

**COMPONENT 2 Practical Programming to Solve Problems****MARK SCHEME****Guidance for examiners**

## Positive marking

It should be remembered that learners are writing under examination conditions and credit should be given for what the learner writes, rather than adopting the approach of penalising him/her for any omissions. It should be possible for a very good response to achieve full marks and a very poor one to achieve zero marks. Marks should not be deducted for a less than perfect answer if it satisfies the criteria of the mark scheme.

For questions that are objective or points-based the mark scheme should be applied precisely. Marks should be awarded as indicated and no further subdivision made.

For band marked questions in **Component 2** the assessment grid advises the marks to allocate to responses which demonstrate the qualities needed in AO2 and AO3. There is limited indicative content as learner response will vary significantly, as the choice of solution will differ based on a variety of factors (e.g. IDE used, interface type chosen, file handling routine used). Where a response is not credit worthy or not attempted it is indicated on the grid as mark band zero.

## **Banded mark schemes**

Banded mark schemes are divided so that each band has a relevant descriptor. The descriptor for the band provides a description of the performance level for that band. Each band contains marks.

Examiners should first read and annotate a learner's answer to pick out the evidence that is being assessed in that question. Once the annotation is complete, the mark scheme can be applied.

This is done as a two stage process.

### **Stage 1 – Deciding on the band**

When deciding on a band, the answer should be viewed holistically. Beginning at the lowest band, examiners should look at the learner's answer and check whether it matches the descriptor for that band. Examiners should look at the descriptor for that band and see if it matches the qualities shown in the learner's answer. If the descriptor at the lowest band is satisfied, examiners should move up to the next band and repeat this process for each band until the descriptor matches the answer.

If an answer covers different aspects of different bands within the mark scheme, a 'best fit' approach should be adopted to decide on the band and then the learner's response should be used to decide on the mark within the band. For instance if a response is mainly in band 2 but with a limited amount of band 3 content, the answer would be placed in band 2, but the mark awarded would be close to the top of band 2 as a result of the band 3 content.

Examiners should not seek to mark candidates down as a result of small omissions in minor areas of an answer.

### **Stage 2 – Deciding on the mark**

Once the band has been decided, examiners can then assign a mark. During standardising (marking conference), detailed advice from the Principal Examiner on the qualities of each mark band will be given. Examiners will then receive examples of answers in each mark band that have been awarded a mark by the Principal Examiner. Examiners should mark the examples and compare their marks with those of the Principal Examiner.

When marking, examiners can use these examples to decide whether a learner's response is of a superior, inferior or comparable standard to the example. Examiners are reminded of the need to revisit the answer as they apply the mark scheme in order to confirm that the band and the mark allocated is appropriate to the response provided.

Indicative content is also provided for banded mark schemes. Indicative content is not exhaustive, and any other valid points must be credited. In order to reach the highest bands of the mark scheme a learner need not cover all of the points mentioned in the indicative content but must meet the requirements of the highest mark band. Where a response is not creditworthy, that is contains nothing of any significance to the mark scheme, or where no response has been provided, no marks should be awarded.

Q	Answer	Mark	AO1	AO2	AO3	Tot
1a	Any one of: <ul style="list-style-type: none"> <li>• MusicFile</li> <li>• VideoFile</li> <li>• Track</li> <li>• Movie</li> </ul>	1		2.1a		1
1bi	3D	1		2.1a		1
1bii	Any one of: <ul style="list-style-type: none"> <li>• Height</li> <li>• Width</li> <li>• Quality</li> <li>• ID</li> <li>• SamplingRate</li> <li>• ChannelCount</li> </ul>	1		2.1a		1
1biii	Any one of: <ul style="list-style-type: none"> <li>• FileSize</li> <li>• MediaLength</li> <li>• Position</li> </ul>	1		2.1a		1
1c	The property album is private to that class.  Any one of: <ul style="list-style-type: none"> <li>• Only an object of type Track would be able to make changes to its internal property Album</li> <li>• To read from the property you would need a method within the class that returns the contents (such as GetAlbum may provide) and similar to make changes to the property</li> <li>• To make changes to the property you would need a method within the class that changes its contents.</li> </ul>	1  1		2.1a  2.1b		2
1d	1 mark for all methods within Track: <ul style="list-style-type: none"> <li>• GetArtist()</li> <li>• GetAlbum()</li> <li>• Play()</li> </ul> 1 mark for all methods within superclass MusicFile: <ul style="list-style-type: none"> <li>• GetChannelCount()</li> <li>• SetLanguage()</li> <li>• GetSamplingRate()</li> </ul> 1 mark for all methods within superclass MediaFile: <ul style="list-style-type: none"> <li>• GetTitle()</li> <li>• GetFileSize()</li> <li>• GetMediaLength()</li> </ul>	1  1  1		2.1b  2.1b  2.1b		3
1e	1 mark for all properties within Movie: <ul style="list-style-type: none"> <li>• 3D</li> <li>• Director</li> <li>• Certificate</li> <li>• Position</li> </ul> 1 mark for all properties within superclass VideoFile: <ul style="list-style-type: none"> <li>• Height</li> <li>• Width</li> </ul>	1  1		2.1b  2.1b		3

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	<ul style="list-style-type: none"> <li>Quality</li> </ul> <p>1 mark for all properties within superclass MediaFile:</p> <ul style="list-style-type: none"> <li>ID</li> <li>Title</li> <li>FileSize</li> <li>MediaLength</li> </ul>	1		2.1b		
1f	<p>The method SetPosition would be used to change the internal property Position.</p> <p>Position is a private property and therefore to change this you would need a <b>publicly</b> available method such as SetPosition to change it.</p>	1		2.1a		2
1g	<p>1 mark for any 1 example:</p> <ul style="list-style-type: none"> <li>SetLanguage(Language)</li> <li>SetPosition(Position)</li> </ul> <p>When <b>passing by reference</b> to the method <code>SetLanguage(Language) / SetPosition(Position)</code> the <b>address of the parameter Language/Position</b> is passed to the method (rather than the actual value of the data)</p> <p>The other method is <b>by value</b>:  <b>a local copy of the contents of Language/Position is created for the method</b>  <code>SetLanguage(Language) / SetPosition(Position)</code>.</p> <p>Accepted for above point, not expected:  Passing by reference may lead to unintended side effects where the parameter has its value changed in the method named and another method within other classes.</p>	1		2.1a		5
		1		2.1b		
		1		2.1b		
		1		2.1b		
		1		2.1b		

Q	Answer	Mark	AO1	AO2	AO3	Tot																				
2a	2	1		2.1a		1																				
2b	<p>1 mark for each example x 2 1 mark for each correctly calculated check digit x 2</p> <p>For example: Customer number 1: 1234, Check digit 1: 0 Customer number 2: 2134, Check digit 1: 0</p> <p>If the two original customer account numbers contained the same digits in different orders the resulting check digits would be the same.</p>	<p>2 2</p> <p>1</p>		<p>3.1c 3.1c</p> <p>3.1c</p>		5																				
2c	<p>1 mark for each correctly completed row.</p> <table border="1" data-bbox="204 763 995 927"> <thead> <tr> <th>i</th> <th>A[i]</th> <th>Total</th> <th>CheckDigit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>6</td> <td>12</td> <td>-1</td> </tr> <tr> <td>2</td> <td>7</td> <td>19</td> <td>-1</td> </tr> <tr> <td>3</td> <td>4</td> <td>27</td> <td>-1</td> </tr> <tr> <td>4</td> <td>8</td> <td>35</td> <td>5</td> </tr> </tbody> </table>	i	A[i]	Total	CheckDigit	1	6	12	-1	2	7	19	-1	3	4	27	-1	4	8	35	5	<p>1 1 1 1</p>			<p>3.1c 3.1c 3.1c 3.1c</p>	4
i	A[i]	Total	CheckDigit																							
1	6	12	-1																							
2	7	19	-1																							
3	4	27	-1																							
4	8	35	5																							

Q	Answer	Mark	AO1	AO2	AO3	Total
3	<p>Any valid/functional comparison based algorithm that returns outputs as stated in question:</p> <p><b>Example</b></p> <pre> 1   set i = 1 2   set Position = -1 3   set Found = false 4   repeat 5     if MyArray[i] = MyArray[i - 1] then 6       set Position = i 7       output "Position =", i 8       output "TRUE" 9       set Found = true 10    else 11     set i = i + 1 12    endif 13  until (Found = true OR i &gt; LEN(MyArray)) 14  if Found = false then 15  output "FALSE" </pre> <p>One mark for each:</p> <ul style="list-style-type: none"> <li>• initialise variables</li> <li>• use of a loop</li> <li>• comparison</li> <li>• output position</li> <li>• output "TRUE"</li> <li>• uses a flag to track "found"</li> <li>• increment</li> <li>• use of terminating condition</li> <li>• use of logical operator for multiple terminating conditions</li> <li>• if "found" statement</li> <li>• output "FALSE"</li> </ul> <p>Marks awarded for concepts demonstrated above. Other solutions incorporating above concepts that provide exactly the same result would be awarded the mark.</p> <p>N.B. Above algorithm searches for adjacent duplicates in a pre populated array as stated in the question.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>			<p>3.1b</p> <p>3.1b</p> <p>3.1b</p> <p>3.1b</p> <p>3.1b</p> <p>3.1b</p> <p>3.1b</p> <p>3.1b</p> <p>3.1b</p> <p>3.1b</p> <p>3.1b</p> <p>3.1b</p>	11

Q	Answer	Mark	AO1	AO2	AO3	Total
4ai 4bi 4ci	<b>Indicative content:</b> <ul style="list-style-type: none"> <li>• Reading contents</li> <li>• Comparing Genres to the list</li> <li>• Incrementing the contents of the genre</li> <li>• Outputting the correct number</li> </ul>	4			3.1b	4

Band	AO3.1b Max 4 marks
	<b>4 marks</b>
<b>3</b>	The candidate has: <ul style="list-style-type: none"> <li>• Implemented all the points required as stated in the indicative content</li> <li>• Used and fully exploited the programming facilities of the language</li> <li>• Demonstrated a sound understanding of the appropriate tools and techniques available to them</li> </ul>
<b>2</b>	<b>2-3 marks</b> The candidate has: <ul style="list-style-type: none"> <li>• Implemented the majority of the points required as stated in the indicative content. Majority is defined as a response that provides two or three items of the functionality signalled in the indicative content</li> <li>• Used and exploited the programming facilities of the language</li> <li>• Demonstrated an understanding of the tools and techniques available to them</li> </ul>
<b>1</b>	<b>1 mark</b> The candidate has: <ul style="list-style-type: none"> <li>• Implemented only one of the points required as stated in the indicative content</li> <li>• Used some of the programming facilities of the language</li> <li>• Demonstrated a limited understanding of the tools and techniques available to them</li> </ul>
<b>0</b>	<b>0 marks</b> Response not credit worthy or not attempted.

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Q	Answer	Mark	AO1	AO2	AO3	Total
4aii 4bii 4cii	<p><b>Indicative content:</b></p> <ul style="list-style-type: none"> <li>• Input</li> <li>Validation methods of: <ul style="list-style-type: none"> <li>○ Range check</li> <li>○ Format check</li> <li>○ Length check</li> <li>○ Presence check</li> </ul> </li> <li>• Creates a data file called customerdetails.txt</li> <li>• Stores on disc in a text file called customerdetails.txt</li> <li>• Descriptive/useful feedback that file has been saved</li> <li>• Candidates may use custom data types / standard methods</li> <li>• Retrieves data from disc</li> <li>• Retrieves specified customer from disc <ul style="list-style-type: none"> <li>○ Candidates may use Random (direct), serial, or sequential file access</li> </ul> </li> <li>• HCI fit for purpose (Textual or GUI)</li> </ul>	12			3.1b	12

Band	AO3.1b Max 12 marks
	<b>9-12 marks</b>
3	<p>The candidate has:</p> <ul style="list-style-type: none"> <li>• Created a new program including all or the majority of the functionality as required in the question and stated in the indicative content. The majority of the functionality is defined as a response that provides nine to eleven items of the functionality signalled in the indicative content</li> <li>• Used and fully exploited the programming facilities of the language</li> <li>• Demonstrated a sound understanding of the appropriate tools and techniques available to them</li> <li>• Written code that is well structured</li> <li>• Provided evidence of a completed user interface which aids user interaction and is intuitive</li> </ul>
2	<p style="text-align: center;"><b>5-8 marks</b></p> <p>The candidate has:</p> <ul style="list-style-type: none"> <li>• Created a new program including most of the functionality as required in the question and stated in the indicative content. Most of the functionality is defined as a response that provides five to eight items of the functionality signalled in the indicative content</li> <li>• Made use of an appropriate range of the programming facilities of the language</li> <li>• Demonstrated an understanding of the tools and techniques available to them</li> <li>• Provided evidence of a completed user interface which aids user interaction</li> </ul>
1	<p style="text-align: center;"><b>1-4 marks</b></p> <p>The candidate has:</p> <ul style="list-style-type: none"> <li>• Created a new program with a limited range of the functionality as stated in the indicative content or improved the prototype provided by adding a limited range of the new functionality as stated in the indicative content. A limited range of functionality is defined as a response that provides one to four items of the functionality signalled in the indicative content</li> <li>• Used a limited range of the programming facilities of the language</li> <li>• Demonstrated a limited understanding of the tools and techniques available to them</li> <li>• Provided evidence of a user interface</li> </ul>
0	<p style="text-align: center;"><b>0 marks</b></p> <p>Response not credit worthy or not attempted.</p>



Q	Answer	Mark	AO1	AO2	AO3	Total
4aiii 4biii 4ciii	<b>Indicative content:</b> <ul style="list-style-type: none"> <li>• Clear annotation of steps within the following routines: <ul style="list-style-type: none"> <li>○ Validation</li> <li>○ Storage of data to file</li> <li>○ Retrieving specified data from file</li> </ul> </li> <li>• Use of self-documenting identifiers / explanation of variables</li> </ul>	4			3.1a	4

Band	AO3.1a Max 4 marks
	<b>4 marks</b>
<b>3</b>	<p>The candidate has:</p> <ul style="list-style-type: none"> <li>• Produced listings that are appropriately laid out and included sufficient annotation to demonstrate an understanding of <b>all</b> programming routines listed in the indicative content</li> <li>• Written code using self-documenting identifiers / explained variables</li> <li>• Used appropriate technical terminology referring to the indicative content confidently and accurately.</li> </ul>
	<b>2-3 marks</b>
<b>2</b>	<p><b>Three</b> marks can be awarded if the candidate has:</p> <ul style="list-style-type: none"> <li>• Produced listings that are appropriately laid out and included sufficient annotation to demonstrate an understanding of <b>all</b> programming routines listed in the indicative content</li> <li>• Not written code using self-documenting identifiers / not explained variables</li> <li>• Used appropriate technical terminology referring to the indicative content.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Produced listings that are appropriately laid out and included sufficient annotation to demonstrate an understanding of <b>two</b> of the programming routines listed in the indicative content</li> <li>• Written code using self-documenting identifiers / explained variables</li> <li>• Used appropriate technical terminology referring to the indicative content.</li> </ul> <p><b>Two</b> marks can be awarded if the candidate has:</p> <ul style="list-style-type: none"> <li>• Produced listings that are appropriately laid out and included sufficient annotation to demonstrate an understanding of <b>two</b> of the programming routines listed in the indicative content</li> <li>• Not written code using self-documenting identifiers / not explained variables</li> <li>• Used appropriate technical terminology referring to the indicative content.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Produced listings that are appropriately laid out and included sufficient annotation to demonstrate an understanding of <b>one</b> of the programming routines listed in the indicative content</li> <li>• Written code using self-documenting identifiers / explained variables</li> <li>• Used appropriate technical terminology referring to the indicative content.</li> </ul>
	<b>1 mark</b>
<b>1</b>	<p>The candidate has:</p> <ul style="list-style-type: none"> <li>• Produced listings that are appropriately laid out and include sufficient annotation to demonstrate an understanding of <b>one</b> programming routine listed in the indicative content</li> <li>• Used limited technical terminology referring to the indicative content.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Written code using self-documenting identifiers</li> <li>• Used limited technical terminology referring to the indicative content.</li> </ul>
<b>0</b>	<b>0 marks</b>
	Response not credit worthy or not attempted.