GCE MARKING SCHEME

COMPUTING
AS/Advanced

SUMMER 2011

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2011 examination in GCE COMPUTING. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were 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 conferences was to ensure that the marking schemes were 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' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

GC3

01 Search engine: is an application / feature / facility / tool accessed over the Internet, which can be used to search for web sites on a particular topic 1

Could be used for instance by English pupils searching for poems by a certain author (**Condone** research alone) 1

VLE: is a software system / intranet application / feature / facility / tool designed to help (teachers and pupils) in the management and use of learning materials 1

Could be used for instance by pupils to access a homework assignment / revision 1

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02 Biometric(s) (scanning / system etc) 1

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03 Example eg: Police could use facial recognition at football ground to check for known trouble makers

Marking: 1 mark for naming / stating situation 1
1 mark for describing it 1

Concern Innocent people might be concerned about the resulting infringement to their privacy / not wanting to be photographed 1

An example of an extended answer worth three marks is:
Face recognition could be used for instance by the police at football grounds to check for known trouble-makers, by comparing current images with stored images (other examples could relate to airport security, city centre drunkenness problems, etc.)
There could be a concern over the lack of privacy if innocent people's facial images are stored by the police.

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04 Serial transmission: data is sent one bit at a time along the same data line 1

Advantage: any one of: 1
- requires only two wires (**condone** one wire) compared with 8 or 16 in parallel
- serial can travel longer distances than parallel
- simpler interface / circuit board / fewer lines required

Parallel transmission: all bits in a byte are sent simultaneously along separate lines 1

Advantage: transmission is faster than serial transmission 1

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05 Simplex: Data transmission is possible in one direction only 1

Half duplex: Data transmission is possible in both directions, but only in one direction at a time 1

Full duplex: Data transmission is possible in both directions simultaneously 1

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06 Protocols are necessary to specify data formats, etc, to enable devices to communicate with each other. 1

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07 A linked list is a set (accept list) of data elements, where each element contains:

- the data itself 1
- a pointer to the next element 1

Benefit: Any one of:

- New items can be inserted into a linked list without rearranging all the other elements. 1
- If programmed dynamically uses memory more efficiently

Drawback: Any one of:

- A linked list is more complex to program / manipulate than an array 1
- Extra programming is required to access the data in the opposite direction (or the list needs to be doubly linked)
- Can only be accessed in a linear manner

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08 3

Address	Integer	**Pointer**
851	4811	**856**
852	2415	**855**
853	3599	**854**
854	4166	**851**
855	2567	**857**
856	5218	**Null / -1 / 0**
857	3100	**853**
…	…	**…**

Accept any similar ending eg "End" or "-" but not blank

Marking: 7 correct -> 3 marks
5 or 6 correct -> 2 marks
3 or 4 correct -> 1 mark

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09 Random access file:

- file where physical location of the record is calculated from the data in the key field 1
this calculation is carried out by a hashing algorithm 1

- A data collision occurs when two data items are hashed to the same location 1
In this case there needs to be an overflow areas where the latest data is stored 1

- When there are many items in the overflow area, access may become slow, 1
in which case a new hashing algorithm is required and a larger file may be needed 1

An example of an extended answer worth six marks is:

A random access file is one where the physical location of the record is calculated (using a hashing algorithm) from the data in the key field. Sometimes, a data collision occurs (ie two data items are hashed to the same location.) In these circumstances, there needs to be an overflow areas where the latest data is stored. When the file begins to get quite full, there may be many items in the overflow area and access may become slow. A solution to this problem is to create a new hashing algorithm and a larger file may be needed.

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10 Any 2 of:

- An archive file is one which contains data which is no longer in (everyday) use, 2x1
- but is kept for security / legal / historical reasons
- is stored securely / off-site / in fire-proof safe etc

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11 Rounding: number is approximated to nearest whole number/tenth/hundredth, etc 1

Truncating: number is approximated to whole number/tenth/hundredth, etc nearer zero 1
(accept *lower*)

Example: for instance 34.7 rounded to nearest whole number is 35 1
34.7 truncated to whole number is 34
(**Marking** – the example must give a different answer and must be correct)

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12 In many cases, rounding tends to give an answer closer to the original number 1

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13 Any 1 of: a problem might arise where:
- continued use in further calculations increases inaccuracy 1
- a test for equality might fail if a minor difference is caused by rounding
- in some applications a high level of accuracy is vital and rounding may reduce this accuracy

(**Not** the idea of "cause an error" or "inaccurate" alone)

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14 ready: the process is waiting to be executed by the processor (because another process is currently being run) 1

blocked: the process that is waiting for some event (such as input / output operation / error) 1

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15 Scheduling is the method by which the processor time is allocated 1

in a multi-programming / multi-tasking / multi-access operating system 1

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16 Batch processing
Example – eg payroll / utility billing / 1

Description: time sheets are collected for e.g. a monthly operation etc 1

Any 2 of:
- Process is carried out with no user interaction
- Batch processing may avoid using computer resources at times when demand is high /off-peak 1
- Errors are stored in a file for later use and not dealt with as they occur 1

An example of an extended answer worth four marks is:
An example could be the monthly payroll for a large employer. Each month, time sheets or other information is collected for processing together as a single process.
This process is carried out with no user interaction, and may be done for instance overnight when the demand for the computer resources is lower than during the working day when demand is higher. Errors are stored in a file for later use and not dealt with as they occur.

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17 Exclusive Or / XOR 1

Any 1 of
- The key is the secure binary number (known only to the sender and recipient) 1
- Can only decrypt / read if this key is known

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18 (Encrypted data) `10111010`
(Key) `11001011`
Answer **`01110001`**

Marking: Method (attempt to XOR the correct two binary numbers) 1

Accuracy 1

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19 Data mining: the analysis of (a large amount of) data (in a data warehouse) to provide new information / find patterns/trends in the data 1

Supermarket: could use data mining on data extracted from loyalty card data (or other customer data) 1

to attract customer to make additional purchases via targeted special offers, etc placement of products to attract customers etc 1

An example of an extended answer worth three marks is:
Data mining is the analysis of a large amount of data in a data warehouse to provide new information or to find new patterns in the existing data. A supermarket could use the intelligence derived from data mining on data extracted from loyalty card data to increase its profits by attracting customers to make additional purchases via targeted special offers, etc.

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20 A database administrator is the person in a company who is responsible for the structure and management of the database system and the data in it. 1

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21 The DMBS may allow certain users read and/or write access to certain records or fields only. 1+1 2

Marking: idea of read and/or write access needed for second mark.

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22 Recursive 1

Must also have a terminating condition (base case / stopping condition) 1

Quicksort 1

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23 CalcF(3) = 3 * [CalcF(2)]
= 3 * [2 * CalcF(1)]
= 3 * [2 * 1] 1

= 6 1

Marking: If no working is shown then no marks awarded

The calculation is the factorial 1
or
The calculation multiplies the number by every integer smaller than itself down to one

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24 Any three of: 3x1

- data independence
- reduces data duplication / redundancy
- reduces the danger of inconsistency / improves data integrity
- reduces the danger of data being lost during update

Third normal form means that data items are dependent on the whole key and nothing except the key (or the key, the whole key and nothing but the key) 1

Or
(Accepted not expected)
Third normal form is achieved when relations (tables) contain no partial or transitive dependencies.

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25 PLAY (PlayTitle, Director)

PERFORMANCE (PerformanceNum, PlayTitle, Date)

CUSTOMER (CustNum, CustName, CustAddress)

BOOKING (BookingNum CustNum, PerformanceNum, NumSeats)

Marking: Four suitably named tables **(or three if done effectively with three)** 1
Each table with a suitable Primary Key identified (n-1 correct = 1 mark) 2
Correct foreign keys (3 x 1) Need to be shown as such 3
Any number of bad fields, / bad FKs – subtract 1 mark
Composite keys instead of surrogate keys equally acceptable

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26 **<letters> ::= a|b|c . . . |z** (condone any upper case letters) 1
<digit> ::= 0|1|2 . . . |9 1
<name> ::= <letter>|<letter><name> 1
<email_ad> ::= <name>.<name><digit>@rcb.co.uk 1

[Marking: one mark for attempted recursion even if incorrect:
same item Left and Right + other item(s) on Right are needed
Can't get 4 unless completely correct
Notation error max 1 mark lost]

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27 Non-procedural languages are to do with facts / rules / making queries 1
Marking: Two of the above are needed for the mark

Procedural languages are concerned with: any 1 of: 1

- carrying out actions / calculations etc
- obeying (ordered) set of instructions

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28 Visual programming languages are: 3x1 3

- particularly suitable for production of objects / buttons / icons, etc
- particularly suitable for developing in a GUI/Windows/graphics content/event driven environment
- may be easier to learn / more intuitive because visual / very good help / tools available

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29 Any 1 of

- Additional functionality can be added without a programmer / buying another package / program 1
- Can customise the package / tailor to specific needs etc

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30 Any 1 of

- If programmer A modifies current version, and programmer B modifies an earlier version, neither new version will contain both modifications 1
- Any amendments must be made to the most recent versions

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31 Standardised programming: any 1 of 1

- program written in a certain language on one computer/environment is likely to run easily on a different computer/environment
- programmer familiar with the language on one computer/environment is likely to be able to adapt easily to working on a different computer/environment

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32

1	set TotalOnPeak = 0	All initialisations	1
2	set TotalOffPeak = 0		
3	input CountOnPeak		
4	for I = 1 to CountOnPeak	Input <u>both</u> loops and increment	1
5	input Passengers		
6	TotalOnPeak = TotalOnPeak + Passengers		
7	endfor		
8	set MeanOnPeak = TotalOnPeak / CountOnPeak	Calculate <u>both</u> means	1
9	output “Mean number of passengers on on-peak buses = ”		
10	output MeanOnPeak		
11	input CountOffPeak	Output <u>both</u> means (condone no text)	1
12	for I = 1 to CountOffPeak		
13	input Passengers		
14	TotalOffPeak = TotalOffPeak + Passengers		
15	endfor		
16	set MeanOffPeak = TotalOffPeak / CountOffPeak		
17	output “Mean number of passengers on off-peak buses = ”		
18	output MeanOffPeak		
19	output “The type of bus with the higher mean =”		
20	if MeanOnPeak > MeanOffPeak,	Determine and output which is higher mean	1
21	then output “on-peak”		
22	else output “off-peak”		
23	output “The difference in means = ”		
24	if MeanOnPeak > MeanOffPeak	Determine and output difference in means	1
25	then output MeanOnPeak - MeanOff Peak		
26	else output MeanOffPeak - MeanOn Peak		

Other methods equally acceptable

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33 Text-based interface 12

- input to the computer is via typed text, probably via a command prompt
- text-based system can allow complex/unusual commands to be entered, which may not be available via a GUI
- text-based system may run more quickly than a GUI / requires fewer resources
- may be very efficient for an experienced user
- * likely to take a novice a longer time to learn

Graphical user interface

- GUI is an interface where most communication is via screen elements such as windows, icons, menus, pointers, etc
- * GUI system is usually easier to learn) Different points
- GUI system is usually more intuitive to use) - if well argued
- GUI may use icons relevant to the application/be more transparent to the user
- may be similar to other packages with which users are familiar
- there is no need to remember complex text commands
- it is easier to cut and paste between applications
- usually good help / tutorial system
- users can customise desk-top, etc

Not "user friendly" alone
(Can't get both * points above)

Speech recognition interface

- commands and/or text input are given to the computer via human speech
- speeds up text input / faster than typing
- can be used by someone doing another task with their hands eg pilot
- can be used by someone who is unable to type / not a skilled typist / disabled
- avoids RSI, etc
- can involve very heavy hardware performance requirements (once only)
- difficulty picking up / separating speech sounds
- people have different accents/voices / computer may need to "learn" the speech style
- cannot usually be used without some tuition / may have to speak slowly
- affected by colds, throat infections / speech impediments etc
- problem of background noise/interference from/to other staff in office
- can overhear others' input
- can have difficulty with proper nouns
- can have difficulty with homophones eg *to too two*

Forms dialogue interface

- Computer prompts for input into specific fields on a screen dialogue form
- Cursor may move automatically to next input field
- Allows change to be made while screen still visible
- Intuitive to fill in - echoes familiar paper form / good for surveys etc
- May include validation – only some entries allowed

[**Marking**: The description of any point could be extended with more detail and gain extra marks]

10-12 marks Candidates give a clear, coherent answer fully and accurately describing and explaining all areas. They use appropriate terminology and accurate spelling, punctuation and grammar.

6-9 marks Candidates describing and explaining a range of a least of the areas, but responses lack clarity. There are a few errors in spelling, punctuation and grammar.

0-5 marks Candidates simply list a range of points or give a brief explanation of one of the areas. The response lacks clarity and there are significant errors in spelling, punctuation and grammar.

0 marks No valid response

[Note: Max of 10 if only 3 of the 4 sections attempted
Max of 8 if only 2 sections attempted Max of 6 if only 1 section attempted]

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