GCE MARKING SCHEME

COMPUTING
AS/Advanced

JANUARY 2013

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2013 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.

CG3

01 A VLE is a **software system** designed to help teachers and pupils in the management and use of learning resources. 1

The school VLE could contain details about - any 1 of: 1
(must be related to learning – not generic)

- homework / coursework assignments
- feedback from teachers to students (not twice)
- additional / background teaching materials, etc

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02 An intranet can only be accessed by (in this case) staff/students (using a log in/password). 1

The school intranet could contain details about; (any 1 of): 1

- teachers / teacher-rooms
- school newsletter / achievements of pupils, etc (not twice)
- feedback from teachers to students / grades / student details (not twice)
- internal telephone book, etc
- teaching resources / homework etc…

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03 The school web site could contain; (any 1 of): 1

- school newsletter / achievements of pupils / open or parent evening (not twice)
- school prospectus etc
- information about school's interaction with local community etc
- school inspection reports etc
- weather warnings / discussion board / forum etc…
- contact details / location

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04 Multi-tasking is a method of organising computer use which allows several different tasks or applications to be available (/ run) at (apparently) the same time. 1

The user is able to switch from one task to another. 1

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05 Benefit of standalone – any one of: 1x1
Security may be improved – reduced chance of hacking / unauthorised access via a network / virus spreading / cheaper and easier to buy and set up
not susceptible to network or server failure

Drawback of standalone:
It is not possible to communicate or share resources such as devices, software or data 1

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06 Any one of:
Digital transmission is preferred as it is less likely to suffer corruption/degradation. 1
Can error check data.
Can compress data and therefore transfer time is quicker.

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07 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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08 Either of:
Switching sends data along the appropriate path. 1
Switching prevents all the data being sent to all parts of the network.

It requires less bandwidth / is more efficient not to send data where it is not required 1

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09 A router is a device in the network which holds information about the address of computers in its network (or address of other networks) 1

… and can therefore send data to the correct computer. 1

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10 Benefits: any 2 of:

- less programming skill required 1+1
- much of the "work" is done for user by package / quicker to achieve objective
- can import / export from / to other packages
- less likely to contain errors / package has already been well tested
- package might include library of standard functions
- more help is available in the package

Drawback:

- Programming might have achieved special functionality unavailable in the package 1

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11 A special purpose language might have helpful/vital features relevant to the application 1

Examples include:

- simulation eg for queuing systems 1
- control of equipment
- computer aided design
- artificial intelligence
- expert systems
- scientific applications, etc
- games programming

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12 Either of:
A scripting language is … 1
a set of commands understood by the applications software
usually embedded in another language and is used to control aspects of the software
(and is a high-level language, interpreted not compiled)

Examples include:

- script embedded in (the HTML in) a web site to control graphics, etc 1
- script embedded in a web site to load/execute a file when clicked, etc

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

Insurance company: could use data extracted from customers:

- to develop new products 3x1
- to improve marketing to existing / new clients
- identify groups of safer clients
- to attempt to reduce fraud …
- … via sharing information with other insurance companies/(police?)

An example of an extended answer worth four 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. An insurance company could use data extracted from customers to develop new insurance products, to improve marketing to existing or new clients and make special offers etc to them. The insurance company could also attempt to reduce fraud by a better understanding of unusual claims etc and could augment this by sharing relevant data with other insurance companies, and possibly the police.

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14 Accept abbreviations in left hand columns.

Address	*Name*	*Pointer*
501	*Lindsey*	**502**
502	*Markowicz*	**503**
503	*Wong*	**Null** / **-1**
504	*Edgeley*	**506**
505	*Abbott*	**504**
506	*Farooq*	**501**

3

Accept any similar ending but not blank

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

15
AND 1

Any 1 of:

- Will identify / pick out / produce left bit / most significant bit 1
- Will determine whether left bit / most significant bit is a 0 or 1

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16 Indexed sequential file:

- Records are stored in key order in the file 1
- Index allows data to be accessed directly 1

Multilevel index:

- There is a main index which contains the location of the next index 1
- This process may extend to several levels and the last index contains the physical address of the record 1

Advantage over standard sequential file:

- Allows faster access because can move directly to individual records 1

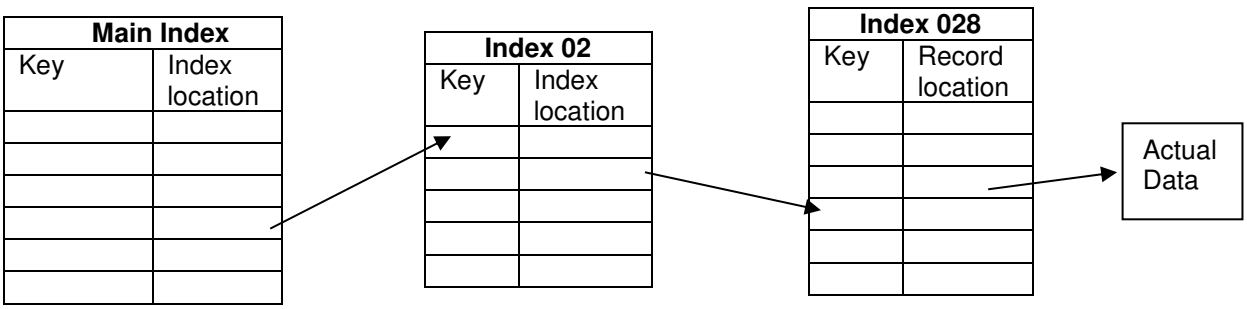
An example of an extended answer worth five marks is:

An indexed sequential file is a file structure where records are stored in key sequence order in the file and where an index is used to allow data to be accessed directly.

A multilevel index arises where this index is a main index which itself contains a range of addresses and the location/block of the next level index. This process may extend to several levels, with the last index containing the physical address of the record.

An indexed sequential file allows faster access because you can move directly to the individual record.

Diagram:



[Marking of diagram: 1 mark for three suitably labelled tables
1 mark for three suitable arrows] 2

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17 A transaction log is used with on-line updating - stores all the update data 1

It can be used in case of failure - could restore data by being combined with previous master/backup file, with minimal data loss. 1

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18 Any 6 of:

- Many organisations eg *Towy* could not survive if their computer system failed
- All computer systems are liable to fail
- You can't always avoid fires, floods, etc. 6x1
- Backups should be made **regularly** / **periodically**
- Files should be archived off-site
- There should be an alternative computer system / ability to replace hardware quickly
- There should be a back-up power supply
- Even if effective, some data/money/business is likely to be lost after the disaster
- Staff trained in recovery procedures
- Data can be restored from safely stored back up

An example of an extended answer worth six marks is:

Many organisations, particularly on-line retailers like *Towy,* are completely reliant on their computer systems and could not continue / survive if the system lost data or failed for anything but a very short time. All computer systems are liable to fail, however well designed and maintained, and it is never possible to be completely secure against fires, floods, earthquakes, terrorist attacks, etc.

To aid a rapid recovery from disaster, periodic / regular backups should be made, with files archived off-site and/or in a fire-proof environment. *Towy* should ensure that an alternative system (computer-based or manual) is available, also a back-up power supply.

However, even if disaster planning is comprehensive and the recovery is well executed, it is still likely that *Towy* will suffer some unavoidable damage, and some money and/or customer good-will will be lost.

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19 parameter 1

How passing by value operates:
A local copy of the variable is created for the procedure (discarded afterwards) 1

Other method: passing by reference: 1
The address of the required data is passed to the procedure 1
(rather than the actual value of the data)

Benefits of passing by value: any 1 of:

- preserves value-at-calling of the parameter 1
- avoids unwanted side-effects

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20 A process is blocked if it is waiting for some event. 1

Example: waiting for an input/output operation with a slow peripheral 1

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21 Partitioning is the dividing up of memory 1
allows more than one job to be resident in the (main) memory at the same time. 1

Code can be loaded into any partition. 1
(If the code is not re-locatable it will have to wait until it can go into one particular Partition / Memory may not be available for the process.)

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22 Any 2 of: 2x1

- Redundancy (data duplication) is reduced (therefore saving space)
- Risk of inconsistent data is reduced (better integrity of data)
- Data independence allows different views of the same data
- Allows easy extension/amendment to the structure of the database.

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23 A database administrator is the person in a company who – any one of: 1
Is responsible for the **maintenance** of the structure and management of the database system and the data in it.
Allows users access to the database possibly with usernames and passwords
Monitoring user activity
Ensuring data backup procedures are followed

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24 Any 2 of this type of example: 4
(Marking: 1 for condition and 1 for both parts of test data x2)

Condition being tested	Array data	Search integer
Search integer occurs once	5 8 5 7 2 3 6 4	7
Search integer occurs more than once	5 8 5 7 2 3 7 4	7
Array data contains all same integer (= or ≠ Search)	2 2 2 2 2 2 2 2	2
Array empty		2
Search integer does not exist	5 8 5 9 2 3 9 4	

Other possibilities can be credited

25

STUDENT (StudentNum, StudentName, …)

TEACHER (TeacherNum, TeacherName, …)

COURSE (CourseNum, TeacherNum, …)

STUDENT-COURSE (StuNum, CourseNum, StartDate, …)

[**Marking**: Four suitably named tables: 1
Four tables with suitable Primary Key shown (2 or 3 correct = 1 mark) 2
One mark for each foreign key (don't need to be identified as such) 3x1
-1 mark for any number of additional bad foreign keys

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26 BNF is used to describe unambiguously the syntax/grammar of a programming language. (Natural languages are generally ambiguous) 1

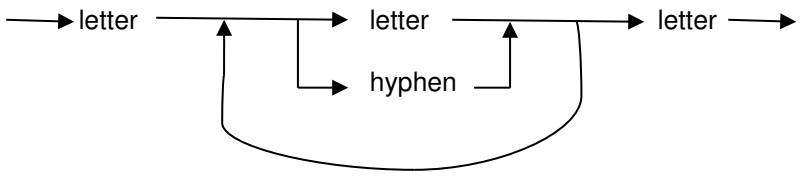
27

```
<letter>      ::=  a|b|c|.....|z
<hyphen>      ::=  -
<word_char>   ::=  <letter>|<hyphen>
<word_chars>  ::=  <word_char>|<word_char><word_chars>
<word>        ::=  <letter>|<letter><letter>|<letter><word_chars><letter>
```

4

[Marking: One mark for attempted recursion even if incorrect
(same item L and R + other item(s) on R are needed)
Max of 1 mark lost for notation
Other equally valid answers exist
Condone any upper case letters seen
However it's done, can only get 4 if completely correct**]**

28



3

[**Marking**: 1 mark for **letter** at start and end with suitable arrows
1 mark for alternative **letter**/**hyphen**
1 mark for loop]

29

```
1   input Name, Mark, Attempt
2   if Attempt = "F"
3       then if Mark ≥ 60
4                then set Grade = "Merit"
5                else if Mark ≥ 50
6                         then set Grade = "Pass"
7                         else set Grade = "Fail"
8                     endif
9            endif
10      else
11               if Mark ≥ 50
12                        then
13                             set Mark = 50
14                             set Grade = "Pass"
15                        else
16                             set Grade = "Fail"
17               endif
18  endif
19  output Name, Mark, Grade
```

Marking	
Input	1
if structure (**F** or **S)**	1
Correct processing for **F**	1
Reduce mark for **S**	1
Otherwise correct processing for **S**	1
Output	1

[**Marking**: Other approaches are possible and will be given full credit if correct
No validation expected (e.g. trapping **Attempt** if neither **F** or **S**)
Condone **>** for **≥** throughout
Condone no **endif**s if structure clear
No marks are given for brevity/efficiency/elegance]

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30 Number would be doubled/multiplied by two/multiplied by 10_2 (subscript required) 1

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31 Overflow occurs when the number is too large to be stored (satisfactorily) by the computer 1

Underflow occurs when the number is very close to zero (**Condone** too small) to be stored (satisfactorily) by the computer 1

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32 Advantage of floating point form:
Can store numbers which are not integers / are real numbers / have decimals 1

Advantage of integer form:
Stores numbers completely precisely / accurately 1

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33 **011000010000 0101 or 0 11000 01 0000 0101** etc (Spacing unimportant) 1+1

24 -> 11000
·25 -> ·01

[Marking: 1 for correct mantissa, 1 for correct exponent]

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34 Answers need to address specific types of disabilities.

(Input)
- Speech recognition interface (SRI) can be used by someone unable to type/disabled
- SRI may have difficulty with background noise / interference / can overhear others' input
- SRI may have difficulty with proper nouns / ambiguity etc

- Foot controlled keyboard / mouse

- Head/eye movement detector

- Oversize keyboard

- Use of head stalk etc

- Braille key overlays

- Screen readers can be used together with a standard GUI

- However any such device will not be suitable if unable to use that part of the body
- Many such devices may have considerable resource implications for the computer system

(Output)
- Screen output can use large / clear fonts / clear colour contrasts etc

- Speech synthesis is useful for people with visual impairment
- Speech synthesis may pronounce words incorrectly
- Speech synthesis can be annoying / obtrusive
- Speech synthesis may have heavy hardware performance requirements **(once only)**

- Braille output may be possible – device punches paper with Braille characters

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

6-8 Candidates give a clear, coherent answer fully and accurately describing and explaining **several** methods of input **and** output which are particularly suitable for users with various types of disabilities. They use appropriate terminology and accurate spelling, punctuation and grammar.
4-5 Candidates describe and explain methods of input **or** output which are particularly suitable for users with various types of disabilities, but responses lack clarity. There are a few errors in spelling, punctuation and grammar.
1-3 Candidates simply describe a method of input **or** output which are particularly suitable for users with various types of disabilities. The response lacks clarity and there are significant errors in spelling, punctuation and grammar.
0 No appropriate response

[End of Paper]

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