N09/5/COMSC/SP1/ENG/TZ0/XX/M

International Baccalaureate®
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MARKSCHEME

November 2009

COMPUTER SCIENCE

Standard Level

Paper 1

10 pages

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. *Award up to **[2 marks max]**.*
The user will
Help define the objectives;
Be interviewed (by the systems analyst);
Be observed using the current system; ***[2 marks]***

2. (a) Scanners convert/digitize hardcopy text or graphics;
Into computer usable form; ***[2 marks]***

(b) *Award up to **[1 mark max]**.*
Possible answers:
Barcode reader (for example in supermarkets);
Optical mark reader (multiple choice tests);
Handwritten character reader (cheques);
etc. ***[1 mark]***

3. *Award up to **[3 marks max]**.*
Network is collection of data communication hardware;
Computers;
Communications software;
Communications media;
Connected in a way to allow users to share resources; ***[3 marks]***

4. (a) *Award up to **[2 marks max]**.*
An operating system is software;
That controls a computer;
Examples:
Provides an interface for users/programs/hardware;
Controls the organization and execution of all programs;
Manages memory;
etc. ***[2 marks]***

(b) *Award up to **[3 marks max]**.*
Examples:
Easy to use;
Speed of operation;
Capability to support multitasking;
Compatibility (capability of being used with hardware);
Quantity of compatible software user needs to install;
Availability of technical support;
etc. ***[3 marks]***

5. *Award up to **[3 marks max]**.*
Quiet;
Output of text and graphics;
Excellent quality;
(Very) high speed;
etc. ***[3 marks]***

6. (a) *Award up to **[2 marks max]**.*
The operator;
Might misread the data / mistype the data;
or
A device;
Might misread code / code might be damaged *etc.*; ***[2 marks]***

(b) *Award up to **[2 marks max]**.*
Double entry;
Would detect the error;
or
Operator;
Might visually notice the error;
or
Check digit;
Would check calculation; ***[2 marks]***

7. (a) $26/16 = 1$ remainder $10 = \text{A}$
$1/16 = 0$ remainder 1
$26_{(10)} = 1\text{A}_{(16)}$ ***[1 mark]***

(b) 11010; ***[1 mark]***

8. (a) *Award up to **[2 marks max]**.*
Data compressor;
Virus software;
File managers;
Defragmentation software;
etc. ***[2 marks]***

(b) *Award up to **[2 marks]** for each description, up to **[4 marks max]**.*
Data compressor
Reduces the size of a file;
By eliminating unnecessary / repeated / expendable data;

Virus software
Seeks out viruses;
And eliminates them;

File managers
Organises files on a computer;
Such as copy, delete *etc.*;

Defragmentation software
Places parts of the same file next to each other;
That were otherwise spread about the disk; ***[4 marks]***

9. (a) A; ***[1 mark]***

(b) C; ***[1 mark]***

SECTION B *Total: [40 marks]*

10. (a) (i) Values are entered into the array `a`. ***[1 mark]***

(ii) The data item `-1` is the end of data marker / ends the `input()` method. ***[1 mark]***

(b) *Award **[1 mark]** for a correct **`total`** column and **[1 mark]** for a correct **`output`** column.*

counter	a[counter]	total	a[counter]!=-1?	output
0	3	3	No	
1	6	9	No	
2	12	21	No	
3	–1	21	Yes	7

[2 marks]

(c) There could be an out-of-bounds error on the array;
If more than 10 entries are made;
There would be a division-by-zero error;
If no data was entered / only `-1` was entered; ***[4 marks]***

(d) *Award up to **[2 marks max]**.*
The division will give an integer value;
Whereas the programmer might be expecting a double/more accurate answer;
İf `-1` was an actual data value;
The program would incorrectly terminate; ***[2 marks]***

Total: [10 marks]

11. (a) *Award up to **[2 marks max]**.*
ASCII uses 7/8 bits, as opposed to Unicode's 16 bits;
Which means that more characters can be represented in Unicode;
ASCII can code 128 characters, Unicode 2^{16} (65 000); ***[2 marks]***

(b) *Award up to **[4 marks max]**.*
The extra characters available in Unicode;
Can be used to represent alternative character sets;
As in Cyrillic, Chinese, *etc.*;
Which allows those nationalities to communicate in their own language;
As in e-mail, social networking *etc.*; ***[4 marks]***

(c) The number of colours possible $= 2^n$;
Where n = number of bits; ***[2 marks]***

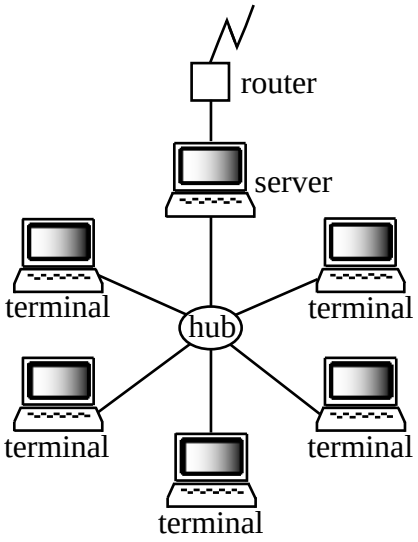
(d) (i) 1010 1100; ***[1 mark]***

(ii) 172; ***[1 mark]***

Total: [10 marks]

12. (a) Standard protocols establish the rules/steps for communication;
And allow communication to take place successfully; ***[2 marks]***

(b) *Award **[1 mark]** each up to **[4 marks max]**, for the correct positioning of the server, hub, router and PCs.*



[4 marks]

(c) *Award **[1 mark]** for a valid implication up to **[4 marks max]**.*
Examples:
Installing in one place (the server) will ensure that the software is always up to date;
And it can be centrally maintained by the technician;
Software can be downloaded to individual PCs as required by the user;
Rather than taking up space on their individual hard disks;
If software is processor intensive, network traffic will increase (and slow down processing);
Software cannot be used by an individual PC if it is not connected to the network;
etc. ***[4 marks]***

Total: [10 marks]

13. (a) A byte is made up of 8 bits;
A word is a certain number of bytes / a group of bits that can be used as a single unit; ***[2 marks]***

(b) *Award the following marks only if in correct order*
The instruction is fetched from the memory;
It is decoded;
It is executed;
Any data (generated) is stored; ***[4 marks]***

(c) (i) A form of access in which all previous records/data must be read before the required record is found;
As would be the case with tape; ***[2 marks]***

(ii) A form of access in which the required record/data can be accessed directly/without reading previous records;
As would be the case with disks/flash memory; ***[2 marks]***

Total: [10 marks]