



**[eduresourceza.com](http://eduresourceza.com)**

---

**COMPUTER SCIENCE**

**9608/23**

Paper 2 Written Paper

**October/November 2017**

MARK SCHEME

Maximum Mark: 75

---

**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level components and some Cambridge O Level components.

© IGCSE is a registered trademark.

---

This document consists of **12** printed pages.

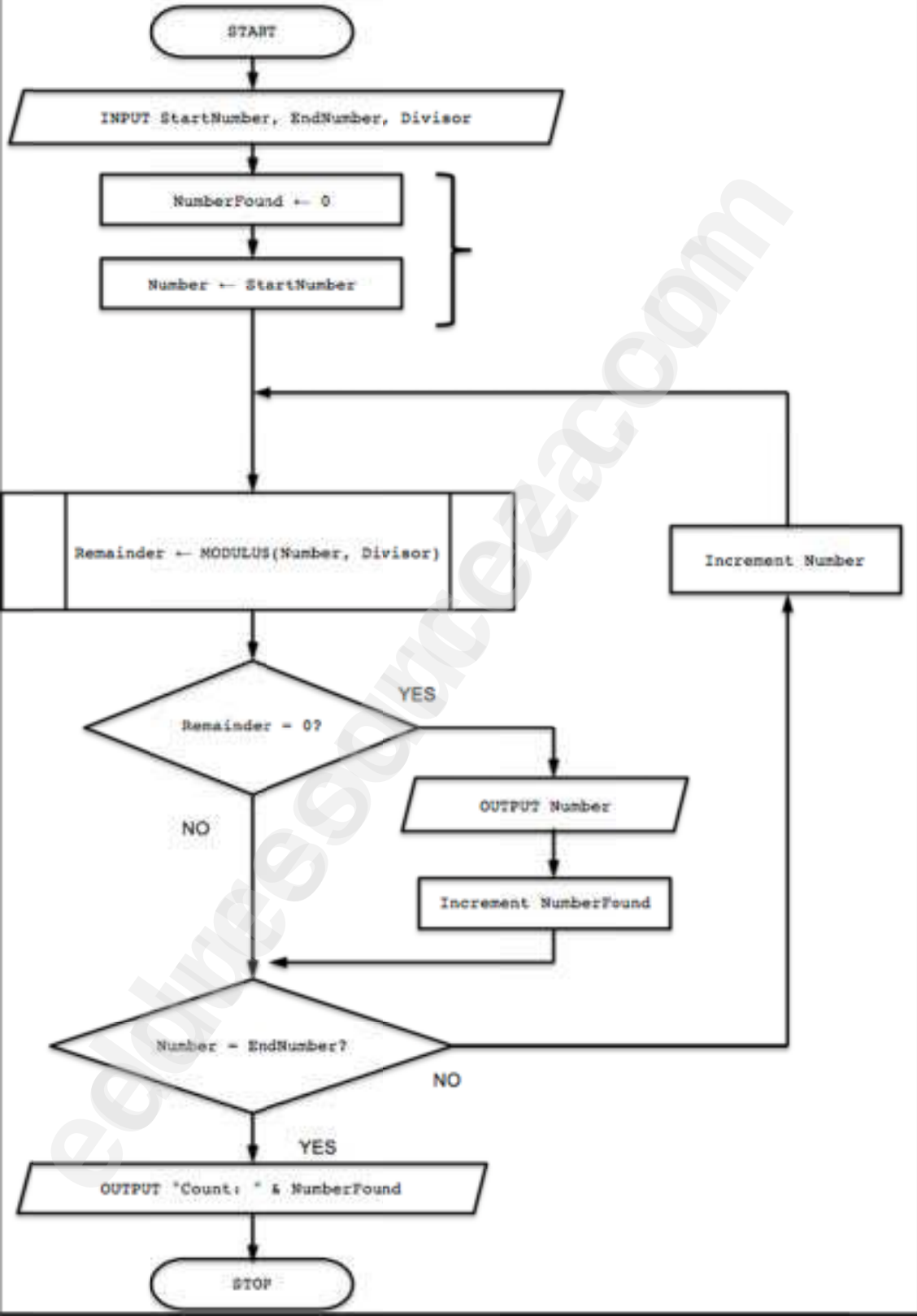


Cambridge Assessment  
International Education

| Question   | Answer                                                                                                                                                                                                                                                                                                                                                                                    | Marks      |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|----|---------|------|--------|--------|--------|------|---------|-----------|------------------|------|------|---|
| 1(a)(i)    | <table><tr><th>Data value</th><th>Data type</th></tr><tr><td>27</td><td>INTEGER</td></tr><tr><td>"27"</td><td>STRING</td></tr><tr><td>"27.3"</td><td>STRING</td></tr><tr><td>TRUE</td><td>BOOLEAN</td></tr><tr><td>27/3/2015</td><td>DATE // DATETIME</td></tr><tr><td>27.3</td><td>REAL</td></tr></table> <p>One mark for each data type<br/>Mark first data type given in each case</p> | Data value | Data type | 27 | INTEGER | "27" | STRING | "27.3" | STRING | TRUE | BOOLEAN | 27/3/2015 | DATE // DATETIME | 27.3 | REAL | 6 |
| Data value | Data type                                                                                                                                                                                                                                                                                                                                                                                 |            |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
| 27         | INTEGER                                                                                                                                                                                                                                                                                                                                                                                   |            |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
| "27"       | STRING                                                                                                                                                                                                                                                                                                                                                                                    |            |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
| "27.3"     | STRING                                                                                                                                                                                                                                                                                                                                                                                    |            |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
| TRUE       | BOOLEAN                                                                                                                                                                                                                                                                                                                                                                                   |            |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
| 27/3/2015  | DATE // DATETIME                                                                                                                                                                                                                                                                                                                                                                          |            |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
| 27.3       | REAL                                                                                                                                                                                                                                                                                                                                                                                      |            |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
| 1(a)(ii)   | 1D Array // 1DList                                                                                                                                                                                                                                                                                                                                                                        | 2          |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
| 1(a)(iii)  | <ul style="list-style-type: none"><li>Each character is represented by an <u>unique</u> / <u>corresponding</u></li><li>binary code / integer / value</li></ul>                                                                                                                                                                                                                            | 2          |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
| 1(b)       | <ul style="list-style-type: none"><li>When a section of code would be repeated</li><li>When a piece of code is needed to perform a specific task</li><li>To support modular programming / step wise refinement</li><li>Easier to debug / maintain</li><li>Built-in / library routines are tried and tested</li></ul> <p>One mark per answer</p>                                           | Max 2      |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |
| 1(c)       | <pre>CASE OF MyVar   1: CALL Proc1()   2: CALL Proc2()   3: CALL Proc3()   OTHERWISE OUTPUT "Error" ENDCASE</pre> <p>One mark for:</p> <ul style="list-style-type: none"><li>First line and ENDCASE</li><li>All clauses for 1, 2 and 3</li><li>'OTHERWISE' clause</li><li>OUTPUT statement</li></ul>                                                                                      | 4          |           |    |         |      |        |        |        |      |         |           |                  |      |      |   |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Marks        |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1(d)     | <p>Ability to recognise:</p> <ul style="list-style-type: none"> <li>• selection statement</li> <li>• iteration statement</li> <li>• assignment statements</li> <li>• data declarations / structures / data types / use of variables or objects</li> <li>• modular structure / functions / procedures / subroutines</li> <li>• subroutine parameters</li> <li>• Specific types of statement, e.g. Input, Output, File operations</li> <li>• Code format</li> <li>• Operators</li> </ul> <p>Mark as follows:<br/>Any two from above, or valid alternative<br/>Accept by example</p> | <b>Max 2</b> |

| Question    | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Marks       |             |         |             |          |           |        |    |    |   |   |    |   |  |  |  |  |  |    |   |    |  |  |  |   |  |  |  |  |  |  |  |    |   |  |  |  |  |  |  |  |          |   |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|---------|-------------|----------|-----------|--------|----|----|---|---|----|---|--|--|--|--|--|----|---|----|--|--|--|---|--|--|--|--|--|--|--|----|---|--|--|--|--|--|--|--|----------|---|
| 2(a)        | <table><tr><th>StartNumber</th><th>EndNumber</th><th>Divisor</th><th>NumberFound</th><th>Number</th><th>Remainder</th><th>Output</th></tr><tr><td>11</td><td>13</td><td>2</td><td>0</td><td>11</td><td>1</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td>12</td><td>0</td><td>12</td></tr><tr><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td>13</td><td>1</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Count: 1</td></tr></table> <p>One mark for correct Number column<br/>One mark for correct Remainder column<br/>One mark for correct Output</p> | StartNumber | EndNumber   | Divisor | NumberFound | Number   | Remainder | Output | 11 | 13 | 2 | 0 | 11 | 1 |  |  |  |  |  | 12 | 0 | 12 |  |  |  | 1 |  |  |  |  |  |  |  | 13 | 1 |  |  |  |  |  |  |  | Count: 1 | 3 |
| StartNumber | EndNumber                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Divisor     | NumberFound | Number  | Remainder   | Output   |           |        |    |    |   |   |    |   |  |  |  |  |  |    |   |    |  |  |  |   |  |  |  |  |  |  |  |    |   |  |  |  |  |  |  |  |          |   |
| 11          | 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2           | 0           | 11      | 1           |          |           |        |    |    |   |   |    |   |  |  |  |  |  |    |   |    |  |  |  |   |  |  |  |  |  |  |  |    |   |  |  |  |  |  |  |  |          |   |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |             | 12      | 0           | 12       |           |        |    |    |   |   |    |   |  |  |  |  |  |    |   |    |  |  |  |   |  |  |  |  |  |  |  |    |   |  |  |  |  |  |  |  |          |   |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             | 1           |         |             |          |           |        |    |    |   |   |    |   |  |  |  |  |  |    |   |    |  |  |  |   |  |  |  |  |  |  |  |    |   |  |  |  |  |  |  |  |          |   |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |             | 13      | 1           |          |           |        |    |    |   |   |    |   |  |  |  |  |  |    |   |    |  |  |  |   |  |  |  |  |  |  |  |    |   |  |  |  |  |  |  |  |          |   |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |             |         |             | Count: 1 |           |        |    |    |   |   |    |   |  |  |  |  |  |    |   |    |  |  |  |   |  |  |  |  |  |  |  |    |   |  |  |  |  |  |  |  |          |   |
| 2(b)        | <p>Mark as follows:</p> <ul style="list-style-type: none"><li>For a (given) range of values</li><li>Counts the number of times one number (numerator) is an exact divisor of the other</li><li>Outputs each numerator (only)</li><li>Outputs the count</li></ul> <p>Accept by example<br/>No mark for:</p> <ul style="list-style-type: none"><li>...calculate the remainder</li><li>...add one to NumberFound</li></ul>                                                                                                                                                                                                                                                  | 3           |             |         |             |          |           |        |    |    |   |   |    |   |  |  |  |  |  |    |   |    |  |  |  |   |  |  |  |  |  |  |  |    |   |  |  |  |  |  |  |  |          |   |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Marks |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 2(c)     |  <pre> graph TD     Start([START]) --&gt; Input[/INPUT StartNumber, EndNumber, Divisor/]     Input --&gt; Init1[NumberFound ← 0]     Init1 --&gt; Init2[Number ← StartNumber]     Init2 --&gt; LoopStart(( ))     LoopStart --&gt; Mod[Remainder ← MODULUS(Number, Divisor)]     Mod --&gt; DivZero{Remainder = 0?}     DivZero -- YES --&gt; OutputNum[/OUTPUT Number/]     OutputNum --&gt; IncFound[Increment NumberFound]     IncFound --&gt; LoopStart     DivZero -- NO --&gt; EndCheck{Number = EndNumber?}     EndCheck -- YES --&gt; OutputCount[/OUTPUT "Count: " &amp; NumberFound/]     OutputCount --&gt; Stop([STOP])     EndCheck -- NO --&gt; IncNum[Increment Number]     IncNum --&gt; LoopStart </pre> <p>The flowchart describes an algorithm to count the number of multiples of a given divisor within a specified range. It begins with a 'START' terminal, followed by an input block for 'StartNumber', 'EndNumber', and 'Divisor'. Initialization steps set 'NumberFound' to 0 and 'Number' to 'StartNumber'. A loop starts with calculating the remainder of 'Number' divided by 'Divisor'. If the remainder is 0, the current 'Number' is output, and 'NumberFound' is incremented. If not, the algorithm checks if 'Number' has reached 'EndNumber'. If yes, it outputs the total count and stops. If no, it increments 'Number' and loops back to the modulus calculation.</p> | 10    |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Marks |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 2(c)     | <p>Mark as follows:</p> <ul style="list-style-type: none"> <li>• One mark for <b>START</b> <b>and</b> <b>STOP / END</b></li> <li>• One mark for bracketed pair</li> <li>• One mark for each of other labelled boxes (shape must be correct for decision box)</li> </ul> <p>Decision box outputs must have two outputs and at least one label (Yes / No)<br/>Different statement categories should not appear in the same symbol (e.g. assignment and I/O)</p> <p>No mark for symbol (or pair) if parent missing or logically incorrect (except for START/END)</p> <p>Full marks should be awarded for functionally equivalent solutions.</p> |       |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Marks |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 3(a)     | <pre> PROCEDURE BubbleSort   DECLARE Temp : STRING   DECLARE FirstID, SecondID : INTEGER   DECLARE NoSwaps : BOOLEAN   DECLARE Boundary : INTEGER   Declare J : INTEGER    Boundary ← 99   REPEAT     NoSwaps ← TRUE     FOR J ← 1 TO Boundary       FirstID ← UserNameArray[J]       SecondID ← UserNameArray[J + 1]       IF FirstID &gt; SecondID         THEN           Temp ← UserNameArray[J]           UserNameArray[J] ← UserNameArray[J + 1]           UserNameArray[J + 1] ← Temp           NoSwaps ← FALSE         ENDIF       ENDFOR       Boundary ← Boundary - 1     UNTIL NoSwaps = TRUE   ENDPROCEDURE </pre> <p>Mark as follows:</p> <ol style="list-style-type: none"> <li>1. Procedure heading and ending (allow array as input parameter)</li> <li>2. Variable declaration for counter / index (integer) <b>or</b> temp (string)</li> <li>3. Outer working loop</li> <li>4. Inner loop with suitable range</li> <li>5. Correct comparison <b>in a loop</b></li> <li>6. Correct swap of complete array element <b>in a loop</b></li> <li>7. Set flag to indicate swap <b>in inner loop</b> and resetting <b>in outer loop</b></li> <li>8. Reducing Boundary <b>in a loop</b></li> </ol> | 8     |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Marks        |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 3(b)     | <p>Pseudocode solution included here for development and clarification of mark scheme. Programming language example solutions appear in the Appendix.</p> <pre> PROCEDURE FindRepeats   DECLARE i, RepeatCount: INTEGER   DECLARE FirstID, SecondID: STRING   RepeatCount ← 0    FOR i ← 2 TO 100     FirstID ← LEFT(UsernameArray[i - 1], 6)     SecondID ← LEFT(UsernameArray[i], 6)     IF FirstID = SecondID       THEN         RepeatCount ← RepeatCount + 1         OUTPUT(UsernameArray[i])       ENDIF     ENDFOR    IF RepeatCount = 0     THEN       OUTPUT "The array contains no repeated UserIDs"     ELSE       OUTPUT "There are " &amp; RepeatCount &amp; " repeated userIDs"     ENDIF   ENDPROCEDURE </pre> <p>Mark as follows (all must be correct syntax for chosen language):</p> <ol style="list-style-type: none"> <li>1. Procedure heading and ending</li> <li>2. Variable declaration for INTEGER (comment in Python) <b>and</b> initialisation for RepeatCount (or equivalent name)</li> <li>3. Loop</li> <li>4. Extraction of UserID <b>in a loop</b></li> <li>5. Correct comparison of consecutive elements... <b>in a loop</b></li> <li>6. ...output correct array element (NOT original, only duplicates) <b>in a loop</b></li> <li>7. increment RepeatCount following a comparison <b>in a loop</b></li> <li>8. Correct conditional statement checking RepeatCount (or equivalent) and then ...<br/>... two correct final OUTPUT statements</li> </ol> | <b>Max 8</b> |

| Question  | Answer                                                                                                                                                                                                                                                                                                                                                                                                    | Marks |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 3(c)(i)   | <ul style="list-style-type: none"> <li>• Problem definition</li> <li>• Design</li> <li>• Coding / programming</li> <li>• Testing</li> <li>• Documentation</li> <li>• Implementation</li> <li>• Maintenance</li> </ul>                                                                                                                                                                                     | 3     |
| 3(c)(ii)  | <u>Integrated Development Environment</u> or a suitable description                                                                                                                                                                                                                                                                                                                                       | 1     |
| 3(c)(iii) | <p>Examples include:</p> <ul style="list-style-type: none"> <li>• context sensitive prompts</li> <li>• (dynamic) syntax checking</li> <li>• use of colours to highlight key words / pretty printing</li> <li>• Formatting</li> <li>• Single-stepping</li> <li>• Breakpoints</li> <li>• Report / watch window</li> <li>• (UML) modelling</li> <li>• Compiler/interpreter</li> <li>• Text editor</li> </ul> | Max 2 |
| 3(c)(iv)  | Run-time                                                                                                                                                                                                                                                                                                                                                                                                  | 1     |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                   | Marks        |                  |        |             |            |             |         |             |             |          |              |              |   |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------|--------|-------------|------------|-------------|---------|-------------|-------------|----------|--------------|--------------|---|
| 4(a)     | <table><thead><tr><th>Value</th><th>Formatted String</th></tr></thead><tbody><tr><td>1327.5</td><td>"□ 1327.50"</td></tr><tr><td>1234</td><td>"□ 1234.00"</td></tr><tr><td>7.456</td><td>"□□□ 07.45"</td></tr></tbody></table> <p>Leading spaces must be present</p>                                                                                                     | Value        | Formatted String | 1327.5 | "□ 1327.50" | 1234       | "□ 1234.00" | 7.456   | "□□□ 07.45" | 2           |          |              |              |   |
| Value    | Formatted String                                                                                                                                                                                                                                                                                                                                                         |              |                  |        |             |            |             |         |             |             |          |              |              |   |
| 1327.5   | "□ 1327.50"                                                                                                                                                                                                                                                                                                                                                              |              |                  |        |             |            |             |         |             |             |          |              |              |   |
| 1234     | "□ 1234.00"                                                                                                                                                                                                                                                                                                                                                              |              |                  |        |             |            |             |         |             |             |          |              |              |   |
| 7.456    | "□□□ 07.45"                                                                                                                                                                                                                                                                                                                                                              |              |                  |        |             |            |             |         |             |             |          |              |              |   |
| 4(b)     | <table><thead><tr><th>Value</th><th>Required output</th><th>Mask</th></tr></thead><tbody><tr><td>1234.00</td><td>"1,234.00"</td><td>"0,000.00"</td></tr><tr><td>3445.66</td><td>"£3,445.66"</td><td>"£0,000.00"</td></tr><tr><td>10345.56</td><td>"\$□□10,345"</td><td>"\$##00,000"</td></tr></tbody></table> <p>Currency and 'punctuation' symbols must be as shown</p> | Value        | Required output  | Mask   | 1234.00     | "1,234.00" | "0,000.00"  | 3445.66 | "£3,445.66" | "£0,000.00" | 10345.56 | "\$□□10,345" | "\$##00,000" | 3 |
| Value    | Required output                                                                                                                                                                                                                                                                                                                                                          | Mask         |                  |        |             |            |             |         |             |             |          |              |              |   |
| 1234.00  | "1,234.00"                                                                                                                                                                                                                                                                                                                                                               | "0,000.00"   |                  |        |             |            |             |         |             |             |          |              |              |   |
| 3445.66  | "£3,445.66"                                                                                                                                                                                                                                                                                                                                                              | "£0,000.00"  |                  |        |             |            |             |         |             |             |          |              |              |   |
| 10345.56 | "\$□□10,345"                                                                                                                                                                                                                                                                                                                                                             | "\$##00,000" |                  |        |             |            |             |         |             |             |          |              |              |   |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Marks |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 5(a)     | <pre> PROCEDURE MakeNewfile   DECLARE OldFileLine : STRING   DECLARE NewFileLine : STRING    OPENFILE "EmailDetails" FOR READ   OPENFILE "NewEmailDetails" FOR WRITE    WHILE NOT EOF("EmailDetails")     READFILE "EmailDetails", OldFileLine     NewFileLine ← "00" &amp; OldFileLine     WRITEFILE "NewEmailDetails", NewFileLine   ENDWHILE    CLOSEFILE "EmailDetails"   CLOSEFILE "NewEmailDetails"  ENDPROCEDURE </pre> <p>Mark as follows:</p> <ol style="list-style-type: none"> <li>1. Variable declaration of STRING for OldFileLine (or equivalent)</li> <li>2. Open EmailDetails for READ</li> <li>3. Open NewEmailDetails for WRITE</li> <li>4. Correct loop checking for EOF (EmailDetails)</li> <li>5. Reading a line from EmailDetails in a loop</li> <li>6. Correct concatenation in a loop</li> <li>7. Writing a line to NewEmailDetails in a loop</li> </ol> <p>Closing both files</p> | 8     |
| 5(b)     | <p><b>Invalid string examples:</b></p> <p>A string with nothing before '@'</p> <p>A string with nothing after '@'</p> <p>A string with 1 or 2 characters after '@'</p> <p>A string with no '@' symbol</p> <p>A string with more than one '@' symbol</p> <p><b>Explanation</b></p> <p>Sensible explanation mapping each given string to an individual rule</p> <p>One mark for string</p> <p>One mark for explanation</p> <p>Each rule should be tested once only</p>                                                                                                                                                                                                                                                                                                                                                                                                                                       | 6     |

**Programming Example Solutions****Q3(b): Visual Basic**

```
Sub FindRepeats()  
    Dim Repeats As Integer  
    Dim i As Integer  
    Dim FirstID As String  
    Dim SecondID As String  
  
    Repeats = 0  
    For i = 1 To 99  
        FirstID = Left(UsernameArray(i), 6)  
        SecondID = Left(UsernameArray(i + 1), 6)  
        If FirstID = SecondID Then  
            Console.WriteLine(UsernameArray(i + 1))  
            Repeats = Repeats + 1  
        End If  
    Next i  
  
    If Repeats = 0 Then  
        Console.WriteLine("The array contains no repeated UserIDs")  
    Else  
        Console.WriteLine("There are " & Repeats & " repeated UserIDs")  
    End If  
  
End Sub
```

**Alternative:**

```
Sub FindRepeats ()  
  
    Dim RepeatCount, i As Integer  
    Dim FirstID, SecondID As String  
  
    RepeatCount = 0  
    For i = 1 to 99  
        FirstID = Left(UsernameArray(i-1),6)  
        SecondID = Left(UsernameArray(i),6)  
        If FirstID = SecondID then  
            Console.WriteLine (UsernameArray(i))  
            RepeatCount = RepeatCount + 1  
        End If  
    Next i  
  
    If RepeatCount = 0 then  
        Console.WriteLine ("The array contains no repeated UserIDs")  
    Else  
        Console.WriteLine ("There are "& RepeatCount & " repeated UserIDs")  
    End If  
  
End Sub
```

**Q3(b): Pascal**

```
procedure FindRepeats ();  
  
var  
    RepeatCount, i : integer;  
    FirstID, SecondID : string;  
  
begin  
    RepeatCount := 0;  
    for i := 1 to 99 do  
        begin  
            FirstID := Copy(UsernameArray[i-1],1,6);  
            SecondID := Copy(UsernameArray[i],1,6);  
            if FirstID = SecondID then  
                begin  
                    writeln (UsernameArray[i]);  
                    RepeatCount := RepeatCount + 1;  
                end;  
            end;  
  
            if RepeatCount = 0 then  
                writeln ('The array contains no repeated UserIDs')  
            else  
                writeln ('There are ', RepeatCount, ' repeated UserIDs')  
            end;  
        end;  
end;
```

**Q3(b): Python**

```
def FindRepeats():
    #Repeats, i Integer
    #FirstID, SecondID string
    Repeats = 0
    for i in range(0, len(UserNameArray)-1):
        FirstID = (UserNameArray[i])[:6]
        SecondID = (UserNameArray[i+1])[:6]
        if FirstID == SecondID:
            print(UserNameArray[i+1])
            Repeats = Repeats + 1
    if Repeats == 0:
        print("The array contains no repeated UserIDs")
    else:
        print("There are ", Repeats, " repeated UserIDs")
```

**Alternative:**

```
def FindRepeats ():

    RepeatCount = 0                                ## Defined as an integer

    for i in range (1,100):                          ## depending on next two
lines(0,99) (2,101)
        FirstID = UserNameArray[i-1]                ## Defined as string
        SecondID = UserNameArray[i]                  ## Defined as string
        if FirstID[0:6] == SecondID[0:6]:            ## Using split
            print (UserNameArray[i])
            RepeatCount += 1

    if repeatCount == 0:
        print ('The array contains no repeated UserIDs')
    else:
        print ('There are ', RepeatCount, ' repeated UserIDs')
```