Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

May 2015

Computer science

Standard level

Paper 1

11 pages

Subject details: **Computer science SL paper 1 markscheme**

Mark allocation

Section A: Candidates are required to answer **all** questions. Total 25 marks.
Section B: Candidates are required to answer **all** questions. Total 45 marks.
Maximum total = 70 marks.

General

A markscheme often has more specific points worthy of a mark than the total allows. This is intentional. Do not award more than the maximum marks allowed for that part of a question.

When deciding upon alternative answers by candidates to those given in the markscheme, consider the following points:

- Each statement worth one point has a separate line and the end is signified by means of a semi-colon (;).
- An alternative answer or wording is indicated in the markscheme by a "/"; either wording can be accepted.
- Words in (…) in the markscheme are not necessary to gain the mark.
- If the candidate's answer has the same meaning or can be clearly interpreted as being the same as that in the markscheme then award the mark.
- Mark positively. Give candidates credit for what they have achieved and for what they have got correct, rather than penalizing them for what they have not achieved or what they have got wrong.
- Remember that many candidates are writing in a second language; be forgiving of minor linguistic slips. In this subject effective communication is more important than grammatical accuracy.
- Occasionally, a part of a question may require a calculation whose answer is required for subsequent parts. If an error is made in the first part then it should be penalized. However, if the incorrect answer is used correctly in subsequent parts then **follow through** marks should be awarded. Indicate this with "**FT**".

General guidance

Issue	Guidance
Answering more than the quantity of responses prescribed in the questions	• In the case of an "identify" question read all answers and mark positively up to the maximum marks. Disregard incorrect answers. • In the case of a "describe" question, which asks for a certain number of facts *eg* "describe two kinds", mark the first two correct answers. This could include two descriptions, one description and one identification, or two identifications. • In the case of an "explain" question, which asks for a specified number of explanations *eg* "explain two reasons …", mark the first two correct answers. This could include two full explanations, one explanation, one partial explanation *etc*.

Section A

1. *Award **[1 mark]** for each correct pair of rows.*

A	B	C	(A or B) and (not C or B)
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

[4]

2. *Award **[1 mark]** for a relevant example and **[2 marks]** for an elaboration.*

Example 1:
A business can let employees work at home / employees who travel a lot/external (non-employee) users;
Accessing the data and services (at the office);
Via secure login;

Example 2:
Using VPN, address is masked;
The location of the user is not known;
May be essential in delicate situations such as political protest groups working from their own country;
Note: *Accept any legitimate reason for needing to be unknown.* **[3]**

3. *Award **[1 mark]** for details of a sub-procedure and **[1 mark]** for how it is used.*
For example:
A sub-procedure is a section of code in a program that does a specific job;
It can be called by name when needed without naming the details as these are wrapped in the procedure; **[2]**

4. *Award **[4 marks]** as follows.*
*Award **[1 mark]** for going 3 times through the loop (with COUNT from 1 to 3).*
*Award **[1 mark]** for incrementing correctly SUM (when N mod COUNT = 0).*
*Award **[1 mark]** for the correct output ("perfect").*
*Award **[1 mark]** for showing all working in a trace table with at least three columns (eg COUNT, SUM, OUTPUT).*
*Award **the first 3** marks for an evident trace but working not shown in a trace table.*

Example answer 1:

COUNT	N mod COUNT=0	SUM	SUM=N	output
1	TRUE	1		
2	TRUE	3		
3	TRUE	6		
			TRUE	perfect

Example answer 2:

COUNT	N mod COUNT	SUM	output
		0	
1	0	1	
2	0	3	
3	0	6	perfect

[4]

5. *Award **[1 mark]** for each usability feature and **[1 mark]** for an elaboration clearly related to the needs of the user, taking into account that not all users have the same physical/technical capabilities, up to **[4 marks max]**.*

For example:

Larger screen;
Easier to view large amounts of data without excessive scrolling or squinting / reduced eyestrain / more accessible to those with weak eyesight;

Hotkeys to control brightness, sound volume, navigation, etc;
Quick access to frequently used adjustments that aid in viewing, listening, etc without first navigating to a software-based control panel;

Size and sensitivity of touchpad;
Those with mobility or coordination issues, or simply with large hands, may need a larger and/or less sensitive pad to control the cursor;

Standard accessibility for visually impaired;
Larger text option or text to speech; **[4]**

6. *Award up to **[2 marks max]**.*
*Award **[1 mark]** for communication with user – email/ pop up etc.*
*Award **[1 mark]** for method of installation of update – automatic/ link/ in list for user to install etc.*

When the software is installed and registered (a cookie is placed on the machine);
This communicates with the software developer automatically on start up;
Messages about updates are sent back to the machine and alerts are given;

OR

Send an email;
With a link to the update; **[2]**

7. (a) *Award **[1 mark]** for the correct list and **[1 mark]** for the correct order. The last two can be in any order. Accept similar descriptions of individual tasks.*

Collect samples
Analyse samples
Write report
Prepare presentation **[2]**

(b) *Award **[1 mark]** for the correct tasks and **[1 mark]** for outlining how they can be done concurrently*.

"Write report" and "prepare presentation" can be done at the same time as they can be performed by different students (using the same data). **[2]**

(c) *Award **[1 mark]** for a correctly labelled chart illustrating the order of tasks from part (a) and **[1 mark]** for showing the concurrency from part (b).*
For example:

Task	Phase 1	Phase 2	Phase 3
Collect samples	—		
Analyse samples		—	
Write report			—
Prepare presentation			—

[2]

Section B

8. (a) *Award marks as follows, **up to [6 marks max]**.*
*Award **[1 mark]** for looping through the database and accessing all records.*
*Award **[1 mark]** for correct calculation of date difference (eg = today – paymentDate **OR** paymentDate – today).*
*Award **[1 mark]** for each list correctly compiled, **x3** (correct conditional statements according to date difference used).*
***Note:** Accept date difference not calculated/stated but assumed as "today – paymentDate" **OR** "paymentDate – today".*
*Award **[1 mark]** for successive if/else but wrong conditions.*
*Award **[1 mark]** for flagging correct records for deletion (do not accept deleting the records).*

Example:

```
set CURRDATE to current date (as a day number)
set LIST1, LIST2 and LIST3 to empty
loop through all CUSTREC in DATABASE
     DUEPERIOD = CURRDATE - CUSTREC.PAYMENTDATE
     if DUEPERIOD > 30 then
          add CUSTREC to LIST3
          flag CUSTREC to delete
     else if DUEPERIOD > 14 then
          add CUSTREC to LIST2
     else if  DUEPERIOD > - 30 then
          add CUSTREC to LIST1
     end if
end loop
```

[6]

***Note:** If candidates give their answer in flowchart form then credit them using the same marking points.*

(b) *Award up to **[4 marks max]**.*
(Using a mail merge facility);
Template for each type of reminder created in the word processor;
Lists created with customer ID;
Linked to customer details in database;
Appropriate details merged/inserted into template;
Email lists created and sent / letters printed and sent; **[4]**

(c) *Award **[1 mark]** for a consequence of data loss to customers and **[1 mark]** for a consequence of data loss to the insurance company.*

Example answer:
Customers would not be reminded when they needed to pay and some may overlook payment, hence not be insured;
The company could lose customers/ruin reputation; **[2]**

(d) *Award marks as follows up to **[3 marks max]**.*
*Award **[1 mark]** for a suitable measure and **[2 marks]** for a description related to the insurance company.*
Example answers:
Mirror system;
All changes to the records made on two systems;
If one fails then the other holds all current data;

Off site backup;
Snapshots/backups made on a regular basis;
In the case of failure a dated/time stamped copy exists and the state up until then can be used to restore customer records; **[3]**

9. (a) *Award up to **[3 marks max]**.*
The OSI is a standardized system/model for network connection;
Consists of (7) layers;
Each dealing with specific parts of network communication;
For example the physical layer which defines the physical connection; **[3]**

Note: *Award **[1 mark]** for the purpose of any of the 7 layers.*
*If candidate lists all 7 layers with no specific example award **[2 marks]** and a further **[1 mark]** if the purpose of at least one layer is given.*

(b) *Award up to **[3 marks max]**.*
Protocols are a set of rules;
To facilitate a process being carried out correctly;
(Used in each layer to ensure communication;)
For example (in the physical layer) the protocols could define the methods for opening and closing communication; **[3]**
Note: *Do not accept examples which are not related to networks.*

(c) *Award **[2 marks]** for an advantage with an elaboration and **[2 marks]** for a disadvantage with an elaboration, up to **[4 marks max]**.*
For example:
An advantage is that lawyers can access quickly with mobile devices;
Anywhere in the building and do not need to be at the workstation;

Users can logon with their own devices (if properly configured);
More familiar with interface/functions;

One disadvantage is security as it could be possible to get to the server from a nearby neighbourhood if not very secure;
Less secure than the cabled system in the building;

Wireless signal could be weak in some parts of the building;
Leading to frustrated/ineffective employees; **[4]**

(d) *Award marks as follows up to **[5 marks max]**.*
*Award **[1 mark]** for looping through the collection.*
*Award **[1 mark]** for returning a job first if time>10 min.*
*Award **[1 mark]** for searching the loop again for each priority level.*
*Award **[1 mark]** for searching from 1 – 4 in order.*
*Award **[1 mark]** for ending when the highest priority level job is found.*

Note: *Accept algorithms, bullet points and text answers which are clear and in correct logical order. Accept the list being sorted before searching.*

For example:

```
loop through all the jobs
  If job.time > 10 min return job
  else set priority = 1
    while priority< 5
      loop through all jobs
        if job.priority = priority return job
      endloop
      increment priority
    end while
  endif
endloop
```

[5]

10. (a) *Award **[2 marks max]** for the similarities and **[2 marks max]** for the differences.*
Both use nested loops;
Each time reducing the inner loop;

Bubble sort swaps adjacent items each time it goes through the list;
Selection sort finds the next smallest each time it goes through the list;
Bubble sort can exit early if already sorted; **[4]**

(b) *Award **[1 mark]** for reference to the size of the list and **[1 mark]** for stating why the selection sort is faster.*
It is possible that selection sort will only need 10 passes of the outer loop to find 10 fastest times;
But bubble sort will need to complete the procedure for the entire list every time;

OR

List is long;
Swapping takes longer than selecting; **[2]**

(c) *Award marks as follows up to **[6 marks max]**.*
*Award **[1 mark]** for setting all variables at start.*
*Award **[1 mark]** for correct double looping through `TIMES`.*
*Award **[1 mark]** for correct selection of `MIN`.*
*Award **[1 mark]** for transfer to `FASTEST`.*
*Award **[1 mark]** for successful swapping selected value.*
*Award **[1 mark]** for resetting `MIN` to value transferred.*
*Award **[1 mark]** for incrementing array index in `FASTEST`.*
*Award **[1 mark]** for transfer of exactly 10 elements.*

For example:

```
MIN = 0
TRANSFER = 0
loop while TRANSFER < 10
     MIN = 250000 //larger than first 10 fastest
     COUNT = TRANSFER
     loop while COUNT < 150
          if TIMES [COUNT] < MIN
               MIN = TIMES[COUNT]
               K = COUNT
          end if
          COUNT = COUNT + 1
     end loop
     FASTEST[TRANSFER] = TIMES[K]
     TEMP = TIMES[TRANSFER]
     TIMES[TRANSFER] = TIMES[K]
     TIMES[K] = TEMP
     K = K + 1
     TRANSFER = TRANSFER + 1
end loop
```

***Note:** Accept any reasonable value set as `MIN` – including `TIMES[0]` provided that this is not replaced by `MIN` after the first loop.*

Alternatively the array can be sorted and then transferred in which case award marks as follows:

*Award **[1 mark]** for creating the array* `FASTEST`*.*
*Award **[1 mark]** for correct double looping through* `TIMES`*.*
*Award **[1 mark]** for comparing adjacent values.*
*Award **[1 mark]** for correct swap if second value is lower.*
*Award **[1 mark]** for looping through* `FASTEST`*.*
*Award **[1 mark]** for transferring first* `TIMES` *to* `FASTEST`*.* **[6]**

(d) The problem with parallel arrays is the sorting/indexing/maintaining relationship;
An object would contain at least a name and a time (accept other descriptions of object);
Would only need to sort the array of objects / only one list to be sorted; **[3]**