                            | 2 | Max 2 marks                                                                                                                                                                                                                                                    |
|   | b | i  | <p>Selection<br/>IF LENGTH(Key) &lt;4 THEN</p> <p>Sequence<br/>OUTPUT "Enter Key"<br/>INPUT Key</p>                                                                                                                                                                                                                                                                                                                                                                                                                    | 2 | <p>1 mark for Selection</p> <p>1 mark for Sequence and must show at least 2 sequential lines</p>                                                                                                                                                               |
|   |   | ii | <ul style="list-style-type: none"> <li>• Checks if key is between 4 and 128 characters (1)</li> <li>• Outputs suitable warning if it is not (1)</li> <li>• Continues asking for key until one of a valid length is used.(1)</li> </ul> <p>Example:</p> <pre>FUNCTION EnterKey(): STRING   STRING Key   REPEAT     OUTPUT "Enter Key"     INPUT Key     IF LENGTH(key)&lt;4 OR LENGTH(key)&gt;128 THEN       (1)        OUTPUT "Key must be between 4 to 128         characters long (inclusive)" (1)      END IF</pre> | 3 | Wording must indicate range                                                                                                                                                                                                                                    |

|  |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |                                                                                                        |
|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------|
|  |   | <pre>       UNTIL LENGTH(key) &gt;=4 AND           LENGTH(key) &lt;=128 (1)        RETURN Key  END FUNCTION </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |                                                                                                        |
|  | c | <ul style="list-style-type: none"> <li>• Open both files</li> <li>• Read from input file loop ...</li> <li>• ... correct end condition</li> <li>• Read from input text file</li> <li>• Add characters together ...</li> <li>• ... as values (not as concatenation)</li> <li>• Wrap rounds correctly on Key characters</li> <li>• Close both files</li> <li>• Correct use of indentation</li> </ul> <p>Example code</p> <pre> PROCEDURE Encrypt(Key)   OPEN FILE A  (AS READ)   OPEN FILE B  (AS WRITE)   Char T   Integer I=0   REPEAT     READ T FROM FILE A     T = Char(Integer(T) + Integer(Key[I]))     WRITE T TO FILE B     I = I + 1     IF I &gt; LENGTH(key) THEN       I=1     ENDIF   UNTIL EOF FILE A   CLOSE FILE A   CLOSE FILE B END PROCEDURE </pre> | 8 | <p>1 per bullet, max 8</p> <p>Allows other methods casting Char to ASCII value i.e. ASC<br/>ASCII.</p> |

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | d | <ul style="list-style-type: none"> <li>• Variable checks.</li> <li>• When execution has stopped can view value(s) ...</li> <li>• ... or modify.</li> <li>• Stepping.</li> <li>• Run one instruction at a time ...</li> <li>• ... to check logic is correct.</li> <li>• Breakpoints.</li> <li>• Marker added to a line to stop execution at that point ...</li> <li>• ...this allows the programmer to watch the effects each line of code.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 9 | <p>1 mark for each correct identification up to a maximum of three identifications plus up to a further 2 marks for each of three valid descriptions.</p> <p>Allow: <b>Cross-referencers</b> (1) which <b>shows where variables are used</b> (1) and allows <b>unplanned duplicate names to be identified</b> (1)</p> <p>Allow; <b>Watches</b> (1) <b>stops when a condition is met on a variable(s)</b> (1) and <b>allows current code statement to be seen and/or value of variables</b> (1)</p> |
| 3 | a | <ul style="list-style-type: none"> <li>• Attack value correctly calculated</li> <li>• Defence value correctly calculated</li> <li>• Correct winner found ...</li> <li>• ... allowing for draw (use of ELSEIF)</li> <li>• Difference between values correctly calculated</li> <li>• Half difference added to winners health points</li> <li>• Half difference added to winners ... <ul style="list-style-type: none"> <li>• Attack points or ...</li> <li>• defence points</li> </ul> </li> <li>• Allowance made for odd number of points difference</li> </ul> <pre> PROCEDURE Around() TempAttack = Attacker_AttackPoints * RAND(8) TempDefence = Defender_DefencePoints *                                 RAND(8) IF TempAttack &gt; TempDefence THEN PointsDiff = TempAttack - TempDefence Attacker_AttackPoints =     Attacker_AttackPoints +     PointsDiff DIV 2 Attacker_HealthPoints =     Attacker_HealthPoints +     (PointsDiff - PointsDiff DIV 2) </pre> | 9 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

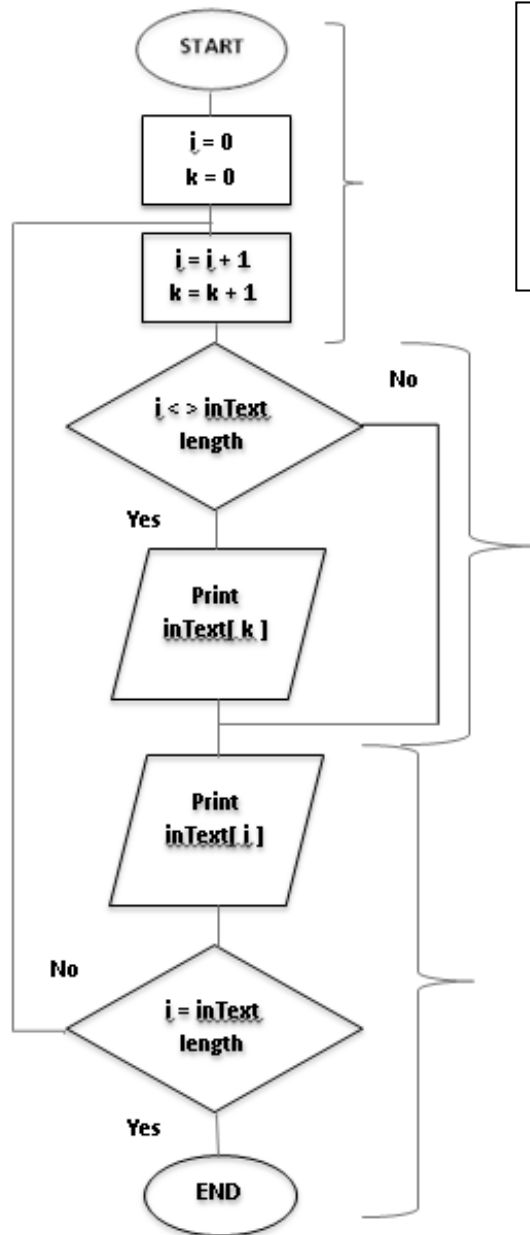


|  |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |                                                                                                                                                |
|--|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------|
|  |   | <pre> ELSEIF TempDefence &gt; TempAttack THEN     PointsDiff = TempDefence - TempAttack     Defender_DefencePoints =         Defender_DefencePoints +             PointsDiff DIV 2      Defender_HealthPoints =         Defender_HealthPoints +             (PointsDiff - PointsDiff DIV 2)  ENDIF END PROCEDURE </pre>                                                                                                                                                                               |   |                                                                                                                                                |
|  | b | <ul style="list-style-type: none"> <li>• Syntax error</li> <li>• Statement that break the rules of the programming language</li> <li>• Example Frint “Hello world”</li> <li>• Logic error</li> <li>• An error that causes the program to perform something unintended</li> <li>• Example IF A&gt;B instead of IF B&gt;A</li> <li>• Run-time error</li> <li>• Error that occurs due to an unexpected event/causes the program to stop working (crashes)</li> <li>• Such as a divide by zero</li> </ul> | 6 | 1 mark for each correct identification up to a maximum of two identifications plus up to a further 2 marks for each of two valid descriptions. |
|  | c | <ul style="list-style-type: none"> <li>• Comments/Annotation</li> <li>• Indentation/formatting</li> <li>• Meaningful identifiers/following naming conventions</li> <li>• Making code modular</li> <li>• Breaking up multi-stage calculations</li> </ul>                                                                                                                                                                                                                                               | 3 | 1 per bullet, max 3                                                                                                                            |
|  | d | <p>Constant</p> <ul style="list-style-type: none"> <li>• Has a fixed value that cannot be changed (while the program is running)</li> <li>• Used to make the code easier to read and maintain</li> </ul> <p>Reserved Word</p>                                                                                                                                                                                                                                                                         | 4 |                                                                                                                                                |

|  |   |                                                                                                                                                                                                                                                                         |   |                                                          |
|--|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------|
|  |   | <ul style="list-style-type: none"> <li>Is a word that cannot be used as an identifier (such as the name of a variable, function, or label)</li> <li>Also known as keywords/keywords are a subset of reserved words</li> </ul>                                           |   | Allow Keyword of the programming language                |
|  | e | <ul style="list-style-type: none"> <li><math>45 / 2 = \mathbf{22.5}</math> or <b>22</b></li> <li><math>35 \text{ DIV } 6 = \mathbf{5}</math></li> <li><math>38 \text{ MOD } 6 = \mathbf{2}</math></li> <li><math>42 + 35 \text{ DIV } 6 = \mathbf{47}</math></li> </ul> | 4 | First bullet allows for program language implementation. |

|   |   |  |                |               |          |          |              |                |   |                                                                           |
|---|---|--|----------------|---------------|----------|----------|--------------|----------------|---|---------------------------------------------------------------------------|
| 4 | a |  | <b>Line No</b> | <b>InText</b> | <b>i</b> | <b>k</b> | <b>Print</b> | <b>Comment</b> | 4 | 1 mark for each band<br><br>Allow line 09 to be missing in bands 2, 3 & 4 |
|   |   |  | 01             | mat           |          |          |              |                |   |                                                                           |
|   |   |  | 02             |               | 0        |          |              |                |   |                                                                           |
|   |   |  | 03             |               |          | 0        |              |                |   |                                                                           |
|   |   |  | 04             |               |          |          |              |                |   |                                                                           |
|   |   |  | 05             |               | 1        |          |              |                |   |                                                                           |
|   |   |  | 06             |               |          | 2        |              |                |   |                                                                           |
|   |   |  | 07             |               |          |          |              | True           |   |                                                                           |
|   |   |  | 08             |               |          |          | a            |                |   |                                                                           |
|   |   |  | 09             |               |          |          |              |                |   |                                                                           |
|   |   |  | 10             |               |          |          | m            |                |   |                                                                           |
|   |   |  | 11             |               |          |          |              | False          |   |                                                                           |
|   |   |  | 04             |               |          |          |              |                |   |                                                                           |
|   |   |  | 05             |               | 2        |          |              |                |   |                                                                           |
|   |   |  | 06             |               |          | 3        |              |                |   |                                                                           |
|   |   |  | 07             |               |          |          |              | True           |   |                                                                           |
|   |   |  | 08             |               |          |          | t            |                |   |                                                                           |
|   |   |  | 09             |               |          |          |              |                |   |                                                                           |
|   |   |  | 10             |               |          |          | a            |                |   |                                                                           |
|   |   |  | 11             |               |          |          |              | False          |   |                                                                           |
|   |   |  | 04             |               |          |          |              |                |   |                                                                           |
|   |   |  | 05             |               | 3        |          |              |                |   |                                                                           |
|   |   |  | 06             |               |          | 4        |              |                |   |                                                                           |
|   |   |  | 07             |               |          |          |              | False          |   |                                                                           |
|   |   |  | 09             |               |          |          |              |                |   |                                                                           |
|   |   |  | 10             |               |          |          | t            |                |   |                                                                           |
|   |   |  | 11             |               |          |          |              | True           |   |                                                                           |
|   |   |  | 12             |               |          |          |              |                |   |                                                                           |

b



- 1st Brace
- 2nd Brace
- 3rd Brace
- Both lines correct from selection symbols
- Correct use of symbols

5

Allow 2 boxes for the initialisation in brace 1  
 Allow 2 boxes for the incrementing in brace 1

|   |   |                                                                                                                                                                                                                                                                                |   |                  |
|---|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------|
|   | c | <ul style="list-style-type: none"> <li>LOCATE("is", "Hard disk") returns <b>7</b></li> <li>LOCATE("ri", "processor Prints") returns <b>12</b></li> <li>LOCATE("ab", "source code") returns <b>0</b></li> </ul>                                                                 | 3 |                  |
| 5 | a | <pre> 01 Sum_Odd(5) 02 False 04 False 06 07 Sum_Odd(3)     } (1)      01 Sum_Odd(3)     02 False     04 False     06     07 Sum_Odd(1)         01 Sum_Odd(1) } (1)         02 True         03 return 1    } (1)     07 return (3+1) 4  } (1) 07 return (5+4) 9    } (1) </pre> | 6 | 1 mark per brace |

|  |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |  |
|--|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--|
|  | b | <ul style="list-style-type: none"><li>• Loop used ...</li><li>• ... with correct end/start condition</li><li>• Correct handling when n =1</li><li>• Correct handling when n is even</li><li>• Correct handling when n is odd</li></ul> <p>Example</p> <pre>FUNCTION Sum_Odd(Integer n)   Total = 0   REPEAT     IF n=1 THEN       Total = Total + 1       n = n - 1     ELSE IF n MOD 2 = 0 THEN       n = n -1     ELSE       Total = Total + n       n= n - 2     END IF   UNTIL n &lt;= 0   RETURN Total END FUNCTION</pre> | 5 |  |
|--|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--|

**OCR (Oxford Cambridge and RSA Examinations)**  
**1 Hills Road**  
**Cambridge**  
**CB1 2EU**

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

**[www.ocr.org.uk](http://www.ocr.org.uk)**

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

**Oxford Cambridge and RSA Examinations**  
**is a Company Limited by Guarantee**  
**Registered in England**  
**Registered Office; 1 Hills Road, Cambridge, CB1 2EU**  
**Registered Company Number: 3484466**  
**OCR is an exempt Charity**

**OCR (Oxford Cambridge and RSA Examinations)**  
**Head office**  
**Telephone: 01223 552552**  
**Facsimile: 01223 552553**

© OCR 2017

