



MARKSCHEME

November 2010

COMPUTER SCIENCE

Standard Level

Paper 1

10 pages

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General Marking Instructions

*After marking a sufficient number of scripts to become familiar with the markscheme and candidates' responses to all or the majority of questions, Assistant Examiners (AEs) will be contacted by their Team Leader (TL). The purpose of this contact is to discuss the standard of marking, the interpretation of the markscheme and any difficulties with particular questions. It may be necessary to review your initial marking after contacting your TL. **DO NOT BEGIN THE FINAL MARKING OF YOUR SCRIPTS IN RED INK UNTIL YOU RECEIVE NOTIFICATION THAT THE MARKSCHEME IS FINALIZED.** You will be informed by e-mail, fax or post of modifications to the markscheme and should receive these about one week after the date of the examination. If you have not received them within 10 days you should contact your TL and IB Cardiff. Make an allowance for any difference in time zone before calling. **AEs WHO DO NOT COMPLY WITH THESE INSTRUCTIONS MAY NOT BE INVITED TO MARK IN FUTURE SESSIONS.***

You should contact the TL whose name appears on your “Allocation of Schools listing” sheet.

Note:

Please use a personal courier service when sending sample materials to TLs unless postal services can be guaranteed. Record the costs on your examiner claim form.

General Marking Instructions

1. Once markscheme is received mark in pencil until final markscheme is received.
2. Follow the markscheme provided, do **not** use decimals or fractions and mark only in **RED**.
3. Where a mark is awarded, a tick (✓) should be placed in the text at the **precise point** where it becomes clear that the candidate deserves the mark.
4. Sometimes, careful consideration is required to decide whether or not to award a mark. Indeed, another examiner may have arrived at the opposite decision. In these cases write a brief annotation in the **left hand margin** to explain your decision. You are encouraged to write comments where it helps clarity, especially for moderation and re-marking.
5. Unexplained symbols or personal codes/notations on their own are unacceptable.
6. Record subtotals (where applicable) in the right-hand margin against the part of the answer to which they refer. Show a mark for each part question (a), (b), *etc.* Do **not** circle sub-totals. Circle the total mark for the question in the right-hand margin opposite the last line of the answer.
7. Where an answer to a part question is worth no marks, put a zero in the right-hand margin.
8. **Section A:** Add together the total for the section and write it in the Examiner Column on the cover sheet.
Section B: Record the mark awarded for each of the six questions answered in the Examiner Column on the cover sheet.
Total: Add up the marks awarded and enter this in the box marked TOTAL in the Examiner Column on the cover sheet.
9. After entering the marks on the cover sheet check your addition of all marks to ensure that you have not made an arithmetical error. Check also that you have transferred the marks correctly to the cover sheet. **We have script checking and a note of all clerical errors may be given in feedback to all examiners.**
10. Every page and every question must have an indication that you have marked it. Do this by **writing your initials** on each page where you have made no other mark.
11. A candidate can be penalized if he/she clearly contradicts him/herself within an answer. Once again make a comment to this effect in the left hand margin.

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.

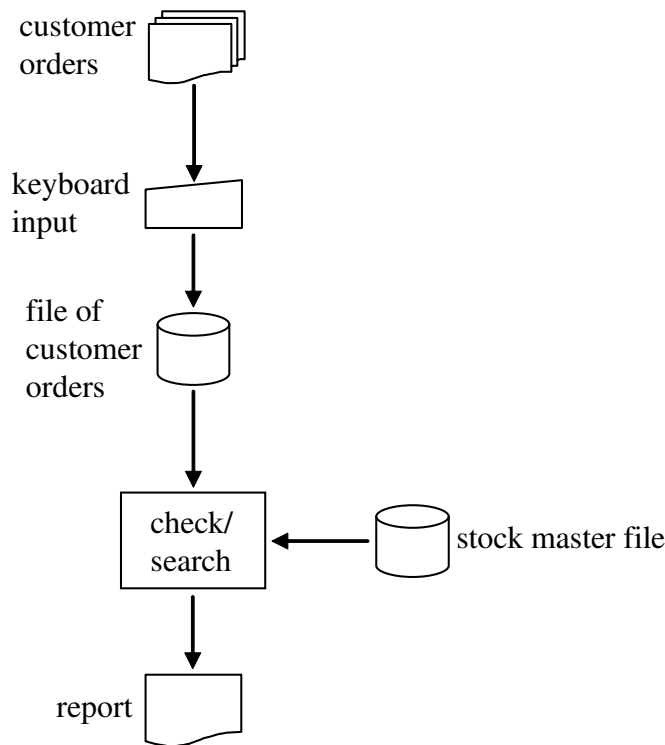
When deciding upon alternative answers by candidates to those given in the markscheme, consider the following points:

- 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.
- 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. (a) The process of replacing the old computer system by the new one / creating the new computer system;
In the series of stages: analysis, design, development, implementation, maintenance; **[2 marks]**
 - (b) Analysis; **[1 mark]**
2. Award **[1 mark]** for each labelled symbol, up to **[5 marks max]**.



[5 marks]

3. Award **[1 mark]** for each of the following items in a labelled diagram, up to **[4 marks max]**.
Control unit (CU);
Arithmetic and Logic Unit (ALU);
Buses;
Primary memory; **[4 marks]**
4. Any example of using a device/computer for accessing information;
From some other computer to which it is connected; **[2 marks]**
5. (a) Award **[1 mark]** for correct answer and **[1 mark]** for showing working.
11001101₍₂₎ **[2 marks]**
- (b) A₉₍₁₆₎; **[1 mark]**

6. Award [1 mark] for definition and [1 mark] for description.
Components or subsystems are replaced incrementally;
Each new component or subsystem is tested in place before the next is replaced; [2 marks]
7. (a) Award up to [1 mark max].
Source documents, data in a form of prepared source documents;
Data capture, data at source produced in machine sensible form (e.g. digital photos, or temperature/humidity readings); [1 mark]
- (b) Data can be transferred from the field to the central computer by using telecommunication facilities;
Accept any appropriate example. [1 mark]
- (c) Example answer:
Data verification is a method of checking/ensuring that data at source is the same as inputted data;
Usually the user is involved, for example asked to retype data;
Data validation is performed by the software;
Checking the range, whether the type of data is correct etc.; [4 marks]
8. Award [1 mark] for stating that the Boolean data type has only two possible values.
OR
Award [1 mark] for identifying the two possible values as *True* and *False*. [1 mark]
9. A LAN is a local area network that encompasses small areas, such as a room or a building;
A WAN is a wide area network that encompasses large areas such as a country; [2 marks]
10. Award up to [2 marks max].
File manager;
Data compressor;
(Anti)virus software;
Defragmentation software;
Credit any acceptable alternatives. [2 marks]

SECTION B

Total: [40 marks]

11. (a) Award [1 mark] for each correct column, up to [5 marks max].

d	q	p	r	$q \geq d * p$	output
8	37	0	0	T	
8	37	1	0	T	
8	37	2	0	T	
8	37	3	0	T	
8	37	4	0	T	
8	37	5	0	F	
8	37	4	5		
					p = 4 r = 5

Award marks only for the last five columns.

[5 marks]

(b) (i) Award [1 mark] for each parameter, up to [2 marks max].

The parameters are d and q.

[2 marks]

(ii) Award [1 mark] for each local variable, up to [2 marks max].

The local variables are r and p.

[2 marks]

(c) Integer division: divides q by d;

[1 mark]

Total: [10 marks]

12. (a) Analog data has a value at all instances in time (continuous);

OR

Analog data can take on any value (continuous);

[1 mark]

(b) Digital data has a value only at particular instances in time (sampled);

OR

Digital data takes on only particular values (discretized);

[1 mark]

(c) Accept any reasonable answer, such as:

The file of samples stored in the player is digital data;

The signal sent to the speaker is analog data;

[2 marks]

(d) (i) Award up to [2 marks max].

Award [1 mark] for any description of $\text{size} = \text{time} * \text{sample_rate} * \text{sample_size}$.

Award [2 marks] for a correct formula such as:

$44100 \text{ samples/sec} * 2 \text{ bytes/sample} * 3 \text{ minutes} * 60 \text{ seconds/minute}$

$/ 1024 \text{ bytes/kB} = 15503 \text{ kB}$

[2 marks]

(ii) Compression software;

[1 mark]

(e) Award [1 mark] for identifying a legitimate ethical issue.

Award up to [2 additional marks] for a discussion of the issue.

[3 marks]

Total: [10 marks]

13. (a) *Award up to [2 marks max].*
All users must be uniquely identifiable (*e.g.* usernames);
All users must be authenticated (*e.g.* passwords);
All users are assigned a user role (*i.e.* student, teacher, *etc.*);
The server software will only permit authenticated users assigned a teacher role to update the grades;
The server must be physically secure; **[2 marks]**

- (b) *Award up to [2 marks max].*
Student e-mails may fill the storage available;
Student e-mails may overload the network;
Students may attach files to e-mail that contain viruses; **[2 marks]**

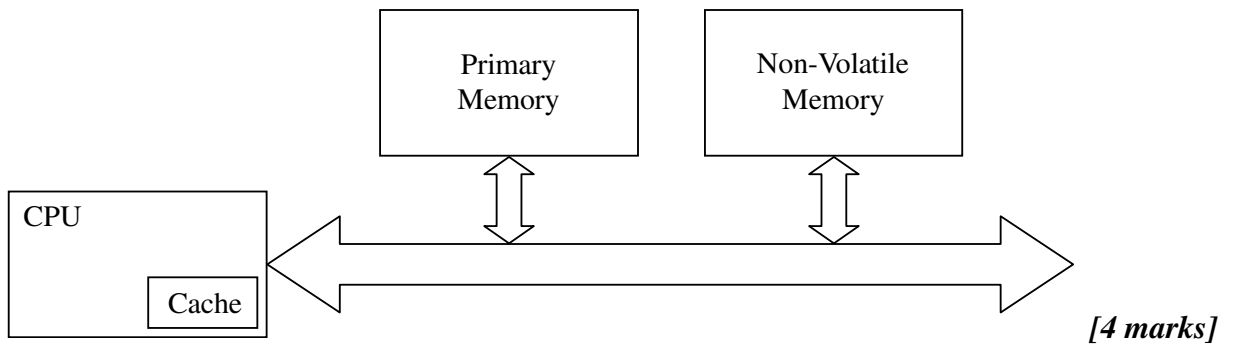
- (c) *For each of the two issues identified by the student:*
Award [1 mark] for identifying a legitimate social/ethical issue.
Award [2 marks] for their discussion (the second mark is awarded for significant depth in the discussion or for proposing a means of addressing the issue).

Possible issues:

- Students may send inappropriate messages within the school;
Students may use e-mail to cheat on exams and assignments;
Students may bully or be bullied by e-mail;
Students may be distracted from classwork by e-mail; **[6 marks]**

Total: [10 marks]

14. (a) Award [1 mark] for the correct location and identification of each block, up to [4 marks max].



- (b) Award [1 mark] for any of the following, up to [2 marks max].

Cache is high-speed memory;

Situated closer to the processor than the RAM / situated between the RAM and the processor;

Which contains commonly used code / latest used code;

Which can be accessed faster than code in the RAM;

Purpose is to speed up the running of programs;

[2 marks]

- (c) Award [1 mark] for any of the following, up to [4 marks max].

Volatile memory is faster than non-volatile memory;

Volatile memory is cheaper than non-volatile memory;

Some non-volatile memory can only be written a limited number of times;

Some non-volatile memory requires special hardware to be written;

Non-volatile memory retains its data without power;

Any discussion of how to segregate instructions and data between the two types of memory may be used for [2 marks max].

[4 marks]

Total: [10 marks]