GCE AS MARKING SCHEME

SUMMER 2018

AS (NEW)
COMPUTER SCIENCE - UNIT 2
2500U20-1

INTRODUCTION

This marking scheme was used by WJEC for the 2018 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

WJEC
GCE A Level Computer Science – Unit 2

Summer 2018 Mark Scheme

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 mark schemes are in two parts.

Part 1 is advice on the indicative content that suggests the range of computer science concepts, theory, issues and arguments which may be included in the learner's answers. These can be used to assess the quality of the learner's response.

Part 2 is an assessment grid advising bands and associated marks that should be given to responses which demonstrate the qualities needed in AO1, AO2 and AO3. 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.

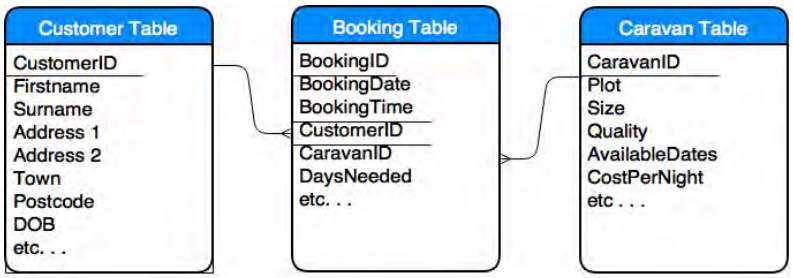
Stage 2 – Deciding on the mark

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.

SECTION A

Q	Answer	Mark	AO1	AO2	AO3	Total
1	**Award 1** mark for each: • Correct **1:M** relationship link from Customer to Booking • Correct **1:M** relationship link from Caravan to Booking (must indicate many side for each mark above) • Foreign key from Customers table (e.g. CustomerID) • Foreign key from Caravan Table (CaravanID) • Customer Table completed with example fields • Booking Table completed with example fields Indicative content:  	1 1 1 1 1 1 1		2.1b		6

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th></tr>
<tr><td>2</td><td>
Award 1 mark in Customer table for each of:
• Fieldnames (2 suitable fields in addition to KF) 1
• Data type (accept autonumber as type) 1
• Key Field (any indicator of KF if clear (*/underline)) 1

Award 1 mark in Booking table for each of:
• New Keyfield 1
• Foreign key from Customer (must match above) 1
• Foreign key from Caravan (must be CaravanID) 1
• Data type (accept autonumber as type) 1
• 1 other field such as BookingDate, length of stay. Date etc. 1

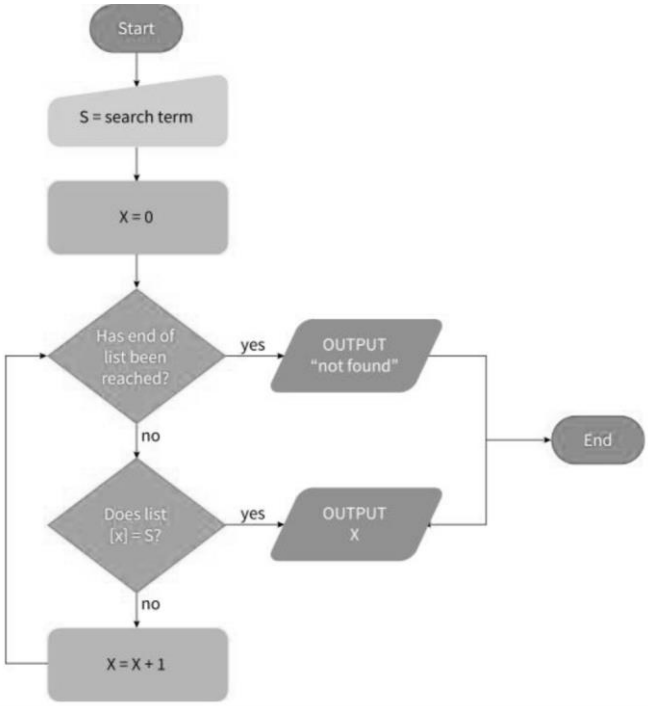
• Requirements for Validation (both tables needed for 1 mark)
o Range, Format, Presence, Length . . . 1
• Field lengths (accept single/double) 1

Accepted: Joint / composite foreign key.

Indicative content

Non exhaustive example of Customers table:
<table>
<tr><th>Fieldname</th><th>Keyfield</th><th>Data Type</th><th>Field Length</th><th>Validation</th></tr>
<tr><td>CustomerID</td><td>Yes-indexed</td><td>Integer</td><td></td><td>Presence</td></tr>
<tr><td>Title</td><td>-</td><td>String</td><td>10</td><td>Lookup Mr, Mrs, Miss …</td></tr>
<tr><td>FirstName</td><td>-</td><td>String</td><td>25</td><td></td></tr>
<tr><td>…</td><td>…</td><td>…</td><td>…</td><td>…</td></tr>
<tr><td>Postcode</td><td>-</td><td>String</td><td>9</td><td>Format LL00 0LL</td></tr>
<tr><td>DOB</td><td>-</td><td>Date</td><td>2/2/4</td><td>Range 1-31, 1-12 …</td></tr>
</table>
Etc . . .

Non exhaustive example of Booking table:
<table>
<tr><th>Fieldname</th><th>Keyfield</th><th>Data Type</th><th>Field Length</th><th>Validation</th></tr>
<tr><td>BookingID</td><td>Yes-indexed</td><td>Integer</td><td></td><td>Presence</td></tr>
<tr><td>CustomerID</td><td>FK</td><td>Same as above</td><td>Same as above</td><td>-</td></tr>
<tr><td>CaravanID</td><td>FK</td><td>Integer</td><td></td><td>-</td></tr>
<tr><td>BookingDate</td><td>-</td><td>Date</td><td>2/2/4</td><td>Range 1-31, 1-12</td></tr>
<tr><td>LengthOfStay</td><td>-</td><td>Integer</td><td></td><td>Range 1-364</td></tr>
</table>
</td><td>11</td><td></td><td>2.1b</td><td></td><td>10</td></tr>
</table>

Q	Answer	Mark	AO1	AO2	AO3	Total
3	**Indicative content:**  One mark for each: • Initialising variable • Correct symbols • Correct decision (search match for list = searchitem type.) • Correct use of a loop • Incrementing the counter • Correct use of terminating condition (end of list) • Correct output location • Correct output not found (not after all items checked, even if item found) Notes: There may be many ways to solve the problem. Must be applied to scenario as AO2	1 1 1 1 1 1 1 1		2.1b		8

Q	Answer	Mark	AO1	AO2	AO3	Total
4	**Indicative content:** • Discussion of interface (CLI/GUI) • Data Structures (arrays/files) • File handling (serial/random) • Validation (range, format, presence, length) • Local or global variables used • Ability to handle data types (string/integer/Boolean) **Note:** this must be applied to how the scenario can be solved using the language of the candidates' choice. (Limited by spec to VB, Python and Java.)	6		2.1b		6

Band	AO2.1b Max 6 marks
3	**5 - 6 marks** The candidate has: • written an extended response that has a sustained line of reasoning which is coherent, relevant, and logically structured • shown clear understanding of the requirements of the question and a clear knowledge of the indicative content. Clear knowledge is defined as a response that provides five to six relevant detailed points on the selection and justification of a method of solution for the main requirements listed in the scenario • addressed the question appropriately with minimal repetition and no irrelevant material • presented a balanced discussion and justified their answer with examples • used appropriate technical terminology referring to the indicative content confidently and accurately.
2	**3 - 4 marks** The candidate has: • written a response that has an adequate line of reasoning with elements of coherence, relevance, and logical structure • shown adequate understanding of the requirements of the question and a satisfactory knowledge of a proposed method of solution as specified in the indicative content. Satisfactory knowledge is defined as a response that provides three to four points on the selection and justification of a method of solution for the three main requirements listed in the scenario • presented a discussion with limited examples • used appropriate technical terminology referring to the indicative content.
1	**1 – 2 marks** The candidate has: • written a response that that lacks sufficient reasoning and structure • produced a discussion which is not well developed • attempted to address the question but has demonstrated superficial knowledge of the topics specified in the indicative content. Superficial knowledge is defined as a response that provides one to two points on the selection and justification of a method of solution for the three main requirements listed in the scenario • used limited technical terminology referring to the indicative content.
0	**0 marks** Response not credit worthy or not attempted.

Q	Answer	Mark	AO1	AO2	AO3	Tot
5	**Indicative content:** **Answer must be within the context of *LlaethFarm Caravan Park's* scenario:** The managers: They would require read/write access to view all details within the three tables: Customers, Bookings, Caravans. The receptionists: They would need to update so need read/write to customers and bookings, however, read only to Caravans would probably be sufficient. (Award mark if justified full access to caravans) The grounds-keepers: They would need to update so need read or read/write to Caravans. Would not need access to customers so no access. Accept read/write or read-only access to Bookings. The cleaners: Would need to update Caravans, but read only to bookings and no access to customers. (Award mark if justified full access to customers)	6		2.1b		6

Band	AO2.1b Max 6 marks
3	**5 - 6 marks** The candidate has: • written an extended response that has a sustained line of reasoning which is coherent, relevant, and logically structured • shown clear understanding of the requirements of the question and a clear knowledge of the indicative content. Clear knowledge is defined as a response that provides five to six relevant detailed points from within the indicative content and related to the scenario. • addressed the question appropriately with minimal repetition and no irrelevant material • presented a balanced discussion and justified their answer with examples related to the clients and staff of the company • used appropriate technical terminology referring to the indicative content confidently and accurately.
2	**3 - 4 marks** The candidate has: • written a response that has an adequate line of reasoning with elements of coherence, relevance, and logical structure • shown adequate understanding of the requirements of the question and a satisfactory knowledge of the topic of the question. Satisfactory knowledge is defined as a response that provides three to four points signalled in the indicative content • presented a discussion with limited examples • used appropriate technical terminology referring to the indicative content.
1	**1 - 2 marks** The candidate has: • written a response that that lacks sufficient reasoning and structure • produced a discussion which is not well developed • attempted to address the question but has demonstrated superficial knowledge of the topics specified in the indicative content. Superficial knowledge is defined as a response that provides only the names of the items within the indicative content and only superficially related to the scenario content. • used limited technical terminology referring to the indicative content.
0	**0 marks** Response not credit worthy or not attempted.

Q	Answer	Mark	AO1	AO2	AO3	Total

6	Any valid/functional binary search or divide and conquer based algorithm that returns outputs as stated in question:
	
	Example
	
	`1 cArray[0 to 9999]`
	
	`2 start is integer`
	`3 endv is integer`
	`4 found is Boolean`
	`5 mid is integer`
	`6`
	`7 set start = 0`
	`8 set endv = 9999`
	`9 set found = FALSE`
	`10`
	`11 input searchValue`
	`12`
	`13 repeat`
	`14 set mid = (start + endv) DIV 2`
	`15 if searchValue = cArray[mid] then`
	`16 set found = TRUE`
	`17 Output "SearchValue found at position", Mid`
	`18 endif`
	`19`
	`20 if searchValue > cArray[mid] then`
	`21 set start = mid + 1`
	`22 endif`
	`23`
	`24 if searchValue < cArray[mid] then`
	`25 set endv = mid - 1`
	`26 endif`
	`27 until (found = TRUE) OR (endv < start)`
	`28`
	`29 if found = FALSE`
	`30 Output "searchValue not found"`
	`31 endif`
	`32 End`
	
	Marking
	• Declare array OR initialise variables
	• Input SearchValue
	• Loop structure
	• Calculate and output position if found
	• Correct terminating condition
	• Correctly discard half of array if myArray[Mid] > SearchValue
	• Correctly discard half of array if myArray(Mid] < SearchValue
	• Output message if not found
	
	Marks awarded for concepts demonstrated above. Other solutions incorporating above concepts that provide exactly the same result are to be awarded the mark.
		1
		1
		1
		1
		1
		1
		1
		
		1
					3.1b	8

Section B

Q	Answer	Mark	AO1	AO2	AO3	Total
1	**Indicative content:** • Addition and Subtraction function working • Multiplication and Division function working • MS stores on screen result in text file called calcResult • MR recalls the value in CalcResult and shows on screen	4			3.1b	4

Band	AO3.1b Max 4 marks
3	**4 marks** The candidate has: • Implemented all the points required as stated in the indicative content • Used and fully exploited the programming facilities of the language • Demonstrated a sound understanding of the appropriate tools and techniques available to them
2	**2 - 3 marks** The candidate has: • 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 • Used and exploited the programming facilities of the language • Demonstrated an understanding of the tools and techniques available to them
1	**1 mark** The candidate has: • Implemented only one of the points required as stated in the indicative content • Used some of the programming facilities of the language • Demonstrated a limited understanding of the tools and techniques available to them
0	**0 marks** Response not credit worthy or not attempted.

Q	Answer	Mark	AO1	AO2	AO3	Total

2	**Indicative content:**
	• Input
	(any four validation methods of):
	  • Range check
	  • Format check
	  • Length check
	  • Presence check
	  • Lookup check
	  • Type check
	• Stores on disk in a text file called customerDetails
	• Retrieves Customer matching criteria entered from file
	• HCI fit for purpose (CLI or GUI)
		8			3.1b	8

Band	AO3.1b Max 8 marks
3	**7-8 marks** The candidate has: • Created a new program including 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 seven to eight items of the functionality signalled in the indicative content • Used and fully exploited the programming facilities of the language • Demonstrated a sound understanding of the appropriate tools and techniques available to them • Written code that is well structured • Provided evidence of a completed user interface which aids user interaction and is intuitive
2	**3-6 marks** The candidate has: • 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 three to six items of the functionality signalled in the indicative content • Made use of an appropriate range of the programming facilities of the language • Demonstrated an understanding of the tools and techniques available to them • Provided evidence of a completed user interface which aids user interaction
1	**1-2 marks** The candidate has: • 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 two items of the functionality signalled in the indicative content • Used a limited range of the programming facilities of the language • Demonstrated a limited understanding of the tools and techniques available to them • Provided evidence of a user interface
0	**0 marks** Response not credit worthy or not attempted.

Q	Answer	Mark	AO1	AO2	AO3	Total
3	**Indicative content:** Clear annotation of steps within the following routines: • Validation • Storage of data to file • Retrieving specified data from file • Use of self-documenting identifiers / explanation of variables	4			3.1a	4

Band	AO3.1a Max 4 marks
3	**4 marks** The candidate has: • Produced listings that are appropriately laid out and included sufficient annotation to demonstrate an understanding of **all** programming routines listed in the indicative content • Written code using self-documenting identifiers / explained variables • Used appropriate technical terminology referring to the indicative content confidently and accurately.
2	**2-3 marks** **Three** marks can be awarded if the candidate has: • Produced listings that are appropriately laid out and included sufficient annotation to demonstrate an understanding of **all** programming routines listed in the indicative content • Not written code using self-documenting identifiers / not explained variables • Used appropriate technical terminology referring to the indicative content. OR • Produced listings that are appropriately laid out and included sufficient annotation to demonstrate an understanding of **two** of the programming routines listed in the indicative content • Written code using self-documenting identifiers / explained variables • Used appropriate technical terminology referring to the indicative content. **Two** marks can be awarded if the candidate has: • Produced listings that are appropriately laid out and included sufficient annotation to demonstrate an understanding of **two** of the programming routines listed in the indicative content • Not written code using self-documenting identifiers / not explained variables • Used appropriate technical terminology referring to the indicative content. OR • Produced listings that are appropriately laid out and included sufficient annotation to demonstrate an understanding of **one** of the programming routines listed in the indicative content • Written code using self-documenting identifiers / explained variables • Used appropriate technical terminology referring to the indicative content.
1	**1 mark** The candidate has: • Produced listings that are appropriately laid out and include sufficient annotation to demonstrate an understanding of **one** programming routine listed in the indicative content • Used limited technical terminology referring to the indicative content. OR • Written code using self-documenting identifiers • Used limited technical terminology referring to the indicative content.
0	**0 marks** Response not credit worthy or not attempted.