GCE AS MARKING SCHEME

SUMMER 2017

**AS (NEW)
COMPUTER SCIENCE - COMPONENT 2
B500U20-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2017 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.

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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	Total
1a	Any one of: • Credit • Cash • Debit	1		2.1a		1
1b	String	1		2.1a		1
1ci	Any one of: • `processed` • `authorised` • `correctMoney`	1		2.1a		1
1cii	Any one of: • `amount` • `cashTendered` • `changeDue`	1		2.1a		1
1d	The attribute `processed` is **protected**. Any one of: • Only objects of **type Payment** • or its subclasses • or within its package would be able to make changes to it This is AO2.1b so must be applied to be awarded the mark.	1 1		2.1a 2.1b		2

1e	1 mark for all methods within superclass **Payment**
	
	`+setAmount(Double)`
	`+getAmount() : Double`
	`+getProcessed(): Boolean`
	`+setProcessed(Boolean) : String`
	
	1 mark for all methods within class **Credit**
	
	`+setNumber(Integer)`
	`+setType(String)`
	`+setExpiry(Integer)`
	`+authorise() : Boolean`
	
	No need for parameter or return type.
		1
		
		1
				2.1b
				
				2.1b
						2

1f	1 mark for all attributes within superclass `Payment`:
	`#amount : Double`
	`#processed : Boolean`
	
	1 mark for all attributes within `Cash`:
	`-cashTendered : Double`
	`-correctMoney : Boolean`
	`-changeDue : Double`
	
	No need for type or visibility
		1
		
		1
				2.1b
				
				2.1b
						2

Q	Answer	Mark	AO1	AO2	AO3	Total
1g	`amount` is common to the superclass and all subclasses. 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 2.1b		2
2	Candidate has designed suitable: • Fieldnames (2 suitable fields in addition to KF) • Data types (accept autonumber as type) • Key Fields (any indicator of KF if clear (*/underline)) • Field lengths (accept single/double) • Requirements for Validation (2 types) o Range, Format, Presence, Length . . . **Indicative content** Non exhaustive example of Clients table:	1 1 1 1 1		2.1b		5

Non exhaustive example of Clients table:

Fieldname	Keyfield (YES/NO)	Data Type	Field Length	Possible Validation
Customerid	Yes	Integer	Short integer	Type (numerical)
firstname	-	String	30	Presence
surname	-	String	30	Presence
postcode	-	String	8	Format
dateofbirth	-	String **Condone** date	10	Range >=1/1/1900 and <=date()
pointscollected	-	Integer	Short integer	Range >=0

etc . . .

Q	Answer	Mark	AO1	AO2	AO3	Total
3	1 mark for each of the following up to a maximum of eight					
	• State 1 method of changeover Marble Garden could use	1		2.1b		8
	• State 2nd method of changeover Marble Garden could use	1		2.1b		
	• Describe 1 advantage of method 1 to Marble Garden	1		3.1c		
	• Describe 1 advantage of method 2 to Marble Garden	1		3.1c		
	• Describe 1 disadvantage of method 1 to Marble Garden	1		3.1c		
	• Describe 1 disadvantage of method 2 to Marble Garden	1		3.1c		
	• Identify the most suitable method for Marble Garden	1		2.1b		
	• Give a reason for the method advised to Marble Garden.	1		3.1c		

Note all marks assigned to AO3.1c must be applied to helping Marble Garden Centre with a clear reason assigned to be awarded the mark

Indicative content:

Direct "big bang" approach can be adopted - sudden change to new system
o Could be used where a failure would not be catastrophic
o Can be cheaper to implement
o New system is available immediately if required
o Can be the least disruptive if implemented well
o New system may not work as well until Marble Garden staff are fully used to using it
o If new system fails Marble Garden have no system which could be costly

Parallel running - both systems running together for a time
o Safest option as if new system fails they still have existing system
o New system is available immediately if required
o The outputs from the old and new systems can be compared to check that the new system is running correctly
o Expensive as require temporary staff or overtime for current staff to operate both systems
o Could cause confusion for staff / customers having two systems

Phased changeover - part-by-part (by functionality)
o Allows users to gradually get used to the new system
o Staff training can be done in stages
o All staff can focus on one area to resolve any problems
o Problems can be fixed quicker as more experts to resolve one functionality problem at a time

Q	Answer	Mark	AO1	AO2	AO3	Total
	o Difficulties identified in one area can be resolved and managed in next area o Might cause problems in the changeover period when they need to communicate with each other and have different systems o Slower to get new system up and running compared to some other methods o If a part of the new system fails, there is no back-up system, so data can be lost Pilot changeover - part-by-part (by part of the organizational units within Marble Garden) o All features of the new system can be fully trialled o If something goes wrong with the new system, only a small part of the organisational operations of Marble Garden is affected o The staff who were part of the pilot scheme can help train other staff. o All staff can focus on one area to resolve any problems o Difficulties identified in one area can be resolved and managed in next area o For the office / department doing the pilot, there is no back-up system if things go wrong o Might cause problems in the changeover period when they need to communicate with each other and have different systems o Slower to get new system up and running compared to some other methods					

Q	Answer					Mark	AO1	AO2	AO3	Total
4a	1 mark for each correctly completed row.									4

Current reading	Expected Growth:	Cumulative Growth:	Average Growth:	Feedback:	Mark	AO3
2	1.6	2.0	2.0	High Growth	1	3.1c
3	3.2	5.0	2.5	Low Growth	1	3.1c
5	4.8	10.0	3.3	High Growth	1	3.1c
7	8.0	17.0	4.2 Accept 4.3	Low Growth	1	3.1c

Ignore more or insufficient decimal places i.e. 8.0 = 8

Q	Answer	Mark	AO1	AO2	AO3	Total
4b	Any valid/functional loop based algorithm that returns outputs as stated in question:					11

Example

```
1    currenttemp is integer
2    set currenttemp = 22
3    set loop = 0
4    begin loop    {start a loop}
5
6    input currenttemp
7
8      if currenttemp > 24 then
9        output "Open the windows and deactivate heater"
10   end if
11
12   if currenttemp > 26 then
13    output "ativate fans"
14   end if
15
16   if currenttemp < 20 then
17    output "deactivate fans and close windows"
18   end if
19
20   if currenttemp < 18 then
21    output "activate heater"
22   end if
23
24   totaltemp = totaltemp + currenttemp
25   loops = loops + 1
26   averagetemp = totaltemp/loops
27   output currenttemp
28   output averagetemp
29
30 loop until currenttemp > 50 or currenttemp < -20
31 output "Warning temperature outside of acceptable…"
32 End
```

One mark for each up to a maximum of 11
- Declare or initialise variables — 1 — 3.1b
- Input currenttemp — 1 — 3.1b
- use of a loop with (50/-20)terminating conditions +output — 1 — 3.1b
- comparison to find temperature above 24 + output — 1 — 3.1b
- comparison to find temp above 26 + output — 1 — 3.1b
- comparison to find temp below 20 + output — 1 — 3.1b
- comparison to find temp below 18 + output — 1 — 3.1b
- output current temp — 1 — 3.1b
- calculating average temp — 1 — 3.1b
- output average temp — 1 — 3.1b
- Algorithm provides all correct outputs — 1 — 3.1b

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.

Q	Answer	Mark	AO1	AO2	AO3	Total
5ai OR 5bi OR 5ci	**Indicative content:** • Reading contents from text file • Comparing contents to requirement entered on screen • Incrementing the number of stock items found • Outputting the correct number to 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

5aii 5bii 5cii	**Indicative content:**
	 • Input
	  (any four validation methods plus appropriate output of):
	   o Range check
	   o Format check
	   o Length check
	   o Presence check
	   o Lookup check
	   o Type check
	
	 • Creates a data file called customerdetails.txt
	 • Stores on disk in a text file called customerdetails.txt
	 • Descriptive/useful feedback that file has been saved
	 • Candidates may use custom data types / standard methods
	 • Retrieves data from disk
	 • Retrieves specified customer details from disk
	   (Candidates may use Random (direct), serial, or
	   sequential file access)
	 • 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: • 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.