GCE MARKING SCHEME

COMPUTING
AS/Advanced

SUMMER 2015

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2015 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.

01 **Any 2 of:**

- Speeds up text input / faster than typing 2x1
- Can be used by someone who is unable to type / not a skilled typist / disabled
- May help to avoid RSI
- Allows user to simultaneously do some other task
- Takes up less room than a keyboard and mouse (useful in mobile devices)

Not: hygiene concerns.
Not just "more intuitive"

02 Different words may sound the same (e.g. week/weak) 1

Command words may be taken as input words (or vice versa) (eg "end sentence") 1

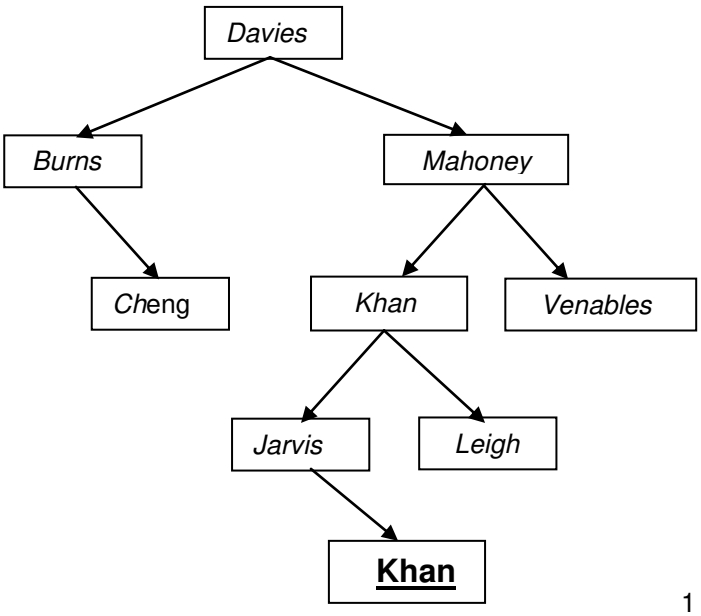
03 Binary tree 1

04 Root (node) 1

05 Advantage: faster to add a value / search for a value. 1

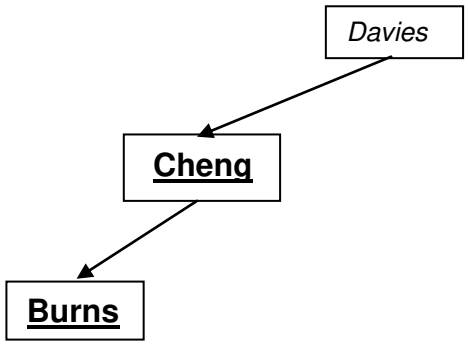
Disadvantage: more complex to program / process / May slow processing/traversal if unbalanced. 1

06



1

07



Marking: 1 mark for reversed names; 1 mark for different arrow 1+1

08 Example situation could be e.g. customer records – sales etc 1

Because need to update them in an unpredictable order as sales come in (particularly where large file and large number of transactions) 1

09 The new data is diverted to an overflow area instead of the original 1

When an attempt is made to access this data, the same process will occur (will access original location fail to find the data and access the overflow) 1

10 Files are often encrypted to safeguard the data by making it impossible to read … 1

… a key and algorithm is used to encrypt/decrypt the data 1

11 An algorithm is a (finite) set of rules / instructions 1

to solve a (specific) problem 1

Any 2 of: 1+1
- structured English
- flowchart
- pseudo-code

(Accepted not expected:)
- formal language e.g. Z

CONDONE annotated code

12 Passing by value:
local copy of the data is created for the procedure (discarded later) 1

Passing by reference: 1
the address of the data is passed (rather than the actual data) 1

Benefit of passing by value:
Avoids problem (associated with passing by ref) of unintended side effects where the Parameter has its value changed in the main program as well as in the procedure 1

Benefit of passing by reference:
Any one of:

- Avoids the larger amount of processing/storage (associated with passing by value) - possibly large amounts of copying 1
- Allows (desirable) change to be passed back to the calling program

13 **10001101** 1

14 **010111001000 0101** (Spacing unimportant)

23 -> 10111
0.125 -> 001

Marking: 1 for correct exponent, 1 for correct mantissa 1+1

15 +9 = **00001001** so -9 **= 11110111** 1+1

```
- 9 *     11110111 +
  4 *     00000100
    *     11111011 -> 00000101
```

Marking: If see all three lines of the correct addition (*) -> first mark
If see correct conversion back to **00000101** -> second mark

16 **OR** 1

Input	Output		
0 0	0		
0 1	1	(all four need to be correct for 1)	1
1 0	1		
1 1	1		

17 **AND** 1

Input	Output		
0 0	0		
0 1	0	(all four need to be correct for 1)	1
1 0	0		
1 1	1		

18 A system like this will be safety-critical – human life is at risk if the software fails (has to fail safe) 1

It is also likely to be highly complex software (and hardware) – there would probably be multiple inputs, has to work in real time (with a fast moving train) 1

19 Benefit: any 1 of:

- saves cost once installed - no need for level crossing staff 1
- not subject to possibly fatal human error

Drawback:
Any one of:

- may not detect unlikely situation eg car on track / may lead to people trying to dodge round barriers 1
- could fail with potentially catastrophic results (even if high quality)

Not unemployment could result

20 Any 2 of:

- check the correspondence between the actual design and its specification / user requirements / objectives / safety critical aspects (related particularly to level-crossing safety) 1+1
- confirm that the most appropriate techniques have been used, particular bearing in mind the safety-critical aspects in this case
- confirm the HCI is appropriate

not cost-related answers

21

- Cannot see / feel / try-on the item (for a tangible item) / may not be as advertised
- Lacks the social aspect of shopping
- Need access to a debit card / credit card / on-line banking 6x1
- Can't get the item immediately (tangible item)
- There is often a delivery charge (tangible item)
- If not at home when delivered you may need to visit post office, etc (tangible item) / you need to be at home when delivered
- Something may get lost or broken in the post (tangible item)
- May need to return item – more difficult than going back to shop (tangible item)
- Website may be fraudulent-may not receive goods (Separate points
- Website may be fraudulent-credit card details may be stolen if well argued)
- May have an impact on traditional shops closing down.

Not health related risks eg RSI / lack of exercise
Not could introduce virus

An example of an extended answer worth six marks is:

With on-line shopping, the purchaser can't see or try-on the item and it may not be as advertised. There is also a delay in receiving the item and there may be a delivery charge. If the customer is not at home when the item delivered they may need to visit post office etc. Something may also be damaged or lost in the post. If the customer needs to return the item it will probably be more difficult than to return it to a shop. There are also concerns over fraud etc - the website may be fraudulent and the customer may not receive the goods or credit/debit card details might be stolen. On-line shopping lacks the social aspect of normal shopping and may also result in high-street shops closing down.

22 A multiprogramming computer system is one where more than one job is held in the computer's main memory at the same time and can be processed in the computer's central processing unit (CPU) at (apparently) the same time. Multiprogramming is used to ensure the most efficient use of the CPU and prevent the CPU being idle while waiting for a slower peripheral. The real-time clock causes regular interrupts to create time-slices, which the operating system allocates to the various jobs: this process is called scheduling and is controlled by a scheduler program. Each job is checked sequentially to ensure that it gets its appropriate share of time – this is known as polling. To allow more than one job to be resident in the main memory at any one time, the memory needs to be separated into separate parts - this is called partitioning.

6

[When answers are given in well-expressed point form:
6 marks may be gained for six or more of the individual points listed below
5 marks may be gained for five of the individual points listed below
4 marks may be gained for four of the individual points listed below
3 marks may be gained for three of the individual points listed below
2 marks may be gained for two of the individual points listed below
1 mark may be gained for one of the individual points listed below

However answered, can't get all 6 unless gained mark for each of <u>scheduling</u> & <u>partitioning</u>

- More than one job is in memory at same time
- More than one job is processed (apparently) at same time
- Real-time clock causes regular interrupts to create time-slices
- <u>Scheduling</u> allocates time-slices to each job
- Polling is the sequential checking of jobs so that each gets its appropriate share of time
- OS uses <u>partitioning</u>, ie the division of computer memory for different jobs
- OS pages jobs in and out to make better use of memory
- OS promotes efficient use of CPU

23 A **router** holds information about the <u>addresses</u> of devices in the network or other networks 1

... and can send data to the correct destination. 1

<u>Protocols</u> are necessary to specify data formats etc to enable devices to communicate with each other 1
Examples: any 1 of:
- Linking a computer to a printer 1
- Using ftp/http/smtp/tcp /pop3 etc
- Linking mobile phones by Bluetooth

24 **<letter> ::= a|b|c . . . |z|A|B…|Z** (condone only upper or only lower))
<digit> ::= 0|1|2 . . . |9) 1
<undersc> ::= _)
<char> ::= <letter>|<digit>|<undersc> 1
<chars> :: = <char>|<char><chars>|null 1

<varname> ::= <letter><chars><letter> 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 <u>including handling of 2 or more chars</u>
- Notation error max 1 mark lost

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

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

Supermarket: could attempt to attract customer to make additional purchases using analysis of data from customer personal data & purchases 1

Insurance company: Any 1 of:
- might use data mining to try to detect fraud 1
- might use data mining to try to attract new business

For both supermarket and insurance company:
must be mass data, not data applying to one person

27 TEACHER (TeacherID, TeacherName, TeacherAddress)

CONTRACT (TeacherID ModuleID, StartDate, HoursWorked,) 7

MODULE (ModuleID, ModuleName)

SKILL (TeacherID, ModuleID)

[**Marking**: Four suitably named tables 1
Each table with suitable PK shown as such (2 or 3 correct = 1 mark) 2
Each FK shown as such 4

Any number of bad fields / bad FKs – remove only 1 mark
Ignore additional / irrelevant fields

Other approaches are possible and will be given full credit if correct.

e.g. CONTRACT (ContractID, TeacherID ModuleID, StartDate, HoursWorked,)

28

```
1    input NumStu
2    Set OverallMax = 0
3    for StuCount = 1 to NumStu
4        set Total = 0
5        set Max = 0 (or any integer < 0)
6        set Min = 10 (or any integer > 10)
7        for MarkCount = 1 to 8
8                input Mark
9                set Total = Total + Mark
10               if Mark > Max then Max = Mark
11               if Mark < Min then Min = Mark
12       endfor
13       set Total = Total - Min - Max
14       output "Final Mark = ", Total
15       If Total > OverallMax
                 then set OverallMax = Total
16   endfor
17   output "Highest Mark = ", OverallMax
```

Marking		
Initialise all 4 (condone 3) (my lines 2,4,5,6)	1	6
Outside loop	1	
Inside loop	1	
Input & increment both max & min	1	
Calc & output final mark	1	
Calc OverallMax inside loop & output it outside loop	1	

[**Marking**: Other approaches are possible and will be given full credit if correct.
No marks are given for brevity / efficiency / elegance.]

29 Why standardised: 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

Why difficult to standardise: 1

- different manufacturers / developers approaching problem differently - may not be keen to share for commercial reasons

30 Subprogram libraries contain utilities / common tasks, etc 1

and can be used by any user, avoiding re-writing (and have been tested) 1

31 Any one of:

- A module might be useful in another program. If it has been complied as part of a whole program, it will not be available in compiled form for the new program. 1
- If any errors are corrected /changes made, the whole program will have to be re-compiled.
- It may be preferable to test each module before combining into the whole program / It is easier to find errors in smaller modules.

Not simply "It will take longer to compile"

32 OOL: Any 2 of: 1+1

- uses objects - include both data and associated processing
- enables production of buttons / icons, etc - useful in a visual environment
- uses features such as inheritance, encapsulation etc (Accepted not expected)

Class: template specifying methods/properties etc. 1

Method: program (routine) defined within the class/contained within the object 1

33 12

- A CASE tool is a software tool which provides a number of functions which assist with the design and testing of a computer system / program.
- provides a data dictionary
- includes a graphics / diagram production feature
- may provide repositories of reusable code
- may provide project management tool(s)
- may incorporate version control
- may carry out report generation
- may include prototyping tool
- may include application generator
- may include code generator
-
- A compiler is a software tool which is used to translate a program (written in a high-level language) into a low-level program ready for execution on the computer.
- It has various stages: lexical analysis, syntax analysis, semantic analysis, code generation, optimisation (**1 mark for naming >=3 if no marks for describing them**)
- During *** Lexical Analysis, input stream is broken into tokens, spaces etc removed
- During *** Syntax Analysis, symbol table produced, tokens are checked for fit to grammar (or symbol table can be described in lexical analysis instead)
- During *** Semantic Analysis, a check is made that all variables are declared, and operations are legal eg real values are not being assigned to integer variables
- During Code Generation, machine code is generated
- During Optimisation, the code is improved if necessary to make it more efficient / faster / less resource greedy
- Produces error messages at any stage when needed (**once only for complier**)

- A debugger is a software tool used to detect, locate and correct faults in a program
- program trace/step-through/step-into: enables the programmer to see the progress through the program - which statements/procedures are being executed at any time
- break point: allows the programmer temporarily to halt execution in order to ascertain the value of variables at that point (or to step through the program from that point)
- variable watch: lists the value of a variable at specific points during the execution
- store dump: lists the entire contents of memory at a specific point
- error diagnostics: provision of messages relating to errors in the program
- post-mortem routines: enables programmer to see the values of variables at the point where the program failed - **accepted not expected**
  Note: if only **name** various facilities eg trace, break point, variable watch, worth 1 only

*** Lexical An, Syntax An and Semantic An can each get two marks for 2 or more good points

9-12 Candidates give a clear, coherent answer fully and accurately describing and explaining all three tools. They use appropriate terminology and accurate spelling, punctuation and grammar.

5-8 Candidates describe and explain a reasonable part of the subject area, but responses lack clarity. There are a few errors in spelling, punctuation and grammar.

0-4 Candidates simply list a range of points or give a brief explanation the subject area. The response lacks clarity and there are significant errors in spelling, punctuation and grammar.

[Maximum of 9 if only two of the three tools discussed
maximum of 5 if only one of the three tools discussed]

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