



MARKSCHEME

May 2009

COMPUTER SCIENCE

Standard Level

Paper 1

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Subject Details: Computer Science SL Paper 1 Markscheme

Mark Allocation

Section A: Candidates are required to answer all questions. Total 30 marks.

Section B: Candidates are required to answer all questions. Total 40 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.
- The order of points does not have to be as written (unless stated otherwise).
- 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 penalising 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**”.

SECTION A

Total: [30 marks]

1. *Award [2 marks] for explaining each difference, up to [4 marks max].*
 Analysis is focused on defining the requirements (such as input and output requirements);
 Whereas design is focused on creating the programs which implement the requirements;

 Analysis is concerned with finding out what the user wants;
 Whereas design is realisation of the solution; **[4 marks]**

2. *Award [2 marks] for explaining each advantage, up to [4 marks max].*
Award [2 marks max] for advantages of modular design, as opposed to modular implementation (construction).
 Reduced development time;
 From re-use of modules;
 Or by using programming teams;

 Reduced errors;
 From re-use of fully tested modules;

 Easier to correct errors;
 Due to code related to an error being localized within a module;

 Easier to add/change functionality (more adaptable);
 By adding new modules within the existing framework;

 Able to focus on one aspect;
 Without need to completely understand the whole; **[4 marks]**

3. (a) *Award [1 mark] for the new system and [1 mark] for the effect on a stated group of people.*
Example:
 Computerising a town's traffic lights system;
 Allows drivers to cross the town more quickly; **[2 marks]**

- (b) *Award [1 mark] for the new system and [1 mark] for the effect on a stated group of people.*
Example:
 Replacing a manual system in a manufacturing company;
 Causes many manual workers to lose their jobs; **[2 marks]**

4. *Award [1 mark] each for any of the following up to [2 marks max].*
 Manage memory allocation;
 Manage disk access;
 Manage screen display;
 Manage user interface;
 Manage interface to peripherals;
 Manage network login;
 Manage security; **[2 marks]**

5. (a) Compilation converts source code;
Into object code;
Accept executable file or executable instead of object code. [2 marks]
- (b) Syntax error; [1 mark]
- (c) Award [1 mark] each for any of the following up to [2 marks max].
The method has to return a `double`;
So should have a `double` in its signature;
And should have a return statement; [2 marks]
6. (a) An array (*accept object*);
Of float/double;
With 30 elements; [3 marks]
- (b) An object;
Containing an `int` (for the age);
And a `boolean` (for the football); [3 marks]
7. Award up to [2 marks max].
The address bus is the pathway/circuit between the processor and the memory;
That carries the address (in memory);
To/from which data is transferred; [2 marks]
8. (a) 5F; [1 mark]
- (b) 95; [1 mark]
9. Method created by the programmer; [1 mark]
Do not accept: "Method created by the user / for the user".
Award [1 mark] if it is clear that the person referred to in the student's answer is the programmer as opposed to the end-user of the software.

SECTION B

Total: [40 marks]

- 10.** (a) *The answers must be detailed, as shown below, to gain credit.*
 The method is a public one, which means it can be called from outside of this class/“anywhere”;
 The identifier/name of the method is `selection`;
 The method returns a reference to an array instance/object (*accept “returns an array”*);
 The method receives as a parameter a reference to the integer array `list` (*accept “receives an array”*); **[4 marks]**
- (b) *Award [1 mark] if the value 2 is now the first value in the array, and [1 mark] for the other values being correct.*
 2, 6, 3, 8, 5 **[2 marks]**
- (c) *Award up to [2 marks max].*
 The method will execute as normal (the same number of loops);
 No swapping will take place;
 There is no “early exit”;
Award [1 mark] for the statement that the output array is the same as the input array. **[2 marks]**
- (d) *Award [1 mark] for suggesting how the size of the array could be known.*
Example:
 The size of array is also sent to the method (`= n`);
 The length of the array is found within the method (`= n`);
 The array could be terminated by a sentinel value;
 The length method could be used;
Award [1 mark] for stating that the loop termination conditions must be adjusted based on the array size. **[2 marks]**

Total: [10 marks]

11. (a) *Award [1 mark] each for any of the following up to [4 marks max].
Award [2 marks max] for generic responses that do not address the specifics of the problem context (salary, hours, taxes, monthly, etc.).*
The transaction file will contain salary details of the last month;
Such as number of hours worked;
The transaction file will need to be sorted;
It will update the master file;
Which contains the complete set of employee details;
Such as total salary / tax earned / hours worked for the year;
And which also needs to be sorted;
The current month's salary will be calculated; **[4 marks]**
- (b) *Award [1 mark] each for any of the following up to [2 marks max].*
The processing only needs to take place at certain intervals/once a month/
does not have to take place immediately;
All the data can be processed at the same time;
Little human intervention is required; **[2 marks]**
- (c) (i) *Award up to [2 marks max].*
Examples:
An (ex-)employee with access privileges could enter the system;
And make changes;

Illegal access to the system / system hacked into from outside/the Internet;
And changes made;

A virus could enter from outside;
And corrupt data; **[2 marks]**
- (ii) *Award up to [2 marks max]. Answer must match answer for part (i).*
Access privileges should be removed;
When an employee leaves;

Passwords should be changed regularly;
So that ex-employees cannot enter the system;

Sensitive data;
Should have limited access/read only (except for administrator);

LANs should have firewalls;
To prevent illegal access from outside;

Virus checkers should be present;
To prevent damage from any type of virus; **[2 marks]**

Total: [10 marks]

12. (a) Award **[1 mark]** for stating each way, and **[1 mark]** for explaining why it would speed up transmission, up to **[4 marks max]**.

Examples:

It could compress the files;

So that there is less data to send (not so that it travels faster);

Accept “transmits faster” so long as it is clear that this refers to the transmission time and not the transmission speed.

It could install fibre optics / dedicated lines *etc.*;

So that more data can travel per second / to have higher bandwidth circuits; **[4 marks]**

- (b) All terminals/parts of the network must have the same rules for communication;
So that data can be transferred successfully/without losing data;

Accept more specific answers such as:

A terminal knows that the sender has finished sending; **[2 marks]**

- (c) Award up to **[2 marks max]** for up to **two** uses.

Examples:

It could allow videoconferencing;

With the use of web cams;

Between different offices;

It could allow communications;

With the use of mailing software;

Between different offices;

The main database;

Could be held at one office;

And queried from the others;

[4 marks]

Total: [10 marks]

13. (a) *Award up to [2 marks max].*
 A microprocessor is a dedicated processor;
 For controlling a device;
 It runs a specific program; **[2 marks]**
- (b) *Award [1 mark max] for any reasonable example. Example must identify a specific system. For example, do not award a mark for “a car”.*
Examples:
 Camera;
 Cellphone;
 Car brakes; **[1 mark]**
- (c) *For this part, if the example in part (b) is complex, i.e. the microprocessor performs multiple functions, accept answers in which part (i) describes a subset of the functions and parts (ii) and (iii) identify inputs and outputs related to that subset.*
- (i) *Award [2 marks] for a good description and [1 mark] for a brief description.*
Examples:
 (Camera) It would control the amount of light entering the lens;
 In order to provide the correct exposure;

 (Cellphone) It allows the user to store phone data;
 By allowing entry, recall, modification, and deletion of directory entries;

 (Car brakes) It would control the amount of braking applied to each wheel;
 To prevent skidding; **[2 marks]**
- (ii) *Examples:*
 (Camera) Amount of light detected by the sensor;
 (Cellphone) Keypad button that has been pressed;
 (Car brakes) Speed of wheel rotation; **[1 mark]**
- (iii) *Examples:*
 (Camera) Sets the aperture;
 (Cellphone) Displays data on LCD screen;
 (Car brakes) Pressure applied to each brake; **[1 mark]**
- (d) ROM/EPROM and RAM;
 ROM is for storing permanent instructions;
 RAM is to provide memory for any processing; **[3 marks]**

Total: [10 marks]
