GCE AS MARKING SCHEME

SUMMER 2018

**AS
COMPUTER SCIENCE - COMPONENT 2
B500U20-1**

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.

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.

Summer 2018 Mark Scheme

Q	Answer	Mark	AO1	AO2	AO3	Tot
1a	Award 1 mark **only** for any one of: • AddCredit • Withdrawal • BalanceEnquiry Ignore letter case No spaces.	1		2.1a		1
1bi	Real	1		2.1a		1
1bii	Integer	1		2.1a		1
1biii	**BalanceEnquiry** Ignore letter case No spaces.	1		2.1a		1
1ci	-successful **Not**: +Success() Condone no – symbol	1		2.1a		1
1cii	type OR -type : String Not: +setType(String)	1		2.1b		1
1d	**Award 1** mark for The attribute Success is **public**. **Award 1** mark for any one of: • objects of **type BalanceEnquiry** • or its subclasses • or within its package would be able to make changes to it Condone all objects/other classes can access it.	1 1		2.1b		2

Q	Answer	Mark	AO1	AO2	AO3	Tot

1e	**Award** 1 mark for all methods within superclass `Transaction`:
	
	`+ getAccountNumber() : Real`
	`+ makeNewTransactionID()`
	`+ getTransactionID() : Integer`
	
	Award 1 mark for all methods within class `AddCredit`:
	`+setAmount(Integer)`
	`+setType(String)`
	`+setDate(Date)`
	`+execute(Real)`
	
	No need for parameter or return type.
		1
		
		1
				2.1b		2

1f	1 mark for all attributes within superclass `Transaction`:
	`#accountNumber : Real`
	`+transactionID : Integer`
	
	1 mark for all attributes within `Withdrawal`:
	`-amount : Integer`
	`-date : Date`
	
	No need for type or visibility
		1
		
		1
				2.1b		2

1g	**Award 1 mark for:** `accountNumber` is common to the superclass and all subclasses. **Award 1 mark for:** All subclasses inherit and can use/have access to this attribute and so it saves re-defining it in every subclass.	1 1		2.1a		2

Q	Answer	Mark	AO1	AO2	AO3	Tot
2	**Indicative content:** **Answer must be within the context of StarLight Coffee scenario as all marks are awarded for AO2.1b:** **Scenario clearly states that StarLight Coffee is a small business. All answers must reflect this. E.g. Explaining tape backup of multiple gigabytes should be well justified.** StarLight could have a backup policy: A backup policy sets out how often and to what medium backups are made. A backup is the process of copying data so that it can be preserved and restored if the original data is lost. Backups of all data should be made regularly as the older the backed up data becomes, the less likely it is to match any current data stored on a computer system. Possible backup methods and secondary storage: **Cloud storage**: StarLight has limited data and so would be able to copy the **data offsite over an internet** connection **continuously**. **Magnetic tape** classically used to store backups: Inexpensive medium and so **affordable** to a small company. They could have a **backup policy of rotating the tapes as in a _grandfather father son_** system. Tapes could be taken off-site **External Hard disk**: Limited data would mean that making a copy would be practical for the company. **Make a copy each night/once a week and take off site** Backups protect data following primary data loss. Generations of files, e.g. the grandfather-father-son regime, allows data to be restored to a previous version following catastrophic data loss. StarLight would have 3 copies of the data to roll back. Backups could be incremental or differential or a mix of both. The backup medium is generally different to the active storage medium.			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 two to three relevant detailed points of backing up data for the organisation and two to three on different storage secondary storage methods, which relate to an extensive amount of the indicative content • addressed the question appropriately with minimal repetition and no irrelevant material • presented a balanced discussion and justified their answer with examples related to the customers • 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 backup and secondary storage methods as specified in the indicative content. Satisfactory knowledge is defined as a response that provides one to two points on both backup and secondary storage methods as signalled in the indicative content • presented a discussion with some limited reference to the scenario • 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 a backup solution and one secondary storage method • 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
3	**Award 1** mark for each correct value <table><tr><td>Points per product:</td><td>Cumulative Total:</td></tr><tr><td>4.4</td><td>13.2</td></tr><tr><td>2.2</td><td>22.0</td></tr><tr><td>5.5</td><td>33.0</td></tr><tr><td>6.6</td><td>39.6</td></tr></table> Ignore more or insufficient decimal places i.e. 4.0 = 4	1 + 1 1 + 1 1 + 1 1 + 1			3.1c	8

Q	Answer	Mark	AO1	AO2	AO3	Total
4	Any valid/functional loop based algorithm that returns outputs as stated in question:				3.1b	12

Example

```
1 currentFullTime is integer
2 cft is integer
3 bonusAwarded is Boolean
4 hour is integer
5 minute is integer
6 PM is Booelan
7 AM is Boolean
8
9  begin loop               {start a loop}
10
11  input currentFullTime
12
13  set cft=currentFullTime {efficient space use}
14  set minute = right(cft,2) {right operator}
15
16  if left(cft,2) = 00 then
17       {left operator returns leftmost, x characters)
18   set AM = True
19   set hour = 12
20  end if
21
22  if left(cft,2) >00 and left(cft,2)<12 then
23   set AM = True
24   set hour = trim(left(cft,2))
25               {trim removes leading white space}
26  end if
27
28  if left(cft,2)>12 then
29   set PM = True
30   set hour= value(left(cft,2)) – 12 {optional val}
31  end if
32
33  if left(cft,2)=12 then
34   set PM= True
35   set hour = 12
36  end if
37
38  if AM = true then
39   output hour : minute "AM No Bonus"
40   set bonusAwarded = False
41  end if
42
43  if PM = true then
44   output hour : minute "PM Bonus Awarded"
45   set bonusAwarded = True
46 end if
47 loop until currentFullTime < 0000 or currentFullTime
   > 2359
48 output "Warning algorithm has an error"
49 End
```

Award 1 mark for each: • Declare or initialise variables • Input `currentFullTime` • use of a loop with any terminating conditions • change 00xx to 12AM • comparison to find time above 1300 • change 01xx to 11xx to 1: xx am – 11:xx am • change time above 13xx to 23xx to 1:xx pm to 11:xx pm • output 12 hour time • calculating correct AM or PM if statement • outputting AM or PM • output Bonus Awarded and set `bonusAwarded=True`. • Algorithm provides all correct outputs Marks awarded for concepts demonstrated above. Other solutions incorporating above concepts that provide exactly the same result would be awarded credit. Line numbers and indentation not required.	1 1 1 1 1 1 1 1 1 1 1 1					

Q	Answer	Mark	AO1	AO2	AO3	Total
5ai OR 5bi OR 5ci	**Indicative content:** • Run the subroutine to save data • Run the subroutine to count data • Message box appears on screen • Number increments in message box	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.

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Q	Answer	Mark	AO1	AO2	AO3	Total
5aii 5bii 5cii	**Indicative content:** • Input whole integers 1 to 9 on a clear first screen • Input whole integers 1 to 9 on a clear screen following the click of an operator (+ or -) • Addition operator button exists and can be clicked/used • Addition operator functions correctly (adds two single digit integers) • Subtraction operator button exists and can be clicked/used • Subtraction operator functions correctly (adds two single digit integers) • Result displayed on screen. • Creates a data file called calcmemory • Stores result on disk in a file called calcmemory • Descriptive/useful feedback that file has been saved ○ Candidates may use custom data types / standard methods / put/get streamwriter/ print # etc • Retrieves data from disk and displays on screen • HCI fit for purpose (Textual or GUI)	12			3.1b	12

Band	AO3.1b
	Max 12 marks
3	**9-12 marks** The candidate has: • 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 twelve 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	**5-8 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 five to eight 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	**1-4 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 four 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

5aiii 5biii 5ciii	**Indicative content:**
	Clear annotation of steps within the following routines:
	    • Operator (additions or subtraction)
	    • Storage of data to file
	    • Retrieving 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.