IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
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N06/5/COMSC/SP2/ENG/TZ0/XX/M

# MARKSCHEME

## November 2006

## COMPUTER SCIENCE

## Standard Level

## Paper 2

11 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 IBCA. 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 remarking.

**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.** Record the mark awarded for each of the three questions answered in the Examiner Column on the cover Sheet.
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 2 Markscheme

**Mark Allocation**

Candidates are required to answer ALL questions. (***[20 marks]*** for question 1, ***[20 marks]*** for question 2, ***[30 marks]*** for question 3. 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 part of a question.

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

- Each marking 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 mark scheme 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. Effective communication is more important than grammatical niceties.
- 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**".

1. (a) For example:

```
public class Relative
{
  public String name;
  public int day;
  public int month;
  public int year;
}
```

*Award marks as follows.*
structure of class (there is no need for variables to be declared as public if this is an inner class);
name string;
all of the date variables integer;

*If candidates use constructors then accept and mark as follows.*
all variables constructed with set and get methods included;
correct type for name;
correct data type for dates variables; ***[3 marks]***

(b)

| | currentYear | Relative.year | age |
|---|---|---|---|
| Luca | 06 | 01 | 5 |
| Janet | 06 | 55 | -49 |
| | | | 51 |

***[3 marks]***

*Award marks as follows.*
*Award **[1 mark]** for correct age of Luca and **[2 marks]** for the correct age of Janet.*

(c) The error would occur for people over one hundred years old and would be a logical error.
If candidates assume that actual age is being calculated they may answer that the error is that age depends on when the birthday is. The error is still logical. Give full marks. ***[2 marks]***

(d)
```
boolean findBirthMonth(Relative aRelative, int aMonth)
{
  return (aRelative.month == aMonth);
}
```

*Award marks as follows.*
one parameter of type Relative passed;
one parameter of type integer passed;
boolean method correctly called;
correct return ***[2 marks]*** ***[5 marks]***

(e)
```
public void monthList(int aMonth)
    {int count=0;
    open("Birth.txt");
    getNext(aRelative);
    do
      {if(findBirthMonth(aRelative, aMonth))
        {count=count +1;
        output(aRelative.name);
        }
        getNext(aRelative);
      }while (!aRelative.name.equals ("XXX"));
       output( "number of birthdays in" + aMonth+ "is" +count);
    }
```

*Award marks as follows.*
open file;
initialise count;
getNext record until "XXX";
correct call to findBirthMonth;
increment count;
output name;
output number of birthdays; ***[7 marks]***

2. (a) *Award **[1 mark]** for a suitable interface and **[2 marks]** for each choice and computer response.*

For example:

- A touch screen;
- where users could select from a set of options (events, distances) once the first option is chosen a new screen would give further choices (start and end town from map or drop down list);
- when selected the distance would be displayed;
- there would be a possibility to try another pair or go back or quit; ***[3 marks max]***

(b) For example:

questionnaires could be placed in service stations and rail stations ***[2 marks]***.
electronic forms on Internet sites which are used for booking journeys ***[2 marks]***.
travel agents could ask customers to answer a few questions about their needs ***[2 marks]***.
*Accept any suitable answer that is outlined.* ***[4 marks max]***

(c) 373; ***[1 mark]***

(d) For example:

```
Static int distance(String town1, String town2)
{
  int code1=-1;
  int code2=-1;
  for(int i=0; i<SIZE &&(code1==-1|| code2==-1);i++)
  {if(town[i].equals(town1)){code1=i;}
   if(town[i].equals(town2)){code2=i;}
  }
  if(code1==-1|| code2==-1)
    {output("towns not found");
    return-1;
    }
  if(code1 > code2)
  {return distance[code1][code2];}
  else
  {return distance[code2][code1];}
}
```

*Award marks as follows.*
all variables correctly declared and initialised;
correct looping through to both place values ***[2 marks]***
return of error if one or other not present;
comparison of positions to find largest;
correct return of distance from array; ***[6 marks]***

(e) *Award marks for any feasible solution as follows.*

- method of capture of information;
- method of transmitting back to one central place;
- conversion to suitable format for display;
- transmitted to displays;

For example:

- video or continual snaps from cameras placed at frequent and strategic spots;
- sent back to central server in real time over WAN or by satellite;
- software that could detect density in photos/videos;
- text message sent giving place of problem and routes to avoid – transmitted to displays via WAN;
- displayed on welcome screen of display; ***[4 marks max]***

(f) *Award full marks for any suitable method that is elaborated. Award* ***[1 mark]*** *if stated only.*

For example:

- for motorists with GPS system in car;
- message can be given to those in the area;
- via satellite; ***[2 marks max]***

*Accept also systems that use the motorway network to display on overhead electronic boards.*

3. (a) (i) 1Gbytes/10Mbytes is 1024/10 so about 100 minutes. ***[2 marks]***

(ii) This will be 1024 times more, *i.e.* approx 100 000 minutes; ***[1 mark]***

(b) *Award **[1 mark]** for each of the following.*

- a driver allows a variety of different software;
- to communicate with the hardware;
- hence can accept data for storage or editing; ***[3 marks max]***

(c) *Award **[2 marks]** for each elaborated implication.*

For example:

digital music is easy to copy;
unauthorized "free" copies can be made and distributed;

there is no physical evidence of theft;
when a digital copy is made;

it is very difficult to discover;
that/where copies are being made; ***[4 marks max]***

(d) *Award **[2 marks max]** for parameters and **[4 marks max]** for process.*

**parameters**
*Award **[2 marks]** for all four of the parameters identified, **[1 mark]** for only three and no marks for one or two only.*
pitch
volume
attack
decay ***[2 marks max]***

**process**
*Award marks as follows.*
sound wave applied to give note ***[2 marks]***
this could be via frequency modulation synthesis – using two or more periodic signals ***[2 marks]***
or by wavetable synthesis – via a lookup table of sampled sounds ***[2 marks]*** ***[4 marks max]***

***[6 marks max]***

(e) *Accept any format if the reason is justified. Award **[1 mark]** for a sensible format, **[3 marks]** for a justification.*

For example:

Probably format 0;
- smallest format of file;
- best for transmission;
- despite lack of quality due to size reduction;
- there should be a compensation in the lack of time lag; ***[3 marks max]***

***[4 marks max]***

(f) *Award **[1 mark]** for each comparison and **[1 mark]** for an elaboration, up to **[2 marks max]**, no more than 3 comparison.*

events not samples are stored;
musician's individual actions are recorded;
instruments/notes can be removed;
this is not possible with digital audio;

less storage required;
since audio recording has to sample "everything";
*e.g.* including pauses;
whereas MIDI does not record if nothing is being played;
MIDI takes 10Kbytes as compared to 10Mbytes for digital audio;

MIDI cannot handle singing;
which is possible with digital audio since it stores/samples "everything"; ***[6 marks max]***

(g) (i) *Award **[1 mark]** for each of the following.*

proximity sensors are used to pick up movement and position;
speed of these two analogue measurements converted to pitch and volume;
by MIDI devices;
edited to fit within the norm of music data and output; ***[2 marks max]***

(ii) *Award **[2 marks]** for any reasonable point elaborated and **[1 mark]** for a point stated but not elaborated. There are many possibilities.*

For example:

The music could be very different to what we are used to and hence not have much success ***[2 marks]***.
Could be excitingly different and very successful ***[2 marks]***.
Could revolutionise live performances which would be exactly synchronised and movement could become an integral part of movement ***[2 marks]***. ***[2 marks max]***